DCS800

Firmware manual
DCS800 Drives (20 to 5200 A)

Safety instructions

What this chapter contains

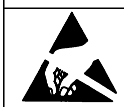
This chapter contains the safety instructions which you must follow when installing, operating and servicing the drive. If ignored, physical injury or death may follow, or damage may occur to the drive, the motor or driven equipment. Read the safety instructions before you work on the unit.

To which products this chapter applies

This chapter applies to the DCS800... Size D1 to D7 and field exciter units DCF80x.

Use of warnings and notes

There are two types of safety instructions throughout this manual: warnings and notes. Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment. They also tell you how to avoid the danger. Notes draw attention to a particular condition or fact, or give information on a subject. The warning symbols are used as follows:

	Dangerous voltage warning warns of high voltage which can cause physical injury and/or damage to the equipment.
	General warning warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.
	Electrostatic discharge warning warns of electrostatic discharge which can damage the equipment.

Installation and maintenance work

These warnings are intended for all who work on the drive, motor cable or motor. Ignoring the instructions can cause physical injury or death.

Only qualified electricians are allowed to install and maintain the drive.

- Never work on the drive, motor cable or motor when main power is applied.
  Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that:
  1. Voltage between drive input phases U1, V1 and W1 and the frame is close to 0 V.
  2. Voltage between terminals C+ and D- and the frame is close to 0 V.
- Do not work on the control cables when power is applied to the drive or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the drive even when the main power on the drive is switched off.
- Do not make any insulation or voltage withstand tests on the drive or drive modules.
- When reconnecting the motor cable, always check that the C+ and D- cables are connected with the proper terminal.

Note:

- The motor cable terminals on the drive are at a dangerously high voltage when the input power is on, regardless of whether the motor is running or not.
- Depending on the external wiring, dangerous voltages (115 V, 220 V or 230 V) may be present on the terminals of relay outputs SDCS-IOB-2 and RDIO.
- DCS800 with enclosure extension: Before working on the drive, isolate the whole drive from the supply.

WARNING! The printed circuit boards contain components sensitive to electrostatic discharge. Wear a grounding wrist band when handling the boards. Do not touch the boards unnecessarily.

Grounding

These instructions are intended for all who are responsible for the grounding of the drive. Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic interference

- Ground the drive, motor and adjoining equipment to ensure personnel safety in all circumstances, and to reduce electromagnetic emission and pick-up.
- Make sure that grounding conductors are adequately sized as required by safety regulations.
- In a multiple-drive installation, connect each drive separately to protective earth (PE).
- Minimize EMC emission and make a 360° high frequency grounding of screened cable entries at the cabinet lead-through.
- Do not install a drive with EMC filter on an ungrounded power system or a high resistance-grounded (over 30 ohms) power system.

Note:

- Power cable shields are suitable for equipment grounding conductors only when adequately sized to meet safety regulations.
- As the normal leakage current of the drive is higher than 3.5 mA AC or 10 mA DC (stated by EN 50178, 5.2.11.1), a fixed protective earth connection is required.

Fiber optic cables

WARNING! Handle the fiber optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibers with bare hands as the fiber is extremely sensitive to dirt. The minimum allowed bend radius is 35 mm (1.4 in.).

Mechanical installation

These notes are intended for all who install the drive. Handle the unit carefully to avoid damage and injury.

- DCS800 sizes D4...D7: The drive is heavy. Do not lift it alone. Do not lift the unit by the front cover. Place units D4 and D5 only on its back.

  DCS800 sizes D5...D7: The drive is heavy. Lift the drive by the lifting lugs only. Do not tilt the unit. The unit will overturn from a tilt of about 6 degrees.
- Make sure that dust from drilling does not enter the drive when installing. Electrically conductive dust inside the unit may cause damage or lead to malfunction.
- Ensure sufficient cooling.
- Do not fasten the drive by riveting or welding.

Operation

These warnings are intended for all who plan the operation of the drive or operate the drive. Ignoring the instructions can cause physical injury or death or damage the equipment.

- Before adjusting the drive and putting it into service, make sure that the motor and all driven equipment are suitable for operation throughout the speed range provided by the drive. The drive can be adjusted to operate the motor at speeds above and below the base speed.
- Do not activate automatic fault reset functions of the Standard Application Program if dangerous situations can occur. When activated, these functions will reset the drive and resume operation after a fault.
- Do not control the motor with the disconnecting device (disconnecting means); instead, use the control panel keys and , or commands via the I/O board of the drive.

- Mains connection
  You can use a disconnect switch (with fuses) in the power supply of the thyristor power converter to disconnect the electrical components of the unit from the power supply for installation and maintenance work. The type of disconnect used must be a disconnect switch as per EN 60947-3, Class B, so as to comply with EU regulations, or a circuit-breaker type which switches off the load circuit by means of an auxiliary contact causing the breaker's main contacts to open. The mains disconnect must be locked in its "OPEN" position during any installation and maintenance work.
- EMERGENCY STOP buttons must be installed at each control desk and at all other control panels requiring an emergency stop function. Pressing the STOP button on the control panel of the thyristor power converter will neither cause an emergency motor stop, nor will the drive be disconnected from any dangerous potential.
  To avoid unintentional operating states, or to shut the unit down in case of any imminent danger according to the standards in the safety instructions it is not sufficient to merely shut down the drive via signals "RUN", "drive OFF" or "Emergency Stop" respectively "control panel" or "PC tool".
- Intended use
  The operating instructions cannot take into consideration every possible case of configuration, operation or maintenance. Thus, they mainly give such advice only, which is required by qualified personnel for normal operation of the machines and devices in industrial installations.

  If in special cases the electrical machines and devices are intended for use in non-industrial installations - which may require stricter safety regulations (e.g. protection against contact by children or similar) -, these additional safety measures for the installation must be provided by the customer during assembly.

Note:

- When the control location is not set to Local (L not shown in the status row of the display), the stop key on the control panel will not stop the drive. To stop the drive using the control panel, press the LOC/REM key and then the stop key .

Table of contents

I/O configuration

Chapter overview

The chapter describes the I/O configuration of digital and analog inputs and outputs with different hardware possibilities.

Digital inputs (DI's)

The basic I/O board is the SDCS-CON-4 with 8 standard DI's. All 8 standard DI's can be replaced with SDCS-IOB-2 and extended by means of one or two RDIO-01 digital I/O extension modules. Thus the maximum number of DI's is 14.

The hardware source is selected by:
- *DIO ExtModule1 (98.03)* for DI9 to DI11
- *DIO ExtModule2 (98.04)* for DI12 to DI14 and
- *IO BoardConfig (98.15)*

Note:
The maximum amount of digital I/O extension modules is two regardless if an AMIA-01 board is used.

SDCS-CON-4 / SDCS-IOB-2

The standard DI's are isolated and filtered. Selectable hardware filtering time (DI7 and DI8 on the SDCS-IOB-2):
- 2 ms or 10 ms (jumper S7 and S8)

Input voltages:
- 24 VDC to 48 VDC, 115 VAC or 230 VAC depending on the hardware
- for more details see *Hardware Manual*

Scan time for DI1 to DI6:
- 5 ms

Scan time for DI7 and DI8:
- 3.3 ms / 2.77 ms (synchronized with mains frequency)

1st and 2nd RDIO-01

The extension DI's are isolated and filtered. Selectable hardware filtering time:
- 2 ms or 5 ms to 10 ms

Input voltages:
- 24 VDC to 250 VDC, 110 VAC to 230 VAC
- for more details see *RDIO-01 User's Manual*

Update time for DI9 to DI14:
- 5 ms connected at SDCS-CON-4
- 14 ms connected via SDCS-COM-8

Attention:
To ensure proper connection and communication of the RDIO-01 boards with the SDCS-CON-4 use the screws included in the scope of delivery.

Configuration

All DI's can be read from *DI StatWord (8.05)*:

bit	DI	configurable	default setting
0	1	yes	*ConvFanAck (10.20)*
1	2	yes	*MotFanAck (10.06)*
2	3	yes	*MainContAck (10.21)*
3	4	yes	*Off2 (10.08)*
4	5	yes	*E Stop (10.09)*
5	6	yes	*Reset (10.03)*
6	7	yes	*OnOff1 (10.15)*
7	8	yes	*StartStop (10.16)*
8	9	yes	-
9	10	yes	-
10	11	yes	-
11	12	no	not selectable
12	13	no	not selectable
13	14	no	not selectable

Configurable = yes:
The DI's can be connected with several converter functions and it is possible to invert the DI's - *DI1Invert (10.25)* to *DI11Invert (10.35)*. In addition the DI's can be used by Adaptive Program, application program or overriding control.

Configurable = no:
The DI's can only be used by Adaptive Program, application program or overriding control.

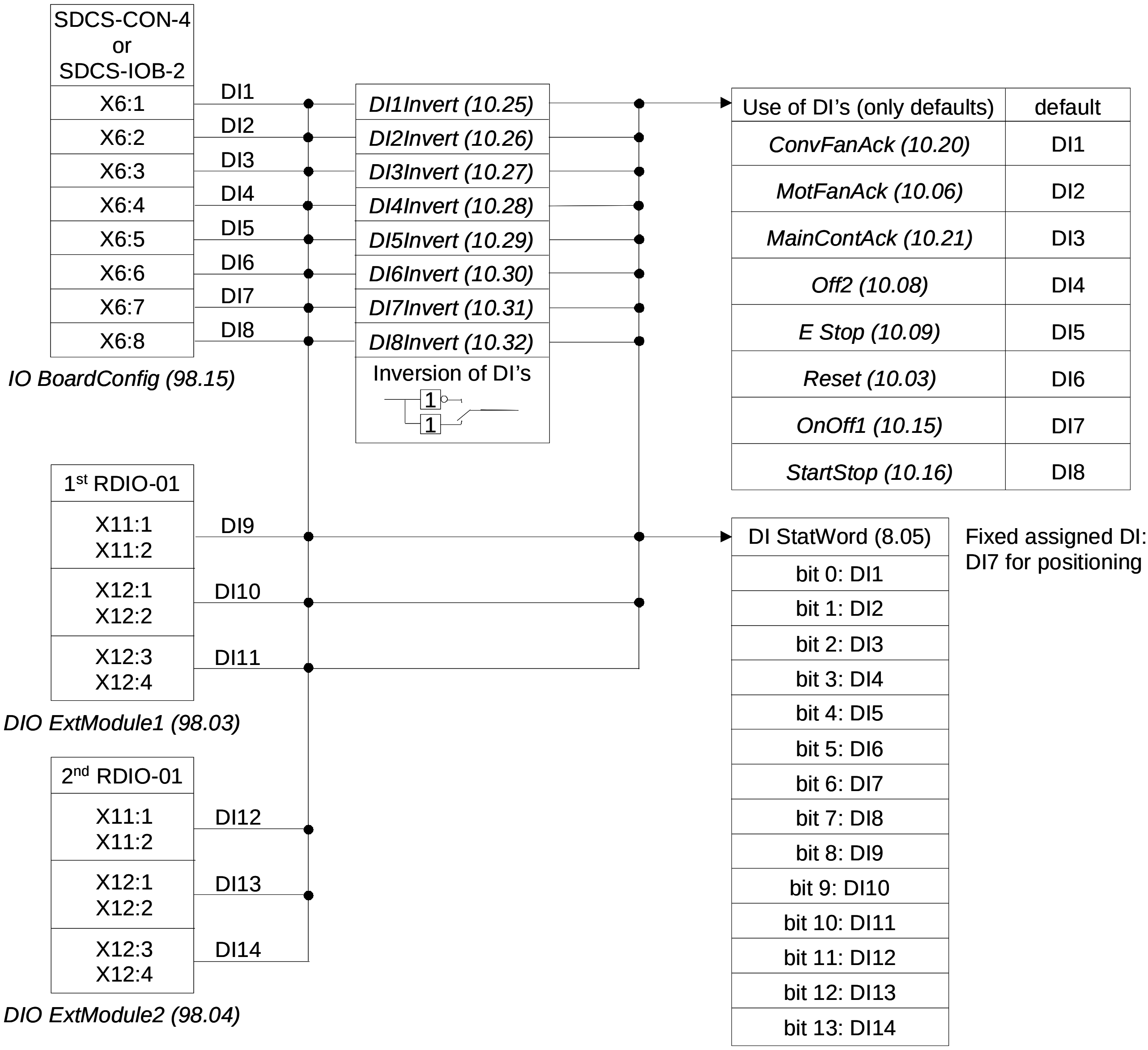
Configurable DI's are defined by means of following parameters:

- *Direction (10.02)*
- *Reset (10.03)*
- *SyncCommand (10.04)*
- *MotFanAck (10.06)*
- *Hand/Auto (10.07)*
- *Off2 (10.08)*
- *E Stop (10.09)*
- *ParChange (10.10)*
- *OvrVoltProt (10.13)*
- *OnOff1 (10.15)*
- *StartStop (10.16)*
- *Jog1 (10.17)*
- *Jog2 (10.18)*
- *ConvFanAck (10.20)*
- *MainContAck (10.21)*
- *DynBrakeAck (10.22)*
- *DC BreakAck (10.23)*
- *Ref1Mux (11.02)*
- *Ref2Mux (11.12)*
- *MotPotUp (11.13)*
- *MotPotDown (11.14)*
- *MotPotMin (11.15)*
- *Ramp2Select (22.11)*
- *Par2Select (24.29)*
- *TorqMux (26.05)*
- *ResCurDetectSel (30.05)*
- *ExtFaultSel (30.31)*
- *ExtAlarmSel (30.32)*
- *M1KlixonSel (31.08)*
- *M1BrakeAckSel (42.02)*
- *FldBoostSel (44.17)*
- *M2KlixonSel (49.38)*
- *ZeroCurDetect (97.18)*
- *ResetAhCounter (97.21)*

Following restrictions apply:

- The position counter synchronization is fixed assigned to input DI7, if activated via *SyncCommand (10.04)*

– DI12 to DI14 are only available in the *DI StatWord (8.05)*, thus they can only be used by Adaptive Program, application program or overriding control



Structure of DI's

Digital outputs (DO's)

The basic I/O board is the SDCS-CON-4 with 7 standard DO's. Standard DO8 is located on the SDCS-PIN-4. All 8 standard DO's can be replaced with SDCS-IOB-2 and extended by means of one or two RDIO-01 digital I/O extension modules. Thus the maximum number of DO's is 12.

The hardware source is selected by:

- *DIO ExtModule1 (98.03)* for DO9 and DO10
- *DIO ExtModule2 (98.04)* for DO11 and DO12
- *IO BoardConfig (98.15)*

Note:
The maximum amount of digital I/O extension modules is two regardless if an AMIA-01 board is used.

SDCS-CON-4 / SDCS-IOB-2

On the SDCS-CON-4 the standard DO's are relay drivers. DO8 is located on the SDCS-PIN-4 and a isolated by means of a relay. If the SDCS-IOB-2 is being used DO6 and DO7 are isolated by means of optocouplers, while the others (DO1 to DO5 and DO8) are isolated by means of relays.

Output values SDCS-CON-4:

- DO6 to DO7 max. 50 mA / 22 VDC at no load
- for more details see *Hardware Manual*

Output values SDCS-PIN-4:

- DO8 max. 3 A / 24 VDC, max. 0.3 A / 115 VDC / 230 VDC or max. 3 A / 230 VAC
- for more details see *Hardware Manual*

Output values SCDS-IOB-2:

- DO6 and DO7: max. 50 mA / 24 VDC
- all others: max. 3 A / 24 VDC, max. 0.3 A / 115 VDC / 230 VDC or max. 3 A / 250 VAC
- for more details see *Hardware Manual*

Update time for DO1 to DO8:

- 3.3 ms / 2.77 ms (synchronized with mains frequency)

1st and 2nd RDIO-01

The extension DO's are isolated by means of relays.

Output values:

- max. 5 A / 24 VDC, max. 0.4 A / 120 VDC or max. 1250 VA / 250 VAC
- for more details see *RDIO-01 User's Manual*

Update time for DO9 to DO12:

- 5 ms connected at SDCS-CON-4
- 14 ms connected via SDCS-COM-8

Attention:
To ensure proper connection and communication of the RDIO-01 boards with the SDCS-CON-4 use the screws included in the scope of delivery.

Configuration

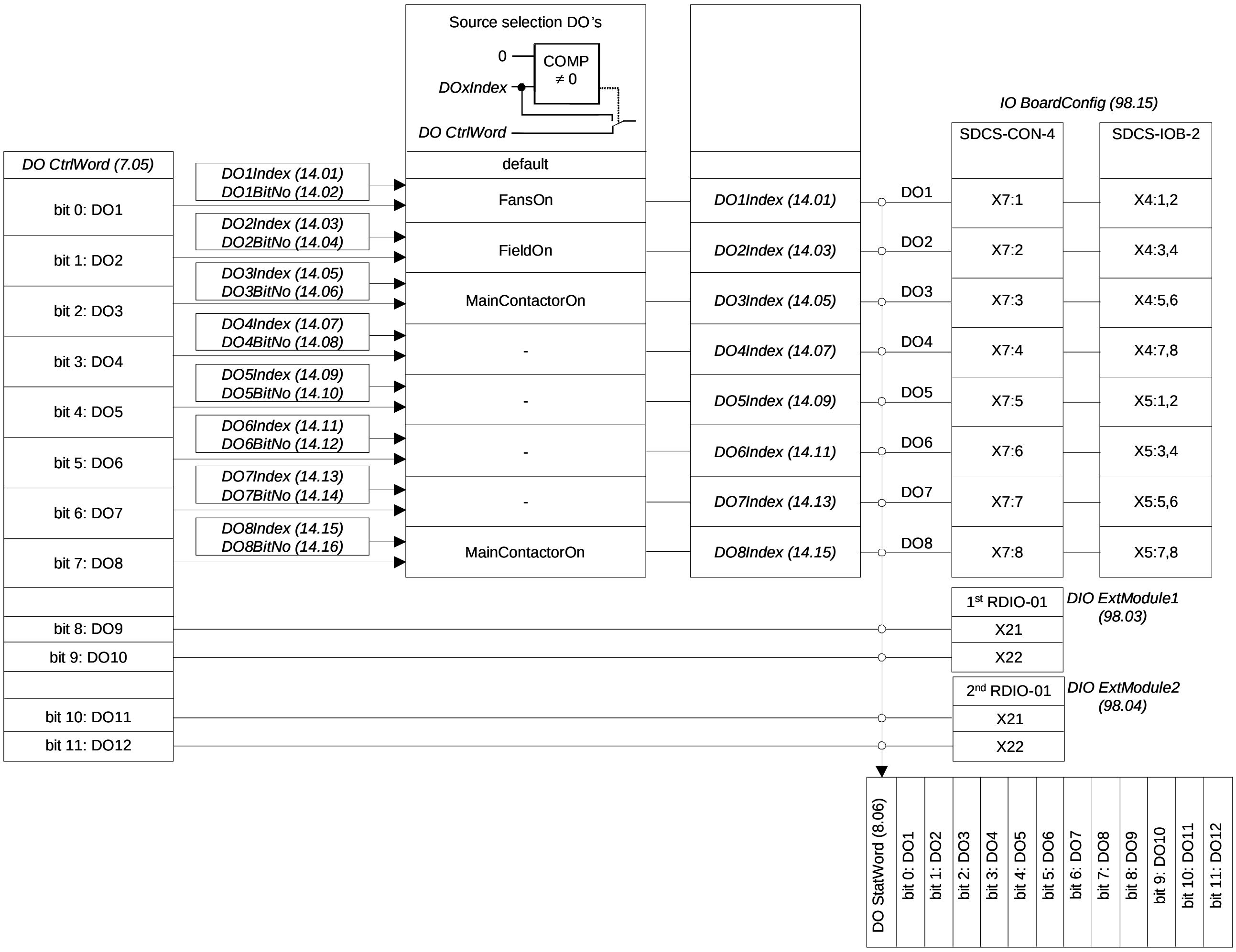
All DO's can be read from *DO StatWord (8.06)*:

bit	DI	configurable	default setting	
0	1	yes	**FansOn**; *CurCtrlStat1 (6.03)*	bit15
1	2	yes	**FieldOn**; *CurCtrlStat1 (6.03)*	bit5
2	3	yes	**MainContactorOn**; *CurCtrlStat1 (6.03)*	bit7
3	4	yes	-	
4	5	yes	-	
5	6	yes	-	
6	7	yes	-	
7	8	yes	**MainContactorOn**; *CurCtrlStat1 (6.03)*	bit7
8	9	yes	-	
9	10	no	not selectable	
10	11	no	not selectable	
11	12	no	not selectable	

Configurable = yes:
The DO's can be connected with any integer or signed integer of the DCS800 by means of group 14. It is possible to invert the DO's by simply negate *DO1Index (14.01)* to *DO8Index (14.15)*. In addition the DO's can be used by Adaptive Program, application program or overriding control if the corresponding *DOxIndex (14.xx)* is set to zero - see *DO CtrlWord (7.05)*.

Configurable = no:
The DO's can only be used by Adaptive Program, application program or overriding control - see *DO CtrlWord (7.05)*.

Note:
DO8 is only available as relay output on the SDCS-PIN-4, if no SDCS-IOB-2 is used.



Structure of DO's

Analog inputs (AI's)

The basic I/O board is the SDCS-CON-4 with 4 standard AI's. All 4 standard AI's can be replaced with SDCS-IOB-3 and extended by means of one or two RAIO-01 analog I/O extension modules. Thus the maximum number of AI's is 8.

The hardware source is selected by:

- *AIO ExtModule (98.06)* for AI5 and AI6
- *AIO MotTempMeas (98.12)* for AI7 and AI8
- *IO BoardConfig (98.15)*

Note:
The maximum amount of analog I/O extension modules is two regardless if an AMIA-01 board is used.

SDCS-CON-4

Hardware setting:

- switching from voltage input to current input by means of jumper S2 and S3
- for more details see *Hardware Manual*

Input range AI1 and AI2 set by parameter:

- ±10 V, 0 V to 10 V, 2 V to 10 V, 5 V offset, 6 V offset
- ±20 mA, 0 mA to 20 mA, 4 mA to 20 mA, 10 mA offset, 12 mA offset

Input range AI3 and AI4 set by parameter:

- ±10 V, 0 V to 10 V, 2 V to 10 V, 5 V offset, 6 V offset

Resolution:

- 15 bits + sign

Update time for AI1 and AI2:

- 3.3 ms / 2.77 ms (synchronized with mains frequency)

Update time for AI3 and AI4:

- 5 ms

Additional functions:

- motor temperature measurement for a PTC connected to AI2 - see *section Motor protection*

SDCS-IOB-3

Hardware setting:

- switching from voltage input to current input by means of jumper S1
- the hardware gain for AI2 and AI3 can be increased by 10 with jumpers S2 and S3, thus the input range changes e.g. from ±10 V to ±1 V
- for more details see *Hardware Manual*

Input range AI1 to AI4 set by parameter:

- ±10 V, 0 V to 10 V, 2 V to 10 V, 5 V offset, 6 V offset
- ±20 mA, 0 mA to 20 mA, 4 mA to 20 mA, 10 mA offset, 12 mA offset

Resolution:

- 15 bits + sign

Update time for AI1 and AI2:

- 3.3 ms / 2.77 ms (synchronized with mains frequency)

Update time for AI3 and AI4:

- 5 ms

Additional functions:

- motor temperature measurement for PT100 or PTC connected to AI2 and AI3 - see *section* Motor protection
- residual current detection monitor input via AI4 - see *section* Motor protection

1st RAIO-01

Hardware setting:

- input range and switching from voltage to current by means of a DIP switch,
- for more details see *RAIO-01 User's Manual*

Input range AI5 and AI6 set by parameter:

- ±10 V, 0 V to 10 V, 2 V to 10 V, 5 V offset, 6 V offset
- ±20 mA, 0 mA to 20 mA, 4 mA to 20 mA, 10 mA offset, 12 mA offset

Resolution:

- 11 bits + sign

Update time for AI5 and AI6:

- 10 ms connected at SDCS-CON-4
- 14 ms connected via SDCS-COM-8

Additional functions:

- all AI's are galvanically isolated

Attention:
To ensure proper connection and communication of the RAIO-01 board with the SDCS-CON-4 use the screws included in the scope of delivery.

2nd RAIO-01

Hardware setting:

- AI7 and AI8 are only used for motor temperature measurement, thus set 0 V to 2 V for 1 PT100 respectively 0 V to 10 V for 2 or 3 PT100 using the DIP switch
- for more details see *RAIO-01 User's Manual*

Resolution:

- 11 bits + sign

Update time for AI7 and AI8:

- 10 ms connected at SDCS-CON-4
- 14 ms connected via SDCS-COM-8

Additional functions:

- all AI's are galvanically isolated
- motor temperature measurement for PT100 connected to AI7 and AI8 - see *section* Motor protection,

Attention:
To ensure proper connection and communication of the RAIO-01 board with the SDCS-CON-4 use the screws included in the scope of delivery.

Configuration

The value of AI1 to AI6 and AITacho can be read from group 5.

AI	configurable	default setting

1	yes	-
2	yes	-
3	yes	-
4	yes	-
5	yes	-
6	yes	-
7	temperature	-
8	temperature	-

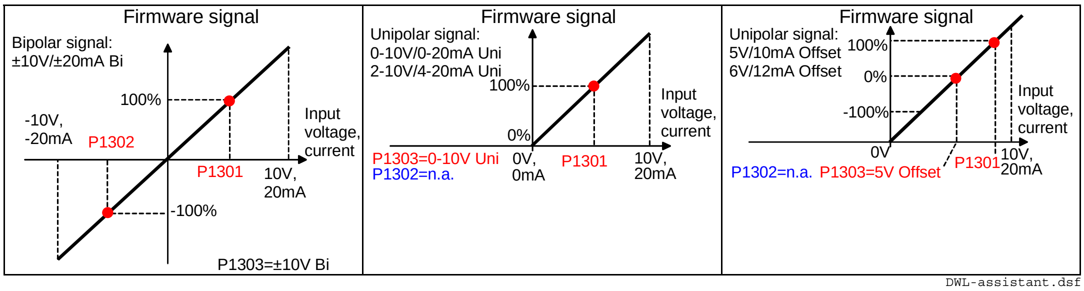
Configurable = yes:
The AI's can be connected with several converter functions and it is possible to scale them by means of group 13. In addition the AI's can be read by Adaptive Program, application program or overriding control.

Configurable = temperature:
The AI's can only be used by the motor temperature measurement - see *M1TempSel (31.05)* and *M2TempSel (49.35)*.

Configurable AI's are defined by means of following parameters:
Ref1Sel (11.03)
Ref2Sel (11.06)
TorqUsedMaxSel (20.18)
TorqUsedMinSel (20.19)
TorqRefA Sel (25.10)
TorqCorrect (26.15)
ResCurDetectSel (30.05)
M1TempSel (31.05)
StrtTorqRefSel (42.07)
CurSel (43.02)
M2TempSel (49.35)

Following restrictions apply:
- the residual current detection input is fixed assigned to AI4, if activated via *ResCurDetectSel (30.05)*
- the motor temperature measurement is fixed assigned to AI2 and AI3 respectively AI7 and AI8, if activated via *M1TempSel (31.05)* respectively *M2TempSel (49.35)*

Scaling

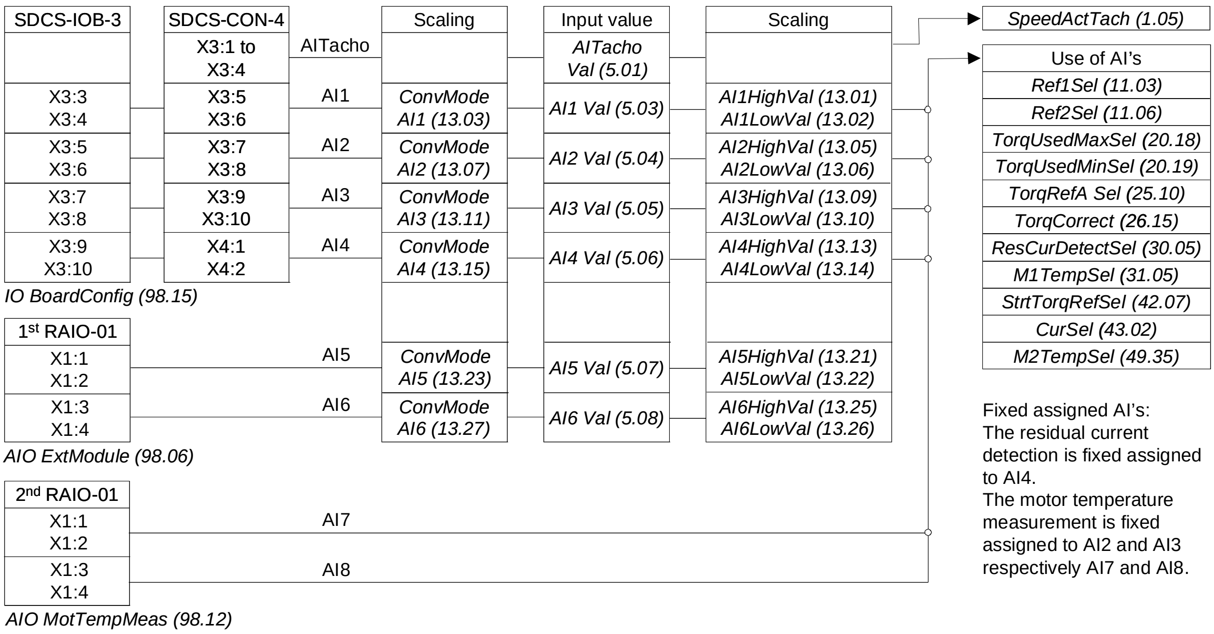


It is possible to scale AI1 to AI6 and AITacho with 3 parameters each:
- the range of each AI is set by means of a jumper - distinguishing between current and voltage - and *ConvModeAI1 (13.03)* to *ConvModeAI6 (13.27)*
- +100 % of the input signal connected to an AI is scaled by means of *AI1HighVal (13.01)* to *AI6HighVal (13.25)*
- -100 % of the input signal connected to an AI is scaled by means of

AI1LowVal (13.02) to *AI6LowVal (13.26)*

Example:

In case the min. / max. voltage (±10 V) of AI1 should equal ±250 % of *TorqRefExt (2.24)*, set:
TorqRefA Sel (25.10) = **AI1**
ConvModeAI1 (13.03) = **±10V Bi**
AI1HighVal (13.01) = 4000 mV
AI1LowVal (13.02) = -4000 mV



Structure of AI's

Analog outputs (AO's)

The basic I/O board is the SDCS-CON-4 with 3 standard AO's. Two AO's are programmable, the third one is fixed and used to display the actual armature current taken directly from the burden resistors. All 3 standard AO's can be replaced with SDCS-IOB-3 and extended by means of one or two RAIO-01 analog I/O extension modules. Thus the maximum number of AO's is 7.

The hardware source is selected by:
- *AIO ExtModule (98.06)* for AO3 and AO4
- *AIO MotTempMeas (98.12)* for AO5 and AO6
- *IO BoardConfig (98.15)*

Note:
The maximum amount of analog I/O extension modules is two regardless if an AMIA-01 board is used.

SDCS-CON-4 / SDCS-IOB-3

Output range AO1 and AO2 set by parameter:
- ±10 V, 0 V to 10 V, 2 V to 10 V, 5 V offset, 6 V offset

Output range fixed AOCurr:
- 4V equals 325 % of *M1NomCur (99.03)*
- for more details see *Hardware Manual*

Resolution:
- 11 bits + sign

Update time for AO1 and AO2:
- 5 ms

Update time fixed AOCurr:
- directly taken from hardware

Additional functions:
- the gain of the fixed AOCurr can be adjusted by means of R110 on the SDCS-IOB-3

1st RAIO-01

Output range AO3 and AO4 set by parameter:
- 0 mA to 20 mA, 4 mA to 20 mA, 10 mA offset, 12 mA offset

Resolution:
- 12 bits

Update time for AO3 and AO4:
- 5 ms connected at SDCS-CON-4
- 14 ms connected via SDCS-COM-8

Additional functions:
- all AO's are galvanically isolated

Attention:
To ensure proper connection and communication of the RAIO-01 board with the SDCS-CON-4 use the screws included in the scope of delivery.

2nd RAIO-01

Hardware settings:

- AO5 and AO6 are only used for motor temperature measurement, no additional setting needed
- for more details see *RAIO-01 User's Manual*

Resolution:
- 12 bits

Update time for AO5 and AO6:
- 5 ms connected at SDCS-CON-4
- 14 ms connected via SDCS-COM-8

Additional functions:
- all AO's are galvanically isolated
- motor temperature measurement for PT100 connected to AO5 and AO6 - see *section* *Motor protection*

Attention:
To ensure proper connection and communication of the RAIO-01 board with the SDCS-CON-4 use the screws included in the scope of delivery.

Configuration

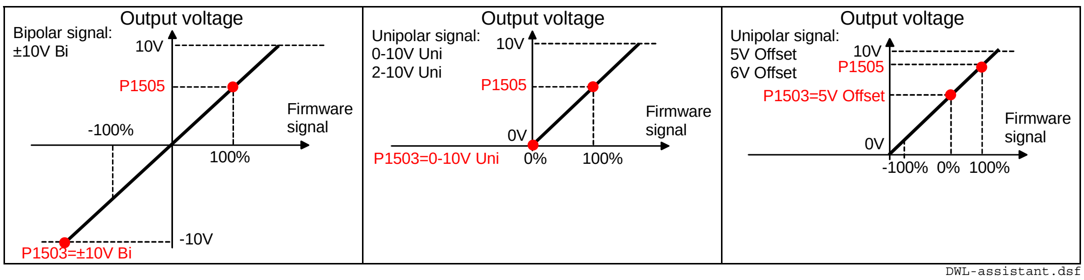
The value of AO1 and AO2 can be read from group 5.

AO	configurable	default setting
1	yes	-
2	yes	-
3	yes	-
4	yes	-
5	temperature	-
6	temperature	-
Curr	fixed	not selectable

Configurable = yes:
The AO's can be connected with any integer or signed integer of the DCS800 by means of group 15. It is possible to invert the AO's by simply negate *IndexAO1 (15.01)* to *IndexAO4 (15.16)*. In addition the AO's can be used by Adaptive Program, application program or overriding control if the corresponding *IndexAOx (15.xx)* is set to zero - see *CtrlWordAO1 (15.02)* to *CtrlWordAO4 (15.17)*.

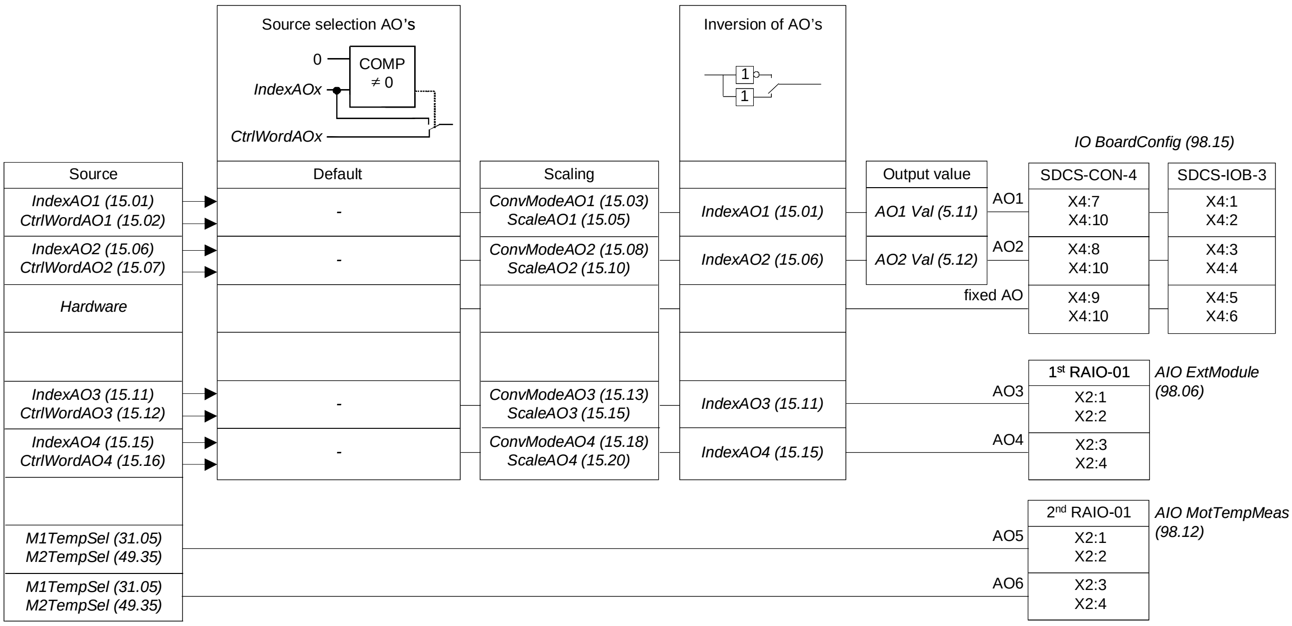
Configurable = temperature:
The AO's can only be used by the motor temperature measurement - see *M1TempSel (31.05)* and *M2TempSel (49.35)*.

Scaling



It is possible to scale AO1 to AO4 with 2 parameters each:

- the range of each AO is set by means of *ConvModeAO1 (15.03)* to *ConvModeAO4 (15.18)*
- if the range is set to bipolar or unipolar signals with offset, ±100 % of the input signal connected to an AO is scaled by means of *ScaleAO1 (15.06)* to *ScaleAO4 (15.20)*
- If the range is set to unipolar signals without offset, only +100 % of the input signal connected to an AO is scaled by means of *ScaleAO1 (15.06)* to *ScaleAO4 (15.20).* The smallest value is always zero
- It is possible to invert the AO's by simply negate *IndexAO1 (15.01)* to *IndexAO4 (15.16)*
  Example:
  In case the min. / max. voltage (±10 V) of AO1 should equal ±250 % of *TorqRefUsed (2.13)*, set:
  IndexAO1 (15.01) = 213
  ConvModeAO1 (15.03) = ±**10V Bi**
  ScaleAO1 (15.05) = 4000 mV



Structure of AO's

Adaptive Program

Chapter overview

The chapter describes the basics of the Adaptive Program and instructs in building a program.

Compatibility

The guide complies with the drive application programs in which the Adaptive Programming features are included.

Safety instructions

Follow all safety instructions delivered with the drive.

- Read the **complete safety instructions** before you install, commission or use the drive. The complete safety instructions are given at the beginning of the Hardware Manual or QuickGuide.
- Read the **software function specific warnings and notes** before changing the default settings of the function. For each function, the warnings and notes are given in the Firmware Manual in the subsection describing the related user-adjustable parameters.

Reader

The reader of the manual is expected to:

- know the standard electrical wiring practices, electronic components and electrical schematic symbols.
- have experience or training in installing, operating or servicing of ABB drives.

Use

The guide is to be used together with DCS800 firmware manual of the drive application program. The firmware manual contains the basic information on the drive parameters including the parameters of the Adaptive Program. The guide gives more detailed information on the Adaptive Program:

- what the Adaptive Program is
- how to build a program
- how the function blocks operate
- how to document the program

Related publications

The user documentation of the drive also includes:

- Firmware manual (3ADW 000 193)
- Hardware manual (3ADW 000 194)
- Guides/supplements for the optional equipment and programs (appropriate manuals are included in the delivery).

What is the Adaptive Program

Conventionally, the user can control the operation of the drive by parameters. Each parameter has a fixed set of choices or a setting range. The parameters make the programming easy, but the choices are limited: you cannot customize the operation any further. The Adaptive Program makes customizing possible without the need of a special programming tool or language, even though the PC programming tool "Drive AP program" makes it easier.

- The program is built of function blocks.
- The control panel is the programming tool.
- The user can document the program by drawing it on block diagram template sheets.

The maximum size of the Adaptive Program is 16 function blocks. The program may consist of several separate functions.

Features

The adaptive programming of DCS800 provides the following features:

- 16 function blocks
- more than 20 block types
- password protection
- 4 different time levels selectable
- check against unconnected blocks
- shift functions
- debug functions
  - output forcing
  - breakpoint
  - single step
  - single cycle
- 10 constant value parameters
- additional output write pointer parameter for each block

How to build the program

The programmer connects a function block to other blocks through a Block Parameter Set. The sets are also used for reading values from the drive application program and transferring data to the drive application program. Each Block Parameter Set consists of six parameters in group 84 and a write pointer in group 86.

The figure below shows the use of Block Parameter Set 1 in the DCS800 firmware (parameters 84.04 to 84.09 and 86.01):

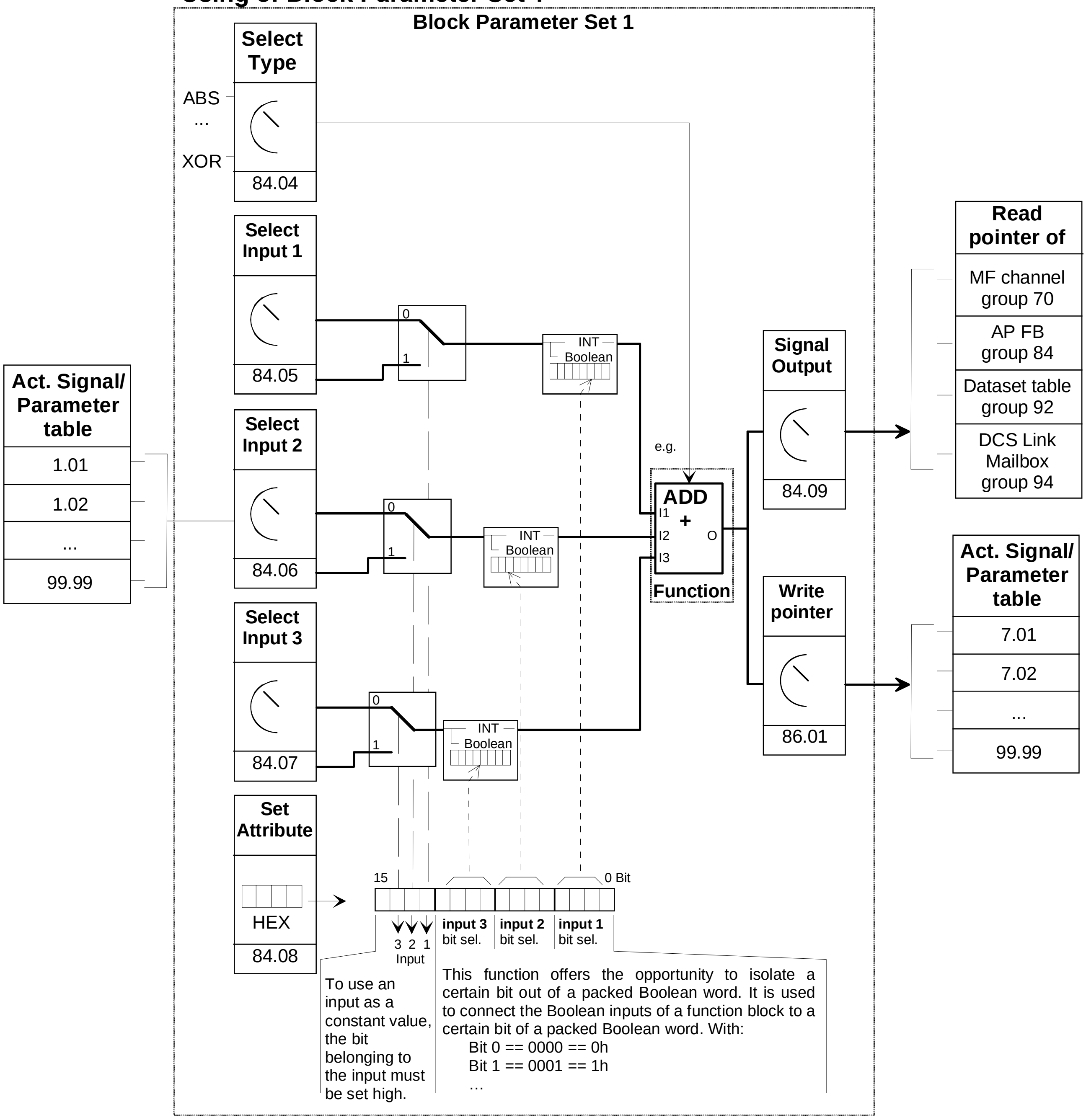
- Parameter 84.04 selects the function block type.
- Parameter 84.05 selects the source that input IN1 of the function block is connected to. A negative value means that the signal will be inverted.
- Parameter 84.06 selects the source that input IN2 of the function block is connected to. A negative value means that the signal will be inverted.
- Parameter 84.07 selects the source that input IN3 of the function block is connected to. A negative value means that the signal will be inverted.
- Parameter 84.08 defines the attributes of inputs.
- Parameter 84.09 contains the signal of this function block, which can be used further for other input selections. The user cannot edit this parameter value.
- The signal output is also available with the write pointer 86.01. Parameter 86.01 gets the destination parameter, which should get the signal.

How to connect the program to the drive application

The output of the Adaptive Program needs to be connected to the drive application program. For that purpose there are two possibilities:

- The signal, e.g. 84.09, can be selected for further functions.
- The signal output is available with the write pointer, e.g. 86.01. This parameter is to be set with the destination parameter, which needs the signal output of this function block.

Using of Block Parameter Set 1



Example

Add to speed reference a constant value and an external additional reference value:

1. Set 84.04=2 (selection of ADD function)
2. Set 84.05=xx.xx (selection of speed reference for Input 1)
3. Set 84.06=xx.xx (selection of external ref (AIx) for Input 2)
4. Set 84.07=1500 (constant value for Input 3)
5. Set 84.08=4000h (because Input 3 = constant -> Bit 14=1 --> 4000h)
6. 84.09=xxxx (contains the computed value; can be read from system's parts e.g. Master Follower channel, other Block Parameter Set Inputs)
7. Set 86.01=xx.xx (write computed value to destination for further processing)

How to control the execution of the program

The Adaptive Program executes the function blocks in numerical order, all blocks on the same time level. This cannot be changed by the user. The user can:

- select the operation mode of the program (stop, start, editing, single cycling, single stepping)
- adjust the execution time level of the program
- delete or add blocks.

Function blocks

Chapter overview

The chapter describes the function blocks.

General rules

The use of block input 1 (BlockxIn1) is compulsory (it must not be left unconnected). Use of input 2 (BlockxIn2) and input 3 (BlockxIn3) is voluntary for the most blocks. As a rule of thumb, an unconnected input does not affect the output of the block.
The Attribute Input (BlockxAttrib) is to set with the attributes, like declaration of constant and bits, of all three inputs.

Block inputs

The blocks use two input formats:

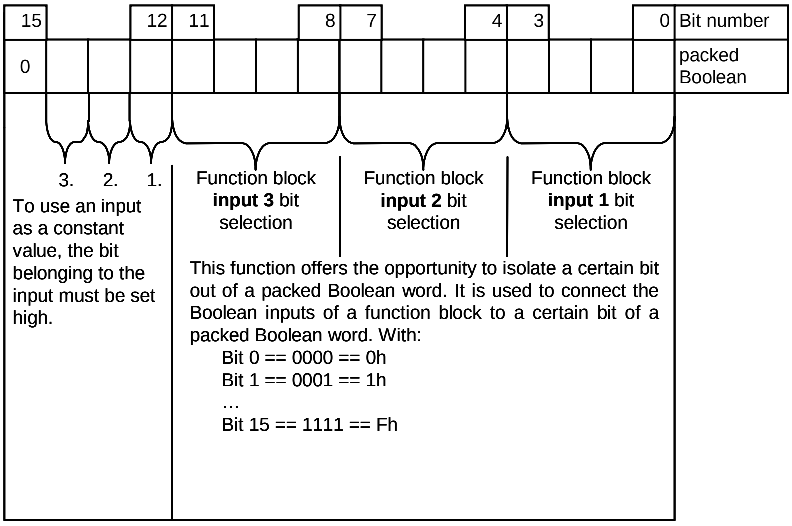
- integer
- boolean

The used format varies depending on the block. For example, the ADD block uses integer inputs and the OR block boolean inputs.

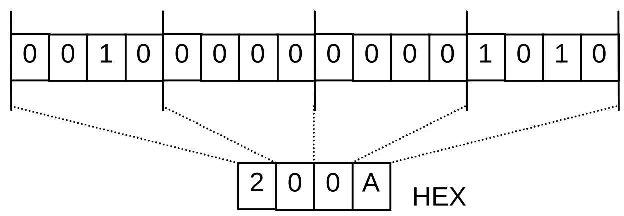
Note: The inputs of the block are read when the execution of the block starts, not simultaneously for all blocks!

Block input attributes

Block inputs gets the parameter of signal source or the value of a constant. Depending on the used block function and depending on the desired function the attributes of all three inputs are to be set as integer, constant or as selection of a bit of a 16-bit word source.
Therefore it is used a 16-bit word, which is defined as following:



Example:



Example of attribute parameter, with
BlockxIn1 as boolean, bit 10
BlockxIn2 as constant
BlockxIn3 as integer

→ Bits converted into hex, the value 200A (H) is to be set into parameter BlockxAttrib.

Parameter value as an integer input

How the block handles the input

The block reads the selected value in as an integer.

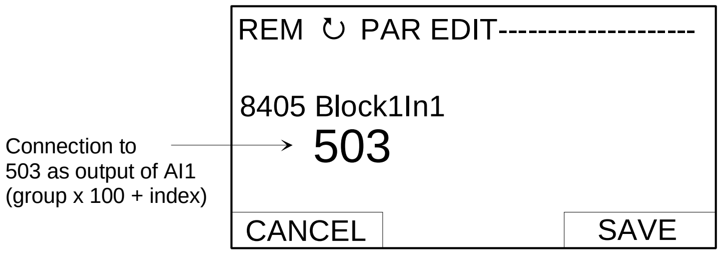
Note: The parameter selected as an input should be an integer value. The internal scaling for each parameter is given in the Firmware Manual.

How to select the input

- Scroll to the input selection parameter of the block and switch to edit mode (Enter).
- Set the address, from which the input value is to be read, with group x 100 + index (e.g. parameter 22.01 = 2201). A negative address (e.g. –2201) will act an inversion of the connected value.

The figure below shows the panel display when the input BlockxIn1 (with e.g. x = 1 for 1. block) selection parameter is in edit mode. The value is inverted if there is a minus (-) sign in the inversion field. The bit selection field is not effective for an integer or string type input.

Display of panel



Example: Analog input AI1, which is supplied with a voltage source of 5.8 V, in a drive equipped with the DCS800 firmware. How is the signal connected to the MAX block as function block 1 in the Adaptive Program? What is the value at the block input?

AI1 is connected to the block as follows:

- Scroll to the input Block1In1 selection parameter 84.05 and shift to edit mode (Enter).
- Set the address of 503, because group 5 and index 3 contains the input value of AI1 (05.03 = 05x100+3 = 503).
  The value at the input of the block is 5800, since the integer scaling of actual signal 5.03 is: 0.001 V = 1 (with default setting of AI1, given in the Firmware Manual).

Constant as an integer input

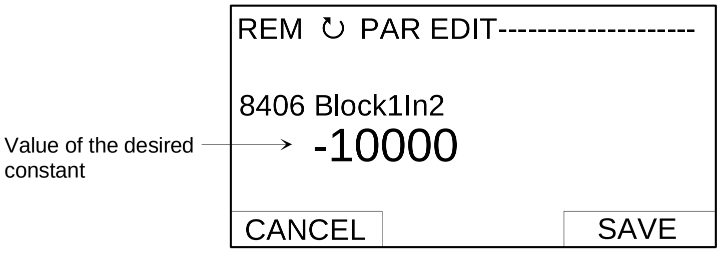
How to set and connect the input

Option 1

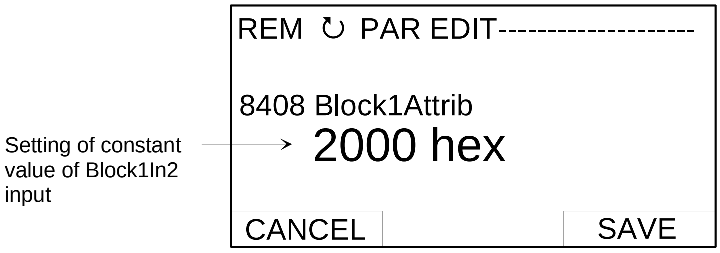
- Scroll to the input selection parameter of the block and switch to edit mode (Enter).
- Give the constant value to this input parameter (double arrow and arrow keys).
- Accept by Enter.
- Scroll to attribute parameter (BlockxAttrib)
- Set the bit for constant attribute of this input in BlockxAttrib parameter.
- Accept by Enter.

The figure below shows the panel display when the input BlockxIn1 selection parameter is in edit mode and the constant field is visible. The constant may have a value from -32768 to 32767. The constant cannot be changed while the Adaptive Program is running.

Display of panel



Display of panel



Option 2

- Set the constant to one of the parameters 85.01 to 85.10 reserved for the constants.
- Connect the constant value to a block as usual by the input selection parameter.

The constants can be changed while the Adaptive Program is running. They may have values from –32767 to 32767.

Note: A constant like option 1 can only be changed in Edit mode. If the constant may be modified during running, a constant parameter like option 2 is more expediently

---

Parameter value as a boolean input

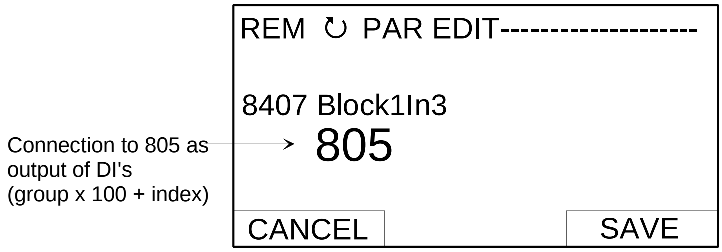
How the block handles the input

- The block reads the selected value as an integer.
- The block uses the bit defined by the bit field as the boolean input.

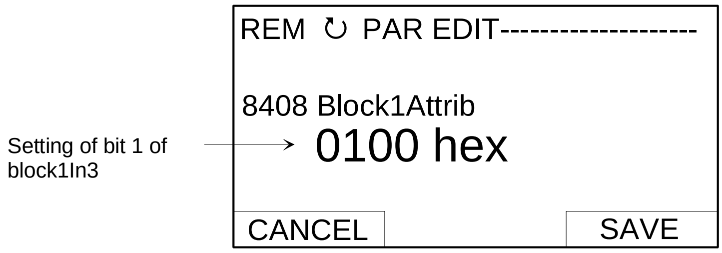
Bit value 1 is boolean value true and 0 is boolean value false

Example: The figure below shows the value of input BlockxIn1 selection parameter when the input is connected to a bit indicating the status of digital input DI2.
In DCS800 firmware, the digital input states are internally stored as actual signal 8.05 DI StatWord. Bit 1 corresponds to DI2, bit 0 to DI1.

Display of panel



Display of panel



How to select the input

See the section Parameter value as an integer input above.

Note: The parameter selected as an input should have a packed boolean value (binary data word). See the Firmware Manual.

Constant as a boolean input

How to set a*nd connect the input*

- Scroll to the input selection parameter of the block and switch to edit mode (Enter).
- Give the constant. If boolean value true is needed, set the constant to -1. If boolean value false is needed, set to 0.
- Accept by Enter.
- Scroll to attribute parameter (BlockxAttrib)
- Set the bit for constant attribute of this input in BlockxAttrib parameter.
- Accept by Enter.

String input

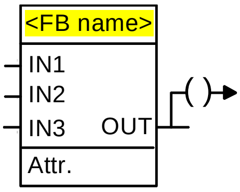
How to select the input

String input is not needed yet. With the EVENT block the text out of the fault, alarm or notice lists will be selected; *see chapter "Status"*.
For changing this text another tool is necessary.

Function blocks details

General

Each of the 16 function blocks has one up to max. three input parameters (group 84), which contains either an output address or a value of constant.
One further parameter is used for the attributes of these inputs. This attribute parameter is to be edited manually, if functions blocks are edited by using panel or by using parameter browser of DriveWindow (light).
By using Adaptive Programming PC tool this attribute parameter will be set automatically.
The output OUT, group 84, can be used for further inputs of function blocks. For writing the output value into standard parameters the output pointer, marked with -( )→, is to be set to the desired standard parameter. Output pointers can be found in group 86.

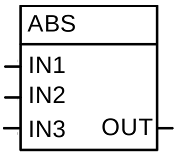


ABS

Type

Arithmetic function

Illustration



Operation

The output is the absolute value of input IN1 multiplied by IN2 and divided by IN3.
OUT = |IN1| * IN2 / IN3

Connections

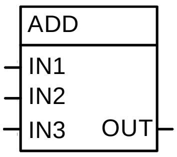
Input IN1, IN2 and IN3 : 16 bit integer values (15 bits + sign)
Output (OUT) : 16 bit integer (15 bits + sign)

ADD

Type

Arithmetic function

Illustration



Operation

The output is the sum of the inputs.

OUT = IN1 + IN2 + IN3

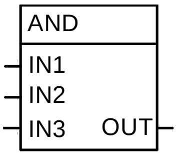
Connections

Input IN1, IN2 and IN3 : 16 bit integer values (15 bits + sign)
Output (OUT) : 16 bit integer (15 bits + sign)

AND

Type Logical function

Illustration



Operation The output is true if all connected inputs are true. Otherwise the output is false. Truth table:

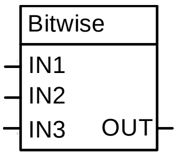
IN1	**IN2**	**IN3**	**OUT** (binary)	**OUT** (value on display)
0	0	0	False (All bits 0)	0
0	0	1	False (All bits 0)	0
0	1	0	False (All bits 0)	0
0	1	1	False (All bits 0)	0
1	0	0	False (All bits 0)	0
1	0	1	False (All bits 0)	0
1	1	0	False (All bits 0)	0
1	1	1	True (All bits 1)	-1

Connections
Input IN1, IN2 and IN3 : boolean values
Output (OUT) : 16 bit integer value (packed boolean)

Bitwise

Type Logical function

Illustration



Operation The block compares bits of three 16 bit word inputs and forms the output bits as follows:

OUT = (IN1 OR IN2) AND IN3.

Example, operation shown with only one bit:

IN1	**IN2**	**IN3**	**OUT**
0	0	0	0
0	1	0	0
1	0	0	0
1	1	0	0
0	0	1	0
0	1	1	1
1	0	1	1
1	1	1	1

Example, operation shown with whole word:

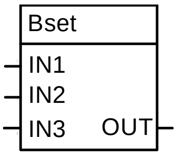
Input [word]		bits																	Output [word]
		15															0		
20518	=> IN1	0	**1**	0	**1**	0	0	0	0	0	0	**1**	0	0	**1**	**1**	0		
4896	=> IN2	0	0	0	**1**	0	0	**1**	**1**	0	0	0	0	0	0	0	0		
17972	=> IN3	0	**1**	0	0	0	**1**	**1**	0	0	0	**1**	**1**	0	**1**	0	0		
		0	**1**	0	0	0	0	**1**	0	0	0	**1**	0	0	**1**	0	0	=> OUT	16932

Connections
Input IN1, IN2 and IN3 : 16 bit integer values (packed boolean)
Output (OUT) : 16 bit integer values (packed boolean)

Bset

Type Logical function

Illustration



Operation

Before the value of input IN1 will be set to the output (OUT), the bit number (IN2) of input word (IN1) will be set to the value of IN3.
Input IN1 is to be a packed word. The value of input IN2
IN3 should have the value 1 for true and 0 for false.

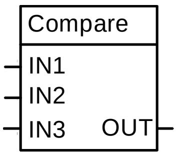
Connections

Input IN1	:	packed 16-bit word
Input IN2	:	16 bit integer value, used 0 … 15 as bit number.
Input IN3	:	boolean value
Output (OUT)	:	16 bit packed word

Compare

Type Logical function

Illustration



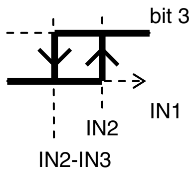
Operation

Output bits 0, 1 and 2:

- If IN1 > IN2, OUT =	001	Output bit 0 is true.
- If IN1 = IN2, OUT =	010	Output bit 1 is true.
- If IN1 < IN2, OUT =	100	Output bit 2 is true.

Output bit 3:

- If IN1 > IN2, OUT =	1ddd	Output bit 3 is true and remains true until IN1 < (IN2 - IN3), after which bit 3 is false.



Output integer value, which is shown on display, is the sum of the bits :

bit 0	**bit 1**	**bit 2**	**bit 3**	**OUT** (value on display)
0	0	0	0	0
1	0	0	0	1
0	1	0	0	2
0	0	1	0	4
0	0	0	1	8
1	0	0	1	9
0	1	0	1	10
0	0	1	1	12

Connections

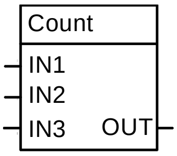
Input IN1, IN2 and IN3	:	16 bit integer values (15 bits + sign)
Output (OUT)	:	16 bit integer (packed boolean)

Count

Type

Arithmetic function

Illustration



Operation

The counter function counts rising edges of input IN1.
The counter is reset by the rising edges of input IN2 and limited to the value set with input IN3.

Input IN1 : Trigger (counter) input (0→1 edge)
Input IN2 : Reset input (0→1 edge).
Input IN3: : Max limit with value
- > 0: the output value increases up to max limit, which is the maximum.
- < 0: the output value increases up to the absolute value of max limit. With max limit the output will be set to 0 and starts countering with further trigger inputs.

Output (OUT) : The output shows the countered value.

Connections

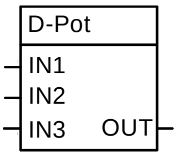
Input IN1, IN2 : Boolean values
Input IN3 : 16 bit integer value; 15 bit + sign
Output (OUT) : 15 bit integer value

D-Pot

Type

Arithmetic function

Illustration



Operation

With input 1 the output will increase, with input 2 the output will decrease.
The absolute value of input 3 is the ramp time in ms related to 20000 of output. With positive sign of input 3 the output range is between 0 and 20000, with negative sign of input 3 the output range is between –20000 and +20000.
If both inputs 1 and 2 are active, input 2 (ramp down) will take action.

Input IN1 : Ramp up (bool)
Input IN2 : Ramp down (bool)
Input IN3 : ramp time, (ms related to 20000)
Output : 15+1 bit value

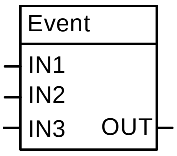
Connections

Input IN1 and IN2 : Boolean values
Input IN3 : 16 bit integer value; 15 bit + sign
Output (OUT) : 16 bit integer value; 15 bit + sign

Event

Type Viewing function

Illustration



Operation Input IN1 triggers the event. IN2 selects the number of fault, alarm, notice or trip texts. IN3 selects the type of the event (alarm, fault, notice or trip).

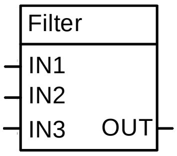
IN1	Activation input (boolean)		
	0->1	block activates the event	
	0	block deactivates the event	
IN2	Selection of displayed message. There exists 5 different messages, which are selected by using numbers depending on the type of event: The default message will be found in brackets.		
	Alarms	Faults and Trips	Notices
	301 (APAlarm1)	601 (APFault1)	801 ( )
	302 (APAlarm2)	602 (APFault2)	802 ( )
	303 (APAlarm3)	603 (APFault3)	803 ( )
	304 (APAlarm4)	604 (APFault4)	804 ( )
	305 (APAlarm5)	605 (APFault5)	805 ( )
IN3	Selection of type of event		
	0	Alarm ; shown as A30x	
	1	Fault ; shown as F60x. Faults have to be reset.	
	2	Notice, shown as N80x	
	3	Trip ; shown as fault F60x. A Trip will also open a connected DC breaker. Trips have to be reset.	

Connections
Input IN1 : 16 bit integer values (15 bits + sign)
Input IN2, IN3 : Selection of byte (compulsory)

Filter

Type Arithmetic function

Illustration



Operation The output is the filtered value of input IN1. Input IN2 is the filtering time.
$OUT = IN1 \cdot (1 - e^{-t/IN2})$
Note: The internal calculation uses 32 bits accuracy to avoid offset errors.

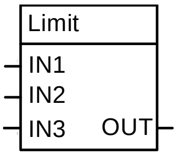
Connections
Input IN1 : 16 bit integer value (15 bits + sign)
Input IN2 : 16 bit integer value (15 bits + sign). One corresponds to 1 ms.
Output (OUT) : 16 bit integer (15 bits + sign)

Limit

Type

Logical function

Illustration



Operation

Value, connected to input IN1 will be limited with input IN2 as upper limit and with input IN3 as lower limit.
The output OUT makes the limited input value available.
The output stays with 0, if the lower limit (input IN3) is greater or equal than the upper limit (input IN2).

Connections

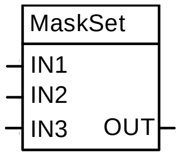
Input IN1, IN2 and IN3	:	16 bit integer value (15 bits + sign)
Output (OUT)	:	16 bit integer value (15 bits + sign)

MaskSet

Type

Logical function

Illustration



Operation

The block function sets or resets the bits defined in IN1 and IN2.

Input IN1: Word input
Input IN2: Set word input
Input IN3; Set/Reset IN2 in IN1.

Example, operation shown with only one bit:,

… with IN3 = Set

IN1	IN2	IN3	OUT
0	0	True	0
1	0	True	**1**
1	1	True	**1**
0	1	True	**1**

… with IN3 = Reset

IN1	IN2	IN3	OUT
0	0	False	0
1	0	False	**1**
1	1	False	0
0	1	False	0

Example, operation shown with whole word:

… with IN3 = true (=> Set)

Input [word]		bits 15															0		Output [word]
26214	=> IN1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0		
-13108	=> IN2	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0		
		1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0	=> OUT	-4370

… with IN3 = false (=> Reset)

Input [word]		bits 15															0		Output [word]
26214	=> IN1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0		
-13108	=> IN2	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0		
		0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	=> OUT	8738

Connections

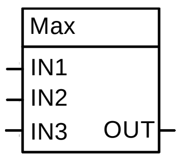
Input IN1 and IN2 : 16 bit integer value (packed boolean)
Input 3 : boolean
Output OUT : 16 bit integer value (packed boolean)

Max

Type

Arithmetic function

Illustration



Operation

The output is the highest input value.
OUT = MAX (IN1, IN2, IN3)

Note: Open input will be taken as value zero.

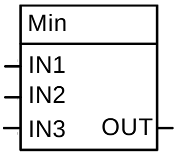
Connections

Input IN1, IN2 and IN3 : 16 bit integer values (15 bits + sign)
Output (OUT) : 16 bit integer (15 bits + sign)

Min

Type Arithmetic function

Illustration



Operation The output is the lowest input value.
OUT = MIN (IN1, IN2, IN3)

Note: Open input will be taken as value zero.

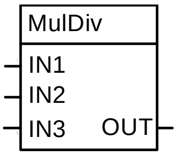
Connections

Input IN1, IN2 and IN3		16 bit integer values (15 bits + sign)
Output (OUT)	:	16 bit integer (15 bits + sign)

MulDiv

Type Arithmetic function

Illustration



Operation The output is the product of input IN1 and input IN2 divided by input IN3.
OUT = (IN1 · IN2) / IN3

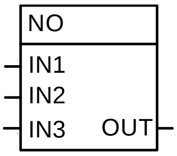
Connections

Input IN1, IN2 and IN3	:	16 bit integer values (15 bits + sign)
Output (OUT)	:	16 bit integer (15 bits + sign)

Not Used

Type -

Illustration



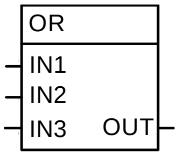
Operation Block is not enabled and not working (default setting).

Connections -

OR

Type Logical function

Illustration



Operation The output is true if any of the inputs is true. Truth table:

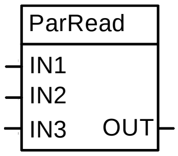
IN1	**IN2**	**IN3**	**OUT** (binary)	**OUT** (value on display)
0	0	0	False (All bits 0)	0
0	0	1	True (All bits 1)	-1
0	1	0	True (All bits 1)	-1
0	1	1	True (All bits 1)	-1
1	0	0	True (All bits 1)	-1
1	1	0	True (All bits 1)	-1
1	1	1	True (All bits 1)	-1

Connections
Input IN1, IN2 and IN3 : boolean values
Output (OUT) : 16 bit integer value (packed boolean)

ParRead

Type Logical function

Illustration



Operation Output (OUT) gives the value of a parameter, which is defined with input IN1 as parameter group and input IN2 as parameter index.

Example for reading parameter 22.01:
input IN1 = 22
input IN2 = 01

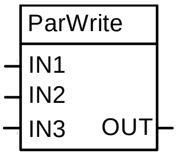
Connections
Input IN1 and IN2 : 16 bit integer value (15 bits + sign)
Output (OUT) : 16 bit integer value (15 bits + sign)

ParWrite

Type

Logical function

Illustration



Operation

Value of input IN1 is written into a parameter, which is defined with input IN2 as group x 100 + index.
Input IN3 can be set with a Boolean value: TRUE means save and FALSE means no save.

The output gives the error code, if parameter access is denied.

Example for parameter 22.01 = 150, not saving into FLASH.
input IN1 = the value of 150 (connection or constant)
input IN2 = 2201
input IN3 = false

Connections

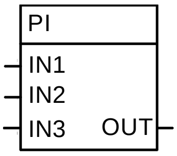
Input IN1 and IN2	:	16 bit integer value (15 bits + sign)
Input IN3	:	Boolean value
Output OUT	:	byte code

PI

Type

Arithmetic controller

Illustration



Operation

The output is input IN1 multiplied by IN2/100 plus integrated IN1 multiplied by IN3/100.

$$O = I1 * I2/100 + (I3/100) * \int I1$$

Note: The internal calculation uses 32 bits accuracy to avoid offset errors.

Connections

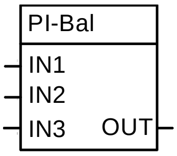
Input IN1	:	16 bit integer value (15 bit + sign)
Input IN2	:	16 bit integer value (15 bit + sign) Gain factor. 100 corresponds to 1.
Input IN3	:	Integrator coefficient. 100 corresponds to 1. 10 000 corresponds to 100.
Output OUT	:	16 bit integer (15 bits + sign). The range is limited to 0 … 10000.

PI-Bal

Type

Arithmetic function

Illustration



Operation

The block initializes the PI block first. When input IN1 becomes true, the block writes the value of IN2 to the output of the PI block. When IN1 becomes false, the block releases the output of the PI controller block which continues normal operation from the set output.
Note: The block may be used only with the PI block. The block must follow the PI block.

Connections

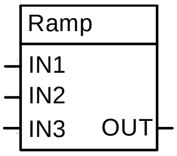
Input IN1	: boolean value
Input IN2	: 16 bit integer value (15 bits + sign)

Ramp

Type

Arithmetic function

Illustration



Operation

The block uses input IN1 as a reference value. With the ramp times (input IN2 and IN3) the output OUT increases or decreases as long as the reference value is reached.

Input IN1 :	Input value
Input IN2 :	Ramp up time, (ms, related to 20000)
Input IN3 :	Ramp down time, (ms, related to 20000)
Output :	integer output

Connections

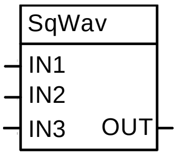
Input IN1	: 16 bit integer value; 15 bit + sign
Input IN2	: 16 bit integer value; 15 bit + sign
Input IN3	: 16 bit integer value; 15 bit + sign
Output OUT	: 16 bit integer value; 15 bit + sign

SqWav

Type

Arithmetic function

Illustration



Operation

The output OUT alternates between the value of input IN3 and zero (0), if the block is enabled with value of input IN1 = true.
The period is set with input IN2 with 1 = 1 ms.

Connections

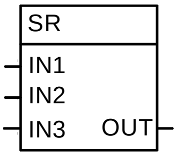
Input IN1 : boolean value
Input IN2 : 16 bit integer value
Input IN3 : 16 bit integer value (15 bits + sign)
Output (OUT) : 16 bit integer value (15 bits + sign)

SR

Type

Logical function

Illustration



Operation

Set/reset block. Input IN1 sets and IN2 and IN3 reset the output.

- If IN1, IN2 and IN3 are false, the current value remains at the output.
- If IN1 is true and IN2 and IN3 are false, the output is true.
- If IN2 or IN3 is true, the output is false.

IN1	**IN2**	**IN3**	**OUT** (binary)	**OUT** (value on display)
0	0	0	Output	Output
0	0	1	False (All bits 0)	0
0	1	0	False (All bits 0)	0
0	1	1	False (All bits 0)	0
1	0	0	True (All bits 1)	-1
1	0	1	False (All bits 0)	0
1	1	0	False (All bits 0)	0
1	1	1	False (All bits 0)	0

Connections

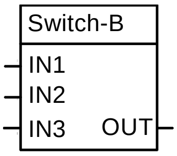
Input IN1, IN2 and IN3 : boolean values
Output (OUT) : 16 bit integer value (15 bits + sign)

Switch-B

Type

Logical function

Illustration



Operation

The output is equal to input IN2 if input IN1 is true and equal to input IN3 if input IN1 is false.

IN1			**OUT**	**OUT** (value on display)
0			= IN3	True = -1
1			= IN2	False = 0

Connections

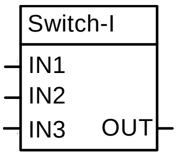
Input IN1, IN2 and IN3 : boolean values
Output (OUT) : 16 bit integer value (packed boolean)

Switch-I

Type

Logical function

Illustration



Operation

The output is equal to input IN2 if input IN1 is true and equal to input IN3 if input IN1 is false.

IN1			**OUT**
0			= IN3
1			= IN2

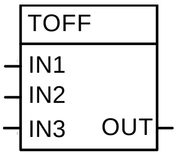
Connections

Input IN1 : boolean value
Input IN2 and IN3 : 16 bit integer values (15 bits + sign)
Output (OUT) : 16 bit integer value (15 bits + sign)

TOFF

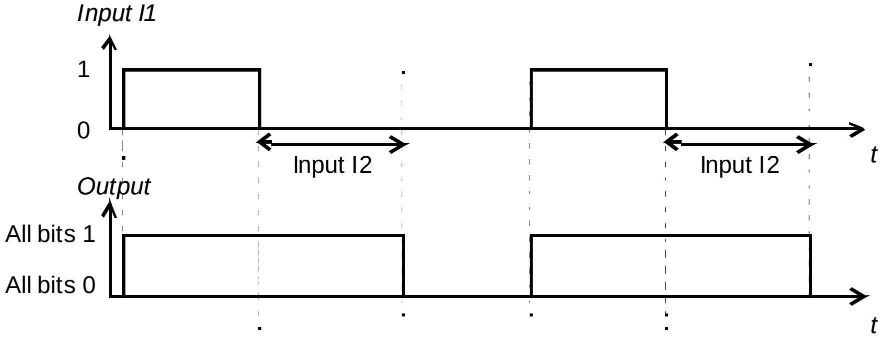
Type Logical function

Illustration



Operation

The output is true when input IN1 is true. The output is false when input IN1 has been false for a time equal or longer than input IN2.



Values on display: True = -1, false = 0.
With input 3 = False the delay time of input 2 is scaled in milliseconds (ms),
with input 3 = True the delay time of input 2 is scaled in seconds (s).

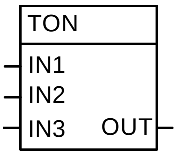
Connections

Input IN1 and IN3	:	boolean value
Input IN2	:	16 bit integer value (15 bits + sign).
Output (OUT)	:	16 bit integer value (packed boolean)

TON

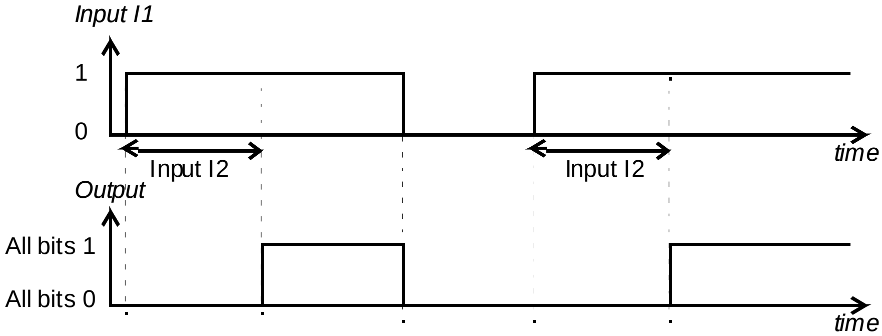
Type Logical function

Illustration



Operation

The output is true when input IN1 has been true for a time equal or longer than input IN2. The output is false when the input is false.



Values on display: True = -1, false = 0.
With input 3 = False the delay time of input 2 is scaled in milliseconds (ms),
with input 3 = True the delay time of input 2 is scaled in seconds (s).

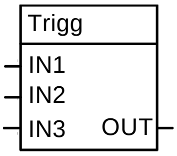
Connections

Input IN1 and IN3 : boolean value
Input IN2 : 16 bit integer value (15 bits + sign
Output (OUT) : 16 bit integer value (packed boolean)

Trigg

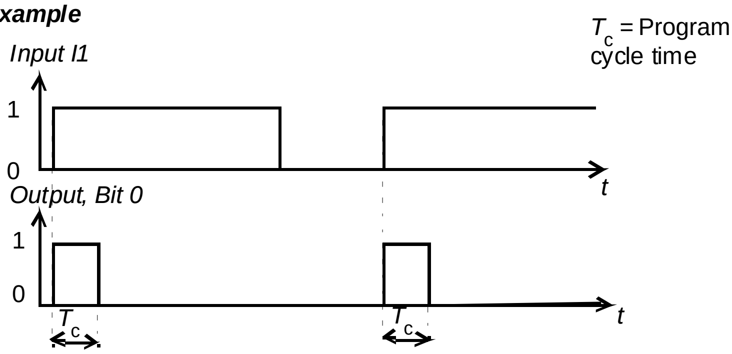
Type Logical function

Illustration



Operation The rising edge of input IN1 sets the output bit 0 for one program cycle.
The rising edge of input IN2 sets the output bit 1 for one program cycle.
The rising edge of input IN3 sets the output bit 2 for one program cycle.

Example

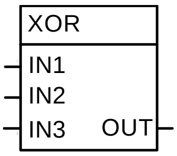


Connections
Input IN1, IN2 and IN3 : boolean values
Output (OUT) : 16 bit integer value (15 bits + sign)

XOR

Type Logical function

Illustration



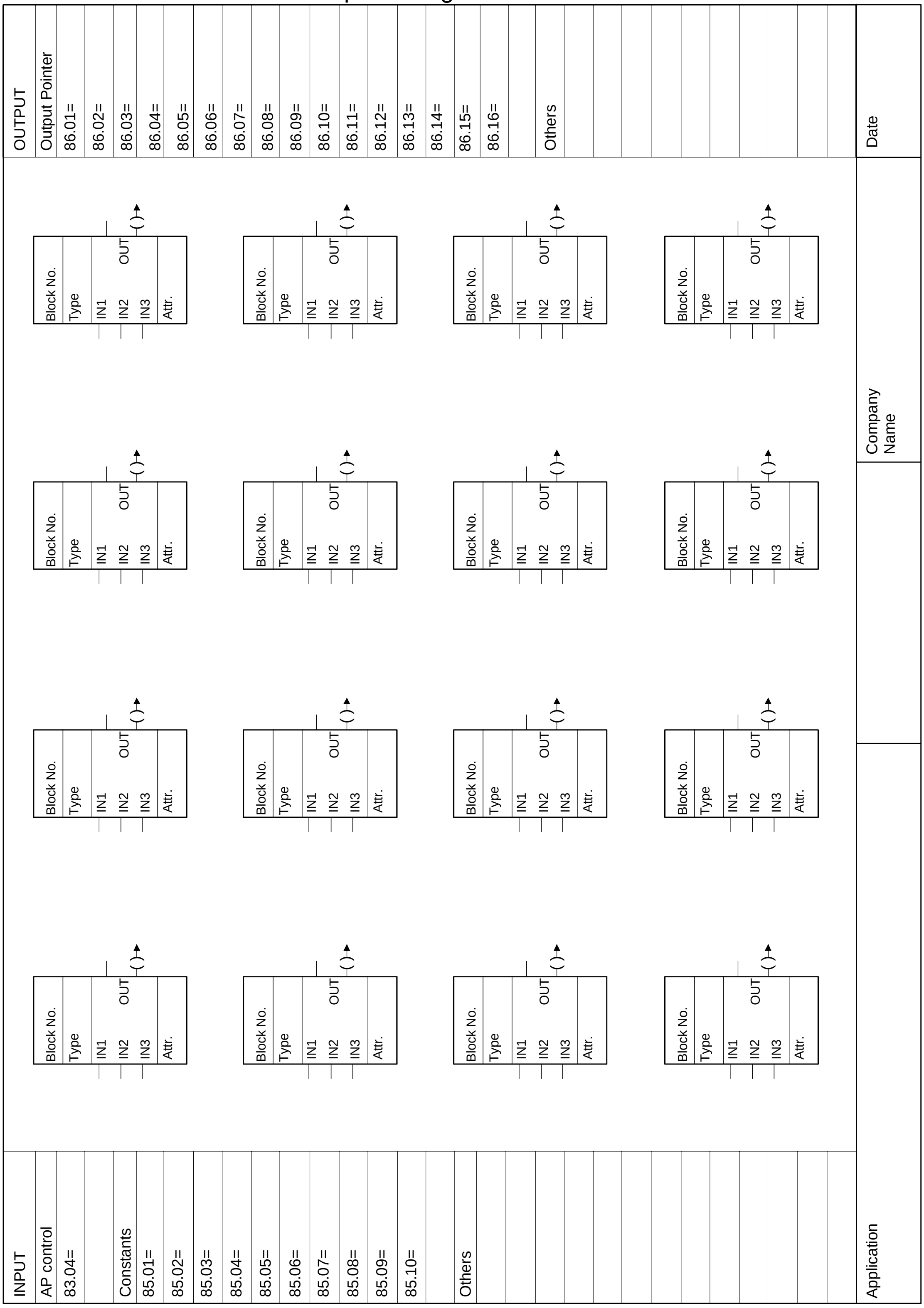
Operation The output is true if one input is true, otherwise the output is false. Truth table:

IN1	**IN2**	**IN3**	**OUT** (binary)	**OUT** (value on display)
0	0	0	False (All bits 0)	0
0	0	1	True (All bits 1)	-1
0	1	0	True (All bits 1)	-1
0	1	1	False (All bits 0)	0
1	0	0	True (All bits 1)	-1
1	0	1	False (All bits 0)	0
1	1	0	False (All bits 0)	0
1	1	1	True (All bits 1)	-1

Connections
Input IN1, IN2 and IN3 : boolean values
Output (OUT) : 16 bit integer value (15 bits + sign)

Customer diagrams

This chapter includes three blank block diagram sheets on which the Adaptive Program can be documented.



Signal and parameter list

Signals and parameters

This chapter contains all signals and parameters.

Signals

Signals are measured and calculated actual values of the drive. This includes the control-, status-, limit-, fault- and alarm words. The drive's signals can be found in groups 1 to 9. None of the values inside these groups is stored in the FLASH memory and thus volatile.

The following table gives an overview of all signal groups:

Group	Description	Comment
1	Physical actual values	
2	Speed controller signals	
3	Reference actual values	
4	Information	self identification
5	Analog I/O	
6	Drive logic signals	
7	Control words	command words
8	Status / limit words	detection on operation and limits
9	Fault / alarm words	diagnosis information

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
1.08	**MotTorq (motor torque)** Motor torque in percent of the active motor nominal torque: – Filtered by means of a 6th order FIR filter (sliding average filter), filter time is 1 mains voltage period. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
2.17	**SpeedRefUsed (used speed reference)** Used speed reference selected with: – *Ref1Mux (11.02)* and *Ref1Sel (11.03)* or – *Ref2Mux (11.12)* and *Ref2Sel (11.06)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C

Sample of signals

All signals are read-only. However the overriding control can write to the control words, but it only affects the RAM.

Min., max., def.:
Minimum, maximum and default values are not valid for groups 1 to 9.

Unit:
Shows the physical unit of a signal, if applicable. The unit is displayed in the control panel and PC tools.

E/C:
By means of *USI Sel (16.09)* it is possible to change between compact **(C)** and extended **(E)** signal and parameter list. The compact list contains only signals and parameters used for a typical commissioning.

Group.Index:
Signal and parameter numbers consists of group number and its index.

Integer Scaling:
Communication between the drive and the overriding control uses 16 bit integer values. The overriding control has to use the information given in integer scaling to read the value of the signal properly.
Example1:
If *MotTorq (1.08)* is read from the overriding control an integer value of 100 corresponds to 1 %.
Example2:
If *SpeedRefUsed (2.17)* is read from the overriding control 20.000 equals the speed (in rpm) shown in *SpeedScaleAct (2.29)* .

Type:
The data type is given with a short code:
I = 16-bit integer value (0, …, 65536)
SI = 16-bit signed integer value (-32768, …, 32767)
C: = text string

Volatile:
Y = values are NOT stored in the FLASH, they will be lost when the drive is de-energized
N = values are stored in the FLASH, they will remain when the drive is de-energized

Parameters

This chapter explains the function and valid values or selections for all parameters. They are arranged in groups by their function. The following table gives an overview of all parameter groups:

Group	Description
10	Start / stop select
11	Speed reference input
12	Constant speeds
13	Analog inputs
14	Digital outputs
15	Analog outputs
16	System control inputs
19	Data storage
20	Limits
21	Start / stop
22	Speed ramp
23	Speed reference
24	Speed control
25	Torque reference
26	Torque reference handling
30	Fault functions
31	Motor 1 temperature
34	Control panel display
42	Brake control
43	Current control
44	Field excitation
45	Field converter settings
47	12-pulse operation
49	Shared motion
50	Speed measurement
51	Fieldbus
52	Modbus
70	DDCS control
71	Drivebus
83	Adaptive program control
84	Adaptive program
85	User constants
86	Adaptive program outputs
90	Receiving datasets addresses 1
91	Receiving datasets addresses 2
92	Transmit datasets addresses 1
93	Transmit datasets addresses 2
94	DCSLink control
97	Measurement
98	Option modules
99	Start-up data

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
20.07	**TorqMaxSPC (maximum torque speed controller)** Maximum torque limit - in percent of the active motor nominal torque - at the output of the speed controller: – *TorqRef2 (2.09)* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0	325	325	%	E
23.01	**SpeedRef (speed reference)** Main speed reference input for the speed control of the drive. Can be connected to *SpeedRefUsed (2.17)* via: – *Ref1Mux (11.02)* and *Ref1Sel (11.03)* or – *Ref2Mux (11.12)* and *Ref2Sel (11.06)* Internally limited from: $-(2.29)*\frac{32767}{20000}rpm \ \ to \ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: Y**	-10000	10000	0	rpm	C

Sample of parameters

Parameter changes by control panel, DriveWindow or DriveWindow Light are stored in the FLASH. Changes made by the overriding control are only stored in the RAM.

Min., max., def.:
Minimum and maximum value or selection of parameter.
Default value or default selection of parameter.

Unit:
Shows the physical unit of a parameter, if applicable. The unit is displayed in the control panel and PC tools.

E/C:
By means of *USI Sel (16.09)* it is possible to change between compact **(C)** and extended **(E)** signal and parameter list. This influences parameter display of control panel. The compact list contains only signals and parameters used for a typical commissioning.

Group.Index:
Signal and parameter numbers consists of group number and its index.

Integer Scaling:
Communication between the drive and the overriding control uses 16 bit integer values. The overriding control has to use the information given in integer scaling to change the value of the parameter properly.
Example1:
If TorqMaxSPC *(20.07)* is written to from the overriding control an integer value of 100 corresponds to 1 %.
Example2:
If *SpeedRef (23.01)* is written to from the overriding control 20.000 equals the speed (in rpm) shown in *SpeedScaleAct (2.29)* .

Type:
The data type is given with a short code:
I = 16-bit integer value (0, …, 65536)
SI = 16-bit signed integer value (-32768, …, 32767)
C: = text string

Volatile:
Y = values are NOT stored in the FLASH, they will be lost when the drive is de-energized
N = values are stored in the FLASH, they will remain when the drive is de-energized

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 1	**Physical actual values**					
1.01	**MotSpeedFilt (filtered motor speed)** Filtered actual speed feedback: – Choose motor speed feedback with *M1SpeedFbSel (50.03)* – Filtered with 1 s and – *SpeedFiltTime (50.06)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
1.02	**SpeedActEMF (speed actual from EMF)** Actual speed calculated from EMF. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
1.03	**SpeedActEnc (speed actual from encoder)** Actual speed measured with pulse encoder. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
1.04	**MotSpeed (motor speed)** Actual motor speed: – Choose motor speed feedback with *M1SpeedFbSel (50.03)*. If *M1SpeedFbSel (50.03)* is set to **External** the signal is updated by Adaptive Program, application program or overriding control. – *SpeedFiltTime (50.06)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
1.05	**SpeedActTach (speed actual from tacho)** Actual speed measured with analog tacho. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
1.06	**MotCur (motor current)** Relative actual motor current in percent of *M1NomCur (99.03)*. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
1.07	**MotTorqFilt (filtered motor torque)** Relative filtered motor torque in percent of the active motor nominal torque: – Filtered by means of a 6th order FIR filter (sliding average filter), filter time is 1 mains voltage period and – *TorqActFiltTime (97.20)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
1.08	**MotTorq (motor torque)** Motor torque in percent of the active motor nominal torque: – Filtered by means of a 6th order FIR filter (sliding average filter), filter time is 1 mains voltage period. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
1.09	**CurRipple (current ripple)** Relative current ripple monitor output in percent of *M1NomCur (99.03).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
1.10	**CurRippleFilt (filtered current ripple)** Relative filtered current ripple monitor output in percent of *M1NomCur (99.03):* – Filtered with 200 ms **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
1.11	**MainsVoltActRel (relative actual mains voltage)** Relative actual mains voltage in percent of *NomMainsVolt (99.10).* **Int. Scaling: 100 == 1 % Type: I Volatile: Y**	-	-	-	%	C
1.12	**MainsVoltAct (actual mains voltage)** Actual mains voltage: – Filtered with 10 ms **Int. Scaling: 1 == 1 V Type: I Volatile: Y**	-	-	-	V	C
1.13	**ArmVoltActRel (relative actual armature voltage)** Relative actual armature voltage in percent of *M1NomVolt (99.02).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
1.14	**ArmVoltAct (actual armature voltage)** Actual armature voltage: – Filtered with 10 ms **Int. Scaling: 1 == 1 V Type: SI Volatile: Y**	-	-	-	V	C
1.15	**ConvCurActRel (relative actual converter current [DC])** Relative actual converter current in percent of *ConvNomCur (4.05).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
1.16	**ConvCurAct (actual converter current [DC])** Actual converter current: – Filtered with 10 ms **Int. Scaling: 1 == 1 A Type: SI Volatile: Y**	-	-	-	A	C
1.17	**EMF VoltActRel (relative actual EMF)** Relative actual EMF in percent of *M1NomVolt (99.02):* *EMF VoltActRel (1.17).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
1.18	**Unused**					
1.19	**Unused**					
1.20	**Mot1TempCalc (motor 1 calculated temperature)** Motor 1 calculated temperature from motor thermal model. Used for motor overtemperature protection. – *M1AlarmLimLoad (31.03)* – *M1FaultLimLoad (31.04)* **Int. Scaling: 100 == 1 % Type: I Volatile: Y**	-	-	-	%	E
1.21	**Mot2TempCalc (motor 2 calculated temperature)** Motor 2 calculated temperature from motor thermal model. Used for motor overtemperature protection. – *M2AlarmLimLoad (49.33)* – *M2FaultLimLoad (49.34)* **Int. Scaling: 100 == 1 % Type: I Volatile: Y**	-	-	-	%	E
1.22	**Mot1TempMeas (motor 1 measured temperature)** Motor 1 measured temperature. Used for motor overtemperature protection: – Unit depends on setting of *M1TempSel (31.05):* **NotUsed** - **1 to 6 PT100** °C **PTC** Ω **Int. Scaling: 1 == 1 °C / 1 Ω / 1 Type: I Volatile: Y**	-	-	-	°C / Ω / -	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
1.23	**Mot2TempMeas (motor 2 measured temperature)** Motor 2 measured temperature. Used for motor overtemperature protection: – Unit depends on setting of *M2TempSel (49.35):* **NotUsed** - **1 to 6 PT100** °C **PTC** Ω **Int. Scaling: 1 == 1 °C / 1 Ω / 1 Type: I Volatile: Y**	-	-	-	°C / Ω / -	E
1.24	**BridgeTemp (actual bridge temperature) (** Actual bridge temperature in degree centigrade. **Int. Scaling: 1 == 1 °C Type: I Volatile: Y**	-	-	-	°C	C
1.25	**CtrlMode (control mode)** Used control mode: 0 = **NotUsed** - 1 = **SpeedCtrl** speed control 2 = **TorqCtrl** torque control 3 = **CurCtrl** current control – *TorqSel (26.01)* **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E
1.26	**Unused**					
1.27	**Unused**					
1.28	**Unused**					
1.29	**Mot1FldCurRel (motor 1 relative actual field current)** Motor 1 relative field current in percent of *M1NomFldCur (99.11)*. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
1.30	**Mot1FldCur (motor 1 actual field current)** Motor 1 field current: – Filtered with 500 ms **Int. Scaling: 100 == 1 A Type: SI Volatile: Y**	-	-	-	A	C
1.31	**Mot2FldCurRel (motor 2 relative actual field current)** Motor 2 relative field current in percent of *M2NomFldCur (49.05)*. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
1.32	**Mot2FldCur (motor 2 actual field current)** Motor 2 field current: – Filtered with 500 ms **Int. Scaling: 100 == 1 A Type: SI Volatile: Y**	-	-	-	A	E
1.33	**ArmCurActSl (12-pulse slave actual armature current)** Actual armature current of 12-pulse slave: – Valid in 12-pulse master only **Int. Scaling: 1 == 1 A Type: SI Volatile: Y**	-	-	-	A	E
1.34	**Unused**	-	-	-	-	E
1.35	**ArmCurAll (12-pulse parallel master and slave actual armature current)** Sum of actual armature current for 12-pulse master and 12-pulse slave: – Filtered with 10 ms – Valid in 12-pulse master only – Valid for 12-pulse parallel only **Int. Scaling: 1 == 1 A Type: SI Volatile: Y**	-	-	-	A	E
1.36	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
1.37	**DC VoltSerAll (12-pulse serial master and slave actual DC voltage)** Sum of actual armature voltage for 12-pulse master and 12-pulse slave: – Valid in 12-pulse master only – Valid for 12-pulse serial/sequential only **Int. Scaling: 1 == 1 V Type: SI Volatile: Y**	-	-	-	V	E
1.38	**MainsFreqAct (actual mains frequency)** Actual mains frequency. **Int. Scaling: 100 == 1 Hz Type: I Volatile: Y**	-	-	-	Hz	C
1.39	**AhCounter (ampere-hour counter)** Ampere hour counter. **100 == 1kAh Type: I Volatile: Y**	-	-	-	kAh	E
1.40	**Unused**					
1.41	**ProcSpeed (process speed)** Calculated process/line speed: – Scaled with *WinderScale (50.17)* **Int. Scaling: 10 == 1 m/min Type: SI Volatile: Y**	-	-	-	m/min	E
Group 2	**Speed controller signals**					
2.01	**SpeedRef2 (speed reference 2)** Speed reference after limiter: – *M1SpeedMin (20.01)* – *M1SpeedMax (20.02)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.02	**SpeedRef3 (speed reference 3)** Speed reference after speed ramp and jog input. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.03	**SpeedErrNeg (Δn)** Δn = speed actual - speed reference. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.04	**TorqPropRef (proportional part of torque reference)** P-part of the speed controller's output in percent of the active motor nominal torque. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
2.05	**TorqIntegRef (integral part of torque reference)** I-part of the speed controller's output in percent of the active motor nominal torque. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
2.06	**TorqDerRef (derivation part of torque reference)** D-part of the speed controller's output in percent of the active motor nominal torque. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
2.07	**TorqAccCompRef (torque reference for acceleration compensation)** Acceleration compensation output in percent of the active motor nominal torque. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
2.08	**TorqRef1 (torque reference 1)** Relative torque reference value in percent of the active motor nominal torque after limiter for the external torque reference: – *TorqMaxTref (20.09)* – *TorqMinTref (20.10)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.09	**TorqRef2 (torque reference 2)** Output value of the speed controller in percent of the active motor nominal torque after limiter: – *TorqMaxSPC (20.07)* – *TorqMinSPC (20.08)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.10	**TorqRef3 (torque reference 3)** Relative torque reference value in percent of the active motor nominal torque after torque selector: – *TorqSel (26.01)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.11	**TorqRef4 (torque reference 4)** = *TorqRef3 (2.10)* + *LoadComp (26.02)* in percent of the active motor nominal torque. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.12	**Unused**					
2.13	**TorqRefUsed (used torque reference)** Relative final torque reference value in percent of the active motor nominal torque after torque limiter: – *TorqMax (20.05)* – *TorqMin (20.06)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.14	**TorqCorr (torque correction)** Relative additional torque reference in percent of the active motor nominal torque: – *TorqCorrect (26.15)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.16	**dv_dt (dv/dt)** Acceleration/deceleration (speed reference change) at the output of the speed reference ramp. **Int. Scaling: (2.29)/s Type: SI Volatile: Y**	-	-	-	rpm/s	C
2.17	**SpeedRefUsed (used speed reference)** Used speed reference selected with: – *Ref1Mux (11.02)* and *Ref1Sel (11.03)* or – *Ref2Mux (11.12)* and *Ref2Sel (11.06)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.18	**SpeedRef4 (speed reference 4)** = *SpeedRef3 (2.02)* + *SpeedCorr (23.04).* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.19	**TorqMaxAll (torque maximum all)** Relative calculated positive torque limit in percent of the active motor nominal torque. Calculated from maximum torque limit, field weakening and armature current limits: – *TorqUsedMax (2.22)* – *FluxRefFldWeak (3.24)* and – *M1CurLimBrdg1 (20.12)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
2.20	**TorqMinAll (torque minimum all)** Relative calculated negative torque limit in percent of the active motor nominal torque. Calculated from minimum torque limit, field weakening and armature current limits: – *TorqUsedMax (2.22)* – *FluxRefFldWeak (3.24)* and – *M1CurLimBrdg2 (20.13)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.21	**Unused**					
2.22	**TorqUsedMax (used torque maximum)** Relative positive torque limit in percent of the active motor nominal torque. Selected with: – *TorqUsedMaxSel (20.18)* Connected to torque limiter after torque selector [*TorqSel (21.01)*] and load compensation [*LoadComp (26.02)*]. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.23	**TorqUsedMin (used torque minimum)** Relative negative torque limit in percent of the active motor nominal torque. Selected with: – *TorqUsedMinSel (20.19)* Connected to torque limiter after torque selector [*TorqSel (21.01)*] and load compensation [*LoadComp (26.02)*]. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.24	**TorqRefExt (external torque reference)** Relative external torque reference value in percent of the active motor nominal torque after torque reference A selector: – *TorqRefA (25.01)* and – *TorqRefA Sel (25.10)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
2.25	**Unused**					
2.26	**TorqLimAct (actual used torque limit)** Shows parameter number of the actual active torque limit: 0 = **0** no limitation active 1 = **2.19** *TorqMaxAll (2.19)* is active, includes current limits and field weakening 2 = **2.20** *TorqMinAll (2.20)* is active, includes current limits and field weakening 3 = **2.22** *TorqUsedMax (2.22)* selected torque limit is active 4 = **2.23** *TorqUsedMin (2.23)* selected torque limit is active 5 = **20.07** *TorqMaxSPC (20.07)* speed controller limit is active 6 = **20.08** *TorqMinSPC (20.08)* speed controller limit is active 7 = **20.09** *TorqMaxTref (20.09)* external reference limit is active 8 = **20.10** *TorqMinTref (20.10)* external reference limit is active 9 = **20.22** *TorqGenMax (20.22)* regenerating limit is active 10 = **2.08** *TorqRef1 (2.08)* limits *TorqRef2 (2.09)*, see also *TorqSel (26.01)* **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
2.27	**Unused**					
2.28	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
2.29	**SpeedScaleAct (actual used speed scaling)** The value of SpeedScaleAct (2.29) equals 20.000 speed units. Currently used speed scaling in rpm for *MotSel (8.09)* = **Motor1**: – 20.000 speed units == *M1SpeedScale (50.01*), in case *M1SpeedScale (50.01)* ≥ 10 – 20.000 speed units == maximum absolute value of *M1SpeedMin (20.01)* and *M1SpeedMax (20.02),* in case *M1SpeedScale (50.01)* < 10 or mathematically: – If *(50.01)* ≥ 10 then 20.000 == *(50.01)* in rpm – If *(50.01)* < 10 then 20.000 == Max [|*(20.01)*|, |*(20.02)*|] in rpm Currently used speed scaling in rpm for *MotSel (8.09)* = **Motor2**: – 20.000 speed units == *M2SpeedScale (49.22*), in case *M2SpeedScale (49.22)* ≥ 10 – 20.000 speed units == maximum absolute value of *M2SpeedMin (49.19)* and *M2SpeedMax (49.20),* in case *M2SpeedScale (49.22)* < 10 or mathematically: – If *(49.22)* ≥ 10 then 20.000 == *(49.22)* in rpm – If *(49.22)* < 10 then 20.000 == Max [|*(49.19)*|, |*(49.22)*|] in rpm **Int. Scaling: 1 == 1 rpm Type: SI Volatile: Y**	-	-	-	rpm	C
2.30	**SpeedRefExt1 (external speed reference 1)** External speed reference 1 after reference 1 multiplexer: – *Ref1Mux (11.02)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.31	**SpeedRefExt2 (external speed reference 2)** External speed reference 2 after reference 2 multiplexer: – *Ref2Mux (11.12)* **Int. Scaling: (2.29) Type: SI Volatile: Y**	-	-	-	rpm	C
2.32	**SpeedRampOut (speed ramp output)** Speed reference after ramp **Int. Scaling: (2.29) Type: SI Volatile: Y**				rpm	C
Group 3	**Reference actual values**					
3.01	**DataLogStatus (status data logger)** 0 = NotInit data logger not initialized 1 = Empty data logger is empty 2 = Running data logger is running (activated) 3 = Triggered data logger is triggered but not filled jet 4 = Filled data logger is triggered and filled (data can be uploaded) **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E
3.02	**Unused**					
3.03	**SquareWave (square wave)** Output signal of the square wave generator. **Int. Scaling: 1==1 Type: SI Volatile: Y**	-	-	-	-	E
3.04	**Unused**					
3.05	**Unused**					
3.06	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
3.07	**PosCountLow (position counter low value)** Position counter low word: – *PosCountInitLo (50.08)* – Unit depends on setting of *PosCountMode (50.07):* **PulseEdges** 1 == 1 pulse edge **Scaled** 0 == 0° and 65536 == 360° **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
3.08	**PosCountHigh (position counter high value)** Position counter high word: – *PosCountInitHi (50.09)* – Unit depends on setting of *PosCountMode (50.07):* **PulseEdges** 1 == 65536 pulse edges **Scaled** 1 == 1 revolution **Int. Scaling: 1 == 1 Type: SI Volatile: Y**	-	-	-	-	E
3.09	**PID Out (output PID controller)** PID controller output. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	-	E
3.10	**Unused**					
3.11	**CurRef (current reference)** Relative current reference in percent of *M1NomCur (99.03)* after scaling with field weakening. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
3.12	**CurRefUsed (used current reference)** Relative current reference in percent of *M1NomCur (99.03)* after current limitation: – *M1CurLimBrdg1 (20.12)* – *M2CurLimBrdg2 (20.13)* – *MaxCurLimSpeed (43.17* to *43.22)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
3.13	**ArmAlpha (armature α, firing angle)** Firing angle (α). **Int. Scaling: 1 == 1 ° Type: I Volatile: Y**	-	-	-	°	C
3.14	**Unused**					
3.15	**ReactCur (reactive current)** Relative actual reactive motor current in percent of *M1NomCur (99.03).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.16	**Unused**					
3.17	**ArmAlphaSl (12-pulse slave armature α, firing angle)** Firing angle (α) of 12-pulse slave converter: – Valid in 12-pulse master only **Int. Scaling: 1 == 1 ° Type: I Volatile: Y**	-	-	-	°	E
3.18	**Unused**					
3.19	**Unused**					
3.20	**PLLOut (phase locked loop output)** Mains voltage cycle (period time). Is used to check if the synchronization is working properly: – 1/50Hz = 0.2s = 20.000µs – 1/60Hz = 0.167s = 16.667µs **Int. Scaling: 1 == 1µs Type: I Volatile: Y**	-	-	-	µs	E
3.21	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
3.22	**CurCtrlIntegOut (integral part of current controller output)** I-part of the current controller's output in percent of *M1NomCur (99.03).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.23	**Unused**					
3.24	**FluxRefFldWeak (flux reference for field weakening)** Relative flux reference at speeds above the field weakening point (base speed) in percent of the nominal flux. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.25	**VoltRef1 (EMF voltage reference 1)** Selected relative EMF voltage reference in percent of *M1NomVolt (99.02)*: – *EMF RefSel (46.03)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	C
3.26	**VoltRef2 (EMF voltage reference 2)** Relative EMF voltage reference in percent of *M1NomVolt (99.02)* after ramp and limitation (input to EMF controller): – *VoltRefSlope (46.06)* – *VoltPosLim (46.07)* – *VoltNegLim (46.08)* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.27	**FluxRefEMF (flux reference after EMF controller)** Relative EMF flux reference in percent of the nominal flux after EMF controller. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.28	**FluxRefSum (sum of flux reference)** = FluxRefEMF (3.27) + FluxRefFldWeak (3.24) in percent of the nominal flux. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.29	**Unused**					
3.30	**FldCurRefM1 (motor 1 field current reference)** Relative motor 1 field current reference in percent of *M1NomFldCur (99.11).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
3.31	**FldCurRefM2 (motor 2 field current reference)** Relative motor 2 field current reference in percent of *M2NomFldCur (49.05).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-	-	-	%	E
Group 4	**Information**					
4.01	**FirmwareVer (firmware version)** Name of the loaded firmware version. The format is: – **-yyy** with: **-** = single phase firmware for demo units and **yyy** = consecutively numbered version. **Int. Scaling: - Type: C Volatile: Y**	-	-	-	-	C
4.02	**Unused**					
4.03	**ApplicName (name of application program)** Name of the loaded application program. **Int. Scaling: - Type: C Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
4.04	**ConvNomVolt (converter nominal voltage measurement circuit)** Adjustment of voltage measuring channels (SDCS-PIN-4 or SDCS-PIN-51). Read from *TypeCode (97.01)* or set with *S ConvScaleVolt (97.03)*: – Read from *TypeCode (97.01)* if *S ConvScaleVolt (97.03)* = 0 – Read from *S ConvScaleVolt (97.03)* if *S ConvScaleVolt (97.03)* ≠ 0 This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: 1 == 1 V Type: I Volatile: Y**	-	-	-	V	C
4.05	**ConvNomCur (converter nominal current measurement circuit)** Adjustment of current measuring channels (SDCS-PIN-4 or SDCS-PIN-51). Read from *TypeCode (97.01)* or set with *S ConvScaleCur (97.02)*: – Read from *TypeCode (97.01)* if *S ConvScaleCur (97.02)* = 0 – Read from *S ConvScaleCur (97.02)* if *S ConvScaleCur (97.02)* ≠ 0 This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: 1 == 1 A Type: I Volatile: Y**	-	-	-	A	C
4.06	**Mot1FexType (motor 1 type of field exciter)** Motor 1 field exciter type. Read from *M1UsedFexType (99.12)*: 0 = **NotUsed** no or foreign field exciter connected 1 = **OnBoard** integrated 1-Q field exciter (for sizes D1 - D4 only), default 2 = **FEX-425-Int** internal 1-Q 25 A field exciter (for size D5 only) 3 = **DCF803-0035** external 1-Q 35 A field exciter used for field currents from 5 A to **35 A** (terminals X100.1 and X100.3) 4 = **DCF803-0050** external 1-Q 50 A field exciter 5 = **DCF804-0050** external 4-Q 50 A field exciter 6 = **DCF803-0060** external 1-Q 60 A field exciter 7 = **DCF804-0060** external 4-Q 60 A field exciter 8 = **DCS800-S01** external 2-Q 3-phase field exciter 9 = **DCS800-S02** external 4-Q 3-phase field exciter 10 = reserved to 19 = reserved 20 = **FEX-4-Term5A** external 1-Q 35 A field exciter used for field currents from 0.3 A to **5 A** (terminals X100.2 and X100.3) 21 = reserved **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
4.07	**Mot2FexType (motor 2 type of field exciter)** Motor 2 field exciter type coding. Read from *M2UsedFexType (49.07)*: 0 = **NotUsed** no or foreign field exciter connected 1 = **OnBoard** integrated 1-Q field exciter (for sizes D1 - D4 only), default 2 = **FEX-425-Int** internal 1-Q 25 A field exciter (for size D5 only) 3 = **DCF803-0035** external 1-Q 35 A field exciter used for field currents from 5 A to **35 A** (terminals X100.1 and X100.3) 4 = **DCF803-0050** external 1-Q 50 A field exciter 5 = **DCF804-0050** external 4-Q 50 A field exciter 6 = **DCF803-0060** external 1-Q 60 A field exciter 7 = **DCF804-0060** external 4-Q 60 A field exciter 8 = **DCS800-S01** external 2-Q 3-phase field exciter 9 = **DCS800-S02** external 4-Q 3-phase field exciter 10 = reserved to 19 = reserved 20 = **FEX-4-Term5A** external 1-Q 35 A field exciter used for field currents from 0.3 A to **5 A** (terminals X100.2 and X100.3) 21 = reserved **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
4.08	**Mot1FexSwVer (motor 1 firmware version of field exciter)** Motor 1 field exciter firmware version. The format is: – **yyy** with: **yyy** = consecutively numbered version. This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: - Type: C Volatile: Y**	-	-	-	-	C
4.09	**Mot2FexSwVer (motor 2 firmware version of field exciter)** Motor 2 field exciter firmware version. The format is: – **yyy** with: **yyy** = consecutively numbered version. This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: - Type: C Volatile: Y**	-	-	-	-	E
4.10	**Unused**					
4.11	**Com8SwVersion (firmware version of SDCS-COM-8)** SDCS-COM-8 firmware version. The format is: – **yyy** with: **yyy** = consecutively numbered version. This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: Type: C Volatile: Y**					E
4.12	**ApplicVer (application version)** Version of the loaded application program. The format is: – **yyy** with: **yyy** = consecutively numbered version. **Int. Scaling: - Type: C Volatile: Y**	-	-	-	-	C
4.13	**DriveLibVer (drive library version)** Version of the loaded function block library. The format is: – **yyy** with: **yyy** = consecutively numbered version. **Int. Scaling: - Type: C Volatile: Y**	-	-	-	-	C
4.14	**ConvType (converter type)** Recognized converter type. Read from *TypeCode (97.01):* 0 = **None** when *TypeCode (97.01)* = **None** 1 = **D1** D1 converter 2 = **D2** D2 converter 3 = **D3** D3 converter 4 = **D4** D4 converter 5 = **D5** D5 converter 6 = **D6** D6 converter 7 = **D7** D7 converter 8 = **ManualSet** set by user, see *S ConvScaleCur (97.02), S ConvScaleVolt (97.03), S MaxBrdgTemp (97.04)* or *S BlockBridge2 (97.07)* for e.g. rebuild kits This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
4.15	**QuadrantType (quadrant type of converter; 1 or 2 bridges)** Recognized converter quadrant type. Read from *TypeCode (97.01)* or set with *S BlockBrdg2 (97.07)*: – Read from *TypeCode (97.01)* if *S BlockBrdg2 (97.07)* = 0 – Read from *S BlockBrdg2 (97.07)* if *S BlockBrdg2 (97.07)* ≠ 0 This signal is set during initialization of the drive, new values are shown after the next power-up. 0 = **Auto** operation mode is taken from *TypeCode (97.01),* default 1 = **BlockBridge2** bridge 2 blocked (== 2-Q operation) 2 = **RelBridge2** bridge 2 released (== 4-Q operation) **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
4.16	**ConvOvrCur (converter overcurrent [DC] level)** Converter current tripping level This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: 1 == 1 A Type: I Volatile: Y**	-	-	-	A	C
4.17	**MaxBridgeTemp (maximum bridge temperature)** Maximum bridge temperature in degree centigrade. Read from *TypeCode (97.01)* or set with *S MaxBrdgTemp (97.04)*: – Read from *TypeCode (97.01)* if *S MaxBrdgTemp (97.04)* = 0 – Read from *S MaxBrdgTemp (97.04)* if *S MaxBrdgTemp (97.04)* ≠ 0 This signal is set during initialization of the drive, new values are shown after the next power-up. **Int. Scaling: 1 == 1 °C Type: I Volatile: Y**	-	-	-	°C	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
4.18	**DCSLinkStat1 (DCSLink status 1 of field exciter nodes)** Status of DCSLink for field exciter nodes 1 to 16: Bit Name Value Comment B0 **Node1** 1 DCSLink node1 active and OK 0 DCSLink node1 not active or faulty B1 **Node2** 1 DCSLink node2 active and OK 0 DCSLink node2 not active or faulty B2 **Node3** 1 DCSLink node3 active and OK 0 DCSLink node3 not active or faulty B3 **Node4** 1 DCSLink node4 active and OK 0 DCSLink node4 not active or faulty B4 **Node5** 1 DCSLink node5 active and OK 0 DCSLink node5 not active or faulty B5 **Node6** 1 DCSLink node6 active and OK 0 DCSLink node6 not active or faulty B6 **Node7** 1 DCSLink node7 active and OK 0 DCSLink node7 not active or faulty B7 **Node8** 1 DCSLink node8 active and OK 0 DCSLink node8 not active or faulty B8 **Node9** 1 DCSLink node9 active and OK 0 DCSLink node9 not active or faulty B9 **Node10** 1 DCSLink node10 active and OK 0 DCSLink node10 not active or faulty B10 **Node11** 1 DCSLink node11 active and OK 0 DCSLink node11 not active or faulty B11 **Node12** 1 DCSLink node12 active and OK 0 DCSLink node12 not active or faulty B12 **Node13** 1 DCSLink node13 active and OK 0 DCSLink node13 not active or faulty B13 **Node14** 1 DCSLink node14 active and OK 0 DCSLink node14 not active or faulty B14 **Node15** 1 DCSLink node15 active and OK 0 DCSLink node15 not active or faulty B15 **Node16** 1 DCSLink node16 active and OK 0 DCSLink node16 not active or faulty **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
4.19	**DCSLinkStat2 (DCSLink status 2 of field exciter nodes)** Status of DCSLink for field exciter nodes 17 to 32: Bit Name Value Comment B0 **Node17** 1 DCSLink node17 active and OK 0 DCSLink node17 not active or faulty B1 **Node18** 1 DCSLink node18 active and OK 0 DCSLink node18 not active or faulty B2 **Node19** 1 DCSLink node19 active and OK 0 DCSLink node19 not active or faulty B3 **Node20** 1 DCSLink node20 active and OK 0 DCSLink node20 not active or faulty B4 **Node21** 1 DCSLink node21 active and OK 0 DCSLink node21 not active or faulty B5 **Node22** 1 DCSLink node22 active and OK 0 DCSLink node22 not active or faulty B6 **Node23** 1 DCSLink node23 active and OK 0 DCSLink node23 not active or faulty B7 **Node24** 1 DCSLink node24 active and OK 0 DCSLink node24 not active or faulty B8 **Node25** 1 DCSLink node25 active and OK 0 DCSLink node25 not active or faulty B9 **Node26** 1 DCSLink node26 active and OK 0 DCSLink node26 not active or faulty B10 **Node27** 1 DCSLink node27 active and OK 0 DCSLink node27 not active or faulty B11 **Node28** 1 DCSLink node28 active and OK 0 DCSLink node28 not active or faulty B12 **Node29** 1 DCSLink node29 active and OK 0 DCSLink node29 not active or faulty B13 **Node30** 1 DCSLink node30 active and OK 0 DCSLink node30 not active or faulty B14 **Node31** 1 DCSLink node31 active and OK 0 DCSLink node31 not active or faulty B15 **Node32** 1 DCSLink node32 active and OK 0 DCSLink node32 not active or faulty **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
4.20	**Ext IO Status (external IO status)** Status of external I/O: Bit Value Comment B0 1 first RAIO-xx detected, see *AIO ExtModule (98.06)* 0 first RAIO-xx not existing or faulty B1 1 second RAIO-xx detected, see *AIO MotTempMeas (98.12)* 0 second RAIO-xx not existing or faulty B2 1 - 0 - B3 1 RTAC-xx detected 0 RTAC-xx not existing or faulty B4 1 first RDIO-xx detected, see *DIO ExtModule1 (98.03)* 0 first RDIO-xx not existing or faulty B5 1 second RDIO-xx detected, see *DIO ExtModule2 (98.04)* 0 second RDIO-xx not existing or faulty B6 1 - 0 - B7 1 - 0 - B8 1 - 0 - B9 1 - 0 - B10 1 SDCS-DSL-4 detected, see *DCSLinkNodeID (94.01)* 0 SDCS-DSL-4 not existing or faulty B11 1 SDCS-IOB-2x detected, see *IO BoardConfig (98.15)* 0 SDCS-IOB-2x not existing or faulty B12 1 SDCS-IOB-3 detected, see *IO BoardConfig (98.15)* 0 SDCS-IOB-3 not existing or faulty B13 1 SDCS-COM-8 detected, see *CommModule (97.02)* and group 70 0 SDCS-COM-8 not existing or faulty B14 1 RMBA-xx (Modbus) detected, see *CommModule (97.02)* and *ModBusModule2 (98.08)* 0 RMBA-xx (Modbus) not existing or faulty B15 1 SDCS-MEM-8 (Memory Card) detected 0 SDCS-MEM-8 (Memory Card) not existing or faulty **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E
4.21	**CPU Load (load of processor)** The calculating power of the processor is divided into two parts: – *CPU Load (4.21)* shows the load of firmware and – *ApplLoad (4.22)* shows the load of application. Neither should reach 100%. **Int. Scaling: 10 == 1 % Type: I Volatile: Y**	-	-	-	%	C
4.22	**ApplLoad (load of application)** The calculating power of the processor is divided into two parts: – *CPU Load (4.21)* shows the load of firmware and – *ApplLoad (4.22)* shows the load of application. Neither should reach 100%. **Int. Scaling: 10 == 1 % Type: I Volatile: Y**	-	-	-	%	C
4.23	**MotNomTorque (motor nominal torque)** Calculated nominal motor torque. **Int. Scaling: 1 == 1Nm Type: I Volatile: Y**	-	-	-	Nm	C
4.24	**ProgressSignal (progress signal for auto tunings)** Progress signal for auto tunings used for Startup Assistants. **Int. Scaling: 1 == 1 % Type: I Volatile: Y**	-	-	-	%	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 5	**Analog I/O**					
5.01	**AITacho Val (analog input for tacho)** Measured actual voltage at analog tacho input. The integer scaling may differ, depending on the connected hardware and jumper setting. **Note1:** A value of 11 V equals 1.25 * *M1OvrSpeed (30.16)* **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	C
5.02	**Unused**					
5.03	**AI1 Val (analog input 1 value)** Measured actual voltage at analog input 1. The integer scaling may differ, depending on the connected hardware and jumper settings. **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	C
5.04	**AI2 Val (analog input 2 value)** Measured actual voltage at analog input 2. The integer scaling may differ, depending on the connected hardware and jumper settings. **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	C
5.05	**AI3 Val (analog input 3 value)** Measured actual voltage at analog input 3. The integer scaling may differ, depending on the connected hardware and jumper settings. **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	E
5.06	**AI4 Val (analog input 4 value)** Measured actual voltage at analog input 4. The integer scaling may differ, depending on the connected hardware and jumper settings. **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	E
5.07	**AI5 Val (analog input 5 value)** Measured actual voltage at analog input 5. The integer scaling may differ, depending on the connected hardware and DIP-switch settings. Available only with RAIO extension module see *AIO ExtModule (98.06).* **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	E
5.08	**AI6 Val (analog input 6 value)** Measured actual voltage at analog input 6. The integer scaling may differ, depending on the connected hardware and DIP-switch settings. Available only with RAIO extension module see *AIO ExtModule (98.06).* **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	E
5.09	**Unused**					
5.10	**Unused**					
5.11	**AO1 Val (analog output 1 value)** Measured actual voltage at analog output 1. **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	C
5.12	**AO2 Val (analog output 2 value)** Measured actual voltage at analog output 2. **Int. Scaling: 1000 == 1 V Type: SI Volatile: Y**	-	-	-	V	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 6	**Drive logic signals**					
6.01	**SystemTime (converter system time)** Shows the time of the converter in minutes. **Int. Scaling: 1 == 1 min Type: I Volatile: Y**	0	64000	0	min	C
6.02	**Unused**					
6.03	**CurCtrlStat1 (1st current controller status)** 1st current controller status word: Bit Value Comment B0 1 command **FansOn** 0 command **FansOff** B1 1 - 0 - B2 1 - 0 - B3 1 motor heating function active 0 motor heating function not active B4 1 field direction reverse 0 field direction forward B5 1 command **FieldOn** 0 command **FieldOff** B6 1 dynamic braking active 0 dynamic braking not active B7 1 command **MainContactorOn** 0 command **MainContactorOff** B8 1 command **DynamicBrakingOn** 0 command **DynamicBrakingOff** B9 1 drive is generating 0 drive is motoring B10 1 - 0 - B11 1 firing pulses active (on) 0 firing pulses blocked B12 1 continuous current 0 discontinuous current B13 1 zero current detected 0 current nonzero B14 1 command trip DC-breaker (continuous signal) 0 no action B15 1 command trip DC-breaker (1 s pulse) 0 no action **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
6.04	**CurCtrlStat2 (2nd current controller status)** 2nd current controller status word. The current controller will be blocked, if any for the bits is set (0 == OK): Bit Value Meaning B0 1 overcurrent, **F502 ArmOverCur** [*FaultWord1 (9.01)* bit 1] 0 no action B1 1 mains overvoltage (AC), **F513 MainsOvrVolt** [*FaultWord1 (9.01)* bit 12] 0 no action B2 1 mains undervoltage (AC), **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11] 0 no action B3 1 waiting for reduction of EMF to match the mains voltage [see *RevVoltMargin (44.21)*] 0 no action B4 1 **F533 ReversalTime** [*FaultWord3 (9.03)* bit 0] or **F534 12PCurDiff** [*FaultWord3 (9.03)* bit 1] 0 no action B5 1 *OperModeSel (43.01)* = **12P…..**: partner blocked) *OperModeSel (43.01)* = **FieldExciter**: Overvoltage protection active (freewheeling) 0 no action B6 1 motor 1 field exciter selftest faulty, **F529 M1FexNotOK** [*FaultWord2 (9.02)* bit 12] 0 motor 1 field exciter selftest OK B7 1 motor 1 field exciter not ready, **F537 M1FexRdyLost** [*FaultWord3 (9.03)* bit 4] 0 motor 1 field exciter ready B8 1 motor 2 field exciter selftest faulty, **F530 M2FexNotOK** [*FaultWord2 (9.02)* bit 13] 0 motor 2 field exciter selftest OK B9 1 motor 2 field exciter not ready, **F538 M2FexRdyLost** [*FaultWord3 (9.03)* bit 5] 0 motor 2 field exciter ready B10 1 waiting for zero current 0 no action B11 1 field reversal active, armature current controller is blocked 0 no action B12 1 - 0 - B13 1 - 0 - B14 1 mains not in synchronism (AC), **F514 MainsNotSync** [*FaultWord1 (9.01)* bit 13] 0 no action B15 1 current controller not released 0 no action **Note1:** A set bit does not necessarily lead to a fault message it depends also on the status of the drive. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C
6.05	**SelBridge (selected bridge)** Selected (current-conducting) bridge: 0 = **NoBridge** no bridge selected 1 = **Bridge1** bridge 1 sel. (motoring bridge) 2 = **Bridge2** bridge 2 sel. (generating bridge) **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
6.06	**FldCtrlAlarm (3-phase field controller alarm)** 3-phase field controller alarm word. This packed binary signal includes alarm signals used in field exciter mode for load monitoring: – OperModeSel (43.01) = **FieldExciter** Bit Value Comment B0 1 DC voltage is over alarm limit of *OvrVoltAlarmLim (46.11)* 0 no action B1 1 DC current is under alarm limit of *MinCurAlarmLim (46.13)* 0 no action **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
6.07	**Unused**					
6.08	**Unused**					
6.09	**CtrlStatMas (12-pulse master control status)** 12-pulse master control status: Bit Value Comment B0 1 command **On** to 12-pulse slave 0 no action B1 1 command **Off2N** to 12-pulse slave (low active) 0 no action B2 1 - 0 - B3 1 command **Run** to 12-pulse slave 0 no action B4 1 command field exciter **On** 0 command field exciter **Off** B5 1 dynamic braking 0 no action B6 1 12-pulse serial operation, see *OperModeSel (43.01)* 0 12-pulse parallel operation, see *OperModeSel (43.01)* B7 1 command **Reset** to 12-pulse slave 0 no action B8 1 - 0 - B9 1 - 0 - B10 1 - 0 - B11 1 autotuning armature current controller active 0 no action B12 1 zero current detected + *RevDly (43.14)* is elapsed 0 no action B13 1 bridge change over active 0 no action B14 1 *CurCtrlStat2 (6.04)* > 0 (current controller is blocked) 0 no action B15 1 *CurRefUsed (3,12)* negative 0 *CurRefUsed (3.12)* positive – The control bits B3 to B6 (**Reset**, **On**, **Run** and **Off2N**) are only valid in the 12-pulse slave, if in the 12-pulse slave *CommandSel (10.01)* = **12P Link** – Valid in 12-pulse master and slave **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
6.10	**CtrlStatSla (12-pulse slave control status)** 12-pulse slave control status: Bit Value Comment B0 1 - 0 - B1 1 - 0 - B2 1 - 0 - B3 1 slave is **Tripped** 0 no action B4 1 - 0 - B5 1 - 0 - B6 1 12-pulse serial operation, see *OperModeSel (43.01)* 0 12-pulse parallel operation, see *OperModeSel (43.01)* B7 1 - 0 - B8 1 - 0 - B9 1 - 0 - B10 1 - 0 - B11 1 - 0 - B12 1 - 0 - B13 1 bridge change over active 0 no action B14 1 *CurCtrlStat2 (6.04)* > 0 (current controller is blocked) 0 no action B15 1 *CurRefUsed (3,12)* negative 0 *CurRefUsed (3.12)* positive – Valid in 12-pulse master and slave **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
6.11	**Unused**					
6.12	**Mot1FexStatus (motor 1 field exciter status)** Motor 1 field exciter status: 0 = **NotUsed** no field exciter connected 1 = **OK** field exciter and communication OK 2 = **ComFault** **F516 M1FexCom** [*FaultWord1 (9.01)* bit 15], communication faulty 3 = **FexFaulty** **F529 M1FexNotOK** [*FaultWord2 (9.02)* bit 12], field exciter selftest faulty 4 = **FexNotReady** **F537 M1FexRdyLost** [*FaultWord3 (9.03)* bit 4], field exciter not ready 5 = **FexUnderCur** **F541 M1FexLowCur** [*FaultWord3 (9.03)* bit 8], field exciter undercurrent 6 = **FexOverCur** **F515 M1FexOverCur** [*FaultWord1 (9.01)* bit 14], field exciter overcurrent 7 = **WrongSetting** check setting of *M1UsedFexType (99.12)* and *M2UsedFexType (49.07)* **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
6.13	**Mot2FexStatus (motor 2 field exciter status)** Motor 1 field exciter status: 0 = **NotUsed** no field exciter connected 1 = **OK** field exciter and communication OK 2 = **ComFault** **F519 M2FexCom** [*FaultWord2 (9.02)* bit 2], communication faulty 3 = **FexFaulty** **F530 M2FexNotOK** [*FaultWord2 (9.02)* bit 13], field exciter selftest faulty 4 = **FexNotReady** **F538 M2FexRdyLost** [*FaultWord3 (9.03)* bit 5], field exciter not ready 5 = **FexUnderCur** **F542 M2FexLowCur** [*FaultWord3 (9.03)* bit 9], field exciter undercurrent 6 = **FexOverCur** **F518 M2FexOverCur** [*FaultWord2 (9.02)* bit 1], field exciter overcurrent 7 = **WrongSetting** check setting of *M1UsedFexType (99.12)* and *M2UsedFexType (49.07)* **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E
Group 7	**Control words**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
7.01	**MainCtrlWord (main control word, MCW)** Main control word:	-	-	-	-	C

Bit	Name	Value	Comment
B0	**On (Off1N)**	1	Command to **RdyRun** state. *MainContCtrlMode (21.16)* = **On**: Close contactors, start field exciter and fans. *MainContCtrlMode (21.16)* = **On&Run**: **RdyRun** flag in *MainStatWord (8.01)* is forced to 1
		0	Command to **Off** state. Stopping via *Off1Mode (21.02)*, then open contactors, stop field exciter and fans.
B1	**Off2N**	1	No **Off2** (Emergency Off / Coast Stop)
		0	Command to **OnInhibit** state. Stop by coasting, open contactors, stop field exciter and fans immediately.
B2	**Off3N**	1	No **Off3** (E-stop)
		0	Command to **OnInhibit** state. Stopping via *E StopMode (21.04)*, open contactors, stop field exciter and fans as needed
B3	**Run**	1	Command to **RdyRef** state. Run with selected speed reference
		0	Command to **RdyRun** state. Stop via *StopMode (21.03).*
B4	**RampOutZero**	1	no action
		0	speed ramp output is forced to zero
B5	**RampHold**	1	no action
		0	freeze (hold) speed ramp
B6	**RampInZero**	1	no action
		0	speed ramp input is forced to zero
B7	**Reset**	1	acknowledge fault indications with the positive edge
		0	no action
B8	**Inching1**	1	constant speed defined by *FixedSpeed1 (23.02)*, active only with *CommandSel (10.01)* = **MainCtrlWord** and **RampOutZero** = **RampHold** = **RampInZero** = 0 plus **Run** command; **Inching2** overrides **Inching1**
		0	no action
B9	**Inching2**	1	constant speed defined by *FixedSpeed2 (23.03)*, active only with *CommandSel (10.01)* = **MainCtrlWord** and **RampOutZero** = **RampHold** = **RampInZero** = 0 plus **Run** command; **Inching2** overrides **Inching1**
		0	no action
B10	**RemoteCmd**	1	overriding control enabled (overriding control has to set this value to 1)
		0	If *MainCtrlWord (7.01)* ≠ 0, retain last *UsedMCW (7.04)* and last *SpeedRefUsed (2.17)*. If *MainCtrlWord (7.01)* = 0 then *UsedMCW (7.04)* = 0 and the drive is stopped.
B11	aux. control	d	used by, Adaptive Program, application program or overriding control to control various functions selected by parameters
B12	aux. control	d	used by, Adaptive Program, application program or overriding control to control various functions selected by parameters
B13	aux. control	d	used by, Adaptive Program, application program or overriding control to control various functions selected by parameters
B14	aux. control	d	used by, Adaptive Program, application program or overriding control to control various functions selected by parameters
B15	aux. control	d	used by, Adaptive Program, application program or overriding control to control various functions selected by parameters

Int. Scaling: 1 == 1 **Type: I** **Volatile: Y**

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
7.02	**AuxCtrlWord (auxiliary control word 1, ACW1)** Auxiliary control word 1: Bit / Name / Value / Comment B0 **RestartDataLog** 1 restart data logger 0 no action B1 **TrigDataLog** 1 trigger data logger 0 no action B2 **RampBypass** 1 bypass speed ramp (speed ramp output is forced to value of speed ramp input) 0 no action B3 **BalRampOut** 1 speed ramp output is forced to BalRampRef (22.08) 0 no action B4 **LimSpeedRef4** 1 SpeedRef4 (2.18) is not limited 0 SpeedRef4 (2.18) is limited by M1SpeedMax (20.02) / M1SpeedMin (20.01) respectively by M2SpeedMax (49.19) / M2SpeedMin (49.20) B5 reserved 1 0 B6 **HoldSpeedCtrl** 1 freeze (hold) the I-part of the speed controller 0 no action B7 **WindowCtrl** 1 release window control 0 block window control B8 **BalSpeedCtrl** 1 speed controller output is forced to BalRef (24.11) 0 no action B9 **SyncCommand** 1 positioning: synchronizing command from SyncCommand (10.04) 0 no action B10 **SyncDisable** 1 positioning: block synchronizing command 0 no action B11 **ResetSyncRdy** 1 positioning: reset SyncRdy [AuxStatWord (8.02) bit 5] 0 no action B12 aux. control d used by, Adaptive Program, application program or overriding control to control various functions selected by parameters B13 aux. control d used by, Adaptive Program, application program or overriding control to control various functions selected by parameters B14 aux. control d used by, Adaptive Program, application program or overriding control to control various functions selected by parameters B15 aux. control d used by, Adaptive Program, application program or overriding control to control various functions selected by parameters **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
7.03	**AuxCtrlWord2 (auxiliary control word 2, ACW2)** Auxiliary control word 1: Bit / Name / Value / Comment B0 reserved 1 0 B1 reserved 1 0 B2 reserved 1 0 B3 reserved 1 0 B4 **DisableBridge1** 1 bridge 1 blocked 0 bridge 1 released B5 **DisableBridge2** 1 bridge 2 blocked 0 bridge 2 released B6 reserved 1 0 B7 reserved 1 0 B8 **DriveDirection** 1 drive direction reverse (see note 1) 0 drive direction forward (see note 1) B9 reserved 1 0 B10 **DirectSpeedRef** 1 speed ramp output is overwritten and forced to *DirectSpeedRef (23.15)* 0 speed ramp is active B11 reserved 1 0 B12 **ForceBrake** 1 apply the brake 0 brake not applied (see note 2) B13 reserved 1 0 B14 reserved 1 0 B15 **ResetPIDCtrl** 1 reset and force PID-controller 0 release PID controller **Note1:** Changes of **DriveDirection** become active only in drive state **RdyRun**. Changing the speed direction of a running drive (**RdyRef** state) by means of **DriveDirection** is not possible. **Note2:** In case **ForceBrake** = 0, the brake is controlled by the internal brake logic in group 42 (Brake control). **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C
7.04	**UsedMCW (used main control word, UMCW)** Internal used (selected) main control word. The selection is depending on the drives local/remote control and *CommandSel (10.01).* The bit functionality is the same as the in the MainCtrlWord (7.01). Not all functions are available in local control or local I/O mode. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

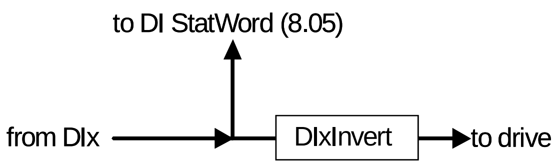
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
7.05	**DO CtrlWord (digital output control word, DOCW)** The DO control word is used by Adaptive Program, application program or overriding control. To connect bits of the *DO CtrlWord (7.05)* with **DO1** to **DO8** use the parameters in group 14 (Digital outputs). **DO9** to **DO12** are fixed written to the extension I/O's and only available for Adaptive Program, application program or overriding control. Bit Name Comment B0 **DO1** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B1 **DO2** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B2 **DO3** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B3 **DO4** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B4 **DO5** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B5 **DO6** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B6 **DO7** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B7 **DO8** this bit has to be send to the digital output via the parameters of group 14 (Digital outputs) B8 **DO9** this bit is written directly to DO1 of the extension IO defined by *DIO ExtModule1 (98.03)* B9 **DO10** this bit is written directly to DO2 of the extension IO defined by *DIO ExtModule1 (98.03)* B10 **DO11** this bit is written directly to DO1 of the extension IO defined by *DIO ExtModule2 (98.04)* B11 **DO12** this bit is written directly to DO2 of the extension IO defined by *DIO ExtModule2 (98.04)* B12 reserved to B15 reserved **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C
7.06	**RFE CtrlWord (control word resonance frequency eliminator, RFECW)** **R**esonance **F**requency **E**liminator control word Bit Name Value Comment B0 **FilterRelease** 1 release RFE filter 0 block RFE filter B1 **BalFilter** 1 balance RFE filter (on parameter change or release) 0 no action B2 reserved to B15 reserved **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 8	**Status / limit words**					
8.01	**MainStatWord (main status word, MSW)** Main status word:	-	-	-	-	C

Bit	Name	Value	Comment
B0	**RdyOn**	1	ready to switch on
		0	not ready to switch on
B1	**RdyRun**	1	ready to generate torque
		0	not ready to generate torque
B2	**RdyRef**	1	operation released **(Running)**
		0	operation blocked
B3	**Tripped**	1	fault indication
		0	no fault
B4	**Off2NStatus**	1	**Off2** not active
		0	**Off2** (**OnInhibit** state) active
B5	**Off3NStatus**	1	**Off3** not active
		0	**Off3** (**OnInhibit** state) active
B6	**OnInhibited**	1	**OnInhibited** state is active after a: - fault - Emergency Off / Coast Stop **(Off3)** - E-stop **(Off2)** - **OnInhibited** via digital input *Off2 (10.08)* or *E Stop (10.09)*
		0	**OnInhibit** state not active
B7	**Alarm**	1	alarm indication
		0	no alarm
B8	**AtSetpoint**	1	setpoint / actual value monitoring in the tolerance zone
		0	setpoint / actual value monitoring out of the tolerance zone
B9	**Remote**	1	remote control
		0	local control
B10	**AboveLimit**	1	speed greater than defined in *SpeedLev (50.10)*
		0	speed lower or equal than defined *SpeedLev (50.10)*
B11 to B15	reserved reserved		

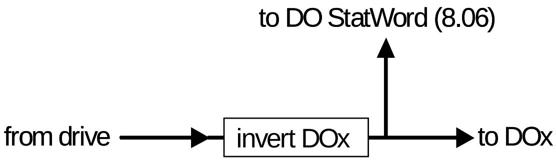
Int. Scaling: 1 == 1 Type: I Volatile: Y

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
8.02	**AuxStatWord (auxiliary status word, ASW)** Auxiliary status word: Bit / Name / Value / Comment B0 **DataLogReady** 1 contents of data logger is readable 0 contents of data logger is not readable B1 **OutOfWindow** 1 actual speed is out of window defined by *WinWidthPos (23.08)* and *WinWidthNeg (23.09)* 0 actual speed is inside the defined window B2 **E-StopCoast** 1 E-stop function has failed, see *E StopDecMin (21.05), E StopDecMax (21.06)* and *DecMonDly (21.07)* 0 no action B3 **User1** 1 macro **User1** active, see *ApplMacro (99.08)* 0 macro **User1** not active B4 **User2** 1 macro **User2** active, see *ApplMacro (99.08)* 0 macro **User2** not active B5 **SyncRdy** 1 positioning: synchronous ready 0 positioning: not ready B6 **Fex1Ack** 1 motor 1 field exciter acknowledged 0 no action B7 **Fex2Ack** 1 motor 2 field exciter acknowledged 0 no action B8 **BrakeCmd** 1 command to open (lift) the brake is given, see group 42 (Brake control) 0 command to apply the brake is given B9 **Limiting** 1 drive is in a limit, see *LimWord (8.03)* 0 drive is not in a limit, B10 **TorqCtrl** 1 drive is torque controlled 0 no action B11 **ZeroSpeed** 1 actual motor speed is in the zero speed limit defined by *ZeroSpeedLim (20.03)* 0 actual motor speed is out of the zero speed limit B12 **EMFSpeed** 1 *M1SpeedFbSel (50.03)* = **EMF** 0 no action B13 **FaultOrAlarm** 1 fault or alarm indication 0 no fault or alarm indication B14 **DriveDirectionNeg** 1 negative drive direction active 0 positive drive direction active B15 **AutoReclosing** 1 auto reclosing logic is active 0 no action **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
8.03	**LimWord (limit word, LW)** Limit word: Bit active limit B0 *TorqMax (20.05)* or *TorqMaxAll (2.19)* B1 *TorqMin (20.06)* or *TorqMinAll (2.20)* B2 *TorqMaxSPC (20.07)* or *TorqMaxAll (2.19)* B3 *TorqMinSPC (20.08)* or *TorqMinAll (2.20)* B4 *TorqMaxTref (20.09)* B5 *TorqMinTref (20.10)* B6 *M1SpeedMax (20.02)* or *M2SpeedMax (49.20)* B7 *M1SpeedMin (20.01)* or *M2SpeedMin (49.19)* B8 *M1CurLimBrdg1 (20.12)* or *M2CurLimBrdg1 (49.12)* B9 *M1CurLimBrdg2 (20.13)* or *M2CurLimBrdg2 (49.13)* B10 reserved to B15 reserved **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
8.04	**Unused**					
8.05	**DI StatWord (digital inputs status word, DISW)** Digital input word, shows the value of the digital inputs before inversion [DI1Invert (10.25), …, DI11Invert (10.35)]:  Bit Name Comment / default setting B0 **DI1** *ConvFanAck (10.20)*, actual setting depends on macro B1 **DI2** *MotFanAck (10.06)*, actual setting depends on macro B2 **DI3** *MainContAck (10.21)*, actual setting depends on macro B3 **DI4** *Off2 (10.08)*, actual setting depends on macro B4 **DI5** *E Stop (10.09)*, actual setting depends on macro B5 **DI6** *Reset (10.03)*, actual setting depends on macro B6 **DI7** *OnOff (10.15)*, actual setting depends on macro B7 **DI8** *StartStop (10.16)*, actual setting depends on macro B8 **DI9** DI1 of the extension IO defined by *DIO ExtModule1 (98.03)* B9 **DI10** DI2 of the extension IO defined by *DIO ExtModule1 (98.03)* B10 **DI11** DI3 of the extension IO defined by *DIO ExtModule1 (98.03)* B11 **DI12** DI1 of the extension IO defined by *DIO ExtModule2 (98.04).* Only available for Adaptive Program, application program or overriding control. B12 **DI13** DI2 of the extension IO defined by *DIO ExtModule2 (98.04).* Only available for Adaptive Program, application program or overriding control. B13 **DI14** DI3 of the extension IO defined by *DIO ExtModule2 (98.04).* Only available for Adaptive Program, application program or overriding control. B14 reserved B15 reserved **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
8.06	**DO StatWord (digital outputs status word, DOSW)**	-	-	-	-	C

Digital output word, shows the value of the digital outputs after inversion:



Bit	Name	Comment / default setting
B0	**DO1**	*DO1Index (14.01)* = 603 and *DO1BitNo (14.02)* = 15, **FansOn**, actual setting depends on macro
B1	**DO2**	*DO2Index (14.03)* = 603 and *DO2BitNo (14.04)* = 5, **FieldOn**, actual setting depends on macro
B2	**DO3**	*DO3Index (14.05)* = 603 and *DO3BitNo (14.06)* = 7, **MainContactorOn**, actual setting depends on macro
B3	**DO4**	*DO4Index (14.07)* = 0 and *DO4BitNo (14.08)* = 0, Not connected, actual setting depends on macro
B4	**DO5**	*DO5Index (14.09)* = 0 and *DO5BitNo (14.10)* = 0, Not connected, actual setting depends on macro
B5	**DO6**	*DO6Index (14.11)* = 0 and *DO6BitNo (14.12)* = 0, Not connected, actual setting depends on macro
B6	**DO7**	*DO7Index (14.13)* = 0 and *DO7BitNo (14.14)* = 0, Not connected, actual setting depends on macro
B7	**DO8**	*DO8Index (14.15)* = 603 and *DO8BitNo (14.16)* = 7, **MainContactorOn**, actual setting depends on macro
B8	**DO9**	DO1 of the extension IO defined by *DIO ExtModule1 (98.03),* written to by *DO CtrlWord (7.05)* bit 8
B9	**DO10**	DO2 of the extension IO defined by *DIO ExtModule1 (98.03),* written to by *DO CtrlWord (7.05)* bit 9
B10	**DO11**	DO1 of the extension IO defined by *DIO ExtModule2 (98.04),* written to by *DO CtrlWord (7.05)* bit 10
B11	**DO12**	DO2 of the extension IO defined by *DIO ExtModule2 (98.04),* written to by *DO CtrlWord (7.05)* bit 11
B12 to B15	reserved reserved	

Int. Scaling: 1 == 1 Type: I Volatile: Y

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
8.07	**Unused**					
8.08	**DriveStat (drive status)**	-	-	-	-	C

Drive status:

0 = **OnInhibited**	drive is in **OnInhibit** state
1 = **ChangeToOff**	drive is changing to **Off**
2 = **Off**	drive is **Off**
3 = **RdyOn**	drive is ready on
4 = **RdyRun**	drive is ready run
5 = **Running**	drive is **Running**
6 = **Stopping**	drive is **Stopping**
7 = **Off3**	drive is in **Off3** state (E-stop)
8 = **Off2**	drive is in **Off2** state (Emergency Off or Coast Stop)
9 = **Tripped**	drive is **Tripped**

Int. Scaling: 1 == 1 Type: C Volatile: Y

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
8.09	**MotSel (selected motor)** Select motor and field exciter: 0 = **Motor1** motor 1 and field exciter 1 are selected 1 = **Motor2** motor 2 and field exciter 2 are selected - See *ParChange (10.10)* **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	E
8.10	**MacroSel (selected macro)** Currently selected macro: 0 = **NotUsed** default 1 = **Factory** factory (default) parameter set 2 = **User1Load** **User1** parameter set 3 = **User1Save** save actual parameter set into **User1** 4 = **User2Load** **User2** parameter set 5 = **User2Save** save actual parameter set into **User2** 3 = **Standard** standard parameter set 4 = **Man/Const** manual / constant speed 5 = **Hand/Auto** hand (manual) / automatic 6 = **Hand/MotPot** hand (manual) / motor potentiometer 7 = reserved reserved 8 = **MotPot** motor potentiometer 9 = **TorqCtrl** torque control - See *ApplMacro (99.08)* **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
8.11	**RFE StatWord (status word resonance frequency eliminator)** **R**esonance **F**requency **E**liminator control word Bit Name Value Comment B0 **FiltParCalcAct** 1 internal parameters are being calculated, filter algorithm is skipped 0 no action B1 **ParUdpReq** 1 parameter update request after parameter change 0 no action B2 **FiltReleased** 1 RFE filter is released 0 RFE filter is blocked B3 **ParChange** 1 parameter have changed 0 no action B4 reserved to B15 reserved **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 9	**Fault / alarm words**					
9.01	**FaultWord1 (fault word 1)** Fault word 1: Bit / Fault text / Fault code and trip level / Comment B0 **AuxUnderVolt** F501 1 auxiliary undervoltage (threshold see hardware manual) B1 **ArmOverCur** F502 3 armature overcurrent, *ArmOvrCurLev (30.09)* B2 **ArmOverVolt** F503 3 armature overvoltage, *ArmOvrVoltLev (30.08)* B3 **ConvOverTemp** F504 2 converter overtemperature, *ConvTempDly (97.05)*, shutdown temperature see *MaxBridgeTemp (4.17)* B4 **ResCurDetect** F505 1 residual current detection, *ResCurDetectSel (30.05)*, *ResCurDetectLim (30.06)*, *ResCurDetectDel (30.07)* B5 **M1OverTemp** F506 2 motor 1 measured overtemperature, *M1FaultLimTemp (31.07)* or *M1KlixonSel (31.08)* B6 **M1OverLoad** F507 2 motor 1 calculated overload (thermal model), *M1FaultLimLoad (31.04)* B7 **I/OBoardLoss** F508 1 I/O board not found or faulty, *DIO ExtModule1 (98.03)*, *DIO ExtModule2 (98.04)*, *AIO ExtModule (98.06)*, *AIO MotTempMeas (98.12), IO BoardConfig (98.15)* B8 **M2OverTemp** F509 2 motor 2 measured overtemperature, *M2FaultLimTemp (49.37)* or *M2KixonSel (49.38)* B9 **M2OverLoad** F510 2 motor 2 calculated overload (thermal model), *M2FaultLimLoad (49.34)* B10 **ConvFanCur** F511 4 converter fan current, *ConvTempDly (97.05)* B11 **MainsLowVolt** F512 3 mains low (under-) voltage, *PwrLossTrip (30.21), UNetMin1 (30.22)*, *UNetMin2 (30.23)* B12 **MainsOvrVolt** F513 1 mains overvoltage, actual mains voltage is > 1.3 * *NomMainsVolt (99.10)* for more than 10 s. B13 **MainsNotSync** F514 3 mains not in synchronism, *DevLimPLL (97.13)* B14 **M1FexOverCur** F515 1 motor 1 field exciter overcurrent, *M1FldOvrCurLev (30.13)* B15 **M1FexCom** F516 1 motor 1 field exciter communication loss, *FexTimeOut (94.07), DCSLinkNodeID (94.01)*, *M1FexNode (94.08)* **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.02	**FaultWord2 (fault word 2)** Fault word 2:	-	-	-	-	C

Bit	Fault text	Fault code and trip level		Comment
B0	**ArmCurRipple**	F517	3	armature current ripple, *CurRippleMode (30.18), CurRippleLim (30.19)*
B1	**M2FexOverCur**	F518	1	motor 2 field exciter overcurrent, *M2FldOvrCurLev (49.09)*
B2	**M2FexCom**	F519	1	motor 2 field exciter communication loss *FexTimeOut (94.07), DCSLinkNodeID (94.01), M2FexNode (94.09)*
B3	reserved	F520	-	no action
B4	**FieldAck**	F521	1	selected motor: field acknowledge, check fault message of or at field exciter
B5	**SpeedFb**	F522	3	selected motor: speed feedback, *SpeedFbFltMode (30.36), M1SpeedFbSel (50.03)*
B6	**ExtFanAck**	F523	4	external fan acknowledge missing *MotFanAck (10.06)*
B7	**MainContAck**	F524	3	main contactor acknowledge missing, *MainContAck (10.21)*
B8	**TypeCode**	F525	1	type code mismatch, *TypeCode (97.01)*
B9	**ExternalDI**	F526	1	external fault via binary input, *ExtFaultSel (30.31)*
B10	**ConvFanAck**	F527	4	converter fan acknowledge missing, *ConvFanAck (10.20)*
B11	**FieldBusCom**	F528	5	fieldbus communication loss, *ComLossCtrl (30.28), FB TimeOut (30.35), CommModule (98.02)*
B12	**M1FexNotOK**	F529	1	motor 1 field exciter not okay
B13	**M2FexNotOK**	F530	1	motor 2 field exciter not okay
B14	**MotorStalled**	F531	3	selected motor: motor stalled, *StallTime (30.01), StallSpeed (30.02), StallTorq (30.03)*
B15	**MotOverSpeed**	F532	3	selected motor: motor overspeed, *M1OvrSpeed (30.16)*

Int. Scaling: 1 == 1 **Type: I** **Volatile: Y**

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.03	**FaultWord3 (fault word 3)** Fault word 3: <table><tr><td>Bit</td><td>Fault text</td><td>Fault code and trip level</td><td></td><td>Comment</td></tr><tr><td>B0</td><td>**ReversalTime**</td><td>F533</td><td>3</td><td>reversal time, *ZeroCurTimeOut (97.19) plus RevDly (43.14), 12P RevTimeOut (47.05)*</td></tr><tr><td>B1</td><td>**12PCurDiff**</td><td>F534</td><td>3</td><td>12-pulse current difference, *DiffCurLim (47.02), DiffCurDly (47.03)*</td></tr><tr><td>B2</td><td>**12PulseCom**</td><td>F535</td><td>3</td><td>12-pulse communication loss, *12P TimeOut (94.03), DCSLinkNodeID (94.01), 12P SlaNode (94.04)*</td></tr><tr><td>B3</td><td>**12PSlaveFail**</td><td>F536</td><td>4</td><td>12-pulse slave failure, this fault message trips the 12-pulse master and appears only in the 12-pulse master</td></tr><tr><td>B4</td><td>**M1FexRdyLost**</td><td>F537</td><td>1</td><td>motor 1 field exciter lost ready-for-operation message while working</td></tr><tr><td>B5</td><td>**M2FexRdyLost**</td><td>F538</td><td>1</td><td>motor 2 field exciter lost ready-for-operation message while working</td></tr><tr><td>B6</td><td>**FastCurRise**</td><td>F539</td><td>1</td><td>fast current rise, *ArmCurRiseMax (30.10)*</td></tr><tr><td>B7</td><td>**COM8Faulty**</td><td>F540</td><td>1</td><td>SDCS-COM-8 not found or faulty, *SysComBoard (98.16)*</td></tr><tr><td>B8</td><td>**M1FexLowCur**</td><td>F541</td><td>1</td><td>motor 1 field exciter low (under-) current, *M1FldMinTrip (30.12), FldMinTripDly (45.18)*</td></tr><tr><td>B9</td><td>**M2FexLowCur**</td><td>F542</td><td>1</td><td>motor 2 field exciter low (under-) current, *M2FldMinTrip (49.08), FldMinTripDly (45.18)*</td></tr><tr><td>B10</td><td>**COM8Com**</td><td>F543</td><td>5</td><td>SDCS-COM-8 communication loss, *Ch0ComLossCtrl (70.05)*, *Ch0TimeOut (70.04)*, *Ch2ComLossCtrl (70.15)*, *Ch2TimeOut (70.14)*</td></tr><tr><td>B11</td><td>**P2PandMFCom**</td><td>F544</td><td>5</td><td>Peer to peer and master follower communication loss, *ComLossCtrl (30.28), MailBoxCycle1 (94.13)*, *MailBoxCycle2 (94.19)*, *MailBoxCycle3 (94.25)*, *MailBoxCycle4 (94.31)*</td></tr><tr><td>B12</td><td>**ApplLoadFail**</td><td>F545</td><td>1</td><td>application load failure, see *Diagnosis (9.11)*</td></tr><tr><td>B13</td><td>**LocalCmdLoss**</td><td>F546</td><td>5</td><td>local command loss, *LocalLossCtrl (30.27)*</td></tr><tr><td>B14</td><td>**HwFailure**</td><td>F547</td><td>1</td><td>hardware failure, see *Diagnosis (9.11)*</td></tr><tr><td>B15</td><td>**FwFailure**</td><td>F548</td><td>1</td><td>firmware failure, see *Diagnosis (9.11)*</td></tr></table>**Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.04	**FaultWord4 (fault word 4)** Fault word 4: Bit – Fault text – Fault code and trip level – Comment B0 **ParComp** F549 1 parameter compatibility, the parameter causing the fault can be identified in *Diagnosis (9.11)* B1 **ParMemRead** F550 1 reading the actual parameter set or a user parameter set from either parameter flash or Memory Card failed (checksum fault) B2 **AIRange** F551 4 analog input range, *AI Mon4mA (30.29)* B3 **MechBrake** F552 3 selected motor: mechanical brake, *BrakeFaultFunc (42.06), StrtTorqRefSel (42.07)* B4 **TachPolarity** F553 3 selected motor: tacho polarity B5 **TachoRange** F554 3 Overflow of AITacho input B6 reserved F555 reserved for PID-controller B7 reserved F556 no action B8 reserved F557 no action B9 reserved F558 no action B10 reserved F559 no action B11 **APFault1** F601 1 Adaptive Program fault 1 B12 **APFault2** F602 1 Adaptive Program fault 2 B13 **APFault3** F603 1 Adaptive Program fault 3 B14 **APFault4** F604 1 Adaptive Program fault 4 B15 **APFault5** F605 1 Adaptive Program fault 4 **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C
9.05	**UserFaultWord (user defined fault word 1)** User defined fault word. All names are defined by the user via application program: Bit – Fault text – Fault code and trip level – Comment B0 **UserFault1** F610 1 B1 **UserFault2** F611 1 B2 **UserFault3** F612 1 B3 **UserFault4** F613 1 B4 **UserFault5** F614 1 B5 **UserFault6** F615 1 B6 **UserFault7** F616 1 B7 **UserFault8** F617 1 B8 **UserFault9** F618 1 B9 **UserFault10** F619 1 B10 **UserFault11** F620 1 B11 **UserFault12** F621 1 B12 **UserFault13** F622 1 B13 **UserFault14** F623 1 B14 **UserFault15** F624 1 B15 **UserFault16** F625 1 **Int. Scaling: 1 == 1 Type: I Volatile: Y**					E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.06	**AlarmWord1 (alarm word 1)** Alarm word 1: Bit / Alarm text / Alarm code and alarm level / Comment B0 **Off2ViaDI** A101 1 **Off2** (Emergency Off / Coast Stop) pending via digital input, Off2 (10.08) B1 **Off3ViaDI** A102 1 **Off3** (E-stop) pending via digital input, *E Stop (10.09)* B2 **DCBreakAck** A103 3 selected motor: DC-breaker acknowledge missing, *DCBreakAck (10.23)* B3 **ConvOverTemp** A104 2 converter overtemperature, shutdown temperature see *MaxBridgeTemp (4.17)*. The converter overtemperature alarm will already appear at approximately 5°C below the shutdown temperature. B4 **DynBrakeAck** A105 1 selected motor: dynamic braking acknowledge is still pending, *DynBrakeAck (10.22)* B5 **M1OverTemp** A106 2 motor 1 measured overtemperature, *M1AlarmLimTemp (31.06)* B6 **M1OverLoad** A107 2 motor 1 calculated overload (thermal model), *M1AlarmLimLoad (31.03)* B7 reserved A108 4 no action B8 **M2OverTemp** A109 2 motor 2 measured overtemperature, *M2AlarmLimTemp (49.36)* B9 **M2OverLoad** A110 2 motor 2 calculated overload (thermal model), *M2AlarmLimLoad (49.33)* B10 **MainsLowVolt** A111 3 mains low (under-) voltage, *PwrLossTrip (30.21), UNetMin1 (30.22)*, *UNetMin2 (30.23)* B11 **P2PandMFCom** A112 4 Drive-to-drive and master follower communication loss, *ComLossCtrl (30.28), MailBoxCycle1 (94.13)*, *MailBoxCycle2 (94.19)*, *MailBoxCycle3 (94.25)*, *MailBoxCycle4 (94.31)* B12 **COM8Com** A113 4 SDCS-COM-8 communication loss, *Ch0ComLossCtrl (70.05)*, *Ch0TimeOut (70.04), Ch2ComLossCtrl (70.15)*, *Ch2TimeOut (70.14)* B13 **ArmCurDev** A114 3 armature current deviation B14 **TachoRange** A115 4 Overflow of AITacho input or *M1OvrSpeed (30.16)* respectively *M2OvrSpeed (49.21)* have been changed B15 reserved A116 - no action **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.07	**AlarmWord2 (alarm word 2)** Alarm word 2: Bit — Alarm text — Alarm code and alarm level — Comment B0 **ArmCurRipple** A117 4 armature current ripple, *CurRippleMode (30.18, CurRippleLim (30.19)* B1 **FoundNewAppl** A118 1 found new application on Memory Card, activate application on Memory Card by means of *ParSave (16.06)* = **EableAppl** B2 **ApplDiff** A119 1 application on drive and Memory Card are different, activate application on Memory Card by means of *ParSave (16.06)* = **EableAppl** B3 **OverVoltProt** A120 3 overvoltage protection active, *OvrVoltProt (30.13)* B4 **AutotuneFail** A121 4 autotuning failure, *Diagnosis (9.11)* B5 **MechBrake** A122 4 selected motor: mechanical brake, *BrakeFaultFunc (42.06), StrtTorqRefSel (42.07)* B6 **FaultSuppres** A123 4 at least one fault message is mask, *FaultMask (30.25)* B7 **SpeedScale** A124 4 speed scaling out of range, *M1SpeedScale (50.01)* and *M1BaseSpeed (99.04)*, the parameter causing the alarm can be identified in *Diagnosis (9.11)* B8 **SpeedFb** A125 4 selected motor: speed feedback, *M1SpeedFbSel (50.03)*, *SpeedFbFltMode (30.36)*, *SpeedFbFltSel (30.17)* B9 **ExternalDI** A126 4 external alarm via binary input, *ExtAlarmSel (30.32)* B10 **AIRange** A127 4 analog input range, *AI Mon4mA(30.29)* B11 **FieldBusCom** A128 4 fieldbus communication loss, *ComLossCtrl (30.28)* B12 **ParRestored** A129 4 The parameters found in flash memory were found invalid at power-up (checksum fault). The parameters were restored from the parameter backup. B13 **LocalCmdLoss** A130 4 local command loss, *LocalLossCtrl (30.27)* B14 **ParAdded** A131 4 A new firmware with a different amount of parameters was downloaded. The new parameters are set to their default values. The parameters causing the alarm can be identified in *Diagnosis (9.11)*. B15 **ParConflict** A132 4 parameter setting conflict, the parameter causing the alarm can be identified in *Diagnosis (9.11)* **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.08	**AlarmWord3 (alarm word 3)** Alarm word 3: Bit — Alarm text — Alarm code and alarm level — Comment B0 reserved A133 - no action B1 **ParComp** A134 4 parameter compatibility, the parameter causing the alarm can be identified in *Diagnosis (9.11)* B2 **ParUpDwnLoad** A135 4 The checksum verification failed during up- or download of parameters. Please try again. B3 **NoAPTaskTime** A136 4 Adaptive Program task for not set in *TimeLevSel (83.04)* B4 **SpeedNotZero** A137 1 Re-start of drive is not possible. Speed zero has not been reached (only in case *FlyStart (21.10)* = **StartFrom0**). *ZeroSpeedLim (20,03)* B5 **Off2FieldBus** A138 1 **Off2** (Emergency Off / Coast Stop) pending via fieldbus, Off2 (10.08) B6 **Off3FieldBus** A139 1 **Off3** (E-stop) pending via fieldbus, *E Stop (10.09)* B7 **IllgFieldBus** A140 4 the fieldbus parameters in group 51 (fieldbus) are not set according to the fieldbus adapter or the device has not been selected B8 **COM8FwVer** A141 4 invalid combination of SDCS-CON-4 firmware and SDCS-COM-8 firmware B9 **MemCardMiss** A142 1 Memory Card missing B10 **MemCardFail** A143 1 checksum failure or wrong Memory Card B11 **APAlarm1** A301 4 Adaptive Program alarm 1 B12 **APAlarm2** A302 4 Adaptive Program alarm 2 B13 **APAlarm3** A303 4 Adaptive Program alarm 3 B14 **APAlarm4** A304 4 Adaptive Program alarm 4 B15 **APAlarm5** A305 4 Adaptive Program alarm 5 **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	C
9.09	**UserAlarmWord (user defined alarm word 1)** User defined alarm word. All names are defined by the user via application program: Bit — Alarm text — Alarm code and alarm level — Comment B0 **UserAlarm1** A310 4 B1 **UserAlarm2** A311 4 B2 **UserAlarm3** A312 4 B3 **UserAlarm4** A313 4 B4 **UserAlarm5** A314 4 B5 **UserAlarm6** A315 4 B6 **UserAlarm7** A316 4 B7 **UserAlarm8** A317 4 B8 **UserAlarm9** A318 4 B9 **UserAlarm10** A319 4 B10 **UserAlarm11** A320 4 B11 **UserAlarm12** A321 4 B12 **UserAlarm13** A322 4 B13 **UserAlarm14** A323 4 B14 **UserAlarm15** A324 4 B15 **UserAlarm16** A325 4 **Int. Scaling: 1 == 1 Type: I Volatile: Y**					E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.10	**SysFaultWord (system fault word)** Operating system faults from SDCS-COM-8 board: Bit Fault text Fault code F B0 Factory macro parameter file error - B1 User macro parameter file error - B2 Non Volatile operating system error - B3 File error in FLASH - B4 Internal time level T2 overflow (100 µs) - B5 Internal time level T3 overflow (1 ms) - B6 Internal time level T4 overflow (50 ms) - B7 Internal time level T5 overflow (1 s) - B8 State overflow - B9 Application window ending overflow - B10 Application program overflow - B11 Illegal instruction - B12 Register stack overflow - B13 System stack overflow - B14 System stack underflow - B15 reserved - **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
9.11	**Diagnosis (diagnosis)** Displays diagnostics messages: 0 = no message **Firmware:** 1 = reserved 2 = parameter flash image too small for all parameters 3 - 5 = reserved 6 = wrong type code 7 = an un-initialized interrupted has occurred 8, 9 = reserved 10 = wrong parameter value **Autotuning:** 11 = autotuning aborted by fault or removing the Run command [UsedMCW (7.04) bit 3] 12 = autotuning timeout, RUN command [UsedMCW (7.04) bit 3] is not set in time 13 = motor is still turning, no speed zero indication 14 = field current not zero 15 = armature current not zero 16 = armature voltage measurement circuit open (e.g. not connected) respectively interrupted 17 = armature circuit and/or armature voltage measurement circuit wrongly connected 18 = no load connected to armature circuit 19 = invalid nominal armature current setting; armature current *M1MotNomCur (99.03)* is set to zero 20 = field current does not decrease when the excitation is switched off 21 = field current actual doesn't reach field current reference; no detection of field resistance; field circuit open (e.g. not connected) respectively interrupted 22 = no writing of control parameters of speed controller 23 = tacho adjustment faulty or not OK 24 - 49 reserved **Hardware:** 50 = parameter FLASH faulty (erase) 51 = parameter FLASH faulty (program) 52 - 69 reserved **A132 ParConflict** (alarm parameter setting conflict): 70 = reserved 71 = flux linearization parameters not consistent 72 = reserved 73 = parameter overflow 74 - 79 reserved	0	65535	0	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Autotuning: 80 = speed does not reach setpoint (EMF control) 81 = motor is not accelerating or wrong tacho polarity (tacho / encoder) 82 = not enough load (too low inertia) for the detection of speed controller parameters 83 - 89 reserved **Thyristor diagnosis:** 90 = shortcut caused by V1 91 = shortcut caused by V2 92 = shortcut caused by V3 93 = shortcut caused by V4 94 = shortcut caused by V5 95 = shortcut caused by V6 96 = thyristor block test failed 97 = shortcut caused by V15 or V22 98 = shortcut caused by V16 or V23 99 = shortcut caused by V11 or V24 100 = shortcut caused by V12 or V25 101 = shortcut caused by V13 or V26 102 = shortcut caused by V14 or V21 103 = motor connected to ground 104 = armature winding is not connected 105 - 120 reserved **AI monitoring:** 121 = AI1 below 4 mA 122 = AI2 below 4 mA 123 = AI3 below 4 mA 124 = AI4 below 4 mA 125 = AI5 below 4 mA 126 = AI6 below 4 mA 127 = AITAC below 4 mA 128 - 149 reserved **Option modules:** 150 = fieldbus module missing see *CommModule (98.02)* 151 = SDCS-COM-8 for DDCS- respectively fieldbus communication missing see *CommModule (98.02)* 152 = SDCS-COM-8 for master-follower communication missing see group 70 153 = reserved 154 = RMBA-xx module missing see group 98 155 = RAIO-xx in option slot on SDCS-CON-4 missing see group 98 156 = RAIO-xx in option slot on AIMA missing see group 98 157 = RDIO-xx in option slot on SDCS-CON-4 missing see group 98 158 = RDIO-xx in option slot on AIMA missing see group 98 159 = RTAC-xx in option slot on SDCS-CON-4 missing see group 98 160 = RTAC-xx in option slot on AIMA missing see group 98 161 = reserved 162 = SDCS-IOB2x respectively SDCS-IOB-3 connection does not match selection in *IO BoardConfig (98.15)* 163 = SDCS-DSL-4 missing see group 94 (needed for DCSLink) 164 = SDCS-DSL-4 missing see group 94 (needed for Modbus) **A134 ParComp** (alarm parameter compatibility conflict): 10000 … 19999 = the parameter with the compatibility conflict can be identified by means of the last 4 digits					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Thyristor diagnosis: 30000 = possibly trigger pulse channels are mixed up 31x00 = V1 or V11 not conducting 32x00 = V2 or V12 not conducting 33x00 = V3 or V13 not conducting 34x00 = V4 or V14 not conducting 35x00 = V5 or V15 not conducting 36x00 = V6 or V16 not conducting x = 0: only a single thyristor is not conducting (e.g. 32000 means V2 respectively V12 is not conducting) x = 1 … 6: additionally a second thyristor is no conducting (e.g. 32500 means V2 and V5 respectively V12 and V15 are not conducting) 3001y = V21 not conducting 3002y = V22 not conducting 3003y = V23 not conducting 3004y = V24 not conducting 3005y = V25 not conducting 3006y = V26 not conducting y = 0: only a single thyristor is not conducting (e.g. 30020 means V22 is not conducting) y = 1 … 6: additionally a second thyristor is no conducting (e.g. 30025 means V22 and V25 are not conducting) **A124 SpeedScale** (alarm speed scaling): 40000 … 49999 = the parameter with the speed scaling conflict can be identified by means of the last 4 digits **F549 ParComp** (fault parameter compatibility conflict): 50000 … 59999= the parameter with the compatibility conflict can be identified by means of the last 4 digits **F545 ApplLoadFail** (ControlBuilder DCS800 application programming): 64110 = task not configured 64112 = attempt to run an illegal copy of a protected program 64113 = retain data invalid caused by SDCS-CON-4 hardware problem 64125 = 5 ms task halted (e.g. task contains an endless loop) 64126 = 20 ms task halted (e.g. task contains an endless loop) 64127 = 100 ms task halted (e.g. task contains an endless loop) 64128 = 500 ms task halted (e.g. task contains an endless loop) Int. Scaling: 1 == 1 Type: I Volatile: Y					
9.12	**LastFault (last fault)** Displays the last fault: **F<Fault code> <FaultName>** (e.g. **F2 ArmOverCur**) **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
9.13	**2nd LastFault (2nd last fault)** Displays the 2nd last fault: **F<Fault code> <FaultName>** (e.g. **F2 ArmOverCur**) **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
9.14	**3rd LastFault (3rd last fault)** Displays the 3rd last fault: **F<Fault code> <FaultName>** (e.g. **F2 ArmOverCur**) **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 10	**Start / stop select**					
10.01	**CommandSel (command selector)** *UsedMCW (7.04)* selector: 0 = **Local I/O** Drive is controlled via local I/O. *Reset (10.03)* = DI6; *UsedMCW (7.04)* bit 7, default *OnOff1 (10.15)* = DI7; *UsedMCW (7.04)* bit 0, default and *StartStop (10.16)* = DI8; *UsedMCW (7.04)* bit 3, default 1 = **MainCtrlWord** drive is controlled via *MainCtrlWord (7.01)* 2 = **Key** Automatic switchover from **MainCtrlWord** to **Local I/O** in case of **F528 FieldBusCom** [*FaultWord2 (9.02)* bit 11]. It is still possible to control the drive via local I/O. *OnOff1 (10.15)* = DI7; *UsedMCW (7.04)* bit 0, default and *StartStop (10.16)* = DI8; *UsedMCW (7.04)* bit 3, default. The used speed reference is set by means of *FixedSpeed1 (23.02).* 3 = **12PLink** Drive is controlled from 12-pulse master (**OnOff1**, **StartStop** and **Reset**). Only available when *OperModeSel (43.01)* = **12P ParaSla** or **12P SerSla**. 4 = **FexLink** Drive is controlled from field exciter master (**OnOff1**, **StartStop** and **Reset**). Only available when OperModeSel (43.01) = **FieldExciter**. **Note1:** Local control mode has higher priority than the selection made with *CommandSel (10.01)*. **Note2:** The commands Off2 (10.08), E Stop (10.09) and Reset (10.03) are always active (in case they are assigned) regardless of *CommandSel (10.01)* setting. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Local I/O	FexLink	Local I/O	-	C
10.02	**Direction (direction of rotation)** Binary signal for **Direction**, *AuxCtrlWord2 (7.03)* bit 8. *Direction (10.02)* allows to change the direction of rotation: 0 = **NotUsed** default 1 = **DI1** 1 = **Reverse,** 0 = **Forward** 2 = **DI2** 1 = **Reverse,** 0 = **Forward** 3 = **DI3** 1 = **Reverse,** 0 = **Forward** 4 = **DI4** 1 = **Reverse,** 0 = **Forward** 5 = **DI5** 1 = **Reverse,** 0 = **Forward** 6 = **DI6** 1 = **Reverse,** 0 = **Forward** 7 = **DI7** 1 = **Reverse,** 0 = **Forward** 8 = **DI8** 1 = **Reverse,** 0 = **Forward** 9 = **DI9** 1 = **Reverse,** 0 = **Forward,** only available with digital extension board 10 = **DI10** 1 = **Reverse,** 0 = **Forward,** only available with digital extension board 11 = **DI11** 1 = **Reverse,** 0 = **Forward,** only available with digital extension board 12 = **MCW Bit11** 1 = **Reverse,** 0 = **Forward,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1 = **Reverse,** 0 = **Forward,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1 = **Reverse,** 0 = **Forward,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1 = **Reverse,** 0 = **Forward,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1 = **Reverse,** 0 = **Forward,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1 = **Reverse,** 0 = **Forward,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1 = **Reverse,** 0 = **Forward,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1 = **Reverse,** 0 = **Forward,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1 = **Reverse,** 0 = **Forward,** *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.03	**Reset (reset command)** Binary signal for **Reset**, *UsedMCW (7.04)* bit 7: 0 = **NotUsed** 1 = **DI1** **Reset** by rising edge (0 → 1) 2 = **DI2** **Reset** by rising edge (0 → 1) 3 = **DI3** **Reset** by rising edge (0 → 1) 4 = **DI4** **Reset** by rising edge (0 → 1) 5 = **DI5** **Reset** by rising edge (0 → 1) 6 = **DI6** **Reset** by rising edge (0 → 1), default 7 = **DI7** **Reset** by rising edge (0 → 1) 8 = **DI8** **Reset** by rising edge (0 → 1) 9 = **DI9** **Reset** by rising edge (0 → 1), only available with digital extension board 10 = **DI10** **Reset** by rising edge (0 → 1), only available with digital extension board 11 = **DI11** **Reset** by rising edge (0 → 1), only available with digital extension board 12 = **MCW Bit11** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	DI6	-	C
10.04	**SyncCommand (synchronization command for position counter)** Binary signal for Synchronization. At the synchronization event [*AuxCtrlWord (7.02)* bit 9 **SyncCommand**] the position counter is initialized by following values: – *PosCountInitLo (50.08)* is written into *PosCountLow (3.07)* and – *PosCountInitHi (50.09)* is written into *PosCountHigh (3.08)*. At the same time *AuxStatWord (8.02)* bit 5 **SyncRdy** is set to 1. The synchronization can be inhibited by setting AuxCtrlWord (7.02) bit 10 **SyncDisable** to 1. The synchronization event is selected by: 0 = **NotUsed** default 1 = **DI7+** rising edge (0 → 1) of DI7 2 = **DI7Hi&Z** DI7 = 1 and rising edge (0 → 1) of zero channel pulse encoder 3 = **DI7Hi&Z Fwd** DI7 = 1 and rising edge (0 → 1) of zero channel pulse encoder, motor rotating forward 4 = **DI7Hi&Z Rev** DI7 = 1 and rising edge (0 → 1) of zero channel pulse encoder, motor rotating reverse 5 = **DI7-** falling edge (1 → 0) of DI7 6 = **DI7Lo&Z** DI7 = 0 and rising edge (0 → 1) of zero channel pulse encoder 7 = **DI7Lo&Z Fwd** DI7 = 0 and rising edge (0 → 1) of zero channel pulse encoder, motor rotating forward 8 = **DI7Lo&Z Rev** DI7 = 0 and rising edge (0 → 1) of zero channel pulse encoder, motor rotating reverse 9 = **Z** rising edge (0 → 1) of zero channel pulse encoder 10 = **SyncCommand** rising edge (0 → 1) of *AuxCtrlWord (7.02)* bit 9 **Note1:** Forward rotation means that the encoders A pulses are before the B pulses. Reverse rotation means that the encoders B pulses are before the A pulses. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	SyncCommand	NotUsed	-	E
10.05	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.06	**MotFanAck (motor fan acknowledge)** The drive trips with **F523 ExtFanAck** [*FaultWord2 (9.02)* bit 6] if a digital input for an external fan is selected and the acknowledge is missing for 10 seconds: 0 = **NotUsed** no reaction 1 = **DI1** 1= **acknowledge** OK, 0 = no **acknowledge** 2 = **DI2** 1= **acknowledge** OK, 0 = no **acknowledge**, default 3 = **DI3** 1= **acknowledge** OK, 0 = no **acknowledge** 4 = **DI4** 1= **acknowledge** OK, 0 = no **acknowledge** 5 = **DI5** 1= **acknowledge** OK, 0 = no **acknowledge** 6 = **DI6** 1= **acknowledge** OK, 0 = no **acknowledge** 7 = **DI7** 1= **acknowledge** OK, 0 = no **acknowledge** 8 = **DI8** 1= **acknowledge** OK, 0 = no **acknowledge** 9 = **DI9** 1= **acknowledge** OK, 0 = no **acknowledge,** only available with digital extension board 10 = **DI10** 1= **acknowledge** OK, 0 = no **acknowledge,** only available with digital extension board 11 = **DI11** 1= **acknowledge** OK, 0 = no **acknowledge,** only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	DI2	-	C
10.07	**HandAuto (hand/auto command)** Binary signal to switch between **Hand** (**Local I/O**) and **Auto** (**MainCtrlWord**) control. Thus the selection made by *CommandSel (10.01)* is overwritten: 0 = **NotUsed** default 1 = **DI1** 1 = **Auto**, 0 = **Hand** 2 = **DI2** 1 = **Auto**, 0 = **Hand** 3 = **DI3** 1 = **Auto**, 0 = **Hand** 4 = **DI4** 1 = **Auto**, 0 = **Hand** 5 = **DI5** 1 = **Auto**, 0 = **Hand** 6 = **DI6** 1 = **Auto**, 0 = **Hand** 7 = **DI7** 1 = **Auto**, 0 = **Hand** 8 = **DI8** 1 = **Auto**, 0 = **Hand** 9 = **DI9** 1 = **Auto**, 0 = **Hand,** only available with digital extension board 10 = **DI10** 1 = **Auto**, 0 = **Hand**, only available with digital extension board 11 = **DI11** 1 = **Auto**, 0 = **Hand**, only available with digital extension board 12 = **MCW Bit11** 1 = **Auto**, 0 = **Hand,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1 = **Auto**, 0 = **Hand,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1 = **Auto**, 0 = **Hand,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1 = **Auto**, 0 = **Hand,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1 = **Auto**, 0 = **Hand,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1 = **Auto**, 0 = **Hand,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1 = **Auto**, 0 = **Hand,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1 = **Auto**, 0 = **Hand,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1 = **Auto**, 0 = **Hand,** *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.08	**Off2 (off2 command, electrical disconnect)** Binary signal for **Off2** (Emergency Off / Coast Stop), *UsedMCW (7.04)* bit 1. For fastest reaction use fast digital inputs DI7 or DI8: 0 = **NotUsed** 1 = **DI1** 1= no **Off2**, 0 = **Off2** active 2 = **DI2** 1= no **Off2**, 0 = **Off2** active 3 = **DI3** 1= no **Off2**, 0 = **Off2** active 4 = **DI4** 1= no **Off2**, 0 = **Off2** active, default 5 = **DI5** 1= no **Off2**, 0 = **Off2** active 6 = **DI6** 1= no **Off2**, 0 = **Off2** active 7 = **DI7** 1= no **Off2**, 0 = **Off2** active 8 = **DI8** 1= no **Off2**, 0 = **Off2** active 9 = **DI9** 1= no **Off2**, 0 = **Off2** active, only available with digital extension board 10 = **DI10** 1= no **Off2**, 0 = **Off2** active, only available with digital extension board 11 = **DI11** 1= no **Off2**, 0 = **Off2** active, only available with digital extension board 12 = **MCW Bit11** 1= no **Off2**, 0 = **Off2** active, *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1= no **Off2**, 0 = **Off2** active, *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1= no **Off2**, 0 = **Off2** active, *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1= no **Off2**, 0 = **Off2** active, *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1= no **Off2**, 0 = **Off2** active, *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1= no **Off2**, 0 = **Off2** active, *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1= no **Off2**, 0 = **Off2** active, *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1= no **Off2**, 0 = **Off2** active, *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1= no **Off2**, 0 = **Off2** active, *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	DI4	-	C
10.09	**E Stop (emergency stop command)** Binary signal for **E Stop**, *UsedMCW (7.04)* bit 2: 0 = **NotUsed** 1 = **DI1** 1= no **E Stop**, 0 = **E Stop** active 2 = **DI2** 1= no **E Stop**, 0 = **E Stop** active 3 = **DI3** 1= no **E Stop**, 0 = **E Stop** active 4 = **DI4** 1= no **E Stop**, 0 = **E Stop** active 5 = **DI5** 1= no **E Stop**, 0 = **E Stop** active, default 6 = **DI6** 1= no **E Stop**, 0 = **E Stop** active 7 = **DI7** 1= no **E Stop**, 0 = **E Stop** active 8 = **DI8** 1= no **E Stop**, 0 = **E Stop** active 9 = **DI9** 1= no **E Stop**, 0 = **E Stop** active, only available with digital extension board 10 = **DI10** 1= no **E Stop**, 0 = **E Stop** active, only available with digital extension board 11 = **DI11** 1= no **E Stop**, 0 = **E Stop** active, only available with digital extension board 12 = **MCW Bit11** 1= no **E Stop**, 0 = **E Stop** active, *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1= no **E Stop**, 0 = **E Stop** active, *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1= no **E Stop**, 0 = **E Stop** active, *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1= no **E Stop**, 0 = **E Stop** active, *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1= no **E Stop**, 0 = **E Stop** active, *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1= no **E Stop**, 0 = **E Stop** active, *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1= no **E Stop**, 0 = **E Stop** active, *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1= no **E Stop**, 0 = **E Stop** active, *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1= no **E Stop**, 0 = **E Stop** active, *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	DI5	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.10	**ParChange (parameter change) I** Binary signal to release either **Motor1/User1** or **Motor2/User2**. The choice to release **Motor1/2** (shared motion) or macros **User1/2** is defined by means of *MacroChangeMode (16.05):* 0 = **NotUsed** default 1 = **DI1** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 2 = **DI2** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 3 = **DI3** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 4 = **DI4** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 5 = **DI5** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 6 = **DI6** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 7 = **DI7** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 8 = **DI8** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0) 9 = **DI9** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), only available with digital extension board 10 = **DI10** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), only available with digital extension board 11 = **DI11** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), only available with digital extension board 12 = **MCW Bit11** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** switch to **Motor2/User2** by rising edge (0 → 1), switch to **Motor1/User1** by falling edge (1 → 0), *AuxCtrlWord (7.02)* bit 15 **Note1:** The macro (**User1**/**User2**) selection made by *ParChange (10.10)* overrides the selection made with *ApplMacro (99.08)*. **Note2:** The motor (**Motor1**/***Motor2***) selection can be made in drive state **RdyOn** and **RdyRun**. **Note3:** *ParChange (10.10)* itself is not overwritten. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.11	**Unused**					
10.12	**Unused**					
10.13	**OvrVoltProt (over voltage protection triggered)** Digital input for over voltage protection unit: 0 = **NotUsed** default 1 = **DI1** 0 = **triggered,** 1 = not **triggered** 2 = **DI2** 0 = **triggered,** 1 = not **triggered** 3 = **DI3** 0 = **triggered,** 1 = not **triggered** 4 = **DI4** 0 = **triggered,** 1 = not **triggered** 5 = **DI5** 0 = **triggered,** 1 = not **triggered** 6 = **DI6** 0 = **triggered,** 1 = not **triggered** 7 = **DI7** 0 = **triggered,** 1 = not **triggered** 8 = **DI8** 0 = **triggered,** 1 = not **triggered** **Note1:** *OvrVoltProt (10.13)* is only active when drive is in field exciter mode. – *OperModeSel (43.01)* = **FieldConv** **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	E
10.14	**Unused**					
10.15	**OnOff1 (on/off1 command)** Binary signal for **OnOff1**, *UsedMCW (7.04)* bit 0: 0 = **NotUsed** 1 = **DI1** **On** by rising edge (0 → 1), 0 = **Off1** 2 = **DI2** **On** by rising edge (0 → 1), 0 = **Off1** 3 = **DI3** **On** by rising edge (0 → 1), 0 = **Off1** 4 = **DI4** **On** by rising edge (0 → 1), 0 = **Off1** 5 = **DI5** **On** by rising edge (0 → 1), 0 = **Off1** 6 = **DI6** **On** by rising edge (0 → 1), 0 = **Off1** 7 = **DI7** **On** by rising edge (0 → 1), 0 = **Off1**, default 8 = **DI8** **On** by rising edge (0 → 1), 0 = **Off1** 9 = **DI9** **On** by rising edge (0 → 1), 0 = **Off1**, only available with digital extension board 10 = **DI10** **On** by rising edge (0 → 1), 0 = **Off1**, only available with digital extension board 11 = **DI11** **On** by rising edge (0 → 1), 0 = **Off1**, only available with digital extension board 12 = **MCW Bit11** **On** by rising edge (0 → 1), 0 = **Off1**, *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** **On** by rising edge (0 → 1), 0 = **Off1**, *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** **On** by rising edge (0 → 1), 0 = **Off1**, *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** **On** by rising edge (0 → 1), 0 = **Off1**, *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** **On** by rising edge (0 → 1), 0 = **Off1**, *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** **On** by rising edge (0 → 1), 0 = **Off1**, *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** **On** by rising edge (0 → 1), 0 = **Off1**, *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** **On** by rising edge (0 → 1), 0 = **Off1**, *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** **On** by rising edge (0 → 1), 0 = **Off1**, *AuxCtrlWord (7.02)* bit 15 21 = **DI7DI8** **On** and **Start** by rising edge (0 → 1) of DI7, **Stop** and **Off1** by falling edge (1 → 0) of DI8. Following settings apply: *OnOff1 (10.15)* = *StartStop (10.16)* = **DI7DI8**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI7DI8	DI7	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.16	**StartStop (start/stop command)** Binary signal for **StartStop**, *UsedMCW (7.04)* bit 3: 0 = **NotUsed** 1 = **DI1** **Start** by rising edge (0 → 1), 0 = **Stop** 2 = **DI2** **Start** by rising edge (0 → 1), 0 = **Stop** 3 = **DI3** **Start** by rising edge (0 → 1), 0 = **Stop** 4 = **DI4** **Start** by rising edge (0 → 1), 0 = **Stop** 5 = **DI5** **Start** by rising edge (0 → 1), 0 = **Stop** 6 = **DI6** **Start** by rising edge (0 → 1), 0 = **Stop** 7 = **DI7** **Start** by rising edge (0 → 1), 0 = **Stop** 8 = **DI8** **Start** by rising edge (0 → 1), 0 = **Stop**, default 9 = **DI9** **Start** by rising edge (0 → 1), 0 = **Stop**, only available with digital extension board 10 = **DI10** **Start** by rising edge (0 → 1), 0 = **Stop**, only available with digital extension board 11 = **DI11** **Start** by rising edge (0 → 1), 0 = **Stop**, only available with digital extension board 12 = **MCW Bit11** **Start** by rising edge (0 → 1), 0 = **Stop**, *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** **Start** by rising edge (0 → 1), 0 = **Stop**, *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** **Start** by rising edge (0 → 1), 0 = **Stop**, *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** **Start** by rising edge (0 → 1), 0 = **Stop**, *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** **Start** by rising edge (0 → 1), 0 = **Stop**, *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** **Start** by rising edge (0 → 1), 0 = **Stop**, *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** **Start** by rising edge (0 → 1), 0 = **Stop**, *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** **Start** by rising edge (0 → 1), 0 = **Stop**, *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** **Start** by rising edge (0 → 1), 0 = **Stop**, *AuxCtrlWord (7.02)* bit 15 21 = **DI7DI8** **On** and **Start** by rising pulse (0 → 1) of DI7, **Stop** and **Off1** by falling pulse (1 → 0) of DI8. Following settings apply: *OnOff1 (10.15)* = *StartStop (10.16)* = **DI7DI8**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI7DI8	DI8		C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.17	**Jog1 (jogging 1 command)** Binary signal for **Jog1**. Selects speed reference set in *FixedSpeed1 (23.02):* 0 = **NotUsed** default 1 = **DI1** 1= **Jog1** active**,** 0 = no **Jog1** 2 = **DI2** 1= **Jog1** active**,** 0 = no **Jog1** 3 = **DI3** 1= **Jog1** active**,** 0 = no **Jog1** 4 = **DI4** 1= **Jog1** active**,** 0 = no **Jog1** 5 = **DI5** 1= **Jog1** active**,** 0 = no **Jog1** 6 = **DI6** 1= **Jog1** active**,** 0 = no **Jog1** 7 = **DI7** 1= **Jog1** active**,** 0 = no **Jog1** 8 = **DI8** 1= **Jog1** active**,** 0 = no **Jog1** 9 = **DI9** 1= **Jog1** active**,** 0 = no **Jog1,** only available with digital extension board 10 = **DI10** 1= **Jog1** active**,** 0 = no **Jog1,** only available with digital extension board 11 = **DI11** 1= **Jog1** active**,** 0 = no **Jog1,** only available with digital extension board 12 = **MCW Bit11** 1= **Jog1** active**,** 0 = no **Jog1,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1= **Jog1** active**,** 0 = no **Jog1,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1= **Jog1** active**,** 0 = no **Jog1,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1= **Jog1** active**,** 0 = no **Jog1,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1= **Jog1** active**,** 0 = no **Jog1,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1= **Jog1** active**,** 0 = no **Jog1,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1= **Jog1** active**,** 0 = no **Jog1,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1= **Jog1** active**,** 0 = no **Jog1,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1= **Jog1** active**,** 0 = no **Jog1,** *AuxCtrlWord (7.02)* bit 15 **Note1:** *Jog2 (10.18)* overrides *Jog1 (10.17)* **Note2:** *CommandSel (10.01)* = **Local I/O**: – The drive has to be in state **RdyRun** (**RdyRef** is still zero). When **Jog1** command is given the drives goes automatically into state **Running** and turns with speed set in *FixedSpeed1 (23.02).* *CommandSel (10.01)* = **MainCtrlWord**: – **Jog1** command is invalid. – *FixedSpeed1 (23.02)* can be released by *MainCtrlWord (7.01)* Bit 8 plus **Run** command. **Note3:** Acceleration and deceleration time for jogging is selected by *JogAccTime (22.12)* and *JogDecTime (22.13).* **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C
10.18	**Jog2 (jogging 2 command)** Binary signal for **Jog2**. Selects speed reference set in *FixedSpeed2 (23.03):* Selection see *Jog1 (10.17).* **Note1:** *Jog2 (10.18)* overrides *Jog1 (10.17)* **Note2:** *CommandSel (10.01)* = **Local I/O**: – The drive has to be in state **RdyRun** (**RdyRef** is still zero). When **Jog2** command is given the drives goes automatically into state **Running** and turns with speed set in *FixedSpeed2 (23.03).* *CommandSel (10.01)* = **MainCtrlWord**: – **Jog2** command is invalid. – *FixedSpeed2 (23.03)* can be released by *MainCtrlWord (7.01)* Bit 9 plus **Run** command. **Note3:** Acceleration and deceleration time for jogging is selected by *JogAccTime (22.12)* and *JogDecTime (22.13).* **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C
10.19	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.20	**ConvFanAck (converter fan acknowledge)** The drive trips with **F527 ConvFanAck** [*FaultWord2 (9.02)* bit 10] if a digital input for the converter fan is selected and the acknowledge is missing for 10 seconds. As soon as the acknowledge is missing **A104 ConvOverTemp** [*AlarmWord1 (9.06)* bit 3] is set. The alarm is reset automatically if the converter fan acknowledge is coming back before the 10 seconds are elapsed: 0 = **NotUsed** no reaction 1 = **DI1** 1= **acknowledge** OK, 0 = no **acknowledge**, default 2 = **DI2** 1= **acknowledge** OK, 0 = no **acknowledge** 3 = **DI3** 1= **acknowledge** OK, 0 = no **acknowledge** 4 = **DI4** 1= **acknowledge** OK, 0 = no **acknowledge** 5 = **DI5** 1= **acknowledge** OK, 0 = no **acknowledge** 6 = **DI6** 1= **acknowledge** OK, 0 = no **acknowledge** 7 = **DI7** 1= **acknowledge** OK, 0 = no **acknowledge** 8 = **DI8** 1= **acknowledge** OK, 0 = no **acknowledge** 9 = **DI9** 1= **acknowledge** OK, 0 = no **acknowledge,** only available with digital extension board 10 = **DI10** 1= **acknowledge** OK, 0 = no **acknowledge,** only available with digital extension board 11 = **DI11** 1= **acknowledge** OK, 0 = no **acknowledge,** only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	DI1	-	C
10.21	**MainContAck (main contactor acknowledge)** The drive trips with **F524 MainContAck** [*FaultWord2 (9.02)* bit 7] if a digital input for the main contactor is selected and the acknowledge is missing for 10 seconds: Selection see *ConvFanAck (10.20).* **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	DI3	-	C
10.22	**DynBrakeAck (dynamic braking acknowledge)** The drive sets **A105 DynBrakeAck** [*AlarmWord1 (9.06)* bit 4] if a digital input for dynamic braking is selected and the acknowledge (dynamic braking active) is still present when **On** [*UsedMCW (7.04)* bit 3] is set: Selection see *ConvFanAck (10.20).* **A105 DynBrakeAck** [*AlarmWord1 (9.06)* bit 4] should prevent the drive to be started while dynamic braking is active. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	C
10.23	**DC BreakAck (DC breaker acknowledge)** The drive sets **A103 DCBreakAck** [*AlarmWord1 (9.06)* bit 2] if a digital input for the DC-breaker is selected and the acknowledge is missing for 10 seconds: Selection see *ConvFanAck (10.20).* The motor will coast if **A103 DCBreakAck** [*AlarmWord1 (9.06)* bit 2] is set. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	E
10.24	**Unused**					
10.25	**DI1Invert (invert digital input 1)** Inversion selection for digital input 1: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.26	**DI2Invert (invert digital input 2)** Inversion selection for digital input 2: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
10.27	**DI3Invert (invert digital input 3)** Inversion selection for digital input 3: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.28	**DI4Invert (invert digital input 4)** Inversion selection for digital input 4: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.29	**DI5Invert (invert digital input 5)** Inversion selection for digital input 5: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.30	**DI6Invert (invert digital input 6)** Inversion selection for digital input 6: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.31	**DI7Invert (invert digital input 7)** Inversion selection for digital input 7: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.32	**DI8Invert (invert digital input 8)** Inversion selection for digital input 8: 0 = **Direct** 1 = **Inverted** **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	C
10.33	**DI9Invert (invert digital input 9)** Inversion selection for digital input 9: 0 = **Direct** only available with digital extension board 1 = **Inverted** only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	E
10.34	**DI10Invert (invert digital input 10)** Inversion selection for digital input 10: 0 = **Direct** only available with digital extension board 1 = **Inverted** only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	E
10.35	**DI11Invert (invert digital input 11)** Inversion selection for digital input 11: 0 = **Direct** only available with digital extension board 1 = **Inverted** only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	Direct	Inverted	Direct	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 11	**Speed reference input**					
11.01	**Unused**					
11.02	**Ref1Mux (speed reference 1 selector/multiplexer)** Speed reference 1 selector: 0 = **Open** switch for speed ref. 1 is fixed open 1 = **Close** switch for speed ref 1 is fixed closed, default 2 = **DI1** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 3 = **DI2** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 4 = **DI3** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 5 = **DI4** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 6 = **DI5** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 7 = **DI6** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 8 = **DI7** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 9 = **DI8** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0 10 = **DI9** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; only available with digital extension board 11= **DI10** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; only available with digital extension board 12 = **DI11** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; only available with digital extension board 13 = **MCW Bit11** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 11 14 = **MCW Bit12** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 12 15 = **MCW Bit13** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 13 16 = **MCW Bit14** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 14 17 = **MCW Bit15** 1= switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 15 18 = **ACW Bit12** 1 = switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 12 19 = **ACW Bit13** 1 = switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 13 20 = **ACW Bit14** 1 = switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 14 21 = **ACW Bit15** 1 = switch is **closed**, speed ref 1 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	Open	ACW Bit15	Close		C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
11.03	**Ref1Sel (speed reference 1 input signal)** Speed reference 1 value: 0 = **SpeedRef2301** *SpeedRef (23.01),* default 1 = **AuxSpeedRef** *AuxSpeedRef (23.13)* 2 = **AI1** analog input AI1 3 = **AI2** analog input AI2 4 = **AI3** analog input AI3 5 = **AI4** analog input AI4 6 = **AI5** analog input AI5 7 = **AI6** analog input AI6 8 = **FixedSpeed1** *FixedSpeed1 (23.02)* 9 = **FixedSpeed2** *FixedSpeed2 (23.03)* 10 = **MotPot** motor pot controlled by *MotPotUp (11.13), MotPotDown (11.14)* and *MotPotMin (11.15)* 11 = **AuxRef-AI1** *AuxSpeedRef (23.13)* minus value of AI1 12 = reserved reserved 13 = **MinAI2AI4** minimum of AI2 and AI4 14 = **MaxAI2AI4** maximum of AI2 and AI4 15 = **AI1Direct+** Fast speed reference input using analog input AI1. *SpeedRefExt1 (2.30)* is written directly onto the speed error summation point and disconnected from the speed ramp. Thus the speed ramp is bypassed. 16 = **AI2Direct+** Fast speed reference input using analog input AI2. *SpeedRefExt1 (2.30)* is written directly onto the speed error summation point and disconnected from the speed ramp. Thus the speed ramp is bypassed. **Int. Scaling: 1 == 1 Type: C Volatile: N**	SpeedRef2301	AI2Direct+	SpeedRef2301		C
11.04	**Unused**					
11.05	**Unused**					
11.06	**Ref2Sel (speed reference 2 input signal)** Speed reference 2 value: 0 = **SpeedRef2301** *SpeedRef (23.01),* default 1 = **AuxSpeedRef** *AuxSpeedRef (23.13)* 2 = **AI1** analog input AI1 3 = **AI2** analog input AI2 4 = **AI3** analog input AI3 5 = **AI4** analog input AI4 6 = **AI5** analog input AI5 7 = **AI6** analog input AI6 8 = **FixedSpeed1** *FixedSpeed1 (23.02)* 9 = **FixedSpeed2** *FixedSpeed2 (23.03)* 10 = **MotPot** motor pot controlled by *MotPotUp (11.13), MotPotDown (11.14)* and *MotPotMin (11.15)* 11 = **AI2-AI3** AI2 minus AI3 12 = **AI2+AI3** AI2 plus AI3 13 = **AI1*AI2** AI1 multiplied with AI2 14 = **AI2*AI3** AI2 multiplied with AI3 15 = **MinAI2AI4** minimum of AI2 and AI4 16 = **MaxAI2AI4** maximum of AI2 and AI4 **Int. Scaling: 1 == 1 Type: C Volatile: N**	SpeedRef	MaxAI2AI4	SpeedRef		E
11.07	**Unused**					
11.08	**Unused**					
11.09	**Unused**					
11.10	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
11.11	**Unused**					
11.12	**Ref2Mux (speed reference 2 selector/multiplexer)** Speed reference 2 selector: 0 = **Invert1102** Invert speed ref. 1 selection; implements a change over switch together with speed ref 2 selection. E.g. if speed ref. 1 selection switch is open the switch for speed ref. 2 is closed and vice versa. 1 = **Open** switch for speed ref. 2 is fixed open, default 2 = **Close** switch for speed ref 2 is fixed closed 3 = **DI1** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 4 = **DI2** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 5 = **DI3** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 6 = **DI4** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 7 = **DI5** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 8 = **DI6** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 9 = **DI7** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 10 = **DI8** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0 11 = **DI9** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; only available with digital extension board 12= **DI10** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; only available with digital extension board 13 = **DI11** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; only available with digital extension board 14 = **MCW Bit11** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 11 15 = **MCW Bit12** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 12 16 = **MCW Bit13** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 13 17 = **MCW Bit14** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 14 18 = **MCW Bit15** 1= switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *MainCtrlWord (7.01)* bit 15 19 = **ACW Bit12** 1 = switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 12 20 = **ACW Bit13** 1 = switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 13 21 = **ACW Bit14** 1 = switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 14 22 = **ACW Bit15** 1 = switch is **closed**, speed ref 2 is active; 0 = switch is **open**, speed ref = 0; *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	Invert	ACW Bit15	Open		E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
11.13	**MotPotUp (motor pot up)** With the motor pot up function the motor speed is increased by means of the selected binary input. The acceleration is limited by *AccTime1 (22.01)* until *Ref1Max (11.05)* respectively *Ref2Max (11.08)* is reached. *MotPotDown (11.14)* overrides *MotPotUp (11.13)*: 0 = **NotUsed** default 1 = **DI1** 1= **increase** speed, 0 = **hold** speed 2 = **DI2** 1= **increase** speed, 0 = **hold** speed 3 = **DI3** 1= **increase** speed, 0 = **hold** speed 4 = **DI4** 1= **increase** speed, 0 = **hold** speed 5 = **DI5** 1= **increase** speed, 0 = **hold** speed 6 = **DI6** 1= **increase** speed, 0 = **hold** speed 7 = **DI7** 1= **increase** speed, 0 = **hold** speed 8 = **DI8** 1= **increase** speed, 0 = **hold** speed 9 = **DI9** 1= **increase** speed, 0 = **hold** speed**,** only available with digital extension board 10 = **DI10** 1= **increase** speed, 0 = **hold** speed**,** only available with digital extension board 11 = **DI11** 1= **increase** speed, 0 = **hold** speed**,** only available with digital extension board 12 = **MCW Bit11** 1= **increase** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1= **increase** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1= **increase** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1= **increase** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1= **increase** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1= **increase** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1= **increase** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1= **increase** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1= **increase** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 15 **Note1:** The speed reference is selected by means of *Ref1Sel (11.03)* = **MotPot** respectively *Ref2Sel (11.06)* = **MotPot**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed		C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
11.14	**MotPotDown (motor pot down)** With the motor pot down function the motor speed is decreased by means of the selected binary input. The deceleration is limited by *DecTime1 (22.02)* until zero speed respectively *MotPotMin (11.15)* is reached. *MotPotDown (11.14)* overrides *MotPotUp (11.13)*: 0 = **NotUsed** default 1 = **DI1** 1= **decrease** speed, 0 = **hold** speed 2 = **DI2** 1= **decrease** speed, 0 = **hold** speed 3 = **DI3** 1= **decrease** speed, 0 = **hold** speed 4 = **DI4** 1= **decrease** speed, 0 = **hold** speed 5 = **DI5** 1= **decrease** speed, 0 = **hold** speed 6 = **DI6** 1= **decrease** speed, 0 = **hold** speed 7 = **DI7** 1= **decrease** speed, 0 = **hold** speed 8 = **DI8** 1= **decrease** speed, 0 = **hold** speed 9 = **DI9** 1= **decrease** speed, 0 = **hold** speed**,** only available with digital extension board 10 = **DI10** 1= **decrease** speed, 0 = **hold** speed**,** only available with digital extension board 11 = **DI11** 1= **decrease** speed, 0 = **hold** speed**,** only available with digital extension board 12 = **MCW Bit11** 1= **decrease** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1= **decrease** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1= **decrease** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1= **decrease** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1= **decrease** speed, 0 = **hold** speed**,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1= **decrease** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1= **decrease** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1= **decrease** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1= **decrease** speed, 0 = **hold** speed**,** *AuxCtrlWord (7.02)* bit 15 **Note1:** The speed reference is selected by means of *Ref1Sel (11.03)* = **MotPot** respectively *Ref2Sel (11.06)* = **MotPot**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed		C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
11.15	**MotPotMin (motor pot minimum)** The motor pot minimum function releases the minimum speed level. The minimum speed level is defined by *FixedSpeed1 (23.02)*. When the drive is started the motor accelerates to *FixedSpeed1 (23.02)*. It is not possible to set the speed below *FixedSpeed1 (23.02)* by means of the motor pot function: 0 = **NotUsed** default 1 = **DI1** 1= **released**, 0 = **blocked** 2 = **DI2** 1= **released**, 0 = **blocked** 3 = **DI3** 1= **released**, 0 = **blocked** 4 = **DI4** 1= **released**, 0 = **blocked** 5 = **DI5** 1= **released**, 0 = **blocked** 6 = **DI6** 1= **released**, 0 = **blocked** 7 = **DI7** 1= **released**, 0 = **blocked** 8 = **DI8** 1= **released**, 0 = **blocked** 9 = **DI9** 1= **released**, 0 = **blocked,** only available with digital extension board 10 = **DI10** 1= **released**, 0 = **blocked,** only available with digital extension board 11 = **DI11** 1= **released**, 0 = **blocked,** only available with digital extension board 12 = **MCW Bit11** 1= **released**, 0 = **blocked,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1= **released**, 0 = **blocked,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1= **released**, 0 = **blocked,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1= **released**, 0 = **blocked,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1= **released**, 0 = **blocked,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1= **released**, 0 = **blocked,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1= **released**, 0 = **blocked,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1= **released**, 0 = **blocked,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1= **released**, 0 = **blocked,** *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed		C
Group 12	**Constant speeds**					
12.01	**unused**					
12.02	**ConstSpeed1 (constant speed 1)** Defines constant speed 1 in rpm. The constant speed can be connected by Adaptive Program or application program. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm \;\; to \;\; (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E
12.03	**ConstSpeed2 (constant speed 2)** Defines constant speed 2 in rpm. The constant speed can be connected by Adaptive Program or application program. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm \;\; to \;\; (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
12.04	**ConstSpeed3 (constant speed 3)** Defines constant speed 3 in rpm. The constant speed can be connected by Adaptive Program or application program. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm \ \ to \ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E
12.05	**ConstSpeed4 (constant speed 4)** Defines constant speed 4 in rpm. The constant speed can be connected by Adaptive Program or application program. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm \ \ to \ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E
Group 13	**Analog inputs**					
13.01	**AI1HighVal (analog input 1 high value)** +100% of the input signal connected to analog input 1 is scaled to the voltage in *AI1HighVal (13.01).* Example: – In case the min. / max. voltage (±10 V) of analog input 1 should equal ±250% of *TorqRefExt (2.24)*, set: *TorqRefA Sel (25.10)* = **AI1** *ConvModeAI1 (13.03)* = ±**10 V Bi**, *AI1HighVal (13.01)* = 4000 mV and *AI1LowVal (13.02)* = -4000 mV **Note1:** To use current please set the jumper (SDCS-CON-4 or SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	-10000	10000	10000	mV	C
13.02	**AI1LowVal (analog input 1 low value)** -100% of the input signal connected to analog input 1 is scaled to the voltage in *AI1LowVal (13.02).* **Note1:** *AI1LowVal (13.02)* is only valid if *ConvModeAI1 (13.03)* = ±**10 V Bi**. **Note2:** To use current please set the jumper (SDCS-CON-4 or SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	C
13.03	**ConvModeAI1 (conversion mode analog input 1)** Analog input 1 signal offset. The distinction between voltage and current is done via jumpers on the SDCS-CON-4 or SDCS-IOB-3 board: 0 = ±**10V Bi** -10 V to 10 V / -20 mA to 20 mA bipolar input, default 1 = **0V-10V Uni** 0 V to 10 V / 0 mA to 20 mA unipolar input 2 = **2V-10V Uni** 2 V to 10 V / 4 mA to 20 mA unipolar input 3 = **5V Offset** 5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
13.04	**FilterAI1 (filter time analog input 1)** Analog input 1 filter time. The hardware filter time is ≤ 2ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	C
13.05	**AI2HighVal (analog input 2 high value)** +100% of the input signal connected to analog input 2 is scaled to the voltage in *AI2HighVal (13.05).* **Note1:** To use current please set the jumper (SDCS-CON-4 or SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	-10000	10000	10000	mV	C
13.06	**AI2LowVal (analog input 2 low value)** -100% of the input signal connected to analog input 2 is scaled to the voltage in *AI2LowVal (13.06).* **Note1:** *AI2LowVal (13.06)* is only valid if *ConvModeAI2 (13.07)* = ±**10V Bi**. **Note2:** To use current please set the jumper (SDCS-CON-4 or SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	C
13.07	**ConvModeAI2 (conversion mode analog input 2)** Analog input 2 signal offset. The distinction between voltage and current is done via jumpers on the SDCS-CON-4 or SDCS-IOB-3 board: 0 = ±**10V Bi** -10 V to 10 V / -20 mA to 20 mA bipolar input, default 1 = **0V-10V Uni** 0 V to 10 V / 0 mA to 20 mA unipolar input 2 = **2V-10V Uni** 2 V to 10 V / 4 mA to 20 mA unipolar input 3 = **5V Offset** 5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	C
13.08	**FilterAI2 (filter time analog input 2)** Analog input 2 filter time. The hardware filter time is ≤ 2ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	C
13.09	**AI3HighVal (analog input 3 high value)** +100% of the input signal connected to analog input 3 is scaled to the voltage in *AI3HighVal (13.09).* **Note1:** To use current please set the jumper (SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	-10000	10000	10000	mV	E
13.10	**AI3LowVal (analog input 3 low value)** -100% of the input signal connected to analog input 3 is scaled to the voltage in *AI3LowVal (13.10).* **Note1:** *AI3LowVal (13.10)* is only valid if *ConvModeAI3 (13.11)* = ±**10V Bi**. **Note2:** To use current please set the jumper (SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
13.11	**ConvModeAI3 (conversion mode analog input 3)** Analog input 3 signal offset. Analog input 3 on the SDCS-CON-4 is only working with voltage. The distinction between voltage and current is done via jumpers on the SDCS-IOB-3 board: 0 = ±**10V Bi** -10 V to 10 V / -20 mA to 20 mA bipolar input, default 1 = **0V-10V Uni** 0 V to 10 V / 0 mA to 20 mA unipolar input 2 = **2V-10V Uni** 2 V to 10 V / 4 mA to 20 mA unipolar input 3 = **5V Offset** 5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	E
13.12	**FilterAI3 (filter time analog input 3)** Analog input 3 filter time. The hardware filter time is ≤ 2 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E
13.13	**AI4HighVal (analog input 4 high value)** +100% of the input signal connected to analog input 4 is scaled to the voltage in *AI4HighVal (13.13)*. **Note1:** To use current please set the jumper (SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	-10000	10000	10000	mV	E
13.14	**AI4LowVal (analog input 4 low value)** -100% of the input signal connected to analog input 4 is scaled to the voltage in *AI4LowVal (13.14)*. **Note1:** *AI3LowVal (13.14)* is only valid if *ConvModeAI4 (13.15)* = ±**10V Bi**. **Note2:** To use current please set the jumper (SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	E
13.15	**ConvModeAI4 (conversion mode analog input 4)** Analog input 4 signal offset. Analog input 4 on the SDCS-CON-4 is only working with voltage. The distinction between voltage and current is done via jumpers on the SDCS-IOB-3 board: 0 = ±**10V Bi** -10 V to 10 V / -20 mA to 20 mA bipolar input, default 1 = **0V-10V Uni** 0 V to 10 V / 0 mA to 20 mA unipolar input 2 = **2V-10V Uni** 2 V to 10 V / 4 mA to 20 mA unipolar input 3 = **5V Offset** 5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	E
13.16	**FilterAI4 (filter time analog input 4)** Analog input 4 filter time. The hardware filter time is ≤ 2 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E
13.17	**TachoHighVal (analog input tacho high value)** +100% of the input signal connected to analog input tacho is scaled to the voltage in *TachoHighVal (13.17)*. **Note1:** To use current please set the jumper (SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	-10000	10000	10000	mV	E

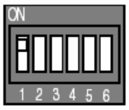
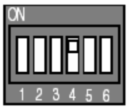
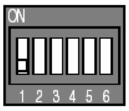
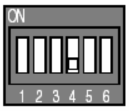
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
13.18	**TachoLowVal (analog input tacho low value)** -100% of the input signal connected to analog input tacho is scaled to the voltage in *TachoLowVal (13.18).* **Note1:** *TachoLowVal (13.18)* is only valid if *ConvModeTacho (13.19)* = ±**10V Bi**. **Note2:** To use current please set the jumper (SDCS-IOB-3) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	E
13.19	**ConvModeTacho (conversion mode analog input tacho)** Analog input tacho signal offset. Analog input tacho on the SDCS-CON-2 is only working with voltage. The distinction between voltage and current is done via jumpers on the SDCS-IOB-3 board: 0 = ±**10V Bi** -10 V to 10 V / -20 mA to 20 mA bipolar input, default 1 = **0V-10V Uni** 0 V to 10 V / 0 mA to 20 mA unipolar input 2 = **2V-10V Uni** 2 V to 10 V / 4 mA to 20 mA unipolar input 3 = **5V Offset** 5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	E
13.20	**Unused**					
13.21	**AI5HighVal (analog input 5 high value)** +100% of the input signal connected to analog input 5 is scaled to the voltage in *AI5HighVal (13.21).* **Note1:** To use current please set the DIP-switches (RAIO-01) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	-10000	10000	10000	mV	E
13.22	**AI5LowVal (analog input 5 low value)** -100% of the input signal connected to analog input 5 is scaled to the voltage in *AIO5LowVal (13.22).* **Note1:** *AI5LowVal (13.22)* is only valid if *ConvModeAI5 (13.23)* = ±**10V Bi**. **Note2:** To use current please set the DIP-switches (RAIO-01) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
13.23	**ConvModeAI5 (conversion mode analog input 5)**	+10V Bi	6V Offset	+10V Bi	-	E

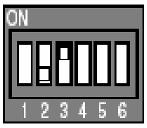
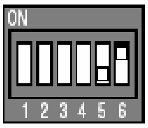
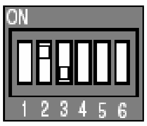
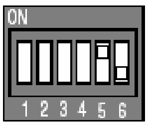
Analog input 5 signal offset. The distinction between bipolar and unipolar respectively voltage and current is done via DIP-switches on the RAIO-01 board:

0 = **±10V Bi**	-10 V to 10 V / -20 mA to 20 mA bipolar input, default
1 = **0V-10V Uni**	0 V to 10 V / 0 mA to 20 mA unipolar input
2 = **2V-10V Uni**	2 V to 10 V / 4 mA to 20 mA unipolar input
3 = **5V Offset**	5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.)
4 = **6V Offset**	6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.)

Bipolar and unipolar:

DIP switch setting		Input signal type
Analogue input AI1	Analogue input AI2	
		±0(4)…20 mA ±0(2)…10 V ±0…2 V
		0(4)…20 mA 0(2)…10 V 0…2 V (Default)

Voltage and current:

Input signal type	DIP switch settings	
	Analogue input 1	Analogue input 2
Current signal ±0(4)…20 mA (Default)		
Voltage signal ±0(2)…10 V		

Int. Scaling: 1 == 1 **Type: C** **Volatile: N**

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
13.24	**Unused**					
13.25	**AI6HighVal (analog input 6 high value)** +100% of the input signal connected to analog input 6 is scaled to the voltage in *AI6HighVal (13.25).* **Note1:** To use current please set the DIP-switches (RAIO-01) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV** **Type: I** **Volatile: N**	-10000	10000	10000	mV	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
13.26	**AI6LowVal (analog input 6 low value)** -100% of the input signal connected to analog input 6 is scaled to the voltage in *AIO6LowVal (13.26).* **Note1:** *AI6LowVal (13.26)* is only valid if *ConvModeAI6 (13.27)* = ±**10V Bi**. **Note2:** To use current please set the DIP-switches (RAIO-01) accordingly and calculate 20 mA to 10 V. **Int. Scaling: 1 == 1 mV Type: SI Volatile: N**	-10000	10000	-10000	mV	E
13.27	**ConvModeAI6 (conversion mode analog input 6)** Analog input 6 signal offset. The distinction between bipolar and unipolar respectively voltage and current is done via DIP-switches on the RAIO-01 board: 0 = ±**10V Bi** -10 V to 10 V / -20 mA to 20 mA bipolar input, default 1 = **0V-10V Uni** 0 V to 10 V / 0 mA to 20 mA unipolar input 2 = **2V-10V Uni** 2 V to 10 V / 4 mA to 20 mA unipolar input 3 = **5V Offset** 5 V / 10 mA offset in the range 0 V to 10 V / 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V / 12 mA offset in the range 2 V to 10 V / 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	E
Group 14	**Digital outputs**					
14.01	**DO1Index (digital output 1 index)** Digital output 1 is controlled by a selectable bit - see *DO1BitNo (14.02)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. Examples: – If *DO1Index (14.01)* = 801 (main status word) and *DO1BitNo (14.02)* = 1 (**RdyRun**) digital output 1 is high when the drive is **RdyRun**. – If *DO1Index (14.01)* = -801 (main status word) and *DO1BitNo (14.02)* = 3 (**Tripped**) digital output 1 is high when the drive is not faulty. Digital output 1 default setting is: command **FansOn** *CurCtrlStat1 (6.03)* bit 0. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	603	-	C
14.02	**DO1BitNo (digital output 1 bit number)** Bit number of the signal/parameter selected with *DO1Index (14.02*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	0	-	C
14.03	**DO2Index (digital output 2 index)** Digital output 2 is controlled by a selectable bit - see *DO2BitNo (14.04)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. Digital output 2 default setting is: command **FieldOn** *CurCtrlStat1 (6.03)* bit 5. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	603	-	C
14.04	**DO2BitNo (digital output 2 bit number)** Bit number of the signal/parameter selected with *DO2Index (14.03*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	5	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
14.05	**DO3Index (digital output 3 index)** Digital output 3 is controlled by a selectable bit - see *DO3BitNo (14.06)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. Digital output 3 default setting is: command **MainContactorOn** *CurCtrlStat1 (6.03)* bit 7. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	603	-	C
14.06	**DO3BitNo (digital output 3 bit number)** Bit number of the signal/parameter selected with *DO3Index (14.05*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	7	-	C
14.07	**DO4Index (digital output 4 index)** Digital output 4 is controlled by a selectable bit - see *DO4BitNo (14.08)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	0	-	C
14.08	**DO4BitNo (digital output 4 bit number)** Bit number of the signal/parameter selected with *DO4Index (14.07*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	0	-	C
14.09	**DO5Index (digital output 5 index)** Digital output 5 is controlled by a selectable bit - see *DO5BitNo (14.10)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	0	-	C
14.10	**DO5BitNo (digital output 5 bit number)** Bit number of the signal/parameter selected with *DO5Index (14.09*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	0	-	C
14.11	**DO6Index (digital output 6 index)** Digital output 6 is controlled by a selectable bit - see *DO6BitNo (14.12)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	0	-	C
14.12	**DO6BitNo (digital output 6 bit number)** Bit number of the signal/parameter selected with *DO6Index (14.11*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	0	-	C
14.13	**DO7Index (digital output 7 index)** Digital output 7 is controlled by a selectable bit - see *DO7BitNo (14.14)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	0	-	C
14.14	**DO7BitNo (digital output 7 bit number)** Bit number of the signal/parameter selected with *DO7Index (14.13*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	0	-	C
14.15	**DO8Index (digital output 8 index)** Digital output 8 is controlled by a selectable bit - see *DO8BitNo (14.16)* - of the source (signal/parameter) selected with this parameter. The format is **-xxyy**, with: **-** = invert digital output, **xx** = group and **yy** = index. Digital output 8 default setting is: command **MainContactorOn** *CurCtrlStat1 (6.03)* bit 7 **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	603	-	C
14.16	**DO8BitNo (digital output 8 bit number)** Bit number of the signal/parameter selected with *DO8Index (14.15*). **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	15	7	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 15	**Analog outputs**					
15.01	**IndexAO1 (analog output 1 index)** Analog output 1 is controlled by a source (signal/parameter) selected with *IndexAO1 (15.01).* The format is **-xxyy**, with: **-** = negate analog output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	0	-	C
15.02	**CtrlWordAO1 (control word analog output 1)** Analog output 1 can be written to via *CtrlWordAO1 (15.02)* using Adaptive Program, application program or overriding control if *IndexAO1 (15.01)* is set to zero. Further description see *group 19 Data Storage*. **Int. Scaling: 1 == 1 Type: SI Volatile: Y**	-32768	32767	0	-	C
15.03	**ConvModeAO1 (convert mode analog output 1)** Analog output 1 signal offset: 0 = **±10V Bi** -10 V to 10 V bipolar output, default 1 = **0V-10V Uni** 0 V to 10 V unipolar output 2 = **2V-10V Uni** 2 V to 10 V unipolar output 3 = **5V Offset** 5 V offset in the range 0 V to 10 V for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V offset in the range 2 V to 10 V for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	±10V Bi	6V Offset	±10V Bi	-	C
15.04	**FilterAO1 (filter analog output 1)** Analog output 1 filter time. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	C
15.05	**ScaleAO1 (scaling analog output 1)** 100% of the signal/parameter selected with *IndexAO1 (15.01)* is scaled to the voltage in *ScaleAO1 (16.05).* Example: – In case the min. / max. voltage (±10 V) of analog output 1 should equal ±250% of *TorqRefUsed (2.13),* set: *IndexAO1 (15.01)* = 213, *ConvModeAO1 (15.03)* = ±**10V Bi** and *ScaleAO1 (15.05)* = 4000 mV **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	0	10000	10000	mV	C
15.06	**IndexAO2 (analog output 2 index)** Analog output 2 is controlled by a source (signal/parameter) selected with *IndexAO2 (15.06).* The format is **-xxyy**, with: **-** = negate analog output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999	0	-	C
15.07	**CtrlWordAO2 (control word analog output 2)** Analog output 2 can be written to via *CtrlWordAO2 (15.07)* using Adaptive Program, application program or overriding control if *IndexAO2 (15.06)* is set to zero. Further description see *group 19 Data Storage*. **Int. Scaling: 1 == 1 Type: SI Volatile: Y**	-32768	32767	0	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
15.08	**ConvModeAO2 (convert mode analog output 2)** Analog output 2 signal offset: 0 = **±10V Bi** -10 V to 10 V bipolar output, default 1 = **0V-10V Uni** 0 V to 10 V unipolar output 2 = **2V-10V Uni** 2 V to 10 V unipolar output 3 = **5V Offset** 5 V offset in the range 0 V to 10 V for testing or indication of bipolar signals (e.g. torque, speed, etc.) 4 = **6V Offset** 6 V offset in the range 2 V to 10 V for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	+10V Bi	6V Offset	+10V Bi	-	C
15.09	**FilterAO2 (filter analog output 2)** Analog output 2 filter time. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	C
15.10	**ScaleAO2 (scaling analog output 2)** 100% of the signal/parameter selected with *IndexAO2 (15.06)* is scaled to the voltage in *ScaleAO2 (16.10).* **Int. Scaling: 1 == 1 mV Type: I Volatile: N**	0	10000	10000	mV	C
15.11	**IndexAO3 (analog output 3 index)** Analog output 3 is controlled by a source (signal/parameter) selected with *IndexAO3 (15.11).* The format is **-xxyy**, with: **-** = negate analog output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999			E
15.12	**CtrlWordAO3 (control word analog output 3)** Analog output 3 can be written to via *CtrlWordAO3 (15.12)* using Adaptive Program, application program or overriding control if *IndexAO3 (15.11)* is set to zero. Further description see *group 19 Data Storage*. **Int. Scaling: 1 == 1 Type: SI Volatile: Y**	-32768	32767	0	-	E
15.13	**ConvModeAO3 (convert mode analog output 3)** Analog output 3 signal offset: 0 = **0mA-20mA Uni** 0 mA to 20 mA unipolar output 1 = **4mA-20mA Uni** 4 mA to 20 mA unipolar output, default 2 = **10mA Offset** 10 mA offset in the range 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 3 = **12mA Offset** 12 mA offset in the range 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	4mA-20mA Uni	12mA Offset	4mA-20mA Uni	-	E
15.14	**FilterAO3 (filter analog output 3)** Analog output 3 filter time. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E
15.15	**ScaleAO3 (scaling analog output 3)** 100% of the signal/parameter selected with *IndexAO3 (15.11)* is scaled to the current in *ScaleAO3 (16.15).* **Int. Scaling: 1000 == 1 mA Type: I Volatile: N**	0	20	20	mA	E
15.16	**IndexAO4 (analog output 4 index)** Analog output 4 is controlled by a source (signal/parameter) selected with *IndexAO4 (15.16).* The format is **-xxyy**, with: **-** = negate analog output, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-9999	9999			E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
15.17	**CtrlWordAO4 (control word analog output 4)** Analog output 4 can be written to via *CtrlWordAO4 (15.17)* using Adaptive Program, application program or overriding control if *IndexAO4 (15.17)* is set to zero. Further description see *group 19 Data Storage*. **Int. Scaling: 1 == 1 Type: SI Volatile: Y**	-32768	32767	0	-	E
15.18	**ConvModeAO4 (convert mode analog output 4)** Analog output 4 signal offset: 0 = **0mA-20mA Uni** 0 mA to 20 mA unipolar output 1 = **4mA-20mA Uni** 4 mA to 20 mA unipolar output, default 2 = **10mA Offset** 10 mA offset in the range 0 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) 3 = **12mA Offset** 12 mA offset in the range 4 mA to 20 mA for testing or indication of bipolar signals (e.g. torque, speed, etc.) **Int. Scaling: 1 == 1 Type: C Volatile: N**	4mA-20mA Uni	12mA Offset	4mA-20mA Uni	-	E
15.19	**FilterAO4 (filter analog output 4)** Analog output 4 filter time. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E
15.20	**ScaleAO4 (scaling analog output 4)** 100% of the signal/parameter selected with *IndexAO4 (15.16)* is scaled to the current in *ScaleAO4 (16.20).* **Int. Scaling: 1000 == 1 mA Type: I Volatile: N**	0	20	20	mA	E
Group 16	**System control inputs**					
16.01	**Unused**					
16.02	**ParLock (parameter lock)** The user can lock all parameters by means of *ParLock (16.02)* and *SysPassCode (16.03):* – To lock parameters set *SysPassCode (16.03)* to the desired value and change *ParLock (16.02)* from **Open** to **Locked**. – Unlocking of parameters is only possible if the proper pass code (the value which was present during locking) is used. To open parameters set *SysPassCode (16.03)* to the proper value and change *ParLock (16.02)* from **Locked** to **Open**. After the parameters are locked or opened the value in *SysPassCode (16.03)* is automatically changed to 0: 0 = **Open** parameter change possible, default 1 = **Locked** parameter change not possible **Int. Scaling: 1 == 1 Type: C Volatile: N**	Open	Locked	Open	-	E
16.03	**SysPassCode (system pass code)** The *SysPassCode (16.03*) is a number between 1 and 30000 to lock all parameters by means of *ParLock (16.02)*. After using **Open** or **Locked** *SysPassCode (16.03)* is automatically set back to zero. **Attention:** Do not forget the pass code! **Int. Scaling: 1 == 1 Type: I Volatile: Y**	0	30000	0	-	E

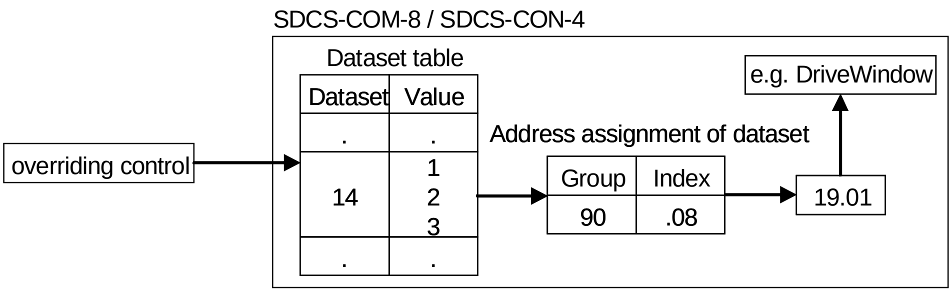
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
16.04	**LocLock (local lock)** Local control can be disabled by setting *LocLock (16.04)* to **True**. If *LocLock (16.04)* is released in local control, it becomes valid after the next changeover to remote control. No pass code is required to change *LocLock (16.04):* 0 = **False** local control released, default 1 = **True** local control blocked **Int. Scaling: 1 == 1 Type: C Volatile: N**	False	True	False	-	C
16.05	**MacroChangeMode (macro change mode)** The choice to release **Motor1/2** (shared motion) or macros **User1/2** is defined by means of *MacroChangeMode (16.05):* 0 = **User1/2** change between parameter sets **User1** and **User2,** default 1 = **Motor1/2** change between **Motor1** and **Motor2**, shared motion (parameters for motor 2 see group 49) *ParChange (10.10)* selects the binary signal to release either **Motor1/User1** or **Motor2/User2.** **Int. Scaling: 1 == 1 Type: C Volatile: N**	User1/2	Motor1/2	User1/2	-	E
16.06	**ParApplSave (save/load parameters and enable/disable application programs)** If parameters are written to cyclic, e.g. from an overriding control, they are only stored in the RAM and not in the FLASH. By means of *ParSave (16.06),* all parameter values are saved from the RAM into the FLASH. *ParSave (16.06)* is also used to save/load a parameter set on/from the memory card and to enable/disable application programs: 0 = **Done** parameters are saved or all other actions are finished, default 1 = **Save** save parameters into the FLASH 3 = **SaveToMemC** save parameter set from control board to memory card 4 = **LoadFromMemC** load parameter set from memory card to control board 4 = **EableAppl** enable application program 5 = **DisableAppl** disable application program After an action (e.g. save, load, …) is finished *ParSave (16.06)* is changed back to **Done**. This will take max. 1 second. **Note1:** Do not use the parameter save function unnecessarily **Note2:** Parameters changed by control panel or commissioning tools are immediately saved into the FLASH. **Int. Scaling: 1 == 1 Type: C Volatile: Y**	Done	DisableAppl	Done	-	E
16.07	**Unused**					
16.08	**Unused**					
16.09	**USI Sel (selector for user interface)** The user interface for the control panel (**Compact/Extended** parameter list) can be selected by *USI Sel (16.09):* 0 = **Compact** short parameter list (C), default 1 = **Extended** long parameter list (E) **Note1:** *USI Sel (16.09)* works only for the control panel. DriveWindow and DriveWindow Light always show the extended parameter list. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Compact	Extended	Compact		C
16.10	**Unused**					
16.11	**SetSystemTime (set the drive's system time)** ??? ??? **Int. Scaling: 1 == 1min Type: I Volatile: Y**	0	64000	0	min	E
16.12	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
16.13	**Unused**					
16.14	**ToolLinkConfig (tool link configuration)** The communication speed of the serial communication for the commissioning tool and the application program tool can be selected with *ToolLinkConfig (16.14)*: 0 = **9600** 9600 Baud 1 = **19200** 19200 Baud 2 = **38400** 38400 Baud, default 3 = reserved If *ToolLinkConfig (16.14)* is changed its new value is taken over after the next power up. **Int. Scaling: 1 == 1 Type: C Volatile: N**	9600	reserved	38400		E

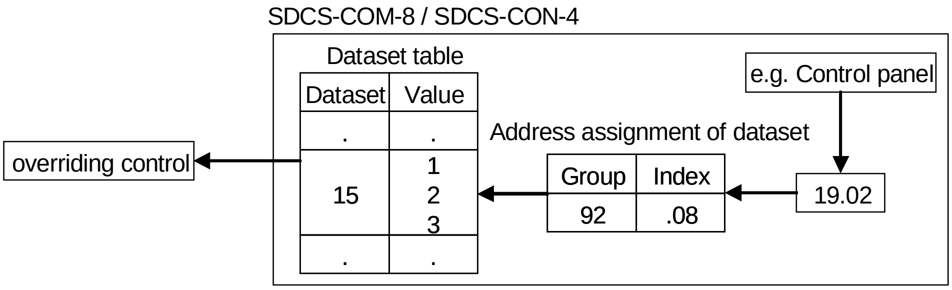
Group 19

Data storage

This parameter group consists of unconnected parameters for linking, testing and commissioning purposes.
Example1:
A value can be send from the overriding control to the drive via groups 90 or 91 to individual parameters in group 19. The parameters of group 19 can be read with the control panel, the commissioning tools, the Adaptive Program and application program.



Example2:
A value can be send from the drive to the overriding control from individual parameters in group 19 via groups 92 or 93 The parameters of group 19 can be written to with the control panel, the commissioning tools, the Adaptive Program and application program.



Note1:
This parameter group can be used as well for reading/writing analog inputs/outputs.

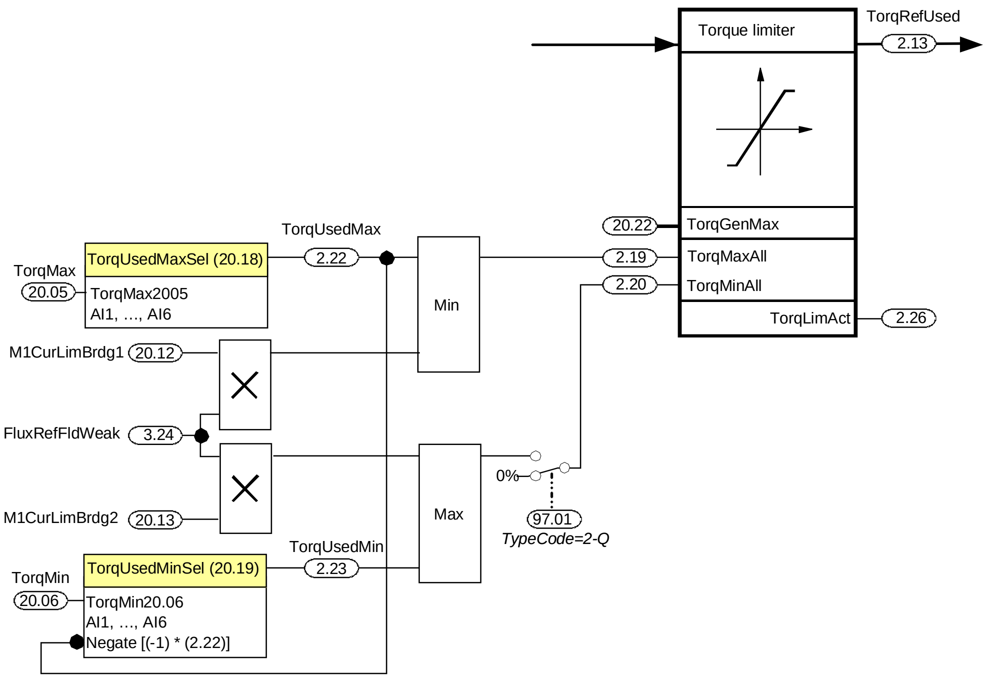
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
19.01	**Data1 (data container 1)** Data container 1 (see group description above). This data container is of is of the type retain. Its value will only be saved when the drive is de-energized. Thus it will not lose its value. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.02	**Data2 (data container 2)** Data container 2 (see group description above). This data container is of is of the type retain. Its value will only be saved when the drive is de-energized. Thus it will not lose its value. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.03	**Data3 (data container 3)** Data container 3 (see group description above). This data container is of is of the type retain. Its value will only be saved when the drive is de-energized. Thus it will not lose its value. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.04	**Data4 (data container 4)** Data container 4 (see group description above). This data container is of is of the type retain. Its value will only be saved when the drive is de-energized. Thus it will not lose its value. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.05	**Data5 (data container 5)** Data container 5 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.06	**Data6 (data container 6)** Data container 6 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.07	**Data7 (data container 7)** Data container 7 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.08	**Data8 (data container 8)** Data container 8 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.09	**Data9 (data container 9)** Data container 9 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.10	**Data10 (data container 10)** Data container 10 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.11	**Data11 (data container 11)** Data container 11 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
19.12	**Data12 (data container 12)** Data container 12 (see group description above) **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E

<table>
<tr><th>Index</th><th>Signal / Parameter name</th><th>min.</th><th>max.</th><th>def.</th><th>unit</th><th>E/C</th></tr>
<tr><td>Group 20</td><td>

Limits

</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>

This parameter group consists of all user settable limits.



</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>20.01</td><td>

M1SpeedMin (motor 1 minimum speed)
Motor 1 negative speed reference limit in rpm for:

- *SpeedRef2 (2.01)*
- *SpeedRefUsed (2.17)*

Internally limited from: $-(2.29) * \frac{32767}{20000} rpm \ \ to \ \ (2.29) * \frac{32767}{20000} rpm$

Note1:
M1SpeedMin (20.01) is must be set in the range of:
0.625 to 5 times of *M1BaseSpeed (99.04).*
If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated.
Note2:
M1SpeedMin (20.01) is also applied to *SpeedRef4 (2.18*) to avoid exceeding the speed limits by means of *SpeedCorr (23.04).* To be able to overspeed the drive (e.g. for winder) it is possible to switch off the speed limit for *SpeedRef4 (2.18)* by means of *AuxCtrlWord (7.02)* bit 4.
Int. Scaling: (2.29) Type: SI Volatile: N

</td><td>-10000</td><td>10000</td><td>-1500</td><td>rpm</td><td>C</td></tr>
</table>

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
20.02	**M1SpeedMax (motor 1 maximum speed)** Motor 1 positive speed reference limit in rpm for: – *SpeedRef2 (2.01)* – *SpeedRefUsed (2.17)* Internally limited from: $-(2.29) * \frac{32767}{20000} rpm \ \ to \ \ (2.29) * \frac{32767}{20000} rpm$ **Note1:** *M1SpeedMax (20.02)* is must be set in the range of: 0.625 to 5 times of *M1BaseSpeed (99.04).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Note2:** *M1SpeedMax (20.02)* is also applied to *SpeedRef4 (2.18*) to avoid exceeding the speed limits by means of *SpeedCorr (23.04).* To be able to overspeed the drive (e.g. for winder) it is possible to switch off the speed limit for *SpeedRef4 (2.18)* by means of *AuxCtrlWord (7.02)* bit 4. **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	1500	rpm	C
20.03	**ZeroSpeedLim (zero speed limit)** When the **Run** command is removed [set *UsedMCW (7.04)* bit 3 to zero], the drive will stop as chosen by *StopMode (21.03)*. As soon as the actual speed reaches the limit set by *ZeroSpeedLim (20.03)* the motor will coast independent of the setting of *StopMode (21.03).* Existing brakes are closed (applied). While the actual speed is in the limit **ZeroSpeed** [*AuxStatWord (8.02)* bit 11] is high. **Note1:** In case *FlyStart (21.10)* = **StartFrom0** and if the restart command comes before zero speed is reached **A137 SpeedNotZero** [*AlarmWord3 (9.08)* bit 4] is generated. Internally limited from: $0 rpm \ \ to \ \ (2.29) rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	0	1000	75	rpm	C
20.04	**Unused**					
20.05	**TorqMax (maximum torque)** Maximum torque limit - in percent of the active motor nominal torque - for selector *TorqUsedMaxSel (20.18).* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0	325	100	%	C
20.06	**TorqMin (minimum torque)** Minimum torque limit - in percent of the active motor nominal torque - for selector *TorqUsedMinSel (20.19).* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	0	-100	%	C
20.07	**TorqMaxSPC (maximum torque speed controller)** Maximum torque limit - in percent of the active motor nominal torque - at the output of the speed controller: – *TorqRef2 (2.09)* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0	325	325	%	E

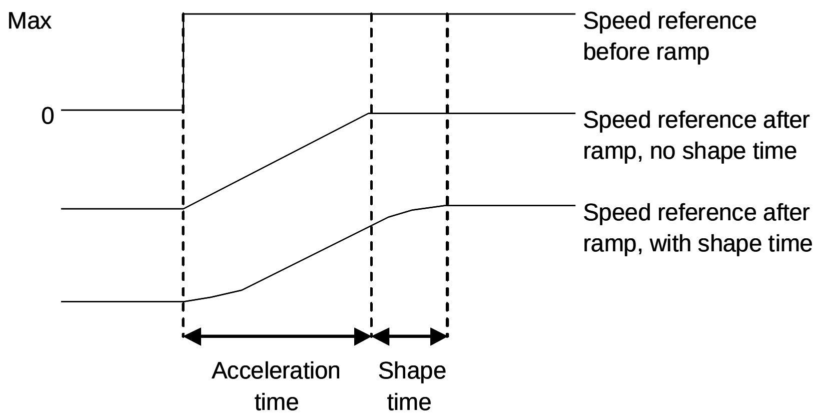
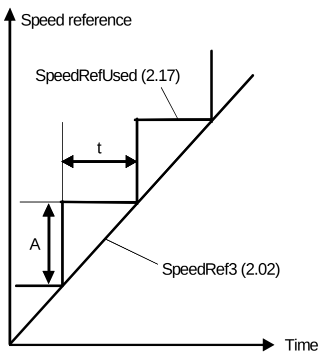
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
20.08	**TorqMinSPC (minimum torque speed controller)** Minimum torque limit - in percent of the active motor nominal torque - at the output of the speed controller. – *TorqRef2 (2.09)* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	0	-325%	%	E
20.09	**TorqMaxTref (maximum torque of torque reference A/B)** Maximum torque limit - in percent of the active motor nominal torque - for external references: – *TorqRefA (25.01)* – *TorqRefB (25.04)* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0.	325	325	%	E
20.10	**TorqMinTref (minimum torque of torque reference A/B)** Minimum torque limit - in percent of the active motor nominal torque - for external references: – *TorqRefA (25.01)* – *TorqRefB (25.04)* **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	0	-325	%	E
20.11	**Unused**					
20.12	**M1CurLimBrdg1 (motor 1 current limit of bridge 1)** Current limit bridge 1 in percent of *M1NomCur (99.03)*. Setting *M1CurLimBrdg1 (20.12)* to 0% disables bridge 1. **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0	325	100	%	C
20.13	**M1CurLimBrdg2 (motor 1 current limit of bridge 2)** Current limit bridge 2 in percent of *M1NomCur (99.03).* Setting *M1CurLimBrdg2 (20.13)* to 0% disables bridge 2. **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Note2:** *M1CurLimBrdg2 (20.13)* is internally set to 0% if *QuadrantType (4.15)* = 2-Q (2-Q drive). **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	0	-100	%	C
20.14	**ArmAlphaMax (maximum firing angle)** Maximum firing angle (α) in degrees. **Int. Scaling: 1 == 1 deg Type: SI Volatile: N**	0	165	150	deg	E
20.15	**ArmAlphaMin (minimum firing angle)** Minimum firing angle (α) in degrees. **Int. Scaling: 1 == 1 deg Type: SI Volatile: N**	0	165	15	deg	E
20.16	**Unused**					
20.17	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
20.18	**TorqUsedMaxSel (maximum used torque selector)** *TorqUsedMax (2.22)* selector: 0 = **TorqMax2005** *TorqMax (20.05),* default 1 = **AI1** analog input 1 2 = **AI2** analog input 2 3 = **AI3** analog input 3 4 = **AI4** analog input 4 5 = **AI5** analog input 5 6 = **AI6** analog input 6 **Int. Scaling: 1 == 1 Type: C Volatile: N**	TorqMax	AI6	TorqMax	-	C
20.19	**TorqUsedMinSel (minimum used torque selector)** *TorqUsedMin (2.23)* selector: 0 = **TorqMin2006** *TorqMin (20.06),* default 1 = **AI1** analog input 1 2 = **AI2** analog input 2 3 = **AI3** analog input 3 4 = **AI4** analog input 4 5 = **AI5** analog input 5 6 = **AI6** analog input 6 7 = **Negate** negated output of *TorqUsedMaxSel (20.18)* is used **Int. Scaling: 1 == 1 Type: C Volatile: N**	TorqMin	Negate	TorqMin	-	C
20.20	**Unused**					
20.21	**Unused**					
20.22	**TorqGenMax (maximum and minimum torque limit during regenerating)** Maximum and minimum torque limit - in percent of the active motor nominal torque - only during regenerating. **Note1:** The used torque limit depends also on the converter's actual limitation situation (e.g. other torque limits, current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0	325	325	%	E
Group 21	**Start / stop**					
21.01	**Unused**					
21.02	**Off1Mode (off 1 mode)** Conditions for motor deceleration when *UsedMCW (7.04)* bit 0 **On** (respectively **Off1N**) is set to low: 0 = **RampStop** stop according to *DecTime1 (22.02)* or *DecTime2 (22.10),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **Note1:** In case *UsedMCW (7.04)* bit 0 **On** and *UsedMCW (7.04)* bit 3 **Run** are set to low (run and on commands are taken away) at the same time or nearly contemporary *Off1Mode (21.02)* and *StopMode (21.03)* **must** have the same setting. **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	DynBraking	RampStop	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
21.03	**StopMode (stop mode)** Conditions for motor deceleration when *UsedMCW (7.04)* bit 3 **Run** is set to low: 0 = **RampStop** stop according to *DecTime1 (22.02)* or *DecTime2 (22.10),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **Note1:** In case *UsedMCW (7.04)* bit 0 **On** and *UsedMCW (7.04)* bit 3 **Run** are set to low (run and on commands are taken away) at the same time or nearly contemporary *Off1Mode (21.02)* and *StopMode (21.03)* **must** have the same setting. **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	DynBraking	RampStop	-	C
21.04	**E StopMode (emergency stop mode)** Conditions for motor deceleration when *UsedMCW (7.04)* bit 2 **Off3N** (respectively E-stop) is set low: 0 = **RampStop** stop according to *E StopRamp (22.11),*default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	DynBraking	RampStop	-	C
21.05	**E StopDecMin (emergency stop minimum deceleration rate)** During an emergency stop the deceleration of the drive is supervised. This supervision starts after the drive has received an emergency stop and the time delay defined in *DecMonDly (21.07)* is elapsed. In case the drive isn't able to decelerate within the window, defined by *E StopDecMin (21.05)* and *E StopDecMax (21.06)*, it is stopped by coasting and *AuxStatWord (8.02)* bit 2 **E-StopCoast** is set high. **Note1:** The supervision is disabled in case *E StopDecMax (21.06)* or *E StopDecMin (21.05)* is set to default. **Int. Scaling: 1 == 1 rpm/s Type: I Volatile: N**	0	18000	18000	rpm/s	E
21.06	**E StopDecMax (emergency stop maximum deceleration rate)** During an emergency stop the deceleration of the drive is supervised. This supervision starts after the drive has received an emergency stop and the time delay defined in *DecMonDly (21.07)* is elapsed. In case the drive isn't able to decelerate within the window, defined by *E StopDecMin (21.05)* and *E StopDecMax (21.06)*, it is stopped by coasting and *AuxStatWord (8.02)* bit 2 **E-StopCoast** is set high. **Note1:** The supervision is disabled in case *E StopDecMax (21.06)* or *E StopDecMin (21.05)* is set to default. **Int. Scaling: 1 == 1 rpm/s Type: I Volatile: N**	0	18000	18000	rpm/s	E
21.07	**DecMonDly (delay deceleration monitoring)** Time delay before the deceleration monitoring of the emergency stop starts. See also *E StopDecMin (21.05)* and *E StopDecMax (21.06).* **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	100	20	s	E
21.08	**Unused**					
21.09	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
21.10	**FlyStart (flying start)** Selection of the desired operating response to a **Run** command [*UsedMCW (7.04))* bit 3] during braking or coasting: 0 = **StartFrom0** wait until the motor has reached zero speed [see *ZeroSpeedLim (20.03)*], then restart. In case the restart command comes before zero speed is reached **A137 SpeedNotZero** [*AlarmWord3 (9.08)* bit 4] is generated. 1 = **FlyingStart** start motor with its actual speed, when the drive was stopped by **RampStop**, **TorqueLimit** or **CoastStop**. Stop by **DynBraking** is not interrupted, wait until zero speed is reached, default 2 = **FlyStartDyn** reserved **Attention:** When using **FlyStartDyn** make sure, that the hardware (e.g. the switch disconnecting the braking resistor) is able to disconnect the current. **Int. Scaling: 1 == 1 Type: C Volatile: N**	StartFrom0	FlyingStart	FlyingStart		E
21.11	**Unused**					
21.12	**Unused**					
21.13	**Unused**					
21.14	**FanDly (fan delay)** After the drive has been switched off [*UsedMCW (7.04)* bit 0 **On** = 0], both fans (motor and converter) mustn't switched off before *FanDly (21.14)* has elapsed. If motor or converter overtemperature is pending, the delay starts after the temperature has dropped below the overtemperature limit. **Int. Scaling: 1 == 1 s Type: I Volatile: N**	0	300	30	s	E
21.15	**Unused**					
21.16	**MainContCtrlMode (main contactor control mode)** *MainContCtrlMode (21.16)* determines the reaction to **On** and **Run** commands [*UsedMCW (7.04)* bits 0 and 3]: 0 = **On** main contactor closes with **On** = 1, default 1 = **On&Run** main contactor closes with **On** = **Run** = 1 2 = **OnHVCB** for high voltage AC circuit breaker configuration (for more information see chapter XXXX); not implemented jet **Int. Scaling: 1 == 1 Type: C Volatile: N**	On	OnHVCB	On	-	E
21.17	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
21.18	**FldHeatSel (field heat selector)** *FldHeatSel (21.18)* releases the field heating for motor 1 and motor 2: 0 = **NotUsed** field heating is off, default 1 = **On** field heating is on, as long as: **On** = 0 [*UsedMCW (7.04)* bit 0] and **Off2N** = 1 [*UsedMCW (7.04)* bit 1, Emergency Off / Coast Stop] 2 = **OnRun** field heating is on as long as: **On** = 1, **Run** = 0 [*UsedMCW (7.04)* bit 3] and **Off2N** = 1 3 = **ACW Bit12** field heating is on as long as: **ACW Bit12** = 1 [*AuxCtrlWord (7.02)* bit 12] and **Run** = 0 4 = **ACW Bit13** field heating is on as long as: **ACW Bit13** = 1 [*AuxCtrlWord (7.02)* bit 13] and **Run** = 0 5 = **ACW Bit14** field heating is on as long as: **ACW Bit14** = 1 [*AuxCtrlWord (7.02)* bit 14] and **Run** = 0 6 = **ACW Bit15** field heating is on as long as: **ACW Bit15** = 1 [*AuxCtrlWord (7.02)* bit 15] and **Run** = 0 **Note1:** The field heating references are set with *M1FldHeatRef (44.04)* and *M2FldHeatRef (49.06).* Field heating for the individual motor can be disabled when the belonging reference is set to zero. Field nominal currents are set with *M1NomFldCur (99.11)* and *M2NomFldCur (49.05).* **Note2:** In case the field exciter is not connected via a separate field contactor following settings apply for field heating: – *MainContCtrlMode (21.16)* = **On** – *FldHeatSel (21.18)* = **OnRun** **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C
Group 22	**Speed ramp**					
22.01	**AccTime1 (acceleration time 1)** The time within the drive will accelerate from zero speed to *SpeedScaleAct (2.29):* – To expand the ramp time use *RampTimeScale (22.03)* – *AccTime1 (22.01)* can be released with *Ramp2Sel (22.11)* **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	300	20	s	C
22.02	**DecTime1 (deceleration time 1)** The time within the drive will decelerate from *SpeedScaleAct (2.29)* to zero speed*:* – To expand the ramp time use *RampTimeScale (22.03)* – *DecTime1 (22.02)* can be released with *Ramp2Sel (22.11)* **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	300	20	s	C
22.03	**RampTimeScale (ramp time scaling)** Multiplier for *AccTime1 (22.01) / AccTime2 (22.09)* and *DecTime1 (22.02) / DecTime2 (22.10)* to expand the ramp time. **Int. Scaling: 100 == 1 Type: I Volatile: N**	0.1	100	1	-	E
22.04	**E StopRamp (emergency stop ramp)** The time within the drive will decelerate from *SpeedScaleAct (2.29)* to zero speed. In case emergency stop is released and *E StopMode (21.04)* = **RampStop**. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	3000	20	s	C

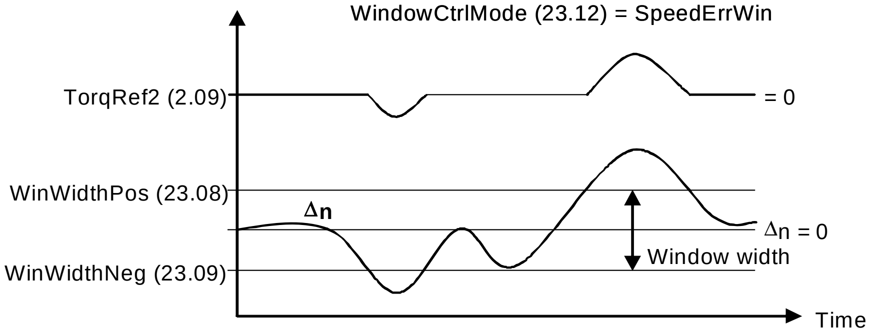
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
22.05	**ShapeTime (shape time)** Speed reference softening time. This function is bypassed during an emergency stop:  **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	30	0	s	E
22.06	**Unused**					
22.07	**VarSlopeRate (variable slope rate)** Variable slope is used to control the slope of the speed ramp during a speed reference change. It is active only with *VarSlopeRate (22.07)* ≠ 0. *VarSlopeRate (22.07)* defines the speed ramp time **t** for the speed reference change **A**:  **t** = cycle time of the overriding control (e.g. speed reference generation) **A** = speed reference change during cycle time **t** **Note1:** In case the overriding control systems cycle time of the speed reference and *VarSlopeRate (22.07)* are equal the shape of *SpeedRef3 (2.02)* is a strait line. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	30000	0	ms	E
22.08	**BalRampRef (balance ramp reference)** The output of the speed ramp can be forced to the value defined by BalRampRef (22.08). The function is released by setting *AuxCtrlWord (7.02)* bit 3 = 1. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm \;\; to \;\; (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E
22.09	**AccTime2 (acceleration time 2)** The time within the drive will accelerate from zero speed to *SpeedScaleAct (2.29):* – To expand the ramp time use *RampTimeScale (22.03)* – *AccTime2 (22.09)* can be released with *Ramp2Sel (22.11)* **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	300	20	s	E

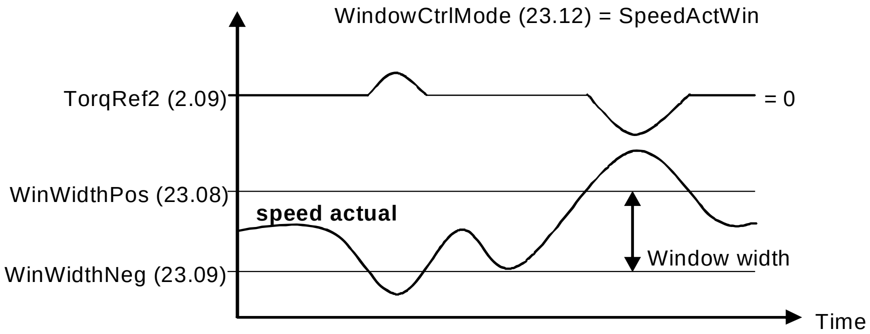
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
22.10	**DecTime2 (deceleration time 2)** The time within the drive will decelerate from *SpeedScaleAct (2.29)* to zero speed: – To expand the ramp time use *RampTimeScale (22.03)* – *DecTime2 (22.10)* can be released with *Ramp2Sel (22.11)* **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	300	20	s	E
22.11	**Ramp2Select (ramp 2 selector)** Select active ramp parameters: 0 = **Acc/Dec1** parameter set 1 [*AccTime1 (22.01)* and *DecTime1 (22.02*]*)* is active, default 1 = **Acc/Dec2** parameter set 2 [*AccTime2 (22.09)* and *DecTime2 (22.10)*] is active 2 = **SpeedLevel** If |*SpeedRef3 (2.02)*| ≤ |*SpeedLev (50.10)*|, then parameter set1 is active. If |*SpeedRef3 (2.02)*| > |*SpeedLev (50.10)*|, then parameter set 2 is active. 3 = **DI1** 0 = parameter set 1 is active, 1 = parameter set 2 is active 4 = **DI2** 0 = parameter set 1 is active, 1 = parameter set 2 is active 5 = **DI3** 0 = parameter set 1 is active, 1 = parameter set 2 is active 6 = **DI4** 0 = parameter set 1 is active, 1 = parameter set 2 is active 7 = **DI5** 0 = parameter set 1 is active, 1 = parameter set 2 is active 8 = **DI6** 0 = parameter set 1 is active, 1 = parameter set 2 is active 9 = **DI7** 0 = parameter set 1 is active, 1 = parameter set 2 is active 10 = **DI8** 0 = parameter set 1 is active, 1 = parameter set 2 is active 11 = **DI9** 0 = parameter set 1 is active, 1 = parameter set 2 is active, only available with digital extension board 12 = **DI10** 0 = parameter set 1 is active, 1 = parameter set 2 is active, only available with digital extension board 13 = **DI11** 0 = parameter set 1 is active, 1 = parameter set 2 is active, only available with digital extension board 14 = **MCW Bit11** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 11 15 = **MCW Bit12** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 12 16 = **MCW Bit13** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 13 17 = **MCW Bit14** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 14 18 = **MCW Bit15** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 15 19 = **ACW Bit12** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 12 20 = **ACW Bit13** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 13 21 = **ACW Bit14** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 14 22 = **ACW Bit15** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	Acc/Dec1	ACW Bit15	Acc/Dec1	-	E
22.12	**JogAccTime (acceleration time jogging)** The time within the drive will accelerate from zero speed to *SpeedScaleAct (2.29)* in case of jogging: – When using jog command *Jog1 (10.17)* or *MainCtrlWord (7.01)* bit 8 speed is set by *FixedSpeed1 (23.02)* – When using jog command *Jog2 (10.18))* or *MainCtrlWord (7.01)* bit 9 speed is set by *FixedSpeed2 (23.03)* – To expand the ramp time use *RampTimeScale (22.03)* **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	300	20	s	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
22.13	**JogDecTime (deceleration time jogging)** The time within the drive will decelerate from *SpeedScaleAct (2.29)* to zero speed in case of jogging: – When using jog command *Jog1 (10.17)* or *MainCtrlWord (7.01)* bit 8 speed is set by *FixedSpeed1 (23.02)* – When using jog command *Jog2 (10.18))* or *MainCtrlWord (7.01)* bit 9 speed is set by *FixedSpeed2 (23.03)* – To expand the ramp time use *RampTimeScale (22.03)* **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0	300	20	s	E
Group 23	**Speed reference**					
23.01	**SpeedRef (speed reference)** Main speed reference input for the speed control of the drive. Can be connected to *SpeedRefUsed (2.17)* via: – *Ref1Mux (11.02)* and *Ref1Sel (11.03)* or – *Ref2Mux (11.12)* and *Ref2Sel (11.06)* Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: Y**	-10000	10000	0	rpm	E
23.02	**FixedSpeed1 (fixed speed 1)** *FixedSpeed1 (23.02)* is specifying a constant speed reference and overrides SpeedRef2 (2.01) at the speed ramp's input. It can be released by *Jog1 (10.17)* or *MainCtrlWord (7.01)* bit 8. The ramp times are set with *JogAccTime (22.12)* and *JogDecTime (22.13)*. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E
23.03	**FixedSpeed2 (fixed speed 2)** *FixedSpeed2 (23.03)* is specifying a constant speed reference and overrides SpeedRef2 (2.01) at the speed ramp's input. It can be released by *Jog2 (10.18)* or *MainCtrlWord (7.01)* bit 9. The ramp times are set with *JogAccTime (22.12)* and *JogDecTime (22.13)*. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	0	rpm	E
23.04	**SpeedCorr (speed correction)** The *SpeedCorr (23.04)* is added to the ramped reference *SpeedRef3 (2.02)*. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Note1:** Since this speed offset is added after the speed ramp, it must be set to zero prior to stopping the drive. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-10000	10000	0	rpm	E
23.05	**SpeedShare (speed sharing)** Scaling factor *SpeedRefUsed (2.17)*. Before speed ramp. **Int. Scaling: 10 == 1 % Type: SI Volatile: N**	-400	400	100	%	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
23.06	**SpeedErrFilt (filter for Δn)** Speed error (Δn) filter time 1. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E

Idea of Window Control:
The idea of the Window Control is to block the speed controller as long as the speed error (Δn) respectively speed actual remains within the window set by *WinWidthPos (23.08)* and *WinWidthNeg (23.09).* This allows the external torque reference [*TorqRef1 (2.08)*] to affect the process directly. If the speed error (Δn) respectively actual speed exceeds the programmed window, the speed controller becomes active. This function could be called over/underspeed protection in torque control mode:





Index	Signal / Parameter name	min.	max.	def.	unit	E/C
23.07	**WinIntegOn (window integrator on)** Enables the integrator of the speed controller when window control is released: 0 = **Off** Integrator of the speed controller is blocked when window control is released 1 = **On** Integrator of the speed controller is enabled when window control is released To release window control set *TorqSel (26.01)* = **Add** and *AuxCtrlWord (7.02)* bit 7 = 1. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Off	On	Off	-	E
23.08	**WinWidthPos (positive window width)** Positive speed limit for the window control, when the speed error ($\Delta n = n_{ref} - n_{act}$) is positive. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	-10000	10000	0	rpm	E

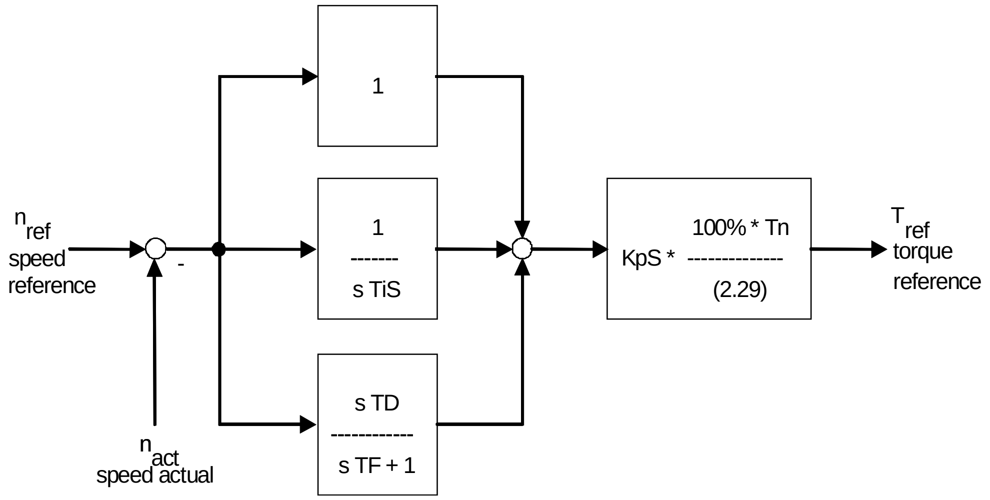
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
23.09	**WinWidthNeg (negative window width)** Negative speed limit for the window control, when the speed error ($\Delta n = n_{ref} - n_{act}$) is negative. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	-10000	10000	0	rpm	E
23.10	**SpeedStep (speed step)** *SpeedStep (23.10)* is added to the speed error (Δn) at the speed controller's input. The given min./max. values are limited by *M1SpeedMin (20.02)* and *M1SpeedMax (20.02).* Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Note1:** Since this speed offset is added after the speed ramp, it must be set to zero prior to stopping the drive. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-10000	10000	0	rpm	E
23.11	**SpeedErrFilt2 (2nd filter for Δn)** Speed error (Δn) filter time 2. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E
23.12	**WinCtrlMode (window control mode)** Window control mode: 0 = **SpeedErrWin** standard window control, Speed error (Δn) has to be in a window defined by *WinWidthPos (23.08)* and *WinWidthNeg (23.09)*, default 1 = **SpeedActWin** speed actual has to be in a window defined by *WinWidthPos (23.08)* and *WinWidthNeg (23.09)* Example1: To get a window of 10rpm width around the speed error (Δn) set: – *WinCtrlMode (23.12)* = **SpeedErrWin** – *WinWidthPos (23.08)* = 5rpm and – *WinWidthNeg (23.09)* = -5rpm Example2: To get a window (e.g. 500rpm to 1000rpm) around speed actual set: – *WinCtrlMode (23.12)* = **SpeedActWin** – *WinWidthPos (23.08)* = 1000rpm and – *WinWidthNeg (23.09)* = 500rpm To get a window (e.g. -50rpm to 100rpm) around speed actual set: – *WinCtrlMode (23.12)* = **SpeedActWin** – *WinWidthPos (23.08)* = 100rpm and – *WinWidthNeg (23.09)* = -50rpm **Int. Scaling: 1 == 1 Type: C Volatile: N**	SpeedErrWin	SpeedActWin	SpeedErrWin	-	E
23.13	**AuxSpeedRef (auxiliary speed reference)** Auxiliary speed reference input for the speed control of the drive. Can be connected to *SpeedRefUsed (2.17)* via: – *Ref1Mux (11.02)* and *Ref1Sel (11.03)* or – *Ref2Mux (11.12)* and *Ref2Sel (11.06)* Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: SI Volatile: Y**	-10000	10000	0	rpm	E
23.14	**Unused**					

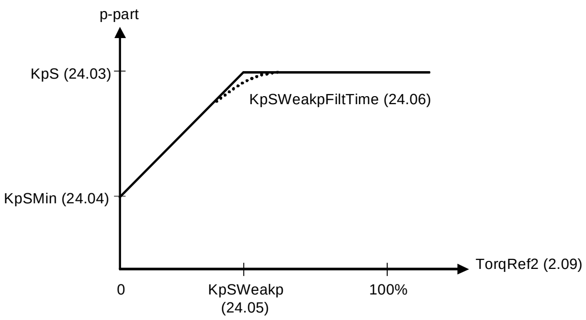
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
23.15	**DirectSpeedRef (direct speed reference)** Direct speed input is connected to *SpeedRef3 (2.02)* by means of *AuxCtrlWord2 (7.03)* bit 10 = 1 and replaces the speed ramp output. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Note1:** Since this speed offset is added after the speed ramp, it must be set to zero prior to stopping the drive. **Int. Scaling: (2.29) Type: SI Volatile: Y**	-10000	10000	0	rpm	E
23.16	**SpeedRefScale (speed reference scaling)** Speed reference scaling. After Speed ramp. **Int. Scaling: 100 == 1 Type: I Volatile: N**	-100	100	1	-	E
Group 24	**Speed control**					

The Speed controller is based on the PID algorithm and is presented as follows:

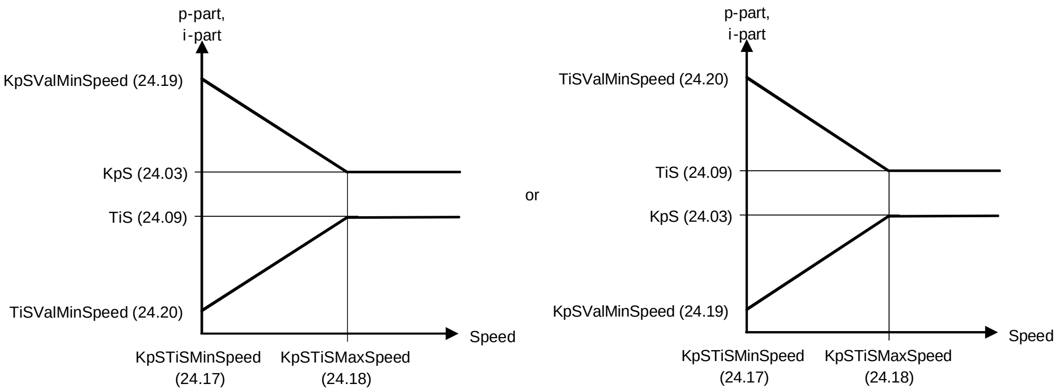
$$T_{ref\,(s)} = KpS * \left[\left(n_{ref\,(s)} - n_{act\,(s)} \right) * \left(1 + \frac{1}{s\,TiS} + \frac{s\,TD}{s\,TF + 1} \right) \right] * \frac{100\% * T_n}{(2.29)}$$

with:
T_{ref} = torque reference
KpS = proportional gain [*KpS (24.03)*]
N_{ref} = speed reference
N_{act} = speed actual
TiS = Integration time [*TiS (24.09)]*
TD = Derivation time [*DerivTime (24.12)]*
TF = Derivation filter time [*DerivFiltTime (24.13)]*
T_n = nominal motor torque
(2.29) = actual used speed scaling [*SpeedScaleAct (2.29)*]



Index	Signal / Parameter name	min.	max.	def.	unit	E/C
24.01	**Unused**					
24.02	**DroopRate (droop rate)** The amount of speed decrease caused by the load is determined by *DroopRate (24.02).* The result is a load dependent speed decrease in percent of *SpeedScaleAct (2.29).* Example: *With DroopRate (24.02)* = 3% and *TorqIntegRef (2.05)* = 100% (nominal motor torque) the actual speed decreases 3% of *SpeedScaleAct (2.29).* **Int. Scaling: 10 == 1 % Type: I Volatile: N**	0	100	0	%	E
24.03	**KpS (p-part speed controller)** Proportional gain of the speed controller can be released by means of *Par2Select (24.29).* Example: The controller generates 15% of motor nominal torque with *KpS (24.03)* = 3, if the speed error (Δn) is 5% of *SpeedScaleAct (2.29).* **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	325	5	-	C
	Load adaptive proportional gain:  The adaptive proportional gain of the speed controller is used to smooth out disturbances which are caused by low loads and backlash. Moderate filtering of the speed error (Δn) is typically not enough to tune the drive. The load adaptation is valid for positive and negative torque.					
24.04	**KpSMin (minimum p-part speed controller)** *KpSMin (24.04)* determines the proportional gain when the speed controller output [*TorqRef2 (2.09)*] is zero. *KpSMin (24.04)* cannot be greater than *KpS (24.03).* **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	(24.03)	0	-	E
24.05	**KpSWeakp (weakening point of p-part speed controller)** The speed controller output [*TorqRef2 (2.09)*], in percent of the active motor nominal torque, where the gain equals *KpS (24.03)*. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	0	%	E
24.06	**KpSWeakpFiltTime (filter time for weakening point of p-part speed controller)** Filter time to soften the proportional gains rate of change. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	100	100	ms	E
24.07	**Unused**					
24.08	**Unused**					

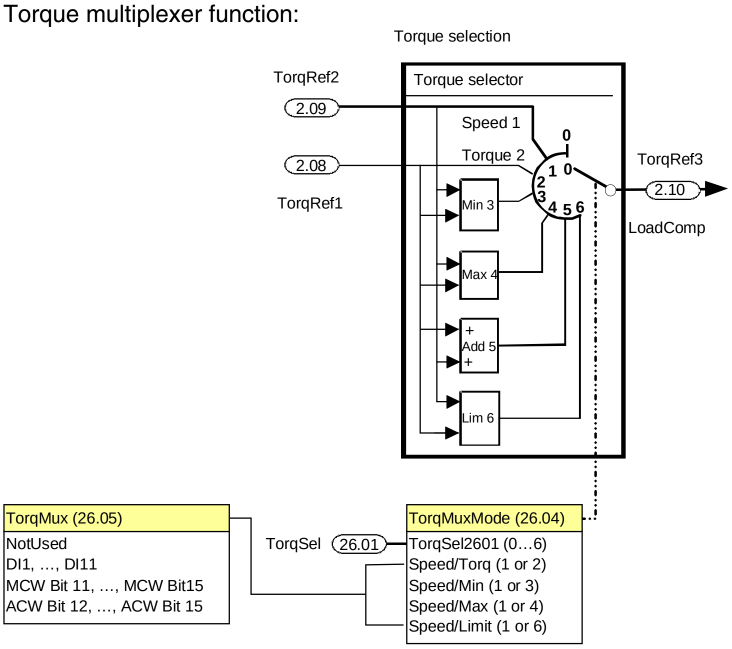
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
24.09	**TiS (i-part speed controller)** Integral time of the speed controller can be released by means of *Par2Select (24.29). TiS (24.09)* defines the time within the integral part of the controller achieves the same value as the proportional part. Example: The controller generates 15% of motor nominal torque with *KpS (24.03)* = 3, if the speed error (Δn) is 5% of *SpeedScaleAct (2.29).* On that condition and with *TiS (24.09)* = 300 ms follows: – the controller generates 30% of motor nominal torque, if the speed error (Δn) is constant, after 300 ms are elapsed (15% from proportional part and 15% from integral part). Setting *TIS (24.09)* to 0 ms disables the integral part of the speed controller and resets its integrator. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	2500	ms	C
24.10	**TiSInitValue (initial value for i-part speed controller)** Initial value of the speed controller integrator, in percent of the active motor nominal torque. The integrator is set as soon as **RdyRef** [*MainStatWord (8.01)*] becomes valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	325	0	%	E
24.11	**BalRef ((balance reference)** External value in percent of the active motor nominal torque. The speed controller output is forced to *BalRef (24.11)* when *AuxCtrlWord (7.02)* bit 8 = 1. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	325	0	%	E
24.12	**DerivTime (d-part speed controller)** Speed controller derivation time. *DerivTime (24.12)* defines the time within the speed controller derives the error value. The speed controller works as PI controller, if *DerivTime (24.12)* is set to zero. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	0	ms	E
24.13	**DerivFiltTime (filter time for d-part speed controller)** Derivation filter time. **Int. Scaling: 1.== 1 ms Type: I Volatile: N**	0	10000	8	ms	E
24.14	**AccCompDerTime (acceleration compensation derivation time)** *AccCompDerTime (24.14)* compensates the inertia by adding the derived and weighted *SpeedRef4 (2.18)* to the speed controller output. The acceleration compensation is inactive, if *AccCompDerTime (24.14)* is set to zero. Example: *AccCompDerTime (24.14)* equals the time required to accelerate the drive to *SpeedScaleAct (2.29)* with motor nominal torque. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	1000	0	s	E
24.15	**AccCompFiltTime (filter time acceleration compensation)** Acceleration compensation filter time. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	8	ms	E
24.16	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Speed adaptive proportional gain and integral time:  In certain applications it is useful to increase / decrease the proportional gain *[KpS (24.03)]* and decrease / increase the integral time [*TiS (24.09)*] at low speeds to improve the performance of the speed control. The linear increase and decrease of these parameters starts at *KpSTiSMaxSpeed (24.18)* and ends at *KpSTiSMinSpeed (24.17)* by means of *KpSValMinSpeed (24.19)* and *TiSValMinSpeed (24.20)*. The speed adaptation is valid for positive and negative speeds.					
24.17	**KpSTiSMinSpeed (minimum speed for p- / i-part speed controller)** The speed limit below which the proportional gain and the integral time are defined by *KpSValMinSpeed (24.19)* and *TiSValMinSpeed (24.20).* Internally limited from: $0rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	0	(24.18)	0	rpm	E
24.18	**KpSTiSMaxSpeed (maximum speed for p- / i-part speed controller)** The speed limit above which the proportional gain and the integral time become constant and are defined by *KpS (24.03)* and *TiS (24.09).* Internally limited from: $0rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	(24.17)	10000	0	rpm	E
24.19	**KpSValMinSpeed (p-part speed controller value at minimum speed)** *KpSValMinSpeed (24.19)* determines the proportional gain percentage at the speed defined by parameter *KpSTiSMinSpeed (24.17*). **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	500	100	%	E
24.20	**TiSValMinSpeed (i-part speed controller value at minimum speed)** *TiSValMinSpeed (24.20)* determines the integral time percentage at the speed defined by parameter *KpSTiSMinSpeed (24.17*). **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	500	100	%	E
24.21	**ZeroFreqRFE (zero frequency resonance frequency eliminator)** Frequency of zero. The filter is located at the input of the speed controller. **Int. Scaling: 10 == 1 Hz Type: I Volatile: N**	0	150	45	Hz	E
24.22	**ZeroDampRFE (zero damping resonance frequency eliminator)** Damping of zero. **Int. Scaling: 1000 == 1 Type: I Volatile: N**	-1	1	0		E

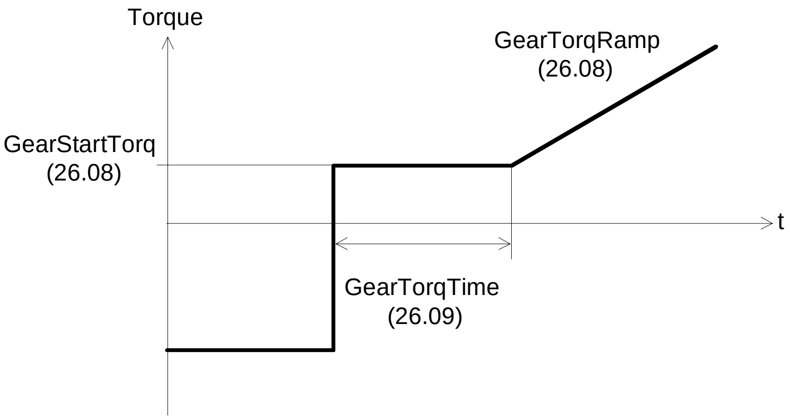
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
24.23	**PoleFreqRFE (pole frequency resonance frequency eliminator)** Frequency of pole. The filter is located at the input of the speed controller. **Int. Scaling: 10 == 1 Hz Type: I Volatile: N**	0	150	40	Hz	E
24.24	**PoleDampRFE (pole damping resonance frequency eliminator)** Damping of pole. **Int. Scaling: 1000 == 1 Type: I Volatile: N**	0	1	0.25		E
24.25	**SpeedErrorScale (Δn scaling)** Scaling factor speed error (Δn). **Int. Scaling: 10 == 1 % Type: I Volatile: N**	10	400	100	%	E
24.26	**Unused**					
24.27	**KpS2 (2nd p-part speed controller)** 2nd proportional gain of the speed controller can be released by means of *Par2Select (24.29).* **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	325	5	-	E
24.28	**TiS2 (2nd i-part speed controller)** 2nd integral time of the speed controller can be released by means of *Par2Select (24.29).* **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	2500	ms	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
24.29	**Par2Select (selector for 2nd set of speed controller parameters)** Select active speed controller parameters: 0 = **ParSet1** parameter set 1 [*KpS (24.03)* and *TiS (24.09)*] is active, default 1 = **ParSet2** parameter set 2 [*KpS2 (24.27)* and *TiS2 (24.28)*] is active 2 = **SpeedLevel** If |*MotSpeed (1.04)*| ≤ |*SpeedLev (50.10)*|, then parameter set1 is active. If |*MotSpeed (1.04)*| > |*SpeedLev (50.10)*|, then parameter set 2 is active. 3 = **SpeedError** If |*SpeedErrNeg (2.03)*| ≤ |*SpeedLev (50.10)*|, then parameter set1 is active. If | *SpeedErrNeg (2.03)*| > |*SpeedLev (50.10)*|, then parameter set 2 is active. 4 = **DI1** 0 = parameter set 1 is active, 1 = parameter set 2 is active 5 = **DI2** 0 = parameter set 1 is active, 1 = parameter set 2 is active 6 = **DI3** 0 = parameter set 1 is active, 1 = parameter set 2 is active 7 = **DI4** 0 = parameter set 1 is active, 1 = parameter set 2 is active 8 = **DI5** 0 = parameter set 1 is active, 1 = parameter set 2 is active 9 = **DI6** 0 = parameter set 1 is active, 1 = parameter set 2 is active 10 = **DI7** 0 = parameter set 1 is active, 1 = parameter set 2 is active 11 = **DI8** 0 = parameter set 1 is active, 1 = parameter set 2 is active 12 = **DI9** 0 = parameter set 1 is active, 1 = parameter set 2 is active, only available with digital extension board 13 = **DI10** 0 = parameter set 1 is active, 1 = parameter set 2 is active, only available with digital extension board 14 = **DI11** 0 = parameter set 1 is active, 1 = parameter set 2 is active, only available with digital extension board 15 = **MCW Bit11** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 11 16 = **MCW Bit12** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 12 17 = **MCW Bit13** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 13 18 = **MCW Bit14** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 14 19 = **MCW Bit15** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *MainCtrlWord (7.01)* bit 15 20 = **ACW Bit12** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 12 21 = **ACW Bit13** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 13 22 = **ACW Bit14** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 14 23 = **ACW Bit15** 0 = parameter set 1 is active, 1 = parameter set 2 is active, *AuxCtrlWord (7.02)* bit 15 **Note1:** Load and speed dependent adaptation parameters are valid regardless of the selected parameter set. **Int. Scaling: 1 == 1 Type: C Volatile: N**	ParSet1	ACW Bit15	ParSet1		E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 25	**Torque reference**					
25.01	**TorqRefA (torque reference A)** External torque reference in percent of the active motor nominal torque. *TorqRefA (25.01)* can be scaled by *LoadShare (25.03).* **Note1:** *TorqRefA (25.01)* is only valid, if *TorqRefA Sel (25.10)* = **TorqRefA**. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-325	325	0	%	E
25.02	**TorqRefA FTC (torque reference A filter time)** *TorqRefA (25.01)* filter time. **Int. Scaling: 1 == 1 ms Type: SI Volatile: N**	0	10000	0	ms	E
25.03	**LoadShare (load share)** Scaling factor *TorqRefA (25.01).* **Int. Scaling: 10 == 1 % Type: SI Volatile: N**	-400	400	100	%	E
25.04	**TorqRefB (torque reference B)** External torque reference in percent of the active motor nominal torque. *TorqRefB (25.04)* is ramped by *TorqRampUp (25.05)* and *TorqRampDown (25.06).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-325	325	0	%	E
25.05	**TorqRampUp (torque ramp up)** Ramp time from 0% to 100%, of active motor nominal torque, for. *TorqRefB (25.04).* **Int. Scaling: 100 = 1 s Type: I Volatile: N**	0	120	0	s	E
25.06	**TorqRampDown (torque ramp down)** Ramp time from 100% to 0%, of active motor nominal torque, for. *TorqRefB (25.04).* **Int. Scaling: 100 = 1 s Type: I Volatile: N**	0	120	0	s	E
25.07	**Unused**					
25.08	**Unused**					
25.09	**Unused**					
25.10	**TorqRefA Sel (torque reference A selector)** Selector for *TorqRefExt (2.24)*: 0 = **TorqRefA2501** *TorqRefA (25.01),* default 1 = **AI1** analog input AI1 2 = **AI2** analog input AI2 3 = **AI3** analog input AI3 4 = **AI4** analog input AI4 5 = **AI5** analog input AI5 6 = **AI6** analog input AI6 **Int. Scaling: 1 == 1 Type: C Volatile: N**	TorqRefA2501	AI6	TorqRefA2501	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 26	**Torque reference handling**					
26.01	**TorqSel (torque selector)** Torque reference selector: 0 = **Zero** zero control, torque reference = 0 1 = **Speed** speed control, default 2 = **Torque** torque control 3 = **Minimum** minimum control: min [*TorqRef1 (2.08), TorqRef2 (2.09)*] 4 = **Maximum** maximum control: max [*TorqRef1 (2.08), TorqRef2 (2.09)*] 5 = **Add** add control: *TorqRef1 (2.08) +TorqRef2 (2.09),* used for window control 6 = **Limitation** limitation control: *TorqRef1 (2.08)* limits *TorqRef2 (2.09).* If *TorqRef1 (2.08)* = 50%, then *TorqRef2 (2.09)* is limited to ±50%. The output of the torque reference selector is *TorqRef3 (2.10).* **Note1:** *TorqSel (26.01)* is only valid, if *TorqMuxMode (26.04)* = **TorqSel**. **Note2:** In case of *UsedMCW (7.04)* bit 2 **Off3N** (respectively E-stop) is set low and *E StopMode (21.04)* = **RampStop** or **TorqueLimit**, the torque selector is automatically set to **Speed**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Zero	Limitation	Speed	-	E
26.02	**LoadComp (load compensation)** Load compensation - in percent of the active motor nominal torque -added to *TorqRef3 (2.10).* The sum of *TorqRef3 (2.10)* and the *LoadComp (26.02)* results in *TorqRef4 (2.11).* **Note1:** Since this torque offset is added, it must be set to zero prior to stopping the drive. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	325	0	%	E
26.03	**Unused**					
	Torque multiplexer function: 					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
26.04	**TorqMuxMode (torque multiplexer mode)** *TorqMuxMode (26.04)* selects a pair of operation modes. The change between operation modes is done by means of *TorqMux (26.05).* Torque reference multiplexer: 0 = **TorqSel2601** operation mode depends on *TorqSel (26.01)*, default 1 = **Speed/Torq** operation mode depends on *TorqMux (26.05)*: - binary input = 0 speed control (1) - binary input = 1 torque control (2) 2 = **Speed/Min** operation mode depends on *TorqMux (26.05):* - binary input = 0 speed control (1) - binary input = 1 minimum control (3) 3 = **Speed/Max** operation mode depends on *TorqMux (26.05):* - binary input = 0 speed control (1) - binary input = 1 maximum control (4) 4 = **Speed/Limit** operation mode depends on *TorqMux (26.05):* - binary input = 0 speed control (1) - binary input = 1 limitation control (6) **Int. Scaling: 1 == 1 Type: C Volatile: N**	TorqSel2601	Speed/Limit	TorqSel2601	-	E
26.05	**TorqMux (torque multiplexer)** *TorqMux (26.05)* selects a binary input to change between operation modes. The choice of the operation modes is provided by means of *TorqMuxMode (26.04)*. Torque reference multiplexer binary input: 0 = **NotUsed** operation mode depends on *TorqSel (26.01)*, default 1 = **DI1** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 2 = **DI2** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 3 = **DI3** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 4 = **DI4** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 5 = **DI5** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 6 = **DI6** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 7 = **DI7** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 8 = **DI8** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)* 9 = **DI9** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** only available with digital extension board 10= **DI10** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** only available with digital extension board 11 = **DI11** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** only available with digital extension board 12 = **MCW Bit11** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 0 = speed control, 1 = depends on *TorqMuxMode (26.04)***,** *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
26.06	**Unused**					
26.07	**Unused**					
26.08	**GearStartTorq (gearbox starting torque)** Gear backlash compensation: – *GearStartTorq (26.08)* is the reduced torque limit - in percent of the active motor nominal torque - used after a torque direction change. The torque limit is reduced for the time defined by *GearTorqTime (26.09).*  **Int. Scaling: 100 = 1 % Type: I Volatile: N**	0	325	325	%	E
26.09	**GearTorqTime (gearbox torque time)** Gear backlash compensation function: – When the torque is changing it's direction, the torque limit is reduced for the time defined by *GearTorqTime (26.09)*. **Int. Scaling: 1 = 1 ms Type: I Volatile: N**	0	10000	100	ms	E
26.10	**GearTorqRamp (gearbox torque ramp)** Gear backlash compensation function: – When the torque is changing it's direction, the torque limit is reduced for the time defined by *GearTorqTime (26.09).* After the time has elapsed, the torque limit is increased to it's normal value according to the ramp time defined by *GearTorqRamp (26.10).* *GearTorqRamp (26.10)* defines the time within the torque increases from zero- to active motor nominal torque. **Int. Scaling: 1 = 1 ms Type: I Volatile: N**	0	64000	100	ms	E
26.11	**Unused**					
26.12	**Unused**					
26.13	**Unused**					
26.14	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
26.15	**TorqCorrect (torque correction)** Torque correction value in percent of the active motor nominal torque: 0 = **NotUsed** no torque correction used, default 1 = **AI1** torque correction via AI1 (fast AI) 2 = **AI2** torque correction via AI2 (fast AI) 3 = **AI3** torque correction via AI3 4 = **AI4** torque correction via AI4 5 = **AI5** torque correction via AI5 6 = **AI6** torque correction via AI6 **Note1:** If *TorqCorrect (26.15)* = **AI3** then AI3 is connected to *TorqCorr (2.14)* and thus added to *TorqRefUsed (2.13).* **Note2:** Since this torque offset is added, it must be set to zero prior to stopping the drive. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	AI6	NotUsed	-	E
Group 30	**Fault functions**					
30.01	**StallTime (stall time)** The time allowed for the drive to undershoot *StallSpeed (30.02)* and exceed *StallTorq (30.03)*.A triggered stall protection leads to fault **F531 MotorStalled** *[FaultWord2 (9.02)* bit 14]. The stall protection is inactive, if *StallTime (30.01)* is set to zero. **Int. Scaling: 1 == 1 s Type: I Volatile: N**	0	200	0	s	C
30.02	**StallSpeed (stall speed)** Actual speed limit used for stall protection. Internally limited from: $0 rpm \ to \ (2.29) rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	0	1000	5	rpm	C
30.03	**StallTorq (stall torque)** Actual torque limit used for stall protection. **Int. Scaling: 100 = 1 % Type: I Volatile: N**	0	325	75	%	C
30.04	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.05	**ResCurDetectSel (residual current detection selector) I** The drive trips with **F505 ResCurDetect** [*FaultWord1 (9.01)* bit 4] if the earth current exceeds *ResCurDetectLim (30.06)* for *ResCurDetectDel (30.07)*: 0 = **NotUsed** residual current detection is blocked, default 1 = **AI4** The earth current is measured by means of a current difference sensor in combination with AI4 (X3:11 and X3:12) on the SDCS-IOB-3 board. 2 = **DI1** The earth current is measured by means of an external device (e.g. Bender relays). 3 = **DI2** The earth current is measured by means of an external device (e.g. Bender relays). 4 = **DI3** The earth current is measured by means of an external device (e.g. Bender relays). 5 = **DI4** The earth current is measured by means of an external device (e.g. Bender relays). 6 = **DI5** The earth current is measured by means of an external device (e.g. Bender relays). 7 = **DI6** The earth current is measured by means of an external device (e.g. Bender relays). 8 = **DI7** The earth current is measured by means of an external device (e.g. Bender relays). 9 = **DI8** The earth current is measured by means of an external device (e.g. Bender relays. 10 = **DI9** The earth current is measured by means of an external device (e.g. Bender relays). Only available with digital extension board 11 = **DI10** The earth current is measured by means of an external device (e.g. Bender relays. Only available with digital extension board 12 = **DI11** The earth current is measured by means of an external device (e.g. Bender relays). Only available with digital extension board **Note1:** If *ResCurDetectSel (30.05)* is connected to a digital input only *ResCurDetectDel (30.06)* remains valid. The trip limit *ResCurDetectLim (30.05)* is adjusted at the external device. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	E
30.06	**ResCurDetectLim (residual current detection limit)** Residual current detection ripping level. If *ResCurDetectSel (30.05)* is connected to a digital input *ResCurDetectLim (30.06)* is deactivated, because the limit is adjusted at the external device. **Int. Scaling: 10 == 1 A Type: I Volatile: N**	0	20	4	A	E
30.07	**ResCurDetectDel (residual current detection delay)** Time delay for **F505 ResCurDetect** [*FaultWord1 (9.01)*]. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	10	ms	E
30.08	**ArmOvrVoltLev (armature overvoltage level)** The drive trips with **F503 ArmOverVolt** [*FaultWord1 (9.01)* bit 2] if *ArmOvrVoltLev (30.08)* - in percent of *M1NomVolt (99.02)* - is exceeded. Example: With *M1NomVolt (99.02)* = 525V and *ArmOvrVoltLev (30.08)* = 120% the drive trips with armature voltages > 630 V. **Int. Scaling: 10 == 1 % Type: I Volatile: N**	20	500	120	%	C
30.09	**ArmOvrCurLev (armature overcurrent level)** The drive trips with **F502 ArmOverCur** [*FaultWord1 (9.01)* bit 1] if *ArmOvrCurLev (30.09)* - in percent of *M1NomCur (99.03)* - is exceeded. Example: With *M1NomCur (99.03)* = 850 A and *ArmOvrCurLev (30.09)* = 250% the drive trips with armature currents > 2125 A. **Int. Scaling: 10 == 1 % Type: I Volatile: N**	20	400	250	%	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.10	**ArmCurRiseMax (maximum rise armature current)** The drive trips with **F539 FastCurRise** [*FaultWord3 (9.03)* bit 6] if *ArmCurRiseMax (30.10)* - in percent of *M1NomCur (99.03)* per 1 ms is exceeded. **Note1:** This trip opens the main contactor and the DC-breaker, if present. **Int. Scaling: 100 == 1 %/ms Type: I Volatile: N**	0	325	325	%/ms	E
30.11	**Unused**					
30.12	**M1FldMinTrip (motor 1 minimum field trip)** The drive trips with **F541 M1FexLowCur** [*FaultWord3 (9.03)* bit 8] if *M1FldMinTrip (30.12)* - in percent of *M1NomFldCur (99.11)* - is still undershot when *FldMinTripDly (45.18)* is elapsed. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	100	50	%	E
30.13	**M1FldOvrCurLev (motor 1 field overcurrent level)** The drive trips with **F515 M1FexOverCur** [*FaultWord1 (9.01)* bit 14] if *M1FldOvrCurLev (30.13)* - in percent of *M1NomFldCur (99.11)* - is exceeded. The field overcurrent fault is inactive, if *M1FldOvrCurLev (30.13)* is set to 135%. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	135	125	%	E
30.14	**SpeedFbMonLev (speed feedback monitor level)** The drive reacts according to *SpeedFbFltSel (30.17)* if the measured speed feedback [*SpeedActEnc (1.03)* or *SpeedActTach (1.05)*] does not exceed *SpeedFbMonLev (30.14)* while the measured EMF exceeds *EMF FbMonLev (30.15)*. Internally limited from: $0rpm \ \ to \ \ (2.29)*\frac{32767}{20000}rpm$ Example: With *SpeedFbMonLev (30.14)* = 15 rpm and *EMF FbMonLev (30.15)* = 50 V the drive trips when the EMF is > 50 V while the speed feedback is ≤ 15 rpm. **Int. Scaling: (2.29) Type: I Volatile: N**	0	10000	15	rpm	E
30.15	**EMF FbMonLev (EMF feedback monitor level)** The speed measurement monitoring function is activated, when the measured EMF exceeds *EMF FbMonLev (30.15)*. See also *SpeedFbMonLev (30.14)*. **Int. Scaling: 1 == 1 V Type: I Volatile: N**	0	2000	50	V	E
30.16	**M1OvrSpeed (motor 1 overspeed)** The drive trips with **F532 MotOverSpeed** [*FaultWord2 (9.02)* bit 15] if *M1OvrSpeed (30.16)* is exceeded. Internally limited from: $0rpm \ \ to \ \ (2.29)*\frac{32767}{20000}rpm$ **Note1:** The value of *M1OvrSpeed (30.16)* is as well used for the analog tacho tuning. Any change of its value has the consequence that **A115 TachoRange** [*AlarmWord1 (9.06)* bit 15] comes up for 10 seconds and *M1TachoAdjust (50.12)* respectively *M1TachoVolt1000 (50.13)* have to be adjusted anew. The adjustment can be done by means of *ServiceMode (99.06)* = **TachFineTune**. **Int. Scaling: (2.29) Type: I Volatile: N**	0	10000	1800	rpm	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.17	**SpeedFbFltSel (speed feedback fault selector)** *SpeedFbFltSel (30.17)* determines the reaction to a speed feedback problem: 0 = **NotUsed** no reaction 1 = **Fault** the drive trips according to *SpeedFbFltMode (30.36)* and sets **F522 SpeedFb** [*FaultWord2 (9.02)* bit 5], default 2 = **EMF/Fault** the speed feedback is switched to EMF, the drive stops according to *E StopRamp (22.11)* and sets **F522 SpeedFb** [*FaultWord2 (9.02)* bit 5] 3 = **EMF/Alarm** the speed feedback is switched to EMF and **A125 SpeedFb** [*AlarmWord2 (9.07)* bit 8] is set **Note1:** In case the actual speed of the drive is in the field weakening area *SpeedFbFltSel (30.17)* reacts as if it is set to **Fault**, this is not valid for selection **NotUsed**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	EMF/Alarm	Fault	-	E
30.18	**CurRippleSel (current ripple selector)** *CurRippleSel (30.18)* determines the reaction when *CurRippleLim (30.19)* is reached: 0 = **NotUsed** no reaction 1 = **Fault** the drive trips with **F517 ArmCurRipple** [*FaultWord2 (9.02)* bit 0], default 2 = **Alarm** **A117 ArmCurRipple** [*AlarmWord2 (9.07)* bit 0] is set **Note1:** The current ripple function detects: – a broken fuse, thyristor or current transformer (T51, T52) – too high gain of the current controller **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	Alarm	Fault	-	E
30.19	**CurRippleLim (current ripple limit)** Threshold for *CurRippleSel (30.18),* in percent of *M1NomCur (99.03)*. Typical values when a thyristor is missing: – armature about 300% – high inductive loads (e.g. excitation) about 90% **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	650	150	%	E
30.20	**Unused**					
30.21	**PwrLossTrip (power loss trip)** The action taken, when the mains voltage undershoots *UNetMin2 (30.23):* 0 = **Immediately** the drive trips immediately with **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11], default 1 = **Delayed** **A111 MainsLowVolt** [*AlarmWord1 (9.06)* bit 10] is set as long as the mains voltage recovers before *PowrDownTime (30.25)* is elapsed, otherwise **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11] is generated **Int. Scaling: 1 == 1 Type: C Volatile: N**	Immediately	Delayed	Immediately	-	E
30.22	**UNetMin1 (mains voltage minimum 1)** First (upper) limit for mains undervoltage monitoring in percent of *NomMainsVolt (99.10).* If the mains voltage undershoots *UNetMin1 (30.22)* following actions take place: – the firing angle is set to *ArmAlphaMax (20.14)*, – single firing pulses are applied in order to extinguish the current as fast as possible, – the controllers are frozen, – the speed ramp output is updated from the measured speed and – **A111 MainsLowVolt** [*AlarmWord1 (9.06)* bit 10] is set as long as the mains voltage recovers before *PowrDownTime (30.25)* is elapsed, otherwise **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11] is generated. **Note1:** *UNetMin2 (30.23)* isn't monitored, unless the mains voltage drops below *UNetMin1 (30.22)* first. Thus for a proper function of the mains undervoltage monitoring *UNetMin1 (30.22)* has to be larger than *UNetMin2 (30.23)*. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	150	80	%	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.23	**UnetMin2 (mains voltage minimum 2)** Second (lower) limit for mains undervoltage monitoring in percent of *NomMainsVolt (99.10).* If the mains voltage undershoots *UnetMin2 (30.23)* following actions take place: – if *PwrLossTrip (30.21)* = **Immediately**: o the drive trips immediately with **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11] – if *PwrLossTrip (30.21)* = **Delayed**: o field acknowledge signals are ignored, o the firing angle is set to *ArmAlphaMax (20.14)*, o single firing pulses are applied in order to extinguish the current as fast as possible, o the controllers are frozen o the speed ramp output is updated from the measured speed and o **A111 MainsLowVolt** [*AlarmWord1 (9.06)* bit 10] is set as long as the mains voltage recovers before *PowrDownTime (30.25)* is elapsed, otherwise **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11] is generated. **Note1:** *UNetMin2 (30.23)* isn't monitored, unless the mains voltage drops below *UNetMin1 (30.22)* first. Thus for a proper function of the mains undervoltage monitoring *UNetMin1 (30.22)* has to be larger than *UNetMin2 (30.23)*. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	150	60	%	C
30.24	**PowrDownTime (power down time)** The mains voltage must recover (over both limits) within *PowrDownTime (30.24).* Otherwise **F512 MainsLowVolt** [*FaultWord1 (9.01)* bit 11] will be generated. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	500	ms	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.25	**FaultMask (mask faults)** **Attention:** Activation of the fault mask **may cause harm to personnel and / or equipment!** Thus **only certified experts** should use the fault mask for e.g. commissioning and fault tracing. The faults or alarms are suppressed, if the according bit of the fault mask is set. The fault mask is not stored, thus there is no fault suppressing after power-on. If a fault is suppressed, **A123 FaultSuppres** [*AlarmWord2 (9.07)* bit 6] is generated. Fault mask word: Bit / Name / Value / Comment B0 **M1Fex** 1 suppressed faults: **F515 M1FexOverCur, F516 M1FexCom, F521 FieldAck, F529 M1FexNotOK** 0 no action B2 **M2Fex** 1 suppressed faults: **F518 M2FexOverCur, F519 M2FexCom, F521 FieldAck, F530 M2FexNotOK** 0 no action B3 **Speed** 1 suppressed faults: **F522 SpeedFb, F553 TachPolarity, F532 MotOverSpeed** 0 no action B4 **Brake** 1 suppressed faults: **F552 MechBrake** 0 no action B5 reserved 1 0 B6 **I/OBoard** 1 suppressed faults: **F508 I/OBoardLoss** 0 no action B7 **Off2/Off3** 1 suppressed alarms: **A101 Off2ViaDI, A102 Off3ViaDI** 0 no action B8 **ConvTemp** 1 suppressed faults: **F504 ConvOverTemp** 0 no action B9 **Mains** 1 suppressed faults: **F512 MainsLowVolt, F513 MainsOvrVolt** 0 no action B10 reserved 1 0 B11 **MainsSycn** 1 suppressed faults: **F514 MainsNotSync** 0 no action B12 **OverCur** 1 suppressed faults: **F502 ArmOverCur** 0 no action B13 **12-Pulse** 1 suppressed faults: **F533 ReversalTime, F534 12PcurDiff, F535 12PulseCom, F536 12SlaveFail** 0 no action B14 **Force** 1 force drive to state **RdyRun** and **RdyRef** [*MainStatWord (8.01)* bit 0 and 1] 0 no action B15 **Bits0To13** 1 suppressed faults: all as to be found in bits 0 to 13 0 no action **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
30.26	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Overview local and communication loss: (see table below)					
30.27	**LocalLossCtrl (local or control panel loss control)** *LocalLossCtrl (30.27)* determines the reaction to a local loss (control panel, DriveWindow, DriveWindowLight). **F546 LocalCmdLoss** [*FaultWord3 (9.03)* bit 13] is set with: 0 = **RampStop** stop according to *E StopRamp (22.11),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **A130 LocalCmdLoss** [*AlarmWord2 (9.07)* bit 13] is set with: 4 = **LastSpeed** the drive continues to run at the last speed before the warning 5 = **FixedSpeed1** the drive continuous to run with *FixedSpeed1 (23.02)* **Note1:** The time out for *LocalLossCtrl (30.27)* is fixed to 10 s. **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	FixedSpeed1	RampStop	-	E
30.28	**ComLossCtrl (communication loss control)** *ComLossCtrl (30.28)* determines the reaction to a communication control loss (fieldbusses - Rxxx, DCSLink - drive-to-drive respectively master-follower) see also *CommandSel (10.01)*. Depending on the type of communication loss either **F528 FieldBusCom** [*FaultWord2 (9.02)* bit 11] or **F544 P2PandMFCom** [*FaultWord3 (9.03)* bit 11] is set with: 0 = **RampStop** stop according to *E StopRamp (22.11),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking Depending on the type of communication loss either **A128 FieldBusCom** [*AlarmWord2 (9.02)* bit 11] or **A112 P2PandMFCom** [*AlarmWord1 (9.01)* bit 11] is set with: 4 = **LastSpeed** the drive continues to run at the last speed before the warning 5 = **FixedSpeed1** the drive continuous to run with *FixedSpeed1 (23.02)* **Note1:** The time out for *ComLossCtrl (30.28)* is set by: – *FB TimeOut (30.35)* for all fieldbusses (Rxxx) and – *MailBoxCycle1 (94.13)* to *MailBoxCycle4 (94.31)* for the DCSLink (drive-to-drive respectively master-follower communication). **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	FixedSpeed1	RampStop	-	E

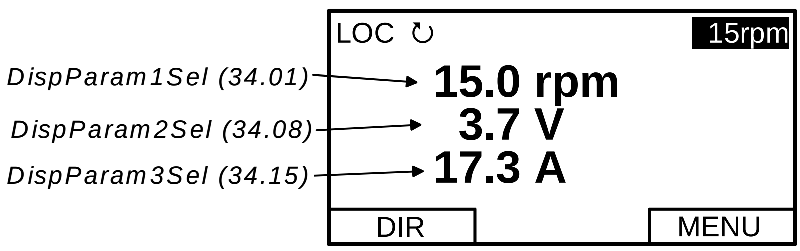
Overview local and communication loss:

Device	Loss control	Time out	Related fault	Related alarm
Control panel	*LocalLossCtrl (30.27)*	fixed to 10 s	**F546 LocalCmdLoss**	**A130 LocalCmdLoss**
DW				
DWL				
Rxxx (Fieldbus)	*ComLossCtrl (30.28)*	*FB TimeOut (30.35)*	**F528 FieldBusCom**	**A128 FieldBusCom**
DCSLink		*MailBoxCycle1 (94.13), MailBoxCycle2 (94.19), MailBoxCycle3 (94.25), MailBoxCycle4 (94.31)*	**F544 P2PandMFCom**	**A112 P2PandMFCom**
	-	*12P TimeOut (94.03)*	**F535 12PulseCom**	-
	-	*FexTimeOut (94.07)*	**F516 M1FexCom** **F519 M2FexCom**	-
SDCS-COM-8	*Ch0ComLossCtrl (70.05)*	*Ch0TimeOut (70.04)*	**F543 COM8Com**	**A113 COM8Com**
	Ch2ComLossCtrl (70.15)	*Ch2TimeOut (70.14)*		

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.29	**AI Mon4mA (analog input 4mA fault selector)** *AI Mon4mA (30.29)* determines the reaction to an undershoot of one of the analog inputs under 4mA / 2V - if it is configured to this mode: 0 = **NotUsed** no reaction 1 = **Fault** the drive stops according to *FaultStopMode (30.30)* and trips with **F551 AIRange** [*FaultWord4 (9.04)* bit 2], default 2 = **LastSpeed** the drive continues to run at the last speed and sets **A127 AIRange** [*AlarmWord2 (9.07)* bit 10] 3 = **FixedSpeed1** the drive continues to run with *FixedSpeed1 (23.02)* and sets **A127 AIRange** [*AlarmWord2 (9.07)* bit 10] **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	FixedSpeed1	Fault	-	E
30.30	**FaultStopMode (fault stop mode)** *FaultStopMode (30.30)* determines the reaction to a fault of trip level 4: 0 = **RampStop** stop according to *E StopRamp (22.11),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **Note1:** *FaultStopMode (30.30)* doesn't apply to communication faults. **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	DynBraking	RampStop	-	C
30.31	**ExtFaultSel (external fault selector)** The drive trips with **F526 ExternalDI** [*FaultWord2 (9.02)* bit 9] if a binary input for an external fault is selected and 1: 0 = **NotUsed** no reaction, default 1 = **DI1** 1 = no fault, 0 = fault 2 = **DI2** 1 = no fault, 0 = fault 3 = **DI3** 1 = no fault, 0 = fault 4 = **DI4** 1 = no fault, 0 = fault 5 = **DI5** 1 = no fault, 0 = fault 6 = **DI6** 1 = no fault, 0 = fault 7 = **DI7** 1 = no fault, 0 = fault 8 = **DI8** 1 = no fault, 0 = fault 9 = **DI9** 1 = no fault, 0 = fault, Only available with digital extension board 10 = **DI10** 1 = no fault, 0 = fault, Only available with digital extension board 11 = **DI11** 1 = no fault, 0 = fault, Only available with digital extension board 12 = **MCW Bit11** 1 = no fault, 0 = fault, *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1 = no fault, 0 = fault, *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1 = no fault, 0 = fault, *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1 = no fault, 0 = fault, *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1 = no fault, 0 = fault, *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1 = no fault, 0 = fault, *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1 = no fault, 0 = fault; external fault is connected to *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1 = no fault, 0 = fault, *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1 = no fault, 0 = fault, *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
30.32	**ExtAlarmSel (external alarm selector)** The drive sets **A126 ExternalDI** [*AlarmWord2 (9.07)* bit 9] if a binary input for an external alarm is selected and 1: 0 = **NotUsed** no reaction, default 1 = **DI1** 1 = no alarm, 0 = alarm 2 = **DI2** 1 = no alarm, 0 = alarm 3 = **DI3** 1 = no alarm, 0 = alarm 4 = **DI4** 1 = no alarm, 0 = alarm 5 = **DI5** 1 = no alarm, 0 = alarm 6 = **DI6** 1 = no alarm, 0 = alarm 7 = **DI7** 1 = no alarm, 0 = alarm 8 = **DI8** 1 = no alarm, 0 = alarm 9 = **DI9** 1 = no alarm, 0 = alarm. Only available with digital extension board 10 = **DI10** 1 = no alarm, 0 = alarm. Only available with digital extension board 11 = **DI11** 1 = no alarm, 0 = alarm. Only available with digital extension board 12 = **MCW Bit11** 1 = no alarm, 0 = alarm, *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** 1 = no alarm, 0 = alarm, *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** 1 = no alarm, 0 = alarm, *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** 1 = no alarm, 0 = alarm, *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** 1 = no alarm, 0 = alarm, *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** 1 = no alarm, 0 = alarm, *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** 1 = no alarm, 0 = alarm, *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** 1 = no alarm, 0 = alarm, *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** 1 = no alarm, 0 = alarm, *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	C
30.33	**ExtFaultOnSel (external fault on selector)** *ExtFaultOnSel (30.33)* determines the reaction to an external fault: 0 = **Fault** external fault is always valid independent from drive state, default 1 = **Fault&RdyRun** external fault is only valid when drive state is **RdyRun** [*MainStatWord (8.01)* bit 1] for at least 6s **Int. Scaling: 1 == 1 Type: C Volatile: N**	Fault	Fault&RdyO	Fault	-	E
30.34	**ExtAlarmOnSel (external alarm on selector)** *ExtAlarmOnSel (30.34)* determines the reaction to an external alarm: 0 = **Alarm** external alarm is always valid independent from drive state, default 1 = **Alarm&RdyRun** external alarm is only valid when drive state is **RdyRun** [*MainStatWord (8.01)* bit 1] for at least 6s **Int. Scaling: 1 == 1 Type: C Volatile: N**	Alarm	Alarm&Rdy	Alarm	-	E
30.35	**FB TimeOut (fieldbus time out)** Time delay before a communication break with a fieldbus is declared. Depending on the setting of *ComLossCtrl (30.28)* either **F528 FieldBusCom** [*FaultWord2 (9.02)* bit 11] or **A128 FieldBusCom** [*AlarmWord2 (9.07)* bit 11] is set. The communication fault and alarm are inactive, if *FB TimeOut (30.35)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	C
30.36	**SpeedFbFltMode (speed feedback fault mode)** *SpeedFbFltMode (30.36)* determines the reaction to a fault of trip level 3: 0 = **CoastStop** torque is zero, default 1 = **DynBraking** dynamic braking **Note1:** *SpeedFbFltMode (30.36)* doesn't apply to communication faults. **Int. Scaling: 1 == 1 Type: C Volatile: N**	CoastStop	DynBraking	CoastStop	-	E

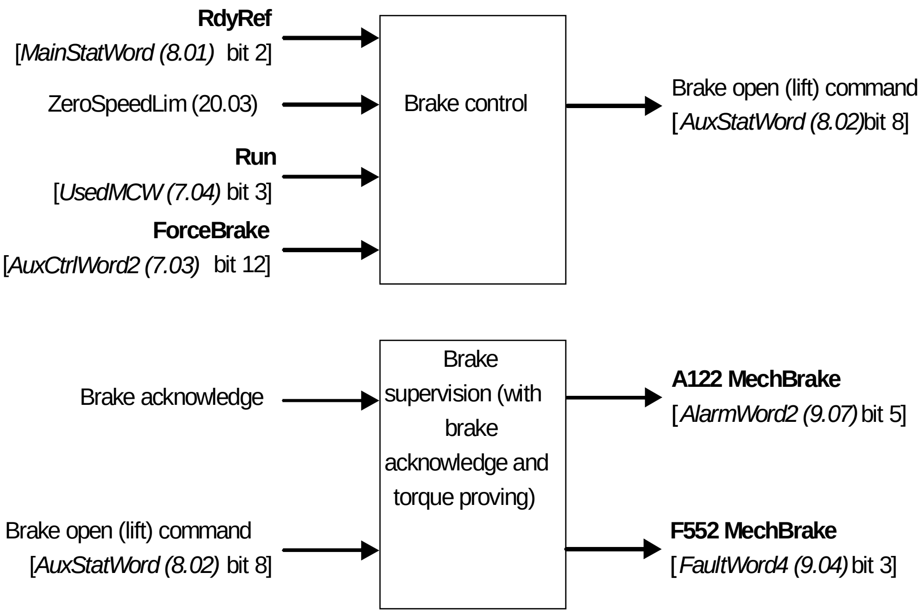
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 31	**Motor 1 temperature**					
31.01	**M1ModelTime (motor 1 model time constant)** Thermal time constant for motor 1. The time within the temperature rises to 63% of its nominal value. The motor thermal model is blocked, if *M1ModelTime (31.01)* is set to zero. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	6400	240	s	E
31.02	**Unused**					
31.03	**M1AlarmLimLoad (motor 1 alarm limit load)** The drive sets **A107 M1OverLoad** [*AlarmWord1 (9.06)* bit 6] if *M1AlarmLimLoad (31.03)* - in percent of *M1NomCur (99.03)* - is exceeded. Output value for motor 1 thermal model is *Mot1TempCalc (1.20).* **Int. Scaling: 10 == 1 % Type: I Volatile: N**	10	325	102	%	E
31.04	**M1FaultLimLoad (motor 1 fault limit load)** The drive trips with **F507 M1OverLoad** [*FaultWord1 (9.01)* bit 6] if *M1FaultLimLoad (31.04)* - in percent of *M1NomCur (99.03)* - is exceeded. Output value for motor 1 thermal model is *Mot1TempCalc (1.20).* **Int. Scaling: 10 == 1 % Type: I Volatile: N**	10	325	106	%	E
31.05	**M1TempSel (motor 1 temperature selector)** *M1TempSel (31.05)* selects motor 1 measured temperature input. Connection possibilities for PT100: – max. 3 PT100 for motor 1 and max. 3 PT100 for motor 2 or – up to 6 PT100 for motor 1 only. Connection possibilities PTC: – max. 1 PTC for motor 1 and max. 1 PTC for motor 2 or – up to 2 PTC for motor 1 only: 0 = **NotUsed** motor 1 temperature measurement is blocked, default 1 = **1PT100 AI2** one PT100 connected to AI2 on SDCS-IOB-3 2 = **2PT100 AI2** two PT100 connected to AI2 on SDCS-IOB-3 3 = **3PT100 AI2** three PT100 connected to AI2 on SDCS-IOB-3 4 = **4PT100 AI2/3** four PT100, 3 connected to AI2 and 1 connected to AI3 on SDCS-IOB-3 5 = **5PT100 AI2/3** five PT100, 3 connected to AI2 and 2 connected to AI3 on SDCS-IOB-3 6 = **6PT100 AI2/3** six PT100, 3 connected to AI2 and 3 connected to AI3 on SDCS-IOB-3 7 = **1PT100 AI7** one PT100 connected to AI7 on RAIO2 8 = **2PT100 AI7** two PT100 connected to AI7 on RAIO2 9 = **3PT100 AI7** three PT100 connected to AI7 on RAIO2 10 = **4PT100 AI7/8** four PT100, 3 connected to AI7 and 1 connected to AI8 on RAIO2 11 = **5PT100 AI7/8** five PT100, 3 connected to AI7 and 2 connected to AI8 on RAIO2 12 = **6PT100 AI7/8** six PT100, 3 connected to AI7 and 3 connected to AI8 on RAIO2 13 = **1PTC AI2** one PTC connected to AI2 on SDCS-IOB-3 14 = **2PTC AI2/3** two PTC, 1 connected to AI2 and 1 connected to AI3 on SDCS-IOB-3 15 = **1PTC AI2/Con** one PTC connected to AI2 on SDCS-CON-4 **Note1:** AI7 and AI8 have to be activated by means of *AIO ExtModule (98.06).* **Note2:** In case only one PT100 is connected to an AI of the SDCS-IOB-3 the input range must be configured by jumpers to a gain of 10. Jumper settings for input range and constant current source see *Hardware manual.* **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	1PTC AI2/Con	NotUsed	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
31.06	**M1AlarmLimTemp (motor 1 alarm limit temperature)** The drive sets **A106 M1OverTemp** [*AlarmWord1 (9.06)* bit 5] if *M1AlarmLimTemp (31.06)* is exceeded. Output value for motor 1 measured temperature is *Mot1TempMeas (1.22).* **Note1:** The units depends on *M1TempSel (31.05).* **Int. Scaling: 1 == 1 °C / 1 Ω / 1 Type: SI Volatile: N**	-10	4000	0	°C / Ω / -	C
31.07	**M1FaultLimTemp (motor 1 fault limit temperature)** The drive trips with **F506 M1OverTemp** [*FaultWord1 (9.01)* bit 5] if *M1FaultLimTemp (31.07)* is exceeded. Output value for motor 1 measured temperature is *Mot1TempMeas (1.22).* **Note1:** The units depends on *M1TempSel (31.05).* **Int. Scaling: 1 == 1 °C / 1 Ω / 1 Type: SI Volatile: N**	-10	4000	0	°C / Ω / -	C
31.08	**M1KlixonSel (motor 1 klixon selector)** The drive trips with **F506 M1OverTemp** [*FaultWord1 (9.01)* bit 5] if a digital input selected and the klixon is open: 0 = **NotUsed** no reaction, default 1 = **DI1** 0 = fault, 1 = no fault 2 = **DI2** 0 = fault, 1 = no fault 3 = **DI3** 0 = fault, 1 = no fault 4 = **DI4** 0 = fault, 1 = no fault 5 = **DI5** 0 = fault, 1 = no fault 6 = **DI6** 0 = fault, 1 = no fault 7 = **DI7** 0 = fault, 1 = no fault 8 = **DI8** 0 = fault, 1 = no fault 9 = **DI9** 0 = fault, 1 = no fault. Only available with digital extension board 10 = **DI10** 0 = fault, 1 = no fault. Only available with digital extension board 11 = **DI11** 0 = fault, 1 = no fault. Only available with digital extension board **Note1:** It is possible to connect several klixons in series. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	C
Group 34	**Control panel display**					
	Signal and parameter visualization on the control panel :  Setting a display parameter to 0 results in no signal or parameter displayed. Setting a display parameter from 101 to 9999 displays the belonging signal or parameter. If a signal or parameter does not exist, the display shows “n.a.”.					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
34.01	**DispParam1Sel (select signal / parameter to be displayed in control panel row 1)** Index pointer to the destination of the control panel first display row [e.g. 101 equals *MotSpeedFilt (1.01)*]. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	101	-	C
34.02	**Unused**					
34.03	**Unused**					
34.04	**Unused**					
34.05	**Unused**					
34.06	**Unused**					
34.07	**Unused**					
34.08	**DispParam2Sel (select signal / parameter to be displayed in control panel row 2)** Index pointer to the destination of the control panel second display row [e.g. 114 equals *ArmVoltAct (1.14)*]. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	114	-	C
34.09	**Unused**					
34.10	**Unused**					
34.11	**Unused**					
34.12	**Unused**					
34.13	**Unused**					
34.14	**Unused**					
34.15	**DispParam3Sel (select signal / parameter to be displayed in control panel row 3)** Index pointer to the destination of the control panel third display row [e.g. 116 equals *ConvCurAct (1.16)*]. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	116	-	C
34.16	**Unused**					
34.17	**Unused**					
34.18	**Unused**					
34.19	**Unused**					
34.20	**Unused**					
34.21	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 42	**Brake control**					

Brake control:



With brake control **On** [*M1BrakeCtrl (42.01)*] and **RdyRef** [*MainStatWord (8.01)* bit 2] equals 1 the torque reference is set to *StrtTorqRef (42.08)*. The brake open (lift) command is given, when torque actual has reached *StrtTorqRef (42.08)*. This function is called torque proving.

The brake open (lift) command [*AuxStatWord (8.02)* bit 8] is send directly, without time delay, to the brake. At the same time a brake open delay [*M1BrakeOpenDly (42.03)*] is started. During the delay, the brake acknowledge is ignored and the torque reference equals *StrtTorqRef (42.08)*.
After the time delay is elapsed normal operation starts.
This function compensates for the mechanical open (lift) delay of the brake.

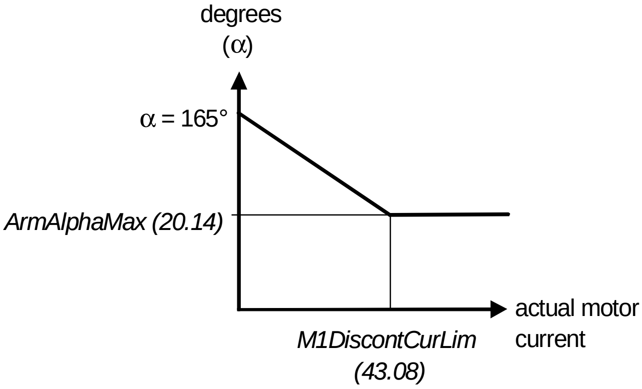
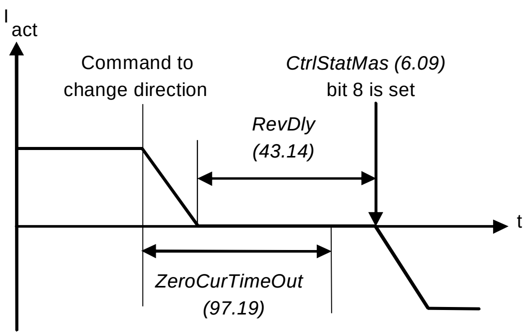
With **Run** [*UsedMCW (7.04)* bit 3] set 0 and motor speed below *ZeroSpeedLim (20.03)*, the brake open (lift) command is removed and a brake close (apply) delay [*M1BrakeCloseDly (42.04)*] is started. During the delay the brake acknowledge is ignored and the motor control remains active with speed reference zero.
This function compensates for the time the drive needs to decelerated from *ZeroSpeedLim (20.03)* to actual speed = 0. This is important for drives with an inaccurate speed feedback (e.g. EMF control) and thus a relatively high setting of *ZeroSpeedLim (20.03)*.

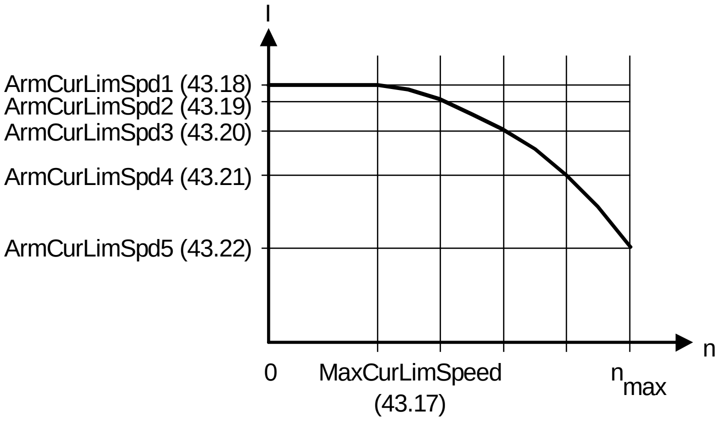
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
42.01	**M1BrakeCtrl (motor 1 brake control)** Releases the control of the brake: 0 = **NotUsed** brake control blocked, default 1 = **On** brake control is released The brake open (lift) command is readable in *AuxStatWord (8.02)* bit 8 and can be connected to the digital output controlling the brake. The brake control can be overwritten by *AuxCtrlWord2 (7.03)* bit 12. The brake is always applied in case **ForceBrake** = 1. Otherwise the brake is controlled by the internal brake logic. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	On	NotUsed	-	E
42.02	**M1BrakeAckSel (motor 1 brake acknowledge selector)** The drive sets either **A122 MechBrake** [*AlarmWord2 (9.07)* bit 5] or trips with **F552 MechBrake** [*FaultWord4 (9.04)* bit 3] depending on *BrakeFaultFunc (42.06)* if a digital input is selected and the brake acknowledge fails: 0 = **NotUsed** brake acknowledge is blocked, default 1 = **DI1** 0 = brake is applied, 1 = brake is open (lifted) 2 = **DI2** 0 = brake is applied, 1 = brake is open (lifted) 3 = **DI3** 0 = brake is applied, 1 = brake is open (lifted) 4 = **DI4** 0 = brake is applied, 1 = brake is open (lifted) 5 = **DI5** 0 = brake is applied, 1 = brake is open (lifted) 6 = **DI6** 0 = brake is applied, 1 = brake is open (lifted) 7 = **DI7** 0 = brake is applied, 1 = brake is open (lifted) 8 = **DI8** 0 = brake is applied, 1 = brake is open (lifted) 9 = **DI9** 0 = brake is applied, 1 = brake is open (lifted). Only available with digital extension board 10 = **DI10** 0 = brake is applied, 1 = brake is open (lifted). Only available with digital extension board 11 = **DI11** 0 = brake is applied, 1 = brake is open (lifted). Only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	E
42.03	**M1BrakeOpenDly (motor 1 brake open delay)** Brake open (lift) delay. This function compensates for the mechanical open (lift) delay of the brake. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	5	0	s	E
42.04	**M1BrakeCloseDly (motor 1 brake close delay)** Brake close (apply) delay. This function compensates for the time the drive needs to decelerated from *ZeroSpeedLim (20.03)* to actual speed = 0. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	5	0	s	E
42.05	**Unused**					
42.06	**BrakeFaultFunc (brake fault function)** *BrakeFaultFunc (42.06)* determines the reaction to an invalid brake acknowledge: 0 = **Alarm** the drive sets **A122 MechBrake** [*AlarmWord2 (9.07)* bit 5] 1 = **Fault** the drive trips with **F552 MechBrake** [*FaultWord4 (9.04)* bit 3], default **Note1:** With **Run** [*UsedMCW (7.04)* bit 3] set 0, motor speed below *ZeroSpeedLim (20.03)*, *M1BrakeCloseDly (42.04)* elapsed and acknowledge brake applied (closed) is missing **F552 MechBrake** [*FaultWord4 (9.04)* bit 3] is overwritten and **A122 MechBrake** [*AlarmWord2 (9.07)* bit 5] is set. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Alarm	Fault	Fault	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
42.07	**StrtTorqRefSel (starting torque reference selector)** Start torque selector: 0 = **NotUsed** start torque reference is fixed zero (torque proving disabled), default 1 = **Memory** torque memory released 2 = **StrtTorqRef** *StrtTorqRef (42.08)* 3 = **AI1** analog input AI1 4 = **AI2** analog input AI2 5 = **AI3** analog input AI3 6 = **AI4** analog input AI4 7 = **AI5** analog input AI5 8 = **AI6** analog input AI6 **Note1:** Torque proving is to give the brake open (lift) command only, when torque actual has reached *StrtTorqRef (42.08)*. In case torque actual does not reach *StrtTorqRef (42.08)* either **A122 MechBrake** [*AlarmWord2 (9.07)* bit 5] is set or the drive trips with **F552 MechBrake** [*FaultWord4 (9.04)* bit 3] depending on *BrakeFaultFunc (42.06)*. **Note2:** Torque memory is the presetting of the torque when starting with e.g. suspended load. The preset torque equals the actual torque stored when the brake open (lift) command is removed. If the preset torque is zero, StrtTorqRef *(42.08)* is used. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	AI6	NotUsed	-	E
42.08	**StrtTorqRef (starting torque reference)** Start torque - in percent of the active motor nominal torque - for torque proving. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	100	%	E
42.09	**BrakeEStopMode (emergency stop mode brake)** *BrakeEStopMode (42.09)* determines the reaction when *UsedMCW (7.04)* bit 2 **Off3N** (respectively E-stop) is set low: 0 = **Disable** the brake is closed according to standard brake control, default 1 = **Enable** the brake is closed immediately with the E-stop **Int. Scaling: 1 == 1 Type: C Volatile: N**	Disable	Enable	Disable	-	E
Group 43	**Current control**					
43.01	**OperModeSel (operation mode selector)** Converter mode selection: 0 = **ArmConv** 6 pulse single armature converter, default 1 = **FieldConv** field exciter mode; **Attention**: The digital input for the external overvoltage protection is assigned by means of *OvrVoltProt (10.13).* 2 = **12PParMaster** 12-pulse parallel master 3 = **12PParSlave** 12-pulse parallel slave 4 = **12PSerMaster** 12-pulse serial master 5 = **12PSerSlave** 12-pulse serial slave 6 = reserved to 11 = reserved This parameter is write protected while **Run** [*UsedMCW (7.04)* bit 3] = 1. **Int. Scaling: 1 == 1 Type: C Volatile: N**	ArmConv	12PSerSlave	ArmConv	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
43.02	**CurSel (current reference selector)** *CurSel (43.02)* selector: 0 = **CurRef311** *CurRef (3.11)* calculated from torque reference, default 1 = **CurRefExt** *CurRefExt (43.03)* external current reference 2 = **AI1** analog input AI1 3 = **AI2** analog input AI2 4 = **AI3** analog input AI3 5 = **AI4** analog input AI4 6 = **AI5** analog input AI5 7 = **AI6** analog input AI6 8 = **FexCurRef** field current reference from armature converter via DCSLink, only if *OperModeSel (43.01)* = **FieldConv** 9 = **FluxRefEMF** *FluxRefEMF (3.27)* EMF controller reference, only if *OperModeSel (43.01)* = **FieldConv** **Note1:** In case *OperModeSel (43.01)* is **12PParSlave** *CurSel (43.02)* is overwritten by the current reference from the 12-pulse parallel master. **Int. Scaling: 1 == 1 Type: C Volatile: N**	CurRef311	FluxRefEMF	CurRef311	-	C
43.03	**CurRefExt (external current reference)** External current reference in percent of *M1NomCur (99.03).* **Note1:** *CurRefExt (43.03)* is only valid, if *CurSel (43.02)* = **CurRefExt**. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-325	325	0		E
43.04	**CurRefSlope (current reference slope)** *CurRefSlope (43.04)* in percent of *M1NomCur (99.03)* per 1 ms. The di/dt limitation is located at the input of the current controller. **Int. Scaling: 100 == 1 %/ms Type: I Volatile: N**	0.2	40	10	%/ms	E
43.05	**ControlModeSel (control mode selector)** Current controller mode selection: 0 = **Standard** PI-controller with RL compensation of EMF based on current actual plus feed forward, default 1 = **FeedFwdRef** PI-controller with RL compensation of EMF based on current reference plus feed forward 2 = **NoFeedFwd** PI-controller without RL compensation of EMF. Feed forward takes place 3 = **PowerSupply1** not implemented jet 4 = **PowerSupply2** *PwrSupplyRefExt (43.24)* is fed into the current control chain (directly after the current controller). The current controller is blocked. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Standard	PowerSupply2	Standard	-	E
43.06	**M1KpArmCur (motor 1 p-part armature current controller)** Proportional gain of the current controller. Example: The controller generates 15 % of motor nominal current [*M1NomCur (99.03)*] with *M1KpArmCur (43.06)* = 3, if the current error is 5 % of *M1NomCur (99.03).* **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	100	0.1	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
43.07	**M1TiArmCur (motor 1 i-part armature current controller)** Integral time of the current controller. *M1TiArmCur (43.07)* defines the time within the integral part of the controller achieves the same value as the proportional part. Example: The controller generates 15% of motor nominal current [*M1NomCur (99.03)*] with *M1KpArmCur (43.06)* = 3, if the current error is 5% of *M1NomCur (99.03)*. On that condition and with *M1TiArmCur (43.07)* = 50 ms follows: – the controller generates 30% of motor nominal current, if the current error is constant, after 50 ms are elapsed (15% from proportional part and 15% from integral part). Setting *M1TiArmCur (43.07)* to 0 ms disables the integral part of the current controller and resets its integrator. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	50	ms	C
43.08	**M1DiscontCurLim (motor 1 discontinuous current limit)** Threshold continuous / discontinuous current in percent of *M1NomCur (99.03)*. The actual continuous / discontinuous current state can be read from *CurCtrlStat1 (6.03)* bit 12. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	100	%	C
43.09	**M1ArmL (motor 1 armature inductance)** Inductance of the armature circuit in mH. Used for the EMF compensation: $EMF = U_A - R_A * I_A - L_A * \frac{dI_A}{dt}$ **Int. Scaling: 100 == 1 mH Type: I Volatile: N**	0	640	0	mH	C
43.10	**M1ArmR (motor 1 armature resistance)** Resistance of the armature circuit in mΩ. Used for the EMF compensation: $EMF = U_A - R_A * I_A - L_A * \frac{dI_A}{dt}$ **Int. Scaling: 1 == 1 mΩ Type: I Volatile: N**	0	65500	0	mΩ	C
43.11	**Unused**					
43.12	**Uk (relative short circuit impedance)** For more information contact Your ABB representative. **Int. Scaling: 10 == 1 % Type: I Volatile: N**	0	15	0	%	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
43.13	**FiringLimMode (firing limit mode)** *FiringLimMode (43.13)* selects the strategy for *ArmAlphaMax (20.14):* 0 = **Fix** the firing angle limit is defined by *ArmAlphaMax (20.14)* 1 = **FixSingle** The firing angle limit is defined by *ArmAlphaMax (20.14)*. When *ArmAlphaMax (20.14)* is reached single firing pulses are fired, default 2 = **Calculated** the firing limit is reduced from 165° to *ArmAlphaMax (20.14)* depending on the actual motor current and *M1DiscontCurLim (43.08)* 3 = **CalcSingle** function same as in **Calculated**, but single pulses are fired when the limit is reached  **Note1:** Single firing pulses force discontinuous current automatically to zero. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Fix	CalcSingle	FixSingle	-	E
43.14	**RevDly (reversal delay)** *RevDly (43.14)* defines the delay time in ms for the bridge reversal after zero current has been detected.  The reversal delay time starts when zero current has been detected, after a command to change current direction has been given. After a command to change current direction the opposite current direction has to be reached before *ZeroCurTimeOut (97.19)* plus *RevDly (43.14)* has been elapsed otherwise the drive trips with **F533 ReversalTime** [*FaultWord3 (9.03)* bit 0]. *RevDly (43.14)* must have the same setting for 12-pulse master and 12-pulse slave with one exception only: – If there is no current measurement in the 12-pulse serial slave [*OperModeSel (43.01)* = **12PserSlave**], set *RevDly (43.14)* in the 12-pulse serial slave to maximum (600 ms). This setting causes the 12-pulse serial slave to base its bridge changeover on the zero current information received via DCSLink [*CtrlStatMas (6.09)* bit 8]. No additional reversal delay is added, since the master delays bit 8 according to its own *RevDly (43.14)*. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	600	5	ms	E
43.15	**Unused**					

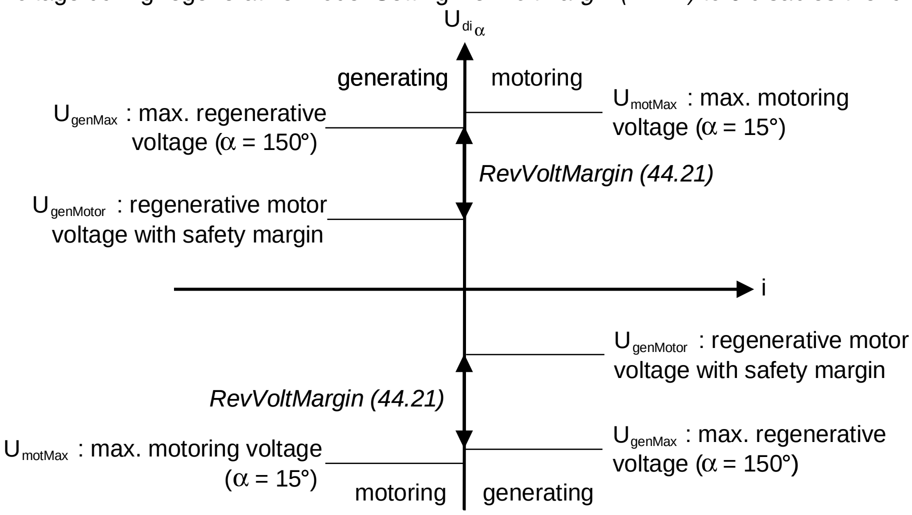
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
43.16	**RevMode (reversal mode)** *RevMode (43.16)* defines the behavior of the speed controller and speed reference during bridge and field reversal (torque reversal): 0 = **Soft** the speed controller is frozen during reversal bumpless reversal, default 1 = **Hard** the speed controller is released during reversal the contouring error is balanced **Int. Scaling: 1 == 1 Type: C Volatile: N**	Soft	Hard	Soft	-	E
	Speed depending current limit:  n_{max} = maximum absolute value of *M1SpeedMin (20.01)* and *M1SpeedMax (20.02)*					
43.17	**MaxCurLimSpeed (speed limit for maximum armature current)** Minimum speed level for armature current reduction. Internally limited from: $0rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	0	10000	1500	rpm	E
43.18	**ArmCurLimSpeed1 (armature current at speed limit 1)** Armature current limit - in percent of *M1NomCur (99.03)* - at *MaxCurLimSpeed (43.17)*. **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	325	%	E
43.19	**ArmCurLimSpeed2 (armature current at speed limit 2)** Armature current limit - in percent of *M1NomCur (99.03)* - at speed: $(43.17)+\frac{1}{4}*\left[n_{\max}-(43.17)\right]$ with: n_{max} = Max [|*(20.01)*|, |*(20.02)*|] **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	325	%	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
43.20	**ArmCurLimSpeed3 (armature current at speed limit 3)** Armature current limit - in percent of *M1NomCur (99.03)* - at speed: $(43.17)+\frac{1}{2}*[n_{max}-(43.17)]$ with: n_{max} = Max [|*(20.01)*|, |*(20.02)*|] **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	325	%	E
43.21	**ArmCurLimSpeed4 (armature current at speed limit 4)** Armature current limit - in percent of *M1NomCur (99.03)* - at speed: $(43.17)+\frac{3}{4}*[n_{max}-(43.17)]$ with: n_{max} = Max [|*(20.01)*|, |*(20.02)*|] **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	325	%	E
43.22	**ArmCurLimSpeed5 (armature current at speed limit 5)** Armature current limit - in percent of *M1NomCur (99.03)* - at n_{max} = Max [|*(20.01)*|, |*(20.02)*|]. **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	325	%	E
43.23	**Unused**					
43.24	**PwrSupplyRefExt (external reference power supply)** External power supply current reference in percent of *M1NomVolt (99.02).* **Note1:** *PwrSupplyRefExt (43.24)* is only valid, if *ControlModeSel (43.05)* = **PowerSupply2**. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-150	150	0	%	E

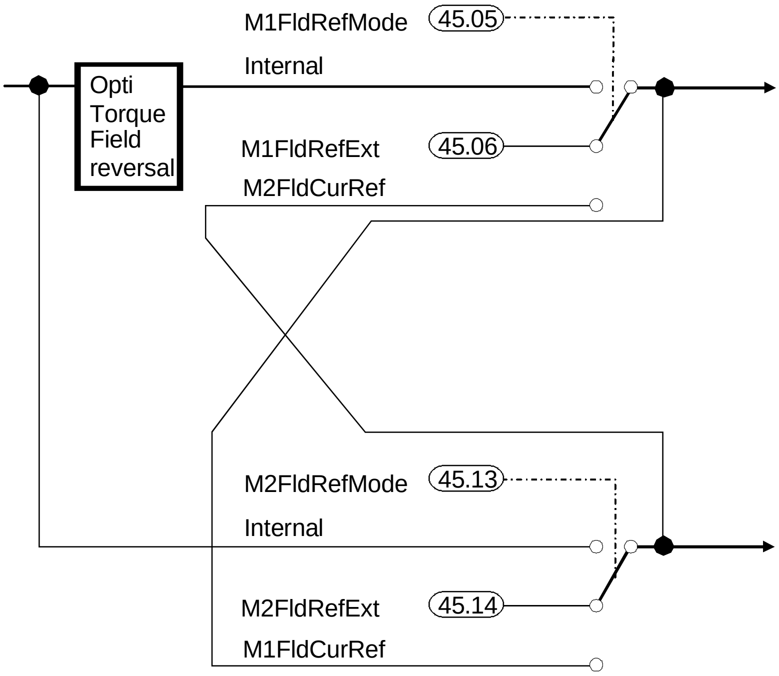
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 44	**Field excitation**					
44.01	**FldCtrlMode (field control mode)** Motor 1 field control mode selection: 0 = **Fix** constant field (no field weakening), no EMF control, no field reversal, default 1 = **EMF** field weakening active, EMF control active, no field reversal 2 = **Fix/Rev** constant field (no field weakening), no EMF control, field reversal active 3 = **EMF/Rev** field weakening active, EMF control active, field reversal active 4 = **Fix/Opti** constant field (no field weakening), no EMF control, no field reversal, optitorque active 5 = **EMF/Opti** field weakening active, EMF control active, no field reversal, optitorque active 6 = **Fix/Rev/Opti** constant field (no field weakening), no EMF control, field reversal active, optitorque active 7 = **EMF/Rev/Opti** field weakening active, EMF control active, field reversal active, optitorque active **Note1:** The field control mode for motor 2 depends on the setting of *M2RefFieldMode (45.13).* **Int. Scaling: 1 == 1 Type: C Volatile: N**	Fix	EMF/Rev/Opti	Fix	-	C
44.02	**M1KpFex (motor 1 p-part field current controller)** Proportional gain of the field current controller. Example: The controller generates 15% of motor nominal field current [*M1NomFldCur (99.11)*] with *M1KpFex (44.02)* = 3, if the field current error is 5% of *M1NomFldCur (99.11)*. **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	325	0.1	-	C
44.03	**M1TiFex (motor 1 i-part field current controller)** Integral time of the field current controller. *M1TiFex (44.03)* defines the time within the integral part of the controller achieves the same value as the proportional part. Example: The controller generates 15% of motor nominal field current [*M1NomFldCur (99.11)*] with *M1KpFex (44.02)* = 3, if the field current error is 5% of *M1NomFldCur (99.11)*. On that condition and with *M1TiFex (44.03)* = 200 ms follows: – the controller generates 30% of motor nominal field current, if the current error is constant, after 200 ms are elapsed (15% from proportional part and 15% from integral part). Setting *M1TiFex (44.03)* to 0 ms disables the integral part of the field current controller and resets its integrator. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	200	ms	C
44.04	**M1FldHeatRef (motor 1 field heating reference)** Field current reference - in percent of *M1NomFieldCur (99.11)* - for field heating [*FldHeatSel (21.18)*] or field reducing. The field reducing is released for motor 1 by means of *M1FldHeatRef (44.04)* < 100% and activated, if: – **Run** = 1 [*UsedMCW (7.04)* bit 3] for longer than 10 s and – the other motor is selected via *ParChange (10.10)* and can be seen in *MotSel (8.09)* **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	100	100	%	E
44.05	**Unused**					
44.06	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
44.07	**EMF CtrlPosLim (positive limit EMF controller)** Positive limit for EMF controller in percent of nominal flux. **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	100	10	%	E
44.08	**EMF CtrlNegLim (negative limit EMF controller)** Negative limit for EMF controller in percent of nominal flux. **Int. Scaling: 1 == 1 % Type: I Volatile: N**	-100	0	-100	%	E
44.09	**KpEMF (p-part EMF controller)** Proportional gain of the EMF controller. Example: The controller generates 15% of motor nominal EMF with *KpEMF (44.09)* = 3, if the EMF error is 5% of *M1NomVolt (99.02)*. **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	325	0.5	-	E
44.10	**TiEMF (i-part EMF controller)** Integral time of the EMF controller. *TiEMF (44.10)* defines the time within the integral part of the controller achieves the same value as the proportional part. Example: The controller generates 15% of motor nominal EMF with *KpEMF (44.09)* = 3, if the EMF error is 5% of *M1NomVolt (99.02)*. On that condition and with *TiEMF (44.10)* = 20 ms follows: – the controller generates 30% of motor nominal EMF, if the EMF error is constant, after 20 ms are elapsed (15% from proportional part and 15% from integral part). Setting *TiEMF (44.10)* to 0 ms disables the integral part of the EMF controller and resets its integrator. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	50	ms	E
44.11	**Unused**					
44.12	**FldCurFlux40 (field current at 40% flux)** Field current at 40% flux in percent of *M1NomFldCur (99.11).* **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	100	40	%	E
44.13	**FldCurFlux70 (field current at 70% flux)** Field current at 70% flux in percent of *M1NomFldCur (99.11).* **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	100	70	%	E
44.14	**FldCurFlux90 (field current at 90% flux)** Field current at 90% flux in percent of *M1NomFldCur (99.11).* **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	100	90	%	E
44.15	**FldWeakDyn (dynamic field weakening)** If the motor speed passes the field weakening point (== base speed) quickly, voltage overshoot may occur. To solve this problem the field weakening point can be lowered by means of *FldWeakDyn (44.15). FldWeakDyn (44.15)* is set in percent of *M1BaseSpeed (99.04).* **Note1:** The lowered field weakening point is compensated by the EMF controller in case of constant speed or slow speed change. *EMF CtrlPosLim (44.07)* has to be set high enough to allow the EMF controller to compensate. **Int. Scaling: 1 == 1 % Type: I Volatile: N**	80	100	100	%	E
44.16	**Unused**					

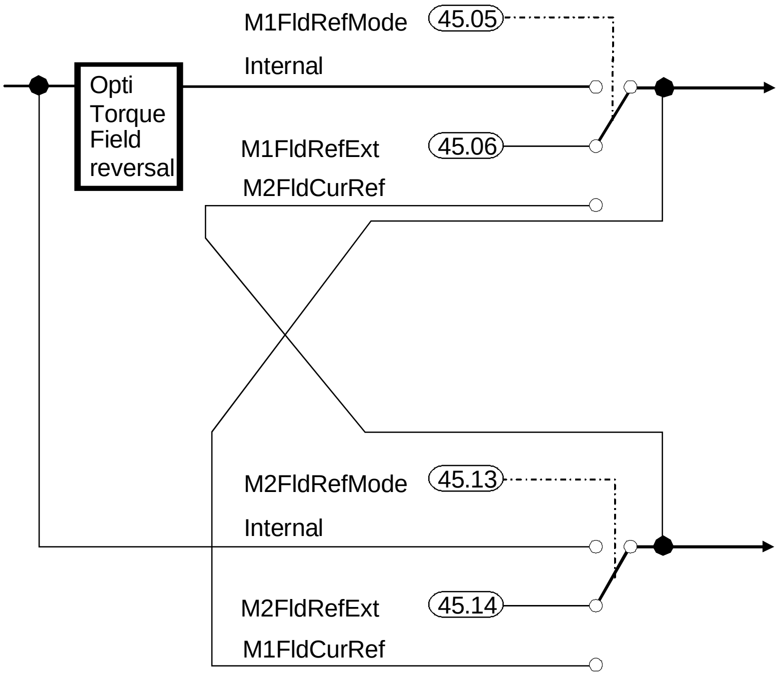
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
44.17	**FldBoostSel (field boost selector)** Selector for *FldBoostSel (44.17):* 0 = **NotUsed** field boost is blocked, default 1 = **Run** field boost starts with **Run** = 1 [*MainCtrlWord (7.01)* bit 3] 2 = **DI1** 1 = field boost, 0 = no field boost 3 = **DI2** 1 = field boost, 0 = no field boost 4 = **DI3** 1 = field boost, 0 = no field boost 5 = **DI4** 1 = field boost, 0 = no field boost 6 = **DI5** 1 = field boost, 0 = no field boost 7 = **DI6** 1 = field boost, 0 = no field boost 8 = **DI7** 1 = field boost, 0 = no field boost 9 = **DI8** 1 = field boost, 0 = no field boost 10 = **DI9** 1 = field boost, 0 = no field boost. Only available with digital extension board 11 = **DI10** 1 = field boost, 0 = no field boost. Only available with digital extension board 12 = **DI11** 1 = field boost, 0 = no field boost. Only available with digital extension board 13 = **MCW Bit11** 1 = field boost, 0 = no field boost, *MainCtrlWord (7.01)* bit 11 14 = **MCW Bit12** 1 = field boost, 0 = no field boost, *MainCtrlWord (7.01)* bit 12 15 = **MCW Bit13** 1 = field boost, 0 = no field boost, *MainCtrlWord (7.01)* bit 13 16 = **MCW Bit14** 1 = field boost, 0 = no field boost, *MainCtrlWord (7.01)* bit 14 17 = **MCW Bit15** 1 = field boost, 0 = no field boost, *MainCtrlWord (7.01)* bit 15 18 = **ACW Bit12** 1 = field boost, 0 = no field boost, *AuxCtrlWord (7.02)* bit 12 19 = **ACW Bit13** 1 = field boost, 0 = no field boost, *AuxCtrlWord (7.02)* bit 13 20 = **ACW Bit14** 1 = field boost, 0 = no field boost, *AuxCtrlWord (7.02)* bit 14 21 = **ACW Bit15** 1 = field boost, 0 = no field boost, *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	E
44.18	**FldBoostFact (field boost factor)** Field boost factor in percent of *M1NomFldCur (99.11).* The resulting field boost current must be lower than the nominal current of the used field exciter. If the field boost current is out of range **A132 ParConflict** [*AlarmWord2 (9.07)* bit 15] is generated. **Note1:** If *FldBoostFact (44.18)* > 100% and *M1UsedFexType (99.12)* = **OnBoard** to **DCF804-0060** or **FEX-4-Term5A** *S M1FldSacle (45.20)* has to be set accordingly. Example: *M1NomFldCur (99.11)* = 20 A and *FldBoostFact (44.18)* = 150% then *S M1FldSacle (45.20)* = 30 A **Note2:** If *FldBoostFact (44.18)* > 100% and *M2UsedFexType (49.07)* = **OnBoard** to **DCF804-0060** or **FEX-4-Term5A** *S M2FldSacle (45.21)* has to be set accordingly. **Int. Scaling: 1 == 1 % Type: I Volatile: N**	100	160	100	%	E
44.19	**FldBoostTime (field boost time)** Time the field boost should last. **Int. Scaling: 1 == 1 s Type: I Volatile: N**	0	600	0	s	E
44.20	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
44.21	**RevVoltMargin (reversal voltage margin)** *RevVoltMargin (44.21)* - in percent of *NomMainsVolt (99.10)* - is a safety margin for the motor voltage during regenerative mode. Setting *RevVoltMargin (44.21)* to 0 disables the function.  For regenerative mode is valid: $U_{genMotor} = \vert U_{genMax} \vert - U_{Safety}$ $with \quad U_{genMax} = 1.35 * \cos \alpha_{max} * U_{Mains}$ $U_{genMax} = 1.35 * \cos (20.14) * U_{Mains}$ $and \quad U_{Safety} = (44.21) \quad follows:$ $U_{genMotor} = \vert 1.35 * \cos (20.14) * U_{Mains} \vert - (44.21) * U_{Mains}$ Example: With *ArmAlphaMax (20.14)* = 150°, *RevVoltMargin (44.21)* = 10% and U_{Mains} = *NomMainsVolt (99.10)* follows: $U_{genMotor} = \vert 1.35 * \cos 150° * U_{Mains} \vert - 0.1 * U_{Mains}$ $U_{genMotor} = \vert -1.16 * U_{Mains} \vert - 0.1 * U_{Mains}$ $U_{genMotor} = 1.06 * U_{Mains}$ **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	20	6	%	E
44.22	**VoltRefExt (external voltage reference)** External voltage reference in percent of *M1NomVolt (99.02)*. **Note1:** *VoltRefExt (44.22)* is only valid, if *EMF RefSel (44.23)* = **VoltRefExt**. **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-100	100	0		E

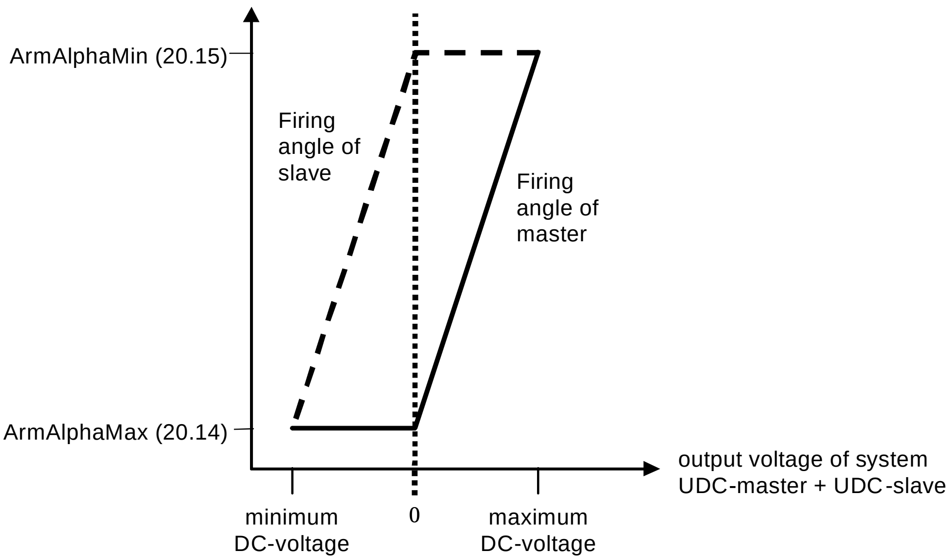
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
44.23	**EMF RefSel (EMF reference selector)** *EMF RefSel (44.23)* selector: 0 = **EMF Internal** internally calculated EMF, default 1 = **VoltRefExt** *VoltRefExt (44.22)* external voltage reference 2 = **AI1** analog input AI1 3 = **AI2** analog input AI2 4 = **AI3** analog input AI3 5 = **AI4** analog input AI4 6 = **AI5** analog input AI5 7 = **AI6** analog input AI6 **Int. Scaling: 1 == 1 Type: C Volatile: N**	EMF Internal	VoltRefExt	AI6	-	E
44.24	**Unused**					
44.25	**VoltCorr (voltage correction)** Voltage correction in percent of *M1NomVolt (99.02).* Added to *VoltRef1 (3.25).* **Int. Scaling: 100 == 1 % Type: SI Volatile: Y**	-100	100	0		E
44.26	**VoltRefSlope (voltage reference slope)** Voltage reference slope in percent *M1NomVolt (99.02)* per 1 ms. The dv/dt limitation is located at the input of the EMF controller. **Int. Scaling: 100 == 1 %/ms Type: I Volatile: N**	0.01	100	30	%/ms	E
44.27	**FluxCorr (flux correction)** *FluxCorr (44.27)* is added to the sum of the flux reference *FluxRefSum (3.28).* **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-100	100	0	%	E
Group 45	**Field converter settings**					
45.01	**M1FreewhlLev (motor 1 freewheeling level)** Motor 1 field exciter free wheeling level [only when *M1UsedFexType (99.12)* = **DCF804-0050** or **DCF804-0060**] in percent / ms of the actual field exciter supply voltage. If 2 successive AC-voltage measurements differ more than *M1FreewhlLev (45.01),* the free-wheeling function is activated. **Int. Scaling: 1 == 1 %/ms Type: I Volatile: N**	0	1000	20	%/ms	E
45.02	**M1PosLimCtrl (motor 1 positive output limit field current controller)** Positive output limit for motor 1 field exciter current controller in percent of the maximum field exciter output voltage. **Note:** 4-Q field exciters which can reverse the field current will used *M1PosLimCtrl (45.02)* also as negative limit. **Int. Scaling: 100 = 1 % Type: I Volatile: N**	0	100	100	%	E
45.03	**Unused**					
45.04	**Unused**					

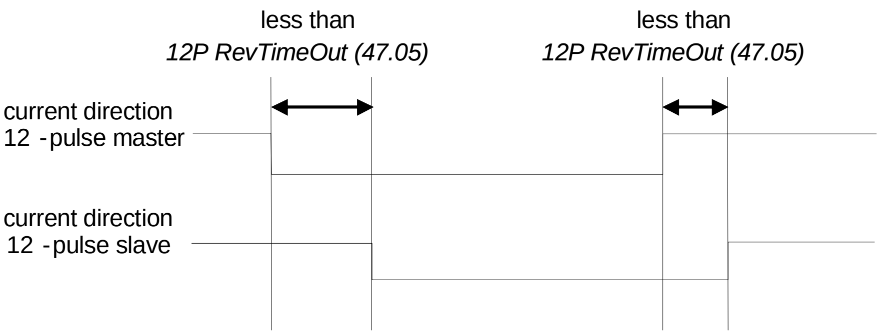
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
45.05	**M1FldRefMode (motor 1 field current reference mode)** *M1FldRefMode (45.05)* selector: 0 = **Internal** motor 1 field current reference according to shared motion *MotSel (8.09)* or field heating *FldHeatSel (21.18),* default 1 = **M2FldCurRef** field current reference is taken from motor 2 2 = **M1FldRefExt** *M1FldRefExt (45.06)* external field current reference  **Int. Scaling: 1 == 1 Type: C Volatile: N**	Internal	M1FldRefExt	Internal	-	E
45.06	**M1FldRefExt (motor 1 external field current reference)** Motor 1 external field current reference input in percent of *M1NomFldCur (99.11).* **Note1:** *M1FldRefExt (45.06)* is only valid, if *M1FldRefMode (45.05)* = **M1FldRefExt**. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-100	100	0	%	E
45.07	**ForceFldDir (force field current direction)** Motor 1 field direction force command: 0 = **NotUsed** the field direction is controlled by *FldCtrlMode (44.01)* and *TorqRefUsed (2.13)*, default 1 = **Forward** field direction is forced to forward direction 2 = **Reverse** field direction is forced to reverse direction 3 = **ExtReverse** In case an external contactor in the field current loop is used to change the field direction, *ForceFldDir (45.07)* has to be switched between **Forward** and **ExtReverse**. **ExtReverse** adapts the armature voltage and speed supervision. The external contactor interlocking and the control of *ForceFldDir (45.07)* has to be done by means of Adaptive Program, application program or overriding control. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ExtReverse	NotUsed	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
45.08	**FluxRevMonDly (flux reversal monitoring delay)** Maximum allowed time within *Mot1FldCurRel (1.29)* and the internal motor flux doesn't correspond to each other during field reversal. During this time **F522 SpeedFb** [*FaultWord2 (9.02)* bit 5] is disabled. **Note1:** *FluxRevMonDly (45.08)* is only effective for *FldCtrlMode (44.01)* = **Fix/Rev**, **EMF/Rev**, **Fix/Rev/Opti** or **EMF/Rev/Opti**. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	20000	0	ms	E
45.09	**FldRevHyst (field current reversal hysteresis)** The sign of *Mot1FldCurRel (1.29)* is used to generate the field reversal acknowledge. To avoid signal noise problems a small hysteresis - in percent of *M1NomFldCur (99.11)* - is used while detecting the sign. **Note1:** *FldRevHyst (45.09)* is only effective for *FldCtrlMode (44.01)* = **Fix/Rev**, **EMF/Rev**, **Fix/Rev/Opti** or **EMF/Rev/Opti**. **Int. Scaling: 100 = 1 % Type: I Volatile: N**	0	100	2	%	E
45.10	**FldRefHyst (field torque reference hysteresis)** *TorqRefUsed (2.13)* hysteresis - in percent of the active motor nominal torque - for field reversal [*FldCtrlMode (44.01)* = **Fix/Rev** or **EMF/Rev**]. The field reversal is controlled by the sign of *TorqRefUsed (2.13)*. **Note1:** FldRefHyst (45.10) is only effective for *FldCtrlMode (44.01)* = **Fix/Rev** or **EMF/Rev**. **Int. Scaling: 100 = 1 % Type: I Volatile: N**	0	100	2	%	E
45.11	**FldRefGain (field current reference gain)** OptiTorque calculates the field current reference depending on *TorqRefUsed (2.13).* Thus, the field current is reduced to a smaller value, if *TorqRefUsed (2.13)* is accordingly low. This speeds up the field reversal, assuming *TorqRefUsed (2.13)* is low during field reversal. OptiTorque is activated by means of *FldCtrlMode (44.01)* and like field reversal only available for motor 1 field exciter. The relation between *TorqRefUsed (2.13)* and *FldCurRefM1 (3.30)* is linear and without offset. It is defined by means of the *FldRefGain (45.11)*. The gain is related to *M1NomFldCur (99.11)* as well as to the active motor nominal torque. Example: With a setting of 20%, 100% field current is generated at *TorqRefUsed (2.13)* = 20%. **Note1:** *FldRefGain (45.11)* is only effective for *FldCtrlMode (44.01)* = **Fix/Opti**, **EMF/Opti**, **Fix/Rev/Opti** or **EMF/Rev/Opti**. **Int. Scaling: 100 = 1 % Type: I Volatile: N**	0	100	50	%	E
45.12	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
45.13	**M2FldRefMode (motor 2 field current reference mode)** *M2FldRefMode (45.13)* selector: 0 = **Internal** motor 2 field current reference according to shared motion *MotSel (8.09)* or field heating *FldHeatSel (21.18),* default 1 = **M1FldCurRef** field current reference is taken from motor 1 2 = **M2FldRefExt** *M2FldRefExt (45.14)* external field current reference  **Int. Scaling: 1 == 1 Type: C Volatile: N**	Internal	M2FldRefExt	Internal	-	E
45.14	**M2FldRefExt (motor 2 external field current reference)** Motor 2 external field current reference input in percent of *M2NomFldCur (49.05).* **Note1:** *M2FldRefExt (45.14)* is only valid, if *M2FldRefMode (45.13)* = **M2FldRefExt**. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-100	100	0	%	E
45.15	**M2FreewhlLev (motor 2 freewheeling level)** Motor 2 field exciter free wheeling level [only when *M2UsedFexType (49.07)* = **DCF804-0050** or **DCF804-0060**] in percent / ms of the actual field exciter supply voltage. If 2 successive AC-voltage measurements differ more than *M2FreewhlLev (45.15),* the free-wheeling function is activated. **Int. Scaling: 1 == 1 %/ms Type: I Volatile: N**	0	1000	20	%/ms	E
45.16	**M2PosLimCtrl (motor 2 positive output limit field current controller** Positive output limit for motor 2 field exciter current controller in percent of the maximum field exciter output voltage. **Note:** 4-Q field exciters which can reverse the field current will used *M2PosLimCtrl (45.16)* also as negative limit. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	100	100	%	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
45.17	**FldCurTrim (field current trimming)** The field current of motor 1 and motor 2 can be corrected by means of *FldCurTrim (45.17)* in percent of *M1NomFldCur (99.11)* respectively *M2NomFldCur (49.05)*: – 0% to 20%: The value is subtracted from motor 1 field current reference. The result is visible in *FldCurRefM1 (3.30)*. – -20% to 0%: The absolute value is subtracted from motor 2 field current reference. The result is visible in *FldCurRefM2 (3.31)*. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-20	20	0	%	E
45.18	**FldMinTripDly (delay field current minimum trip)** *FldMinTripDly (45.18)* delays **F541 M1FexLowCur** [*FaultWord3 (9.03)* bit 8] respectively **F542 M2FexLowCur** [*FaultWord3 (9.03)* bit 9]. If the field current recovers before the delay is elapsed **F541** / **F542** will be disregarded: – *M1FldMinTrip (30.12)* – *M2FldMinTrip (49.08)* **Note1:** *FldMinTripDly (45.18)* is blocked when *OperModeSel (43.01)* = **FieldConv**. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	50	10000	2000	ms	E
45.19	**Unused**					
45.20	**S M1FldScale (set: motor 1 field current scaling factor)** Motor 1 field exciter scaling factor. *S M1FldScale (45.20)* is write protected, unless *ServiceMode (99.06)* = **SetTypeCode**. To use *S M1FldScale (45.20)* following inequation has to be valid: *M1NomFldCur (99.11)* ≤ *S M1FldScale (45.20)* ≤ maximum field current of the used field exciter – For *S M1FldScale (45.20)* > maximum field current of the used field exciter **A132 ParConflict** [*AlarmWord2 (9.07)* bit 15] is generated. – For *M1NomFldCur (99.11)* > *S M1FldScale (45.20)* the scaling is automatically set by *M1NomFldCur (99.11)*. – The scaling factor is released when *M1NomFldCur (99.11)* < *S M1FldScale (45.20)* and *M1UsedFexType (99.12)* = **OnBoard** to **DCF804-0060** or **FEX-4-Term5A**. If the scaling is changed its new value is taken over after the next power up. **Int. Scaling: 100 == 1 A Type: I Volatile: N**	0	60	0	A	E
45.21	**S M2FldScale (set: motor 2 field current scaling factor)** Motor 2 field exciter scaling factor. *S M2FldScale (45.21)* is write protected, unless *ServiceMode (99.06)* = **SetTypeCode**. To use *S M2FldScale (45.21)* following inequation has to be valid: *M2NomFldCur (49.05)* ≤ *S M2FldScale (45.21)* ≤ maximum field current of the used field exciter – For *S M2FldScale (45.21)* > maximum field current of the used field exciter **A132 ParConflict** [*AlarmWord2 (9.07)* bit 15] is generated. – For *M2NomFldCur (49.05)* > *S M2FldScale (45.21)* the scaling is automatically set by *M2NomFldCur (49.05)*. – The scaling factor is released when *M2NomFldCur (49.05)* < *S M2FldScale (45.21)* and *M2UsedFexType (49.07)* = **OnBoard** to **DCF804-0060** or **FEX-4-Term5A**. If the scaling is changed its new value is taken over after the next power up. **Int. Scaling: 100 == 1 A Type: I Volatile: N**	0	60	0	A	E
45.22	**M1OperModeFex4 (motor 1 fex4 operation mode selector)** The DCF803-0035 can be connected to either a 3-phase supply or a single phase supply: 0 = **1-phase** single phase supply 1 = **3-phase** 3-phase supply, default **Int. Scaling: 1 == 1 Type: C Volatile: N**	1-phase	3-phase	3-phase	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
45.23	**M2OperModeFex4 (motor 2 fex4 operation mode selector)** The DCF803-0035 can be connected to either a 3-phase supply or a single phase supply: 0 = **1-phase** single phase supply 1 = **3-phase** 3-phase supply, default **Int. Scaling: 1 == 1 Type: C Volatile: N**	1-phase	3-phase	3-phase	-	E
Group 47	**12-pulse operation**					
47.01	**12P Mode (12-pulse mode)** The setting of *OperModeSel (43.01)* determines the reaction of *12P Mode (47.01). OperModeSel (43.01)* = **12PParMaster** respectively **12PParSlave**: 0 = **Normal** 12-pulse parallel master and 12-pulse parallel slave use their own current controller independently, default 1 = **Difference** the 12-pulse parallel slave calculates the difference between the 12-pulse parallel master actual current and its own actual current and controls this difference to zero by means of its current controller 2 = Sequential not used for 12-pulse parallel mode 3 = DiodeBridge not used for 12-pulse parallel mode *OperModeSel (43.01)* = **12PSerMaster** respectively **12PSerSlave**: 0 = **Normal** 12-pulse serial master and 12-pulse serial slave are controlled by the same firing angle, default 1 = Difference not used for 12-pulse serial mode 2 = **Sequential** Sequential control of the firing angles. Only one unit changes its firing angle, while the other unit's firing angle is fixed at the minimum- or maximum firing angle. See diagram below. 3 = **DiodeBridge** the 12-pulse serial slave converter is a diode bridge  *12P Mode (47.01)* must have the same setting for 12-pulse master and 12-pulse slave. In case of **DiodeBridge** the setting is only possible in the 12-pulse master. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Normal	DiodeBridge	Normal	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
47.02	**DiffCurLim (current difference level)** Permitted current difference between the converters in 12-pulse parallel configuration in percent of *M1NomCur (99.03)*. The drive trips with **F534 12PCurDiff** [*FaultWord3 (9.03)* bit 1] if *DiffCurLim (47.02)* is still exceeded when *DiffCurDly (47.03)* is elapsed. *DiffCurLim (47.02)* is only active in the 12-pulse parallel master. **Int. Scaling: 1 == 1 % Type: I Volatile: N**	1	50	10	%	E
47.03	**DiffCurDly (current difference delay)** *DiffCurDly (47.03)* delays **F534 12PCurDiff** [*FaultWord3 (9.03)* bit 1]. If the current difference becomes smaller than *DiffCurLim (47.02)* before the delay is elapsed **F534** will be disregarded: – *DiffCurLim (47.02)* *DiffCurDly (47.03)* is only active in the 12-pulse parallel master. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	10	64000	500	ms	E
47.04	**Unused**					
47.05	**12P RevTimeOut (12-pulse reversal timeout)** Additionally in 12-pulse mode the current direction of both - master and slave - bridges is monitored. The drive trips with **F533 ReversalTime** [*FaultWord3 (9.03)* bit 0] if the 2 converters have different bridges fired for more than *12P RevTimeOut (47.05)*. *12P RevTimeOut (47.05)* is only active in the 12-pulse master.  **Note1:** *12P RevTimeOut (47.05)* must be longer than *ZeroCurTimeOut (97.19)*. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	1000	100	-	E
Group 49	**Shared motion**					
49.01	**M2NomVolt (motor 2 nominal voltage)** Motor 2 nominal armature voltage (DC) from the motor rating plate. **Note1:** In 12-pulse serial mode, this parameter has to be set to the value of the voltage the converter itself is providing. This is usually 50 % of the rated motor voltage, if one motor is connected. In case 2 motors in series are connected it is 100 % of one motor's rated voltage. **Note2:** The hardware of the measuring circuit has to be adapted for motor voltages lower than 50V. **Int. Scaling: 1 == 1 V Type: I Volatile: N**	5	2000	350	V	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.02	**M2NomCur (motor 2 nominal current)** Motor 2 nominal armature current (DC) from the motor rating plate. If several motors are connected to the drive, enter the total current of all motors. **Note1:** In 12-pulse parallel mode, this parameter has to be set to the value of the current the converter itself is providing. This is usually 50 % of the rated motor current, if one motor is connected. In case 2 motors in parallel are connected it is 100 % of one motor's rated current. **Note2:** In case the converter is used as a 3-phase field exciter use *M2NomCur (49.02)* to set the nominal field current. **Int. Scaling: 1 == 1 A Type: I Volatile: N**	0	30000	0	A	E
49.03	**M2BaseSpeed (motor 2 base speed)** Motor 2 base speed from the rating plate, usually the field weak point. *M2BaseSpeed (49.03)* is must be set in the range of: 0.2 to 1.6 times of *SpeedScaleAct (2.29).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Int. Scaling: 10 == 1 rpm Type: I Volatile: N**	10	6500	1500	rpm	E
49.04	**Unused**					
49.05	**M2NomFldCur (motor 2 nominal field current)** Motor 2 nominal field current from the motor rating plate. **Note1:** In case the converter is used as a 3-phase field exciter use *M2NomCur (49.05)* to set the nominal field current. **Int. Scaling: 100 == 1 A Type: I Volatile: N**	0.3	655	0.3	A	E
49.06	**M2FldHeatRef (motor 2 field heating reference)** Field current reference - in percent of *M2NomFieldCur (49.05)* - for field heating [*FldHeatSel (21.18)*] or field reducing. The field reducing is released for motor 2 by means of *M2FldHeatRef (49.06)* < 100% and activated, if: – **Run** = 1 [*UsedMCW (7.04)* bit 3] for longer than 10 s and – the other motor is selected via *ParChange (10.10* and can be seen in MotSel (8.09)*)* **Int. Scaling: 1 == 1 % Type: I Volatile: N**	0	100	100	%	E
49.07	**M2UsedFexType (motor 2 used field exciter type)** Select motor 2 used field exciter type: 0 = **NotUsed** no or foreign field exciter connected 1 = **OnBoard** integrated 1-Q field exciter (for sizes D1 - D4 only), default 2 = **FEX-425-Int** internal 1-Q 25 A field exciter (for size D5 only) 3 = **DCF803-0035** external 1-Q 35 A field exciter used for field currents from 5 A to **35 A** (terminals X100.1 and X100.3) 4 = **DCF803-0050** external 1-Q 50 A field exciter 5 = **DCF804-0050** external 4-Q 50 A field exciter 6 = **DCF803-0060** external 1-Q 60 A field exciter 7 = **DCF804-0060** external 4-Q 60 A field exciter 8 = **DCS800-S01** external 2-Q 3-phase field exciter 9 = **DCS800-S02** external 4-Q 3-phase field exciter 10 = reserved to 19 = reserved 20 = **FEX-4-Term5A** external 1-Q 35 A field exciter used for field currents from 0.3 A to **5 A** (terminals X100.2 and X100.3) 21 = reserved If the fex type is changed its new value is taken over after the next power-up. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	reserved	NotUsed	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.08	**M2FldMinTrip (motor 2 minimum field trip)** The drive trips with **F542 M2FexLowCur** [*FaultWord3 (9.03)* bit 9] if *M2FldMinTrip (49.08)* - in percent of *M2NomFldCur (49.05)* - is still undershot when *FldMinTripDly (45.18)* is elapsed. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	100	50	%	E
49.09	**M2FldOvrCurLev (motor 2 field overcurrent level)** The drive trips with **F518 M2FexOverCur** [*FaultWord2 (9.02)* bit 1] if *M2FldOvrCurLev (49.09)* - in percent of *M2NomFldCur (49.05)* - is exceeded. The field overcurrent fault is inactive, if *M2FldOvrCurLev (49.09)* is set to 135%. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	135	125	%	E
49.10	**M2KpFex (motor 2 p-part field current controller)** Proportional gain of the field current controller. Example: The controller generates 15% of motor nominal field current [*M2NomFldCur (49.05)*] with *M2KpFex (49.10)* = 3, if the field current error is 5% of *M2NomFldCur (49.05)*. **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	325	0.1	-	E
49.11	**M2TiFex (motor 2 i-part field current controller)** Integral time of the field current controller. *M2TiFex (49.11)* defines the time within the integral part of the controller achieves the same value as the proportional part. Example: The controller generates 15% of motor nominal field current [*M2NomFldCur (49.05*] with *M2KpFex (49.10)* = 3, if the field current error is 5% of *M2NomFldCur (49.05)*. On that condition and with *M2TiFex (49.11)* = 200 ms follows: – the controller generates 30% of motor nominal field current, if the current error is constant, after 200 ms are elapsed (15% from proportional part and 15% from integral part). Setting *M2TiFex (49.11)* to 0 ms disables the integral part of the field current controller and resets its integrator. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	200	ms	E
49.12	**M2CurLimBrdg1 (motor 2 current limit of bridge 1)** Current limit bridge 1 in percent of *M2NomCur (49.02)*. Setting *M2CurLimBrdg1 (49.12)* to 0% disables bridge 1. **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	0	325	100	%	E
49.13	**M2CurLimBrdg2 (motor 2 current limit of bridge 2)** Current limit bridge 2 in percent of *M2NomCur (49.02)*. Setting *M2CurLimBrdg2 (49.13)* to 0% disables bridge 2. **Note1:** The used current limit depends also on the converter's actual limitation situation (e.g. torque limits, other current limits, field weakening). The limit with the smallest value is valid. **Note2:** *M2CurLimBrdg2 (49.13)* is internally set to 0% if *QuadrantType (4.15)* = 2-Q (2-Q drive). **Int. Scaling: 100 == 1 % Type: SI Volatile: N**	-325	0	-100	%	E
49.14	**M2KpArmCur (motor 2 p-part armature current controller)** Proportional gain of the current controller. Example: The controller generates 15% of motor nominal current [*M2NomCur (49.02)*] with *M2KpArmCur (49.14)* = 3, if the current error is 5% of *M2NomCur (49.02)*. **Int. Scaling: 100 == 1 Type: I Volatile: N**	0	100	0.1	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.15	**M2TiArmCur (motor 2 i-part armature current controller)** Integral time of the current controller. *M2TiArmCur (49.15)* defines the time within the integral part of the controller achieves the same value as the proportional part. Example: The controller generates 15% of motor nominal current [*M2NomCur (49.02)*] with *M2KpArmCur (49.14)* = 3, if the current error is 5% of *M2NomCur (49.02)*. On that condition and with *M2TiArmCur (49.15)* = 50 ms follows: – the controller generates 30% of motor nominal current, if the current error is constant, after 50 ms are elapsed (15% from proportional part and 15% from integral part). Setting *M2TiArmCur (49.15)* to 0 ms disables the integral part of the current controller and resets its integrator. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	50	ms	E
49.16	**M2DiscontCurLim (motor 2 discontinuous current limit)** Threshold continuous / discontinuous current in percent of *M2NomCur (49.02).* The actual continuous / discontinuous current state can be read from *CurCtrlStat1 (6.03)* bit 12. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	0	325	100	%	E
49.17	**M2ArmL (motor 2 armature inductance)** Inductance of the armature circuit in mH. Used for the EMF compensation: $EMF = U_A - R_A * I_A - L_A * \frac{dI_A}{dt}$ **Int. Scaling: 100 == 1 mH Type: I Volatile: N**	0	640	0	mH	E
49.18	**M2ArmR (motor 2 armature resistance)** Resistance of the armature circuit in mΩ. Used for the EMF compensation: $EMF = U_A - R_A * I_A - L_A * \frac{dI_A}{dt}$ **Int. Scaling: 1 == 1 mΩ Type: I Volatile: N**	0	65500	0	mΩ	E
49.19	**M2SpeedMin (motor 2 minimum speed)** Motor 2 negative speed reference limit in rpm for: – *SpeedRef2 (2.01)* – *SpeedRefUsed (2.17)* Internally limited from: $-(2.29) * \frac{32767}{20000} rpm \ \ to \ \ (2.29) * \frac{32767}{20000} rpm$ **Note1:** *M2SpeedMin (49.19)* is must be set in the range of: 0.625 to 5 times of *M1BaseSpeed (99.04).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Note2:** *M2SpeedMin (49.19)* is also applied to *SpeedRef4 (2.18*) to avoid exceeding the speed limits by means of *SpeedCorr (23.04).* To be able to overspeed the drive (e.g. for winder) it is possible to switch off the speed limit for *SpeedRef4 (2.18)* by means of *AuxCtrlWord (7.02)* bit 4. **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	-1500	rpm	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.20	**M2SpeedMax (motor 2 maximum speed)** Motor 2 positive speed reference limit in rpm for: – *SpeedRef2 (2.01)* – *SpeedRefUsed (2.17)* Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Note1:** *M2SpeedMax (49.20)* is must be set in the range of: 0.625 to 5 times of *M1BaseSpeed (99.04).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Note2:** *M2SpeedMax (49.20)* is also applied to *SpeedRef4 (2.18*) to avoid exceeding the speed limits by means of *SpeedCorr (23.04).* To be able to overspeed the drive (e.g. for winder) it is possible to switch off the speed limit for *SpeedRef4 (2.18)* by means of *AuxCtrlWord (7.02)* bit 4. **Int. Scaling: (2.29) Type: SI Volatile: N**	-10000	10000	1500	rpm	E
49.21	**M2OvrSpeed (motor 2 overspeed)** The drive trips with **F532 MotOverSpeed** [*FaultWord2 (9.02)* bit 15] if *M2OvrSpeed (49.21)* is exceeded. Internally limited from: $0rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Note1:** The value of *M2OvrSpeed (49.21)* is as well used for the analog tacho tuning. Any change of its value has the consequence that **A115 TachoRange** [*AlarmWord1 (9.06)* bit 15] comes up for 10 seconds and *M2TachoAdjust (49.26)* respectively *M2TachoVolt1000 (49.27)* have to be adjusted anew. The adjustment can be done by means of *ServiceMode (99.06)* = **TachFineTune**. **Int. Scaling: (2.29) Type: I Volatile: N**	0	10000	1800	rpm	E
49.22	**M2SpeedScale (motor 2 speed scaling)** Motor 2 speed scaling in rpm. *M2SpeedScale (49.22)* defines the speed - in rpm - that corresponds to 20.000 speed units. The speed scaling is released when *M2SpeedScale (49.22)* ≥ 10: – 20.000 speed units == *M2SpeedScale (49.22*), in case *M2SpeedScale (49.22)* ≥ 10 – 20.000 speed units == maximum absolute value of *M2SpeedMin (49.19)* and *M2SpeedMax (49.20),* in case *M2SpeedScale (49.22)* < 10 or mathematically – If *(49.22)* ≥ 10 then 20.000 == *(49.22)* in rpm – If *(49.22)* < 10 then 20.000 == Max [|*(49.19)*|, |*(49.20)*|] in rpm The actual used speed scaling is visible in *SpeedScale Act (2.29).* **Note1:** *M2SpeedScale (49.22)* has to be set in case the speed is read or written by means of an overriding control (e.g. fieldbus). **Note2:** *M2SpeedScale (49.22)* is must be set in the range of: 0.625 to 5 times of *M2BaseSpeed (49.03).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Commissioning hint:** – set *M2SpeedScale (49.22)* to maximum speed – set *M2BaseSpeed (49.03)* to base speed – set *M2SpeedMax (49.20)* / *M2SpeedMin (49.19)* to ±maximum speed **Int. Scaling: 10 == 1 rpm Type: I Volatile: N**	0	6500	0	rpm	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.23	**M2EncMeasMode (motor 2 encoder measuring mode)** *M2EncMeasMode (49.23)* selects the measurement mode for the pulse encoder: 0 = **A+/B Dir** channel A: rising edges for speed; channel B: direction 1 = **A+-** channel A: rising and falling edges for speed; channel B: not used 2 = **A+-/B Dir** channel A: rising and falling edges for speed; channel B: direction 3 = **A+-/B+-** channel A & B: rising and falling edges for speed and direction, default **Int. Scaling: 1 == 1 Type: C Volatile: N**	A+/B Dir	A+-/B+-	A+-/B+-	-	E
49.24	**M2SpeedFbSel (motor 2speed feedback selector)** Motor 2 speed feedback selection: 0 = **EMF** speed is calculated by means of the EMF, default 1 = **Encoder** speed is measured by means of a pulse encoder 2 = **Tacho** speed is measured by means of an analog tacho 3 = **External** *MotSpeed (1.04)* is updated by Adaptive Program, application program or overriding control. **Int. Scaling: 1 == 1 Type: C Volatile: N**	EMF	External	EMF	-	E
49.25	**M2EncPulseNo (motor 2 encoder pulse number)** Number of pulse encoder pulses per revolution. **Int. Scaling: 1 == 1 ppr Type: I Volatile: N**	20	10000	1024	ppr	E
49.26	**M2TachoAdjust (motor 2 tacho adjust)** Fine tuning of analog tacho. The value equals the actual speed measured by means of a hand held tacho: – *M2TachoAdjust (49.26)* = speed $actual_{HandHeldTacho}$ Internally limited to: $\pm(2.29)*\frac{32767}{20000}rpm$ **Note1:** Changes of *M2TachoAdjust (49.26)* are only valid during tacho fine tuning [*ServiceMode (99.06)* = **TachFineTune**]. During tacho fine tuning *M2SpeedFbSel (49.24)* is automatically forced to **EMF**. **Attention:** The value of *M2TachoAdjust (49.26)* has to be the speed measured by the hand held tacho and **not** the delta between speed reference and measured speed. **Int. Scaling: (2.29) Type: I Volatile: Y**	-10000	10000	0	rpm	E
49.27	**M2TachoVolt1000 (motor 2 tacho voltage at 1000rpm)** *M2TachoVolt1000 (49.27)* is used to adjust the voltage the analog tacho is generating at a speed of 1000 rpm: – *M1TachoVolt1000 (50.13)* ≥ 1 V, the setting is used to calculate tacho gain – *M1TachoVolt1000 (50.13)* = 0 V, the tacho gain is measured by means of the speed feedback assistant – *M1TachoVolt1000 (50.13)* = -1 V, the tacho gain was successfully measured by means of the speed feedback assistant **Note1:** Use *ServiceMode (99.06)* = **TachFineTune** **Int. Scaling: 10 == 1 V Type: I Volatile: N**	-1	270	0	V	E
49.28	**M2BrakeCtrl (motor 2 brake control)** Releases the control of the brake: 0 = **NotUsed** brake control blocked, default 1 = **On** brake control is released The brake open (lift) command is readable in *AuxStatWord (8.02)* bit 8 and can be connected to the digital output controlling the brake. The brake control can be overwritten by *AuxCtrlWord2 (7.03)* bit 12. The brake is always applied in case **ForceBrake** = 1. Otherwise the brake is controlled by the internal brake logic. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	On	NotUsed	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.29	**M2BrakeAckSel (motor 2 brake acknowledge selector)** The drive sets either **A122 MechBrake** [*AlarmWord2 (9.07)* bit 5] or trips with **F552 MechBrake** [*FaultWord4 (9.04)* bit 3] depending on *BrakeFaultFunc (42.06)* if a digital input is selected and the brake acknowledge fails: 0 = **NotUsed** brake acknowledge is blocked, default 1 = **DI1** 0 = brake is applied, 1 = brake is open (lifted) 2 = **DI2** 0 = brake is applied, 1 = brake is open (lifted) 3 = **DI3** 0 = brake is applied, 1 = brake is open (lifted) 4 = **DI4** 0 = brake is applied, 1 = brake is open (lifted) 5 = **DI5** 0 = brake is applied, 1 = brake is open (lifted) 6 = **DI6** 0 = brake is applied, 1 = brake is open (lifted) 7 = **DI7** 0 = brake is applied, 1 = brake is open (lifted) 8 = **DI8** 0 = brake is applied, 1 = brake is open (lifted) 9 = **DI9** 0 = brake is applied, 1 = brake is open (lifted). Only available with digital extension board 10 = **DI10** 0 = brake is applied, 1 = brake is open (lifted). Only available with digital extension board 11 = **DI11** 0 = brake is applied, 1 = brake is open (lifted). Only available with digital extension board **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	E
49.30	**M2BrakeOpenDly (motor 2 brake open delay)** Brake open (lift) delay. This function compensates for the mechanical open (lift) delay of the brake. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	5	0	s	E
49.31	**M2BrakeCloseDly (motor 2 brake close delay)** Brake close (apply) delay. This function compensates for the time the drive needs to decelerated from *ZeroSpeedLim (20.03)* to actual speed = 0. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	5	0	s	E
49.32	**M2ModelTime (motor 2 model time constant)** Thermal time constant for motor 1. The time within the temperature rises to 63% of its nominal value. The motor thermal model is blocked, if *M2ModelTime (49.32)* is set to zero. **Int. Scaling: 10 == 1 s Type: I Volatile: N**	0	6400	240	s	E
49.33	**M2AlarmLimLoad (motor 2 alarm limit load)** The drive sets **A110 M2OverLoad** [*AlarmWord1 (9.06)* bit 9] if *M2AlarmLimLoad (49.33)* - in percent of *M2NomCur (49.02)* - is exceeded. Output value for motor 1 thermal model is *Mot2TempCalc (1.21).* **Int. Scaling: 10 == 1 % Type: I Volatile: N**	10	325	102	%	E
49.34	**M2FaultLimLoad (motor 2 fault limit load)** The drive trips with **F510 M2OverLoad** [*FaultWord1 (9.01)* bit 9] if *M2FaultLimLoad (49.34)* - in percent of *M2NomCur (49.02)* - is exceeded. Output value for motor 1 thermal model is *Mot2TempCalc (1.21).* **Int. Scaling: 10 == 1 % Type: I Volatile: N**	10	325	106	%	E

<table>
<tr><th>Index</th><th>Signal / Parameter name</th><th>min.</th><th>max.</th><th>def.</th><th>unit</th><th>E/C</th></tr>
<tr><td>49.35</td><td>M2TempSel (motor 2 temperature selector)
M2TempSel (49.33) selects motor 2 measured temperature input.
Connection possibilities for PT100:
– max. 3 PT100 for motor 2 and max. 3 PT100 for motor 1 or
– up to 6 PT100 for motor 2 only.
Connection possibilities PTC:
– max. 1 PTC for motor 2 and max. 1 PTC for motor 1 or
– up to 2 PTC for motor 2 only:
0 = NotUsed motor 2 temperature measurement is blocked, default
1 = 1PT100 AI3 one PT100 connected to AI3 on SDCS-IOB-3
2 = 2PT100 AI3 two PT100 connected to AI3 on SDCS-IOB-3
3 = 3PT100 AI3 three PT100 connected to AI3 on SDCS-IOB-3
4 = 4PT100 AI3/2 four PT100, 3 connected to AI3 and 1 connected to AI2 on SDCS-IOB-3
5 = 5PT100 AI3/2 five PT100, 3 connected to AI3 and 2 connected to AI2 on SDCS-IOB-3
6 = 6PT100 AI3/2 six PT100, 3 connected to AI3 and 3 connected to AI2 on SDCS-IOB-3
7 = 1PT100 AI8 one PT100 connected to AI8 on RAIO2
8 = 2PT100 AI8 two PT100 connected to AI8 on RAIO2
9 = 3PT100 AI8 three PT100 connected to AI8 on RAIO2
10 = 4PT100 AI8/7 four PT100, 3 connected to AI8 and 1 connected to AI7 on RAIO2
11 = 5PT100 AI8/7 five PT100, 3 connected to AI8 and 2 connected to AI7 on RAIO2
12 = 6PT100 AI8/7 six PT100, 3 connected to AI8 and 3 connected to AI7 on RAIO2
13 = 1PTC AI3 one PTC connected to AI3 on SDCS-IOB-3
14 = 2PTC AI3/2 two PTC, 1 connected to AI3 and 1 connected to AI2 on SDCS-IOB-3
15 = 1PTC AI2/Con one PTC connected to AI2 on SDCS-CON-4
Note1:
AI7 and AI8 have to be activated by means of AIO ExtModule (98.06).
Note2:
In case only one PT100 is connected to an AI of the SDCS-IOB-3 the input range must be configured by jumpers to a gain of 10. Jumper settings for input range and constant current source see Hardware manual.
Int. Scaling: 1 == 1 Type: C Volatile: N</td><td>NotUsed</td><td>1PTC AI2/Con</td><td>NotUsed</td><td>-</td><td>E</td></tr>
<tr><td>49.36</td><td>M2AlarmLimTemp (motor 2 alarm limit temperature)
The drive sets A108 M2OverTemp [AlarmWord1 (9.06) bit 8] if M2AlarmLimTemp (49.36) is exceeded. Output value for motor 1 measured temperature is Mot2TempMeas (1.23).
Note1:
The units depends on M2TempSel (49.35).
Int. Scaling: 1 == 1 °C / 1 Ω / 1 Type: SI Volatile: N</td><td>-10</td><td>4000</td><td>0</td><td>°C</td><td>E</td></tr>
<tr><td>49.37</td><td>M2FaultLimTemp (motor 2 fault limit temperature)
The drive trips with F509 M2OverTemp [FaultWord1 (9.01) bit 8] if M2FaultLimTemp (49.37) is exceeded. Output value for motor 1 measured temperature is Mot2TempMeas (1.23).
Note1:
The units depends on M2TempSel (49.35).
Int. Scaling: 1 == 1 °C / 1 Ω / 1 Type: SI Volatile: N</td><td>-10</td><td>4000</td><td>0</td><td>°C</td><td>E</td></tr>
</table>

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
49.38	**M2KlixonSel (motor 2 klixon selector)** The drive trips with **F509 M2OverTemp** [*FaultWord1 (9.01)* bit 8] if a digital input selected and the klixon is open: 0 = **NotUsed** no reaction, default 1 = **DI1** 0 = fault, 1 = no fault 2 = **DI2** 0 = fault, 1 = no fault 3 = **DI3** 0 = fault, 1 = no fault 4 = **DI4** 0 = fault, 1 = no fault 5 = **DI5** 0 = fault, 1 = no fault 6 = **DI6** 0 = fault, 1 = no fault 7 = **DI7** 0 = fault, 1 = no fault 8 = **DI8** 0 = fault, 1 = no fault 9 = **DI9** 0 = fault, 1 = no fault. Only available with digital extension board 10 = **DI10** 0 = fault, 1 = no fault. Only available with digital extension board 11 = **DI11** 0 = fault, 1 = no fault. Only available with digital extension board **Note1:** It is possible to connect several klixons in series. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	DI11	NotUsed	-	E
Group 50	**Speed measurement**					
50.01	**M1SpeedScale (motor 1 speed scaling)** Motor 1 speed scaling in rpm. *M1SpeedScale (50.01)* defines the speed - in rpm - that corresponds to 20.000 speed units. The speed scaling is released when *M1SpeedScale (50.01)* ≥ 10: – 20.000 speed units == *M1SpeedScale (50.01*), in case *M1SpeedScale (50.01)* ≥ 10 – 20.000 speed units == maximum absolute value of *M1SpeedMin (20.01)* and *M1SpeedMax (20.02),* in case *M1SpeedScale (50.01)* < 10 or mathematically – If *(50.01)* ≥ 10 then 20.000 == *(50.01)* in rpm – If *(50.01)* < 10 then 20.000 == Max [|*(20.01)*|, |*(20.02)*|] in rpm The actual used speed scaling is visible in *SpeedScale Act (2.29).* **Note1:** *M1SpeedScale (50.01)* has to be set in case the speed is read or written by means of an overriding control (e.g. fieldbus). **Note2:** *M1SpeedScale (50.01)* is must be set in the range of: 0.625 to 5 times of *M1BaseSpeed (99.04).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Commissioning hint:** – set *M1SpeedScale (50.01)* to maximum speed – set *M1BaseSpeed (99.04)* to base speed – set *M1SpeedMax (20.02)* / *M1SpeedMin (20.01)* to ±maximum speed **Int. Scaling: 10 == 1 rpm Type: I Volatile: N**	0	6500	0	rpm	C
50.02	**M1EncMeasMode (motor 1 encoder measuring mode)** *M1EncMeasMode (50.02)* selects the measurement mode for the pulse encoder: 0 = **A+/B Dir** channel A: rising edges for speed; channel B: direction 1 = **A+-** channel A: rising and falling edges for speed; channel B: not used 2 = **A+-/B Dir** channel A: rising and falling edges for speed; channel B: direction 3 = **A+-/B+-** channel A & B: rising and falling edges for speed and direction, default **Int. Scaling: 1 == 1 Type: C Volatile: N**	A+/B Dir	A+-/B+-	A+-/B+-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
50.03	**M1SpeedFbSel (motor 1speed feedback selector)** Motor 1 speed feedback selection: 0 = **EMF** speed is calculated by means of the EMF, default 1 = **Encoder** speed is measured by means of a pulse encoder 2 = **Tacho** speed is measured by means of an analog tacho 3 = **External** *MotSpeed (1.04)* is updated by Adaptive Program, application program or overriding control. **Int. Scaling: 1 == 1 Type: C Volatile: N**	EMF	External	EMF	-	C
50.04	**M1EncPulseNo (motor 1 encoder pulse number)** Number of pulse encoder pulses per revolution. **Int. Scaling: 1 == 1 ppr Type: I Volatile: N**	20	10000	1024	ppr	C
50.05	**Unused**					
50.06	**SpeedFiltTime (actual speed filter time)** Speed actual filter time for *MotSpeed (1.04)*. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	5	ms	E
50.07	**PosCountMode (position counter mode)** The position counter is based on the pulse count of the pulse encoder, with all pulse edges are counted. The 32-bit position value is divided in 2 16-bit words: 0 = **PulseEdges** for low word *PosCountLow (3.07)* respectively *PosCountInitLo (50.08)* is valid 1 == 1 pulse edge for high word *PosCountHigh (3.08)* respectively *PosCountInitHi (50.09)* is valid 1 == 65536 pulse edges 1 = **Scaled** for low word *PosCountLow (3.07)* respectively *PosCountInitLo (50.08)* is valid 0 == 0° and 65536 == 360° for high word *PosCountHigh (3.08)* respectively *PosCountInitHi (50.09)* is valid 1 == 1 revolution, default The position counter is controlled by *SyncCommand (10.04)* and *AuxCtrlWord (7.02)* bits 9 to 11. The status can be seen from *AuxStatWord (8.02)* bit 5 **SyncRdy**. The position control function has to be implemented by Adaptive Program, application program or overriding control. **Int. Scaling: 1 == 1 Type: C Volatile: N**	PulseEdges	Scaled	Scaled	-	E
50.08	**PosCountInitLo (Position counter low initial value)** Position counter initial low word. Unit depends on setting of *PosCountMode (50.07):* – **PulseEdges** 1 == 1 pulse edge – **Scaled** 0 == 0° and 65536 == 360° See also *SyncCommand (10.04)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	65536	0	-	E
50.09	**PosCountInitHi (Position counter high initial value)** Position counter initial high word. Unit depends on setting of *PosCountMode (50.07):* – **PulseEdges** 1 == 65536 pulse edges – **Scaled** 1 == 1 revolution See also *SyncCommand (10.04)*. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
50.10	**SpeedLev (speed level)** When *MotSpeed (1.04)* reaches *SpeedLev (50.10)* the bit **AboveLimit** [*MainStatWord (8.01)* bit 10] is set. Internally limited from: $-(2.29)*\frac{32767}{20000}rpm\ \ to\ \ (2.29)*\frac{32767}{20000}rpm$ **Int. Scaling: (2.29) Type: I Volatile: N**	0	10000	1500	rpm	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
50.11	**DynBrakeDly (delay dynamic braking)** In case of dynamic braking with EMF feedback [*M1SpeedFbSel (50.03)* = **EMF**] or a speed feedback fault there is no valid information about the motor speed and thus no zero speed information. To prevent an interlocking of the drive after dynamic braking the speed is assumed zero after *DynBrakeDly (50.11)* is elapsed: **-1 s** = the motor voltage is measured directly at the motor terminals and is thus valid during dynamic braking **0 s** = no zero speed signal for dynamic braking is generated **1 s to 3000 s** = zero speed signal for dynamic braking is generated after the programmed time is elapsed **Int. Scaling: 1 == 1 s Type: I Volatile: N**	-1	3000	0	s	E
50.12	**M1TachoAdjust (motor 1 tacho adjust)** Fine tuning of analog tacho. The value equals the actual speed measured by means of a hand held tacho: – *M1TachoAdjust (50.12)* = speed $actual_{HandHeldTacho}$ Internally limited to: $\pm(2.29)*\frac{32767}{20000}rpm$ **Note1:** Changes of *M1TachoAdjust (50.12)* are only valid during tacho fine tuning [*ServiceMode (99.06)* = **TachFineTune**]. During tacho fine tuning *M1SpeedFbSel (50.03)* is automatically forced to **EMF**. **Attention:** The value of *M1TachoAdjust (50.12)* has to be the speed measured by the hand held tacho and **not** the delta between speed reference and measured speed. **Int. Scaling: (2.29) Type: I Volatile: Y**	-10000	10000	0	rpm	C
50.13	**M1TachoVolt1000 (motor 1 tacho voltage at 1000 rpm)** *M1TachoVolt1000 (50.13)* is used to adjust the voltage the analog tacho is generating at a speed of 1000 rpm: – *M1TachoVolt1000 (50.13)* ≥ 1 V, the setting is used to calculate tacho gain – *M1TachoVolt1000 (50.13)* = 0 V, the tacho gain is measured by means of the speed feedback assistant – *M1TachoVolt1000 (50.13)* = -1 V, the tacho gain was successfully measured by means of the speed feedback assistant **Note1:** Use *ServiceMode (99.06)* = **TachFineTune** or assistant (control panel or DriveWindow Light). **Int. Scaling: 10 == 1 V Type: I Volatile: N**	0	270	60	V	C
50.14	**Unused**					
50.15	**PosSyncMode (position counter synchronization mode)** Position counter synchronization mode: 0 = **Single** the next synchronization must be prepared by resetting **SyncRdy** [*AuxStatWord (8.02)* bit 5] with **ResetSyncRdy** [*AuxCtrlWord (7.02)* bit 11], default 1 = **Cyclic** the synchronization happens on every occurrence of the synchronization event **Int. Scaling: 1 == 1 Type: C Volatile: N**	Single	Cyclic	Single	-	E
50.16	**Unused**					
50.17	**WinderScale (winder scaling)** Speed actual scaling. Before speed error (Δn) generation. **Int. Scaling: 100 == 1 Type: I Volatile: N**	-100	100	1	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 51	**Fieldbus**					
	This parameter group defines the communication parameters for fieldbus adapters (Fxxx, Rxxx and Nxxx). The parameter names and the number of the used parameters depend on the selected fieldbus adapter (see fieldbus adapter manual). **Note1:** If a fieldbus parameter is changed its new value takes effect only upon setting *FBA PAR REFRESH (51.27)* = **RESET** or at the next power up of the fieldbus adapter.					
51.01	**Fieldbus1 (fieldbus parameter 1)** Fieldbus parameter 1 **Int. Scaling: 1 == 1 Type: C Volatile: Y**	-	-	-	-	C
…	…					C
51.15	**Fieldbus15 (fieldbus parameter 15)** Fieldbus parameter 15 **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	32767	0	-	C
51.16	**Fieldbus16 (fieldbus parameter 16)** Fieldbus parameter 16 **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	32767	0	-	C
…	…					C
51.27	**FBA PAR REFRESH (fieldbus parameter refreshing)** If a fieldbus parameter is changed its new value takes effect only upon setting *FBA PAR REFRESH (51.27)* = **RESET** or at the next power up of the fieldbus adapter. *FBA PAR REFRESH (51.27)* is automatically set back to **DONE** after the refreshing is finished. 0 = **DONE** default 1 = **RESET** refresh the parameters of the fieldbus adapter **Note1:** This service is only available for Rxxx fieldbus adapters. **Int. Scaling: 1 == 1 Type: C Volatile: N**	DONE	RESET	DONE	-	C
…	…					C
51.31	**Fieldbus31 (fieldbus parameter 31)** Fieldbus parameter 31 **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	32767	0	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 52	**Modbus**					
	This parameter group defines the communication parameters for the Modbus adapter RMBA-xx (see also Modbus adapter manual). **Note1:** If a Modbus parameter is changed its new value takes effect only upon the next power up of the Modbus adapter.					
52.01	**StationNumber (station number)** Defines the address of the station. Two stations with the same station number are not allowed online. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	247	1	-	E
52.02	**BaudRate (baud rate)** Defines the transfer rate of the Modbus link: 0 = reserved 1 = **600** 600 Baud 2 = **1200** 1200 Baud 3 = **2400** 2400 Baud 4 = **4800** 4800 Baud 5 = **9600** 9600 Baud, default 6 = **19200** 19200 Baud **Int. Scaling: 1 == 1 Type: C Volatile: N**	600	19200	9600	-	E
52.03	**Parity (parity)** Defines the use of parity and stop bit(s). The same setting must be used in all online stations: 0 = reserved 1 = **None1Stopbit** no parity bit, one stop bit 2 = **None2Stopbits** no parity bit, two stop bits 3 = **Odd** odd parity indication bit, one stop bit 4 = **Even** even parity indication bit, one stop bit, default **Int. Scaling: 1 == 1 Type: C Volatile: N**	reserved	Even	Even	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 70	**DDCS control**					
70.01	**Ch0 NodeAddr (channel 0 node address)** Channel 0 is used for communication with the overriding control. Node address channel 0: – if APC2 or NCSA-01 (AC31) is used *Ch0 NodeAddr (70.01)* = 1 – if AC70 or AC80 is used via the optical module bus (adapters TB810 or TB811) *Ch0 NodeAddr (70.01)* is calculated from the **POSTION** terminal of the **DRIENG** data base element as follows: 1. multiply the hundreds of the value **POSITION** by 16 2. add the tens and ones of the value **POSITION** to the result Example: **POSITION** I *Ch0 NodeAddr (70.01)* 101 I 16*1+01 = 17 712 I 16*7+12 = 124 – if AC 800M is used via the optical module bus *Ch0 NodeAddr (70.01)* is calculated from the position of the **DCS600 ENG** hardware module as follows: 1. multiply the hundreds of the value **POSITION** by 16 2. add the tens and ones of the value **POSITION** to the result Example: **POSITION** I *Ch0 NodeAddr (70.01)* 112 I 16*1+12 = 28 503 I 16*5+03 = 83 **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	254	1	-	E
70.02	**Ch0 LinkControl (channel 0 link control) I** DDCS channel 0 intensity control for transmission LEDs. This parameter can be used in special cases to optimize the communication performance of the link. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	15	10	-	E
70.03	**Ch0 BaudRate (channel 0 baud rate)** Channel 0 communication speed. *Ch0 BaudRate (70.03)* must be set to **4 Mbits/s** when Advant controller communication modules (e.g. FCI or FBA) are used. Otherwise the overriding control automatically sets the communication speed. 0 = **8 Mbits/s** 1 = **4 Mbits/s**, default 2 = **2 Mbits/s** 3 = **1 Mbits/s** **Int. Scaling: 1 == 1 Type: C Volatile: N**	8 Mbits/s	1 Mbits/s	4 Mbits/s	-	E
70.04	**Ch0 TimeOut (channel 0 timeout)** Time delay before a communication break with channel 0 is declared. Depending on the setting of *Ch0 ComLossCtrl (70.05)* either **F543 COM8Com** [*FaultWord3 (9.03)* bit 10] or **A113 COM8Com** [*AlarmWord1 (9.06)* bit 12] is set. The communication fault and alarm are inactive, if *Ch0 TimeOut (70.04)* is set to 0 ms. **Note1:** The supervision is activated after the reception of the first valid message. **Note2:** The time out starts when the link doesn't update any of the first 2 receive datasets addressed by *Ch0 DsetBaseAddr (70.24)*. Example: When *Ch0 DsetBaseAddr (70.24)* = 10 the reception of datasets 10 and 12 is supervised. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
70.05	**Ch0 ComLossCtrl (channel 0 communication loss control)** *Ch0 ComLossCtrl (70.05)* determines the reaction to a communication loss of channel 0 control. **F543 COM8Com** [*FaultWord3 (9.03)* bit 10] is set with: 0 = **RampStop** stop according to *E StopRamp (22.11),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **A113 COM8Com** [*AlarmWord1 (9.06)* bit 12] is set with: 4 = **LastSpeed** the drive continues to run at the last speed before the warning 5 = **FixedSpeed1** the drive continuous to run with *FixedSpeed1 (23.02)* **Note1:** The time out for *Ch0 ComLossCtrl (70.05)* is set by: – *Ch0 TimeOut (70.04)* **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	FixedSpeed1	RampStop	-	E
70.06	**CH0 HW Config (channel 0 hardware configuration)** *CH0 HW Config (70.06)* is used to enable / disable the regeneration of the Channel 0 optotransmitters in DDCS mode [*Ch0 DriveBus (71.01)* = **No**]. Regeneration means that the drive echoes all messages back. DDCS mode is typically used with APC2, AC70, AC80 and module bus of AC 800M. 0 = **Ring** Regeneration is enabled. Used with ring-type bus topology. Typically when Channel 0 of all SDCS-COM-8 has been connected to a ring. 1 = **Star** Regeneration is disabled. Used with star-type topology. Typically with configurations using the NDBU-x5 branching units*,* default **Note1:** This parameter has no effect in DriveBus mode [*Ch0 DriveBus (71.01)* = **Yes**]. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Ring	Star	Star	-	E
70.07	**Ch1 LinkControl (channel 1 link control) I** Channel 1 is used for communication with the AMIA-xx adapter. DDCS channel 1 intensity control for transmission LEDs. This parameter can be used in special cases to optimize the communication performance of the link. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	15	10	-	E
70.08	**Ch2 NodeAddr (channel 2 node address)** Channel 2 is used for point to point communication connections between drives (e.g. master-follower communication). Node address channel 2: 0 = master drive, this value is set internally if *Ch2 MaFoMode (70.09)* = **Master** 1, …, 125 = Node addresses of slave drives **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	125	1	-	E
70.09	**Ch2 MaFoMode (channel 2 master-follower mode)** Channel 2 can be used to send reference values (e.g. torque reference) from the master to one or several followers. Master-follower is an application in which machinery is run by several drives with all motor shafts coupled to each other by gears, chains, belts etc. 0 = reserved 1 = **NotUsed** channel 2 is not used for master-follower communication*,* default 2 = **Master** the drive is the master of the master-follower link and broadcasts via channel 2 the contents of dataset 41 [defined by *Ch2 MasSig1 (70.10)* to *Ch2 MasSig3 (70.12)*] 3 = **Follower** the drive is a follower of the master-follower link and receives via channel 2 the contents of dataset 41 [defined by *Ch2 FolSig1 (70.18)* to *Ch2 FolSig3 (70.20)*] **Note1:** The followers node address is defined by *Ch2 NodeAddr (70.08)*. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	Follower	NotUsed	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
70.10	**Ch2 MasSig1 (channel 2 master signal 1)** Master signal 1 broadcasts via channel 2 as 1st value of dataset 41 to all followers. The format is **xxyy**, with: **xx** = group and **yy** = index. Default setting of 701 equals *MainCtrlWord (7.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	701	-	E
70.11	**Ch2 MasSig2 (channel 2 master signal 2)** Master signal 2 broadcasts via channel 2 as 2nd value of dataset 41 to all followers. The format is **xxyy**, with: **xx** = group and **yy** = index. Default setting of 2301 equals *SpeedRef (23.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	2301	-	E
70.12	**Ch2 MasSig3 (channel 2 master signal 3)** Master signal 3 broadcasts via channel 2 as 3rd value of dataset 41 to all followers. The format is **xxyy**, with: **xx** = group and **yy** = index. Default setting of 210 equals *TorqRef3 (2.10)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	210	-	E
70.13	**Ch2 LinkControl (channel 2 link control)** DDCS channel 2 intensity control for transmission LEDs. This parameter can be used in special cases to optimize the communication performance of the link. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	15	10	-	E
70.14	**Ch2 TimeOut (channel 2 timeout)** Time delay before a communication break with channel 2 is declared. Depending on the setting of *Ch2 ComLossCtrl (70.15)* either **F543 COM8Com** [*FaultWord3 (9.03)* bit 10] or **A113 COM8Com** [*AlarmWord1 (9.06)* bit 12] is set. The communication fault and alarm are inactive, if *Ch2 TimeOut (70.14)* is set to 0 ms. **Note1:** The supervision is activated after the reception of the first valid message. **Note2:** The time out starts when the link doesn't update the master-follower dataset. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E
70.15	**Ch2 ComLossCtrl (channel 2 communication loss control)** *Ch2 ComLossCtrl (70.15)* determines the reaction to a communication loss of channel 2. **F543 COM8Com** [*FaultWord3 (9.03)* bit 10] is set with: 0 = **RampStop** stop according to *E StopRamp (22.11),* default 1 = **TorqueLimit** stop by active torque limit 2 = **CoastStop** torque is zero 3 = **DynBraking** dynamic braking **A113 COM8Com** [*AlarmWord1 (9.06)* bit 12] is set with: 4 = **LastSpeed** the drive continues to run at the last speed before the warning 5 = **FixedSpeed1** the drive continuous to run with *FixedSpeed1 (23.02)* **Note1:** The time out for *Ch2 ComLossCtrl (70.15)* is set by: – *Ch2 TimeOut (70.14)* **Int. Scaling: 1 == 1 Type: C Volatile: N**	RampStop	FixedSpeed1	RampStop	-	E
70.16	**Unused**					
70.17	**Unused**					
70.18	**Ch2 FolSig1 (channel 2 follower signal 1)** Follower signal 1 receives via channel 2 the 1st value of dataset 41 from the master. The format is **xxyy**, with: **xx** = group and **yy** = index. Default setting of 701 equals *MainCtrlWord (7.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	701	-	E

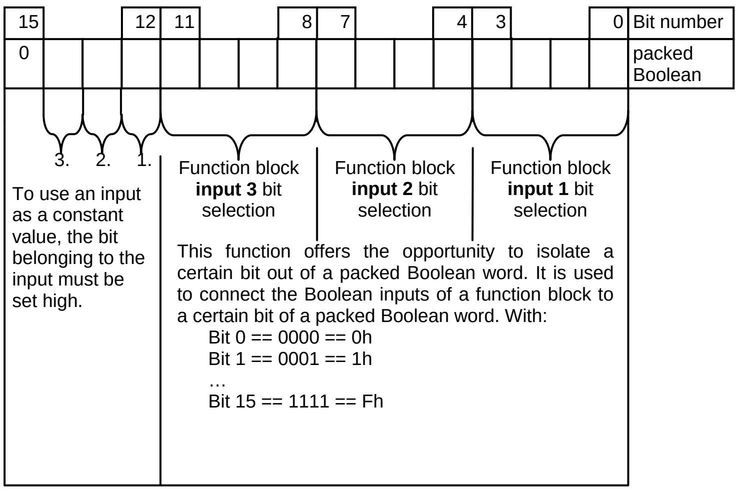
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
70.19	**Ch2 FolSig2 (channel 2 follower signal 2)** Follower signal 2 receives via channel 2 the 2nd value of dataset 41 from the master. The format is **xxyy**, with: **xx** = group and **yy** = index. Default setting of 2301 equals *SpeedRef (23.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	2301	-	E
70.20	**Ch2 FolSig3 (channel 2 follower signal 3)** Follower signal 3 receives via channel 2 the 3rd value of dataset 41 from the master. The format is **xxyy**, with: **xx** = group and **yy** = index. Default setting of 2501 equals *TorqRefA (25.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	2501	-	E
70.21	**Ch3 HW Config (channel 3 hardware configuration)** *CH0 HW Config (70.06)* is used to enable / disable the regeneration of the Channel 3 optotransmitters. Regeneration means that the drive echoes all messages back. 0 = **Ring** Regeneration is enabled. Used with ring-type bus topology. 1 = **Star** Regeneration is disabled. Used with star-type topology. Typically with configurations using the NDBU-x5 branching units, default **Note1:** This parameter has no effect in DriveBus mode [*Ch0 DriveBus (71.01)* = **Yes**]. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Ring	Star	Star	-	E
70.22	**Ch3 NodeAddr (channel 3 node address)** Channel 3 is used for communication with start-up and maintenance tools (e.g. DriveWindow). If several drives are connected together via channel 3, each of them must be set to a unique node address. Node address channel 3: 0, …, 75 valid node address for SDCS-COM-8 76, …, 124 reserved node address for NDBU-x5 branching units 125, …, 254 valid node address for SDCS-COM-8 **Attention:** A new node address becomes only valid after the next SDCS-COM-8 power-up. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	254	1	-	E
70.23	**Ch3 LinkControl (channel 3 link control)** DDCS channel 3 intensity control for transmission LEDs. This value is adjusted by the link including each device on the link. This parameter can be used in special cases to optimize the communication performance of the link. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	15	15	-	E
70.24	**Ch0 DsetBaseAddr (channel 0 dataset base address)** Dataset number of the 1st dataset used for the communication with the overriding control system (e.g. field bus adapters, Advant controllers). The dataset addressed by *Ch0 DsetBaseAddr(70.24)* is the 1st dataset send from the overriding control to the drive, while the next dataset is the 1st one send from the drive to the overriding control and so on. Up to 8 datasets for each direction are supported (addressing of the data sets see groups 90 to 93). Examples: – *Ch0 DsetBaseAddr(70.24)* = 1 dataset range 1, …, 16 – *Ch0 DsetBaseAddr(70.24)* = 10 dataset range 10, …, 25 **Note1:** The datasets for the APC-mailbox function (32 and 33) as well as for the master-follower communication (41) are not programmable. **Int. Scaling: 1 == 1 Type: I Volatile: N**	1	16	10	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 71	**Drivebus**					
71.01	**Ch0 DriveBus (channel 0 drive bus)** Communication mode selection for channel 0. The DriveBus mode is used with the AC80 and AC 800M controllers. 0 = **No** DDCS mode 1 = **Yes** DriveBus mode, default **Attention:** A new mode becomes only valid after the next SDCS-COM-8 power-up. **Int. Scaling: 1 == 1 Type: C Volatile: N**	No	Yes	Yes	-	E
Group 83	**Adaptive program control**					
83.01	**AdapProgCmd (Adaptive Program command)** Selects the operation mode for the adaptive Program: 0 = **Stop** stop, the Adaptive Program is not running and cannot be edited, default 1 = **Start** running, the Adaptive Program is running and cannot be edited 2 = **Edit** edit, the Adaptive Program is not running and can be edited 3 = **SingleCycle** The Adaptive Program runs only once. If a breakpoint is set with *BreakPoint (83.06)* the Adaptive Program will stop before the breakpoint. After the **SingleCycle** *AdapProgCmd (83.01)* is automatically set back to **Stop**. 4 = **SingleStep** Runs only one function block. *LocationCounter (84.03)* shows the function block number, which will be executed during the next **SingleStep**. After a **SingleStep** *AdapProgCmd (83.01)* is automatically set back to **Stop**. *LocationCounter (84.03)* shows the next function block to be executed. To reset *LocationCounter (84.03)* to the first function block set *AdapProgCmd (83.01)* to **Stop** again (even if it is already set to **Stop**). **A136 NoAPTaskTime** [*AlarmWord3 (9.08)* bit 3] is set when *TimeLevSel (83.04)* is not set to **5ms, 20ms, 100ms** or **500ms** but *AdapProgCmd (83.01)* is set to **Start**, **SingleCycle** or **SingleStep** **Note1:** *AdapProgCmd (83.01)* = **Start**, **SingleCycle** or **SingleStep** is only valid, if *AdapPrgStat (84.01)* ≠ **Running**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Stop	SingleStep	Stop	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
83.02	**EditCmd (edit command)** Edit application program. *EditCmd (83.02)* is automatically set back to **Done** after the chosen action is finished: 0 = **Done** no action or edit application program completed, default 1 = **Push** Shifts the function block in the spot defined by *EditBlock (83.03)* and all subsequent function blocks one spot forward. A new function block can be placed in the now empty spot by programming its parameter set as usual. Example: A new function block needs to be placed in between the function block number four (84.22) to (84.27) and five (84.28) to (84.33). In order to do this: 1. set *AdapProgCmd (83.01)* = **Edit** 2. set *EditBlock (83.03)* = 5 (selects function block 5 as the desired spot for the new function block) 3. set *EditCmd (83.02)* = **Push** (shifts function block 5 and all subsequent function blocks one spot forward) 4. Program empty spot 5 by means of (84.28) to (84.33) 2 = **Delete** Deletes the function block in the spot defined by *EditBlock (83.03)* and shifts all subsequent function blocks one spot backward. To delete all function blocks set *EditBlock (83.03)* = 17. 3 = **Protect** Turns all parameters of the Adaptive Program into protected mode (parameters cannot be read or written to). Before using the **Protect** command set the pass code by means of *PassCode (83.05).* **Attention:** Do not forget the pass code! 4 = **Unprotect** Reset of protected mode. Before the **Unprotect** command can be used, *PassCode (83.05)* has to be set. **Attention:** The proper pass code has to be used! **Int. Scaling: 1 == 1 Type: C Volatile: Y**	Done	Unprotect	Done	-	E
83.03	**EditBlock (edit block)** Defines the function block which is selected by *EditCmd (83.02)* = **Push** or **Delete**. After a **Push** or **Delete** *EditBlock (83.03)* is automatically set back to 1. **Note1:** To delete all function blocks set *EditBlock (83.03)* = 17. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	1	17	1	-	E
83.04	**TimeLevSel (time level select)** Selects the cycle time for the Adaptive Program. This setting is valid for all function blocks. 0 = **Off** no task selected 1 = **5ms** Adaptive Program runs with 5 ms 2 = **20ms** Adaptive Program runs with 20 ms 3 = **100ms** Adaptive Program runs with 100 ms 4 = **500ms** Adaptive Program runs with 500 ms **A136 NoAPTaskTime** [*AlarmWord3 (9.08)* bit 3] is set when *TimeLevSel (83.04)* is not set to **5ms, 20ms, 100ms** or **500ms** but *AdapProgCmd (83.01)* is set to **Start**, **SingleCycle** or **SingleStep**. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Off	500ms	Off	-	E
83.05	**PassCode (pass code)** The pass code is a number between 1 and 65535 to write protect Adaptive Programs by means of *EditCmd (83.02)*. After using **Protect** or **Unprotect** *PassCode (83.05)* is automatically set back to zero. **Attention:** Do not forget the pass code! **Int. Scaling: 1 == 1 Type: I Volatile: Y**	0	65535	0	-	E
83.06	**BreakPoint (break point)** Breakpoint for *AdapProgCmd (83.01)* = **SingleCycle**. The break point is not used, if *BreakPoint (83.06)* is set to zero. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	0	16	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 84	**Adaptive program**					
84.01	**AdapPrgStat (Adaptive Program status word)** Adaptive program status word: Bit Name Value Comment B0 **Bit 0** 1 Adaptive Program is running 0 Adaptive Program is stopped B1 **Bit 1** 1 Adaptive Program can be edited 0 Adaptive Program cannot be edited B2 **Bit 2** 1 Adaptive Program is being checked 0 no action B3 **Bit 3** 1 Adaptive Program is faulty 0 Adaptive Program is OK B4 **Bit 4** 1 Adaptive Program is protected 0 Adaptive Program is unprotected Faults in the Adaptive Program can be: – used function block with not at least input 1 connection – used pointer is not valid – invalid bit number for function block **Bset** – location of function block **PI-Bal** after **PI** function block **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
84.02	**FaultedPar (faulted parameters)** The Adaptive Program will be checked before running. If there is a fault, *AdapPrgStat (84.01)* is set to “faulty” and FaultedPar (84.02) shows the faulty input. **Note1:** In case of a problem check the value and the attribute of the faulty input. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E
84.03	**LocationCounter (location counter)** Location counter for *AdapProgCmd (83.01)* = **SingleStep** shows the function block number, which will be executed next. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	-	-	-	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
84.04	**Block1Type (function block 1 type)** Selects the type for function block 1 [Block Parameter Set 1 (BPS1)]. Detailed description of the type can be found in chapter '*Function blocks*': 0 = **NotUsed** function block is not used 1 = **ABS** absolute value 2 = **ADD** sum 3 = **AND** AND 4 = **Bitwise** bit compare 5 = **Bset** bit set 6 = **Compare** compare 7 = **Count** counter 8 = **D-Pot** ramp 9 = **Event** event 10 = **Filter** filter 11 = **Limit** limit 12 = **MaskSet** mask set 13 = **Max** maximum 14 = **Min** minimum 15 = **MulDiv** multiplication and division 16 = **OR** OR 17 = **ParRead** parameter read 18 = **ParWrite** parameter write 19 = **PI** PI-controller 20 = **PI-Bal** initialization for PI-controller 21 = **Ramp** ramp 22 = **SqWav** square wave 23 = **SR** SR flip-flop 24 = **Switch-B** switch Boolean 25 = **Switch-I** switch integer 26 = **TOFF** timer off 27 = **TON** timer on 28 = **Trigg** trigger 29 = **XOR** exclusive OR 30 = **Sqrt** square root **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	Sqrt	NotUsed	-	E
84.05	**Block1In1 (function block 1 input 1)** Selects the source for input 1 of function block 1 (BPS1). There are 2 types of inputs, signals/parameters and constants: – Signals/parameters are all signals and parameters available in the drive. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. Example: To connect negated *SpeedRef (23.01)* set *Block1In1 (84.05)* = -2301 and *Block1Attrib (84.08)* = 0h. To get only a certain bit e.g. **RdyRef** bit 3 of *MainStatWord (8.01)* set *Block1In1 (84.05)* = 801 and *Block1Attrib (84.08)* = 3h. – Constants are feed directly into the function block input and have to be declared by means of *Block1Attrib (84.08).* Example: To connect the constant value of 12345 set *Block1In1 (84.05)* = 12345 and *Block1Attrib (84.08)* = 1000h. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E

<table>
<tr><th>Index</th><th>Signal / Parameter name</th><th>min.</th><th>max.</th><th>def.</th><th>unit</th><th>E/C</th></tr>
<tr><td>84.06</td><td>Block1In2 (function block 1 input 2)
Selects the source for input 2 of function block 1 (BPS1). Description see Block1In1 (84.05), except:
Example:
To get only a certain bit e.g. RdyRef bit 3 of MainStatWord (8.01) set Block1In2 (84.06) = 801 and Block1Attrib (84.08) = 30h.
Int. Scaling: 1 == 1 Type: SI Volatile: N</td><td>-32768</td><td>32767</td><td>0</td><td>-</td><td>E</td></tr>
<tr><td>84.07</td><td>Block1In3 (function block 1 input 3)
Selects the source for input 2 of function block 1 (BPS1). Description see Block1In1 (84.05), except:
Example:
To get only a certain bit e.g. RdyRef bit 3 of MainStatWord (8.01) set Block1In3 (84.07) = 801 and Block1Attrib (84.08) = 300h.
Int. Scaling: 1 == 1 Type: SI Volatile: N</td><td>-32768</td><td>32767</td><td>0</td><td>-</td><td>E</td></tr>
<tr><td>84.08</td><td>Block1Attrib (function block 1 attribute)
Defines the attributes of function block 1 for all three inputs [Block1In1 (84.05), Block1In2 (84.06) and Block1In3 (84.07)] (BPS1).
Block1Attrib (84.08) is divided into 4 parts:
– Bit number 0 - 3 for input 1 to get a certain bit out of a packed Boolean word.
– Bit number 4 - 7 for input 2 to get a certain bit out of a packed Boolean word.
– Bit number 8 - 11 for input 3 to get a certain bit out of a packed Boolean word.
– Bit number 12 - 14 for input 1 - 3 to feed a constant directly into the input


Int. Scaling: 1 == 1 Type: h Volatile: N</td><td>0h</td><td>FFFFh</td><td>0h</td><td>-</td><td>E</td></tr>
<tr><td>84.09</td><td>Block1Output (function block 1 output)
Function block 1 output, can be used as an input for further function blocks.
Int. Scaling: 1 == 1 Type: SI Volatile: Y</td><td>-</td><td>-</td><td>-</td><td>-</td><td>E</td></tr>
</table>

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
84.10 to 84.99	The description of the parameters for function blocks 2 to 16 is basically the same as for function block 1. For Your convenience the following table shows the parameter numbers of all function blocks1:					E

Function block	BlockxType	BlockxIn1 input 1	BlockxIn2 input 2	BlockxIn3 input 1	BlockxAttrib	BlockxOutput signal	BlockxOut pointer
1	84.04	84.05	84.06	84.07	84.08	84.09	86.01
2	84.10	84.11	84.12	84.13	84.14	84.15	86.02
3	84.16	84.17	84.18	84.19	84.20	84.21	86.03
4	84.22	84.23	84.24	84.25	84.26	84.27	86.04
5	84.28	84.29	84.30	84.31	84.32	84.33	86.05
6	84.34	84.35	84.36	84.37	84.38	84.39	86.06
7	84.40	84.41	84.42	84.43	84.44	84.45	86.07
8	84.46	84.47	84.48	84.49	84.50	84.51	86.08
9	84.52	84.53	84.54	84.55	84.56	84.57	86.09
10	84.58	84.59	84.60	84.61	84.62	84.63	86.10
11	84.64	84.65	84.66	84.67	84.68	84.69	86.11
12	84.70	84.71	84.72	84.73	84.74	84.75	86.12
13	84.76	84.77	84.78	84.79	84.80	84.81	86.13
14	84.82	84.83	84.84	84.85	84.86	84.87	86.14
15	84.88	84.89	84.90	84.91	84.92	84.93	86.15
16	84.94	84.95	84.96	84.97	84.98	84.99	86.16

Group 85

User constants

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
85.01	**Constant1 (constant 1)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.02	**Constant2 (constant 2)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.03	**Constant3 (constant 3)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.04	**Constant4 (constant 4)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.05	**Constant5 (constant 5)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.06	**Constant6 (constant 6)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.07	**Constant7 (constant 7)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
85.08	**Constant8 (constant 8)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.09	**Constant9 (constant 9)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.10	**Constant10 (constant 10)** Sets an integer constant for the Adaptive Program. **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
85.11	**String1 (string 1)** Sets a string for the Adaptive Program. With DriveWindow it is possible to fill in a string (e.g. name of an event) with a maximum of 12 characters. This string is shown in the control panel and in DriveWindow. **Int. Scaling: 1 == 1 Type: SI/C Volatile: N**	'string'	'string'	' '	-	E
85.12	**String2 (string 2)** Sets a string for the Adaptive Program. With DriveWindow it is possible to fill in a string (e.g. name of an event) with a maximum of 12 characters. This string is shown in the control panel and in DriveWindow. **Int. Scaling: 1 == 1 Type: SI/C Volatile: N**	'string'	'string'	' '	-	E
85.13	**String3 (string 3)** Sets a string for the Adaptive Program. With DriveWindow it is possible to fill in a string (e.g. name of an event) with a maximum of 12 characters. This string is shown in the control panel and in DriveWindow. **Int. Scaling: 1 == 1 Type: SI/C Volatile: N**	'string'	'string'	' '	-	E
85.14	**String4 (string 4)** Sets a string for the Adaptive Program. With DriveWindow it is possible to fill in a string (e.g. name of an event) with a maximum of 12 characters. This string is shown in the control panel and in DriveWindow. **Int. Scaling: 1 == 1 Type: SI/C Volatile: N**	'string'	'string'	' '	-	E
85.15	**String5 (string 5)** Sets a string for the Adaptive Program. With DriveWindow it is possible to fill in a string (e.g. name of an event) with a maximum of 12 characters. This string is shown in the control panel and in DriveWindow. **Int. Scaling: 1 == 1 Type: SI/C Volatile: N**	'string'	'string'	' '	-	E
Group 86	**Adaptive program outputs**					
86.01	**Block1Out (block 1 output)** The value of function block 1 output [*Block1Output (84.09)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
86.02	**Block2Out (block 2 output)** The value of function block 2 output [*Block2Output (84.15)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.03	**Block3Out (block 3 output)** The value of function block 3 output [*Block3Output (84.21)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.04	**Block4Out (block 4 output)** The value of function block 4 output [*Block1Output (84.27)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.05	**Block5Out (block 5 output)** The value of function block 5 output [*Block1Output (84.33)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.06	**Block6Out (block 6 output)** The value of function block 6 output [*Block1Output (84.39)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.07	**Block7Out (block 7 output)** The value of function block 7 output [*Block1Output (84.45)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.08	**Block8Out (block 8 output)** The value of function block 8 output [*Block1Output (84.51)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.09	**Block9Out (block 9 output)** The value of function block 9 output [*Block1Output (84.57)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.10	**Block10Out (block 10 output)** The value of function block 10 output [*Block1Output (84.63)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.11	**Block11Out (block 11 output)** The value of function block 11 output [*Block1Output (84.69)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
86.12	**Block12Out (block 12 output)** The value of function block 12 output [*Block1Output (84.75)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.13	**Block13Out (block 13 output)** The value of function block 13 output [*Block1Output (84.81)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.14	**Block14Out (block 14 output)** The value of function block 14 output [*Block1Output (84.87)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.15	**Block15Out (block 15 output)** The value of function block 15 output [*Block1Output (84.93)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
86.16	**Block16Out (block 16 output)** The value of function block 16 output [*Block16Output (84.99)*] is written to a sink (signal/parameter) by means of this index pointer [e.g. 2301 equals *SpeedRef (23.01)*]. The format is **-xxyy**, with: **-** = negate signal/parameter, **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-9999	9999	0	-	E
Group 90	**Receiving datasets addresses 1**					
	Addresses for the received data transmitted from the overriding control to the drive. The format is **xxyy**, with: **xx** = group and **yy** = index. The dataset base address is set in *Ch0 DsetBaseAddr (70.24)*.					
90.01	**DsetXVal1 (dataset X value 1)** Dataset X value 1 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)*. Default setting of 701 equals *MainCtrlWord (7.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	701	-	E
90.02	**DsetXVal2 (dataset X value 2)** Dataset X value 2 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)*. Default setting of 2301 equals *SpeedRef (23.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	2301	-	E
90.03	**DsetXVal3 (dataset X value 3)** Dataset X value 2 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)*. Default setting of 2501 equals *TorqRefA (25.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	2501	-	E
90.04	**DsetXplus2Val1 (dataset X+2 value 1)** Dataset X+2 value 1 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 2. Default setting of 702 equals *AuxCtrlWord (7.02)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	702	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
90.05	**DsetXplus2Val2 (dataset X+2 value 2)** Dataset X+2 value 2 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 2. Default setting of 703 equals *AuxCtrlWord2 (7.03)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	703	-	E
90.06	**DsetXplus2Val3 (dataset X+2 value 3)** Dataset X+2 value 3 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 2. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.07	**DsetXplus4Val1 (dataset X+4 value 1)** Dataset X+4 value 1 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 4. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.08	**DsetXplus4Val2 (dataset X+4 value 2)** Dataset X+4 value 2 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 4. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.09	**DsetXplus4Val3 (dataset X+4 value 3)** Dataset X+4 value 3 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr(70.24)* + 4. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.10	**DsetXplus6Val1 (dataset X+6 value 1)** Dataset X+6 value 1 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 6. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.11	**DsetXplus6Val2 (dataset X+6 value 2)** Dataset X+6 value 2 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 6. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.12	**DsetXplus6Val3 (dataset X+6 value 3)** Dataset X+6 value 3 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 6. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.13	**DsetXplus8Val1 (dataset X+8 value 1)** Dataset X+8 value 1 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 8. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.14	**DsetXplus8Val2 (dataset X+8 value 2)** Dataset x+8 value 2 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 8. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.15	**DsetXplus8Val3 (dataset X+8 value 3)** Dataset X+8 value 3 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 8. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.16	**DsetXplus10Val1 (dataset X+10 value 1)** Dataset X+10 value 1 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 10. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
90.17	**DsetXplus10Val2 (dataset X+10 value 2)** Dataset X+10 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 10. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
90.18	**DsetXplus10Val3 (dataset X+10 value 3)** Dataset X+10 value 3 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 10. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
Group 91	**Receiving datasets addresses 2**					
	Addresses for the received data transmitted from the overriding control to the drive. The format is **xxyy**, with: **xx** = group and **yy** = index. The dataset base address is set in *Ch0 DsetBaseAddr(70.24)*.					
91.01	**DsetXplus12Val1 (dataset X+12 value 1)** Dataset X+12 value 1 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 12. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
91.02	**DsetXplus12Val2 (dataset X+12 value 2)** Dataset X+12 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 12. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
91.03	**DsetXplus12Val3 (dataset X+12 value 3)** Dataset X+12 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 12. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
91.04	**DsetXplus14Val1 (dataset X+14 value 1)** Dataset X+14 value 1 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 14. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
91.05	**DsetXplus14Val2 (dataset X+14 value 2)** Dataset X+14 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 14. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
91.06	**DsetXplus14Val3 (dataset X+14 value 3)** Dataset X+14 value 3 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 14. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
Group 92	**Transmit datasets addresses 1**					
	Addresses for the transmit data send from the drive to the overriding control. The format is **xxyy**, with: **xx** = group and **yy** = index. The dataset base address is set in *Ch0 DsetBaseAddr(70.24)*.					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
92.01	**DsetXplus1Val1 (dataset X+1 value 1)** Dataset X+1 value 1 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 1. Default setting of 801 equals *MainStatWord (8.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	801	-	E
92.02	**DsetXplus1Val2 (dataset X+1 value 2)** Dataset X+1 value 2 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 1. Default setting of 104 equals *MotSpeed (1.04)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	104	-	E
92.03	**DsetXplus1Val3 (dataset X+1 value 3)** Dataset X+1 value 3 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 1. Default setting of 209 equals *TorqRef2 (2.09)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	209	-	E
92.04	**DsetXplus3Val1 (dataset X+3 value 1)** Dataset X+3 value 1 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 3. Default setting of 802 equals *AuxStatWord (8.02)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	802	-	E
92.05	**DsetXplus3Val2 (dataset X+3 value 2)** Dataset X+3 value 2 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 3. Default setting of 101 equals *MotSpeedFilt (1.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	101	-	E
92.06	**DsetXplus3Val3 (dataset X+3 value 3)** Dataset X+3 value 3 (interval: 2 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 3. Default setting of 108 equals *MotTorq (1.08)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	108	-	E
92.07	**DsetXplus5Val1 (dataset X+5 value 1)** Dataset X+5 value 1 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 5. Default setting of 901 equals *FaultWord1 (9.01)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	901	-	E
92.08	**DsetXplus5Val2 (dataset X+5 value 2)** Dataset X+5 value 2 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 5. Default setting of 902 equals *FaultWord2 (9.02)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	902	-	E
92.09	**DsetXplus5Val3 (dataset X+5 value 3)** Dataset X+5 value 3 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 5. Default setting of 903 equals *FaultWord3 (9.03)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	903	-	E
92.10	**DsetXplus7Val1 (dataset X+7 value 1)** Dataset X+7 value 1 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 7. Default setting of 904 equals *FaultWord4 (9.04)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	904	-	E
92.11	**DsetXplus7Val2 (dataset X+7 value 2)** Dataset X+7 value 2 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 7. Default setting of 906 equals *AlarmWord1 (9.06)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	906	-	E
92.12	**DsetXplus7Val3 (dataset X+7 value 3)** Dataset X+7 value 3 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 7. Default setting of 907 equals *AlarmWord2 (9.07)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	907	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
92.13	**DsetXplus9Val1 (dataset X+9 value 1)** Dataset X+9 value 1 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 9. Default setting of 908 equals *AlarmWord3 (9.08)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	908	-	E
92.14	**DsetXplus9Val2 (dataset X+9 value 2)** Dataset X+9 value 2 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 9. Default setting of 803 equals *LimWord (8.03)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	803	-	E
92.15	**DsetXplus9Val3 (dataset X+9 value 3)** Dataset X+9 value 3 (interval: 10 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 9. Default setting of 805 equals *DI StatWord (8.05)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	805	-	E
92.16	**DsetXplus11Val1 (dataset X+11 value 1)** Dataset X+11 value 1 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 11. Default setting of 806 equals *DO StatWord (8.06)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	806	-	E
92.17	**DsetXplus11Val2 (dataset x+11 value 2)** Dataset X+11 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 11. Default setting of 124 equals *BridgeTemp (1.24)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	124	-	E
92.18	**DsetXplus11Val3 (dataset X+11 value 3)** Dataset X+11 value 3 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 11. Default setting of 112 equals *Mot1TempMeas (1.22)*. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	122	-	E
Group 93	**Transmit datasets addresses 2**					
	Addresses for the transmit data send from the drive to the overriding control. The format is **xxyy**, with: **xx** = group and **yy** = index. The dataset base address is set in *Ch0 DsetBaseAddr(70.24)*.					
93.01	**DsetXplus13Val1 (dataset X+13 value 1)** Dataset X+13 value 1 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 13. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
93.02	**DsetXplus13Val2 (dataset X+13 value 2)** Dataset X+13 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 13. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
93.03	**DsetXplus13Val3 (dataset X+13 value 3)** Dataset X+13 value 3 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 13. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
93.04	**DsetXplus15Val1 (dataset X+15 value 1)** Dataset X+15 value 1 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 15. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
93.05	**DsetXplus15Val2 (dataset X+15 value 2)** Dataset X+15 value 2 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 15. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
93.06	**DsetXplus15Val3 (dataset X+15 value 3)** Dataset X+15 value 3 (interval: 50 ms). Dataset address = *Ch0 DsetBaseAddr (70.24)* + 15. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E

Group 94

DCSLink control

This parameter group defines the communication parameters for the DCSLink board SDCS-DSL-4. For communication between the armature converter and the field exciters respectively 12-pulse communication only the basic communication parameters [(94.01) to (94.09)] have to be set.

For master-follower and drive-to-drive communication the basic communication parameters have to be set. The data transfer is done by means of the 4 available mailboxes [(94.12) to (94.35)].

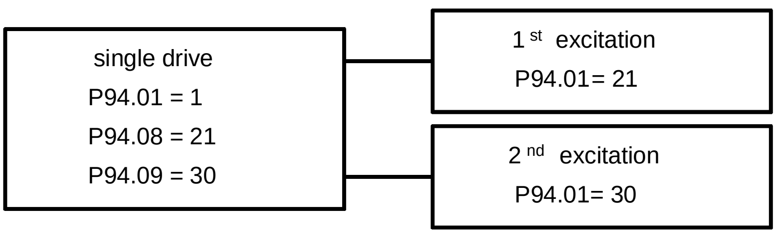
Parameter settings, default values:

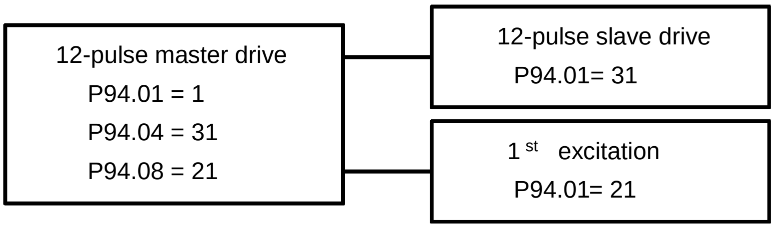
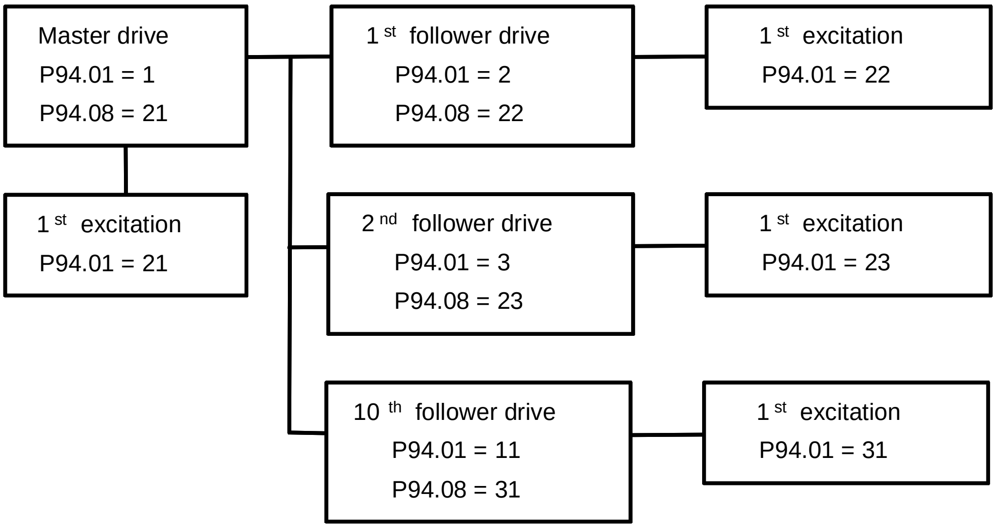
single drive with excitation	*DCSLinkNodeID (94.01)* = 1 *M1FexNode (94.08)* = 21 *M2FexNode (94.09)* = 30	see example 1
12-pulse drive	*DCSLinkNodeID (94.01)* = 1 *12P SlaNode (94.04)* = 31 *M1FexNode (94.08)* = 21	see example 2

Example parameter settings for:

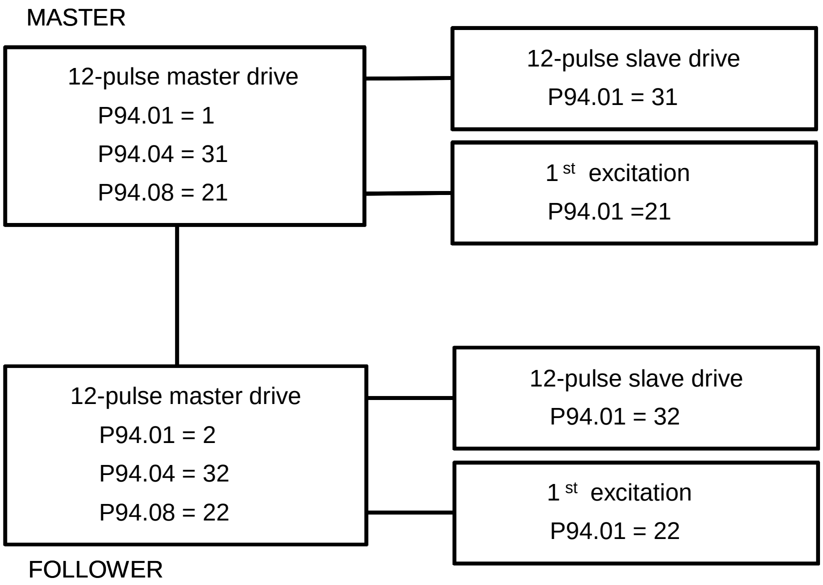
master-follower (94.01)	1	2	3	…	11	see example 3
field exciter (94.08)	21	22	23	…	31	see example 3
12-pulse slave (94.04) and (94.01)	31	32	-	-	-	see example 4
drive-to-drive (94.01)	1	2	3	-	-	see example 5

Example 1:
Single drive with one respectively two field exciters

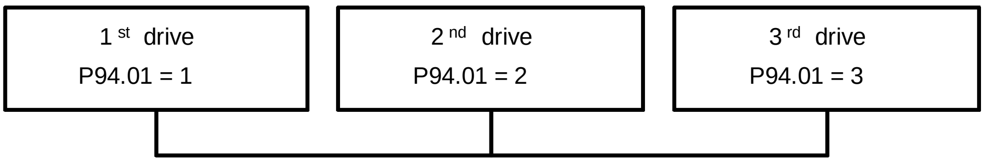


Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Example 2: 12-pulse configuration 					
	Example 3: Master-follower configuration (broadcast) 					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Example 4: Two 12-pulse drives in master-follower configuration					

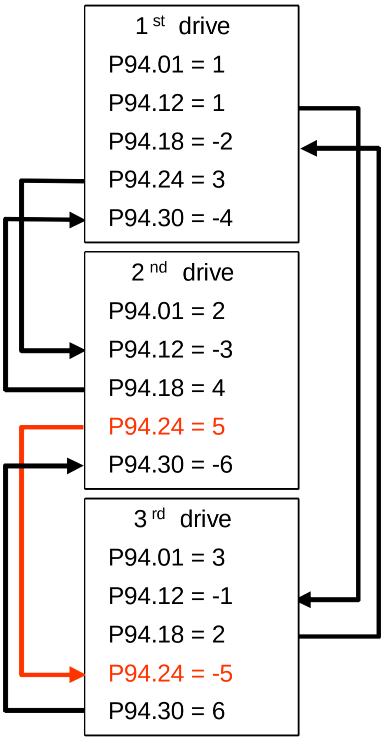


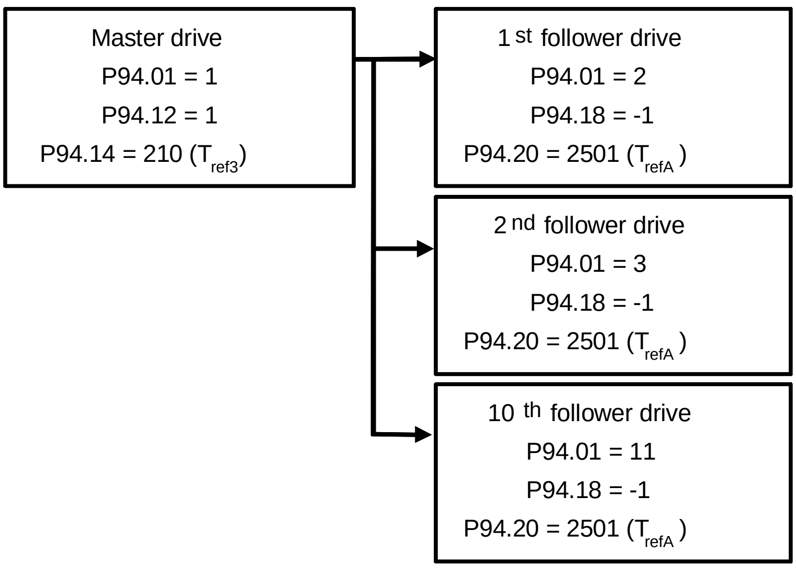
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
	Example 5: Drive-to-drive configuration					



Index	Signal / Parameter name	min.	max.	def.	unit	E/C
94.01	**DCSLinkNodeID (DCSLink node ID)** Defines the DCSLink node ID of the station. Two stations with the same node ID are not allowed. Maximum allowed station count is 50. See also examples 1 to 5 above. The DCSLink node ID is inactive, if *DCSLinkNodeID (94.01)* is set to 0. The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the SDCS-DSL-4 board is chosen, but not connected or faulty. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	63	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
94.02	**BaudRate (baud rate)** Defines the transfer rate of the DCSLink. The transfer rate decreases with the total length of the DCSLink cable: 0 = **20 kBit/s** 20 kBit/s, total cable length max. 500 m 1 = **50 kBit/s** 50 kBit/s, total cable length max. 500 m 2 = **125 kBit/s** 125 kBit/s, total cable length max. 500 m 3 = **250 kBit/s** 250 kBit/s, total cable length max. 250 m 4 = **500 kBit/s** 500 kBit/s, total cable length max. 100 m, default 5 = **800 kBit/s** 800 kBit/s, total cable length max. 50 m 6 = **888 kBit/s** 888 kBit/s, total cable length max. 35 m 7 = **1 MBit/s** 1 MBit/s, total cable length approximately 25 m **Note1:** Maximum total cable length should not exceed 100 m. Maximum amount of connected stations is 50 (e.g. 25 drives including one external field exciter each). **Int. Scaling: 1 == 1 Type: C Volatile: N**	20 kBit/s	1 MBit/s	500 kBit/s	-	E
94.03	**12P TimeOut (12-pulse timeout)** Time delay before a 12-pulse communication break is declared. **F535 12PulseCom** [*FaultWord3 (9.03)* bit 2] is set. The communication fault is inactive, if *12P TimeOut (94.03)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E
94.04	**12P SlaNode (12-pulse slave node ID)** Defines the DCSLink node ID of the 12-pulse slave drive in the 12-pulse master drive. See also examples 2 and 4 above. The 12-pulse node ID is inactive, if *12P SlaNode (94.04)* is set to 0. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	63	31	-	E
94.05	**Unused**					
94.06	**Unused**					
94.07	**FexTimeOut (field exciter timeout)** Time delay before a field exciter communication break is declared. Depending on the fex with the communication break either **F516 M1FexCom** [*FaultWord1 (9.01)* bit 15] or **F519 M2FexCom** [*FaultWord2 (9.02)* bit 2] is set. The communication fault is inactive, if *FexTimeOut (94.07)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E
94.08	**M1FexNode (motor 1 field exciter node ID)** Defines the DCSLink node ID of motor 1 field exciter in the drive. See also examples 1 to 4 above. The field exciter node ID is inactive, if *M1FexNode (94.08)* is set to 0. **Note1:** *M1FexNode (94.08)* is void, when *M1UsedFexType (99.12)* = **NotUsed** or **OnBoard**. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	32	21	-	E
94.09	**M2FexNode (motor 2 field exciter node ID)** Defines the DCSLink node ID of motor 2 field exciter in the drive. See also example 1 above. The field exciter node ID is inactive, if *M2FexNode (94.09)* is set to 0. **Note1:** *M2FexNode (94.09)* is void, when *M2UsedFexType (49.07)* = **NotUsed** or **OnBoard**. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	32	30	-	E
94.10	**Unused**					
94.11	**Unused**					
	The drive-to-drive and master-follower communication utilizes 4 mailboxes to transfer data. Thus data transfer to any station in the system is possible. Each mailbox can transmit / receive up to 4 values. Positive mailbox node ID numbers transmit data, negative receive data. To get communication mailbox node ID pairs are needed.					

<table>
<tr><th>Index</th><th>Signal / Parameter name</th><th>min.</th><th>max.</th><th>def.</th><th>unit</th><th>E/C</th></tr>
<tr><td></td><td>Example 6:
Drive-to-drive configuration, sending signals from drive 2 using MailBox3 (94.24) to drive 3 using MailBox3 (94.24) by means of 5 to transmit data and -5 to receive data.


</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Example 7:
Master-follower configuration; send TorqRef3 (2.10) from the master drive via MailBox1 (94.12) to TorqRefA (25.01) of the followers via MailBox2 (94.18).


</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
94.12	**MailBox1 (mailbox 1 node ID)** Mailbox 1 can transmit / receive up to 4 values [*TrmtRecVal1.1 (94.13), TrmtRecVal1.2 (94.14), TrmtRecVal1.3 (94.15)* and *TrmtRecVal1.4 (94.16)*]. Positive mailbox node ID numbers transmit data, negative receive data. To get communication, mailbox node ID pairs are needed. See also examples 6 and 7 above. The mailbox is inactive, if *MailBox1 (94.12)* is set to 0. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-64	64	0	-	E
94.13	**MailBoxCycle1 (cycle time mailbox 1)** The function of *MailBoxCycle1 (94.13)* is depending on *MailBox1 (94.12)*. *MailBox1 (94.12)* is positive (== transmit data): Communication cycle time, sets the communication interval. The communication is inactive, if *MailBoxCycle1 (94.13)* is set to 0 ms. *MailBox1 (94.12)* is negative (== receive data): Communication timeout, the time delay before a drive-to-drive or master-follower communication break is declared. Depending on the setting of *ComLossCtrl (30.28)* either **F544 P2PandMFCom** [*FaultWord3 (9.03)* bit 11] or **A112 P2PandMFCom** [*AlarmWord1 (9.06)* bit 11] is set. The communication fault and alarm are inactive, if *MailBoxCycle1 (94.13)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E
94.14	**TrmtRecVal1.1 (mailbox 1 transmit / receive value 1)** Mailbox 1 transmit / receive value 1. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.15	**TrmtRecVal1.2 (mailbox 1 transmit / receive value 2)** Mailbox 1 transmit / receive value 2. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.16	**TrmtRecVal1.3 (mailbox 1 transmit / receive value 3)** Mailbox 1 transmit / receive value 3. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.17	**TrmtRecVal1.4 (mailbox 1 transmit / receive value 4)** Mailbox 1 transmit / receive value 4. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.18	**MailBox2 (mailbox 2 node ID)** Mailbox 2 can transmit / receive up to 4 values [*TrmtRecVal2.1 (94.20), TrmtRecVal2.2 (94.21), TrmtRecVal2.3 (94.22)* and *TrmtRecVal2.4 (94.23)*]. Positive mailbox node ID numbers transmit data, negative receive data. To get communication, mailbox node ID pairs are needed. See also examples 6 and 7 above. The mailbox is inactive, if *MailBox2 (94.18)* is set to 0. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-64	64	0	-	E
94.19	**MailBoxCycle2 (cycle time mailbox 2)** The function of *MailBoxCycle2 (94.19)* is depending on *MailBox2 (94.18)*. *MailBox2 (94.18)* is positive (== transmit data): Communication cycle time, sets the communication interval. The communication is inactive, if *MailBoxCycle2 (94.19)* is set to 0 ms. *MailBox2 (94.18)* is negative (== receive data): Communication timeout, the time delay before a drive-to-drive or master-follower communication break is declared. Depending on the setting of *ComLossCtrl (30.28)* either **F544 P2PandMFCom** [*FaultWord3 (9.03)* bit 11] or **A112 P2PandMFCom** [*AlarmWord1 (9.06)* bit 11] is set. The communication fault and alarm are inactive, if *MailBoxCycle2 (94.18)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
94.20	**TrmtRecVal2.1 (mailbox 2 transmit / receive value 1)** Mailbox 2 transmit / receive value 1. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.21	**TrmtRecVal2.2 (mailbox 2 transmit / receive value 2)** Mailbox 2 transmit / receive value 2. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.22	**TrmtRecVal2.3 (mailbox 2 transmit / receive value 3)** Mailbox 2 transmit / receive value 3. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.23	**TrmtRecVal2.4 (mailbox 2 transmit / receive value 4)** Mailbox 2 transmit / receive value 4. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.24	**MailBox3 (mailbox 3 node ID)** Mailbox 3 can transmit / receive up to 4 values [*TrmtRecVal3.1 (94.26), TrmtRecVal3.2 (94.27), TrmtRecVal3.3 (94.28)* and *TrmtRecVal3.4 (94.29)*]. Positive mailbox node ID numbers transmit data, negative receive data. To get communication, mailbox node ID pairs are needed. See also examples 6 and 7 above. The mailbox is inactive, if *MailBox3 (94.24)* is set to 0. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-64	64	0	-	E
94.25	**MailBoxCycle3 (cycle time mailbox 3)** The function of *MailBoxCycle3 (94.25)* is depending on *MailBox3 (94.24)*. *MailBox3 (94.24)* is positive (== transmit data): Communication cycle time, sets the communication interval. The communication is inactive, if *MailBoxCycle3 (94.25)* is set to 0 ms. *MailBox3 (94.24)* is negative (== receive data): Communication timeout, the time delay before a drive-to-drive or master-follower communication break is declared. Depending on the setting of *ComLossCtrl (30.28)* either **F544 P2PandMFCom** [*FaultWord3 (9.03)* bit 11] or **A112 P2PandMFCom** [*AlarmWord1 (9.06)* bit 11] is set. The communication fault and alarm are inactive, if *MailBoxCycle3 (94.25)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E
94.26	**TrmtRecVal3.1 (mailbox 3 transmit / receive value 1)** Mailbox 3 transmit / receive value 1. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.27	**TrmtRecVal3.2 (mailbox 3 transmit / receive value 2)** Mailbox 3 transmit / receive value 2. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.28	**TrmtRecVal3.3 (mailbox 3 transmit / receive value 3)** Mailbox 3 transmit / receive value 3. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.29	**TrmtRecVal3.4 (mailbox 3 transmit / receive value 4)** Mailbox 3 transmit / receive value 4. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
94.30	**MailBox4 (mailbox 4 node ID)** Mailbox 4 can transmit / receive up to 4 values [*TrmtRecVal4.1 (94.32), TrmtRecVal4.2 (94.33), TrmtRecVal4.3 (94.34)* and *TrmtRecVal4.4 (94.35)*]. Positive mailbox node ID numbers transmit data, negative receive data. To get communication, mailbox node ID pairs are needed. See also examples 6 and 7 above. The mailbox is inactive, if *MailBox4 (94.30)* is set to 0. **Int. Scaling: 1 == 1 Type: I Volatile: N**	-64	64	0	-	E
94.31	**MailBoxCycle4 (cycle time mailbox 4)** The function of *MailBoxCycle4 (94.31)* is depending on *MailBox4 (94.30)*. *MailBox4 (94.30)* is positive (== transmit data): Communication cycle time, sets the communication interval. The communication is inactive, if *MailBoxCycle4 (94.31)* is set to 0 ms. *MailBox4 (94.30)* is negative (== receive data): Communication timeout, the time delay before a drive-to-drive or master-follower communication break is declared. Depending on the setting of *ComLossCtrl (30.28)* either **F544 P2PandMFCom** [*FaultWord3 (9.03)* bit 11] or **A112 P2PandMFCom** [*AlarmWord1 (9.06)* bit 11] is set. The communication fault and alarm are inactive, if *MailBoxCycle4 (94.31)* is set to 0 ms. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	64000	100	ms	E
94.32	**TrmtRecVal4.1 (mailbox 4 transmit / receive value 1)** Mailbox 4 transmit / receive value 1. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.33	**TrmtRecVal4.2 (mailbox 4 transmit / receive value 2)** Mailbox 4 transmit / receive value 2. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.34	**TrmtRecVal4.3 (mailbox 4 transmit / receive value 3)** Mailbox 4 transmit / receive value 3. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E
94.35	**TrmtRecVal4.4 (mailbox 4 transmit / receive value 4)** Mailbox 4 transmit / receive value 4. The format is **xxyy**, with: **xx** = group and **yy** = index. **Int. Scaling: 1 == 1 Type: I Volatile: N**	0	9999	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 97	**Measurement**					
97.01	**TypeCode (type code)** *TypeCode (97.01)* is preset in the factory and is write protected. The type code identifies the drives current-, voltage- and temperature measurement. To un-protect the type code for change set *ServiceMode (99.06)* = **SetTypeCode**. The change of the type code is taken over after the next power up: 0 = **None** — the type code is set by user, see *S ConvScaleCur (97.02), S ConvScaleVolt (97.03), S MaxBrdgTemp (97.04)* and *S BlockBridge2 (97.07)* for e.g. rebuild kits 1 = **S01-0020-04** — type code, see table to 142 = **S01-5203-05** — type code, see table	None	S01-5203-05	factory preset value	-	E

The drive's basic type code:
DCS800-AAX-YYYY-ZZ

Product family:	DCS800		
Type:	AA	= S0	Modules
Bridge type:	X	= 1	single bridge (2-Q)
		= 2	2 anti parallel bridges (4-Q)
Module type:	YYYY	=	converter type current
Rated AC Voltage:	ZZ	= 04	230 VAC - 400 VAC
		= 05	230 VAC - 525 VAC
		= 06	270 VAC - 600 VAC
		= 07	315 VAC - 700 VAC
		= 08	360 VAC - 800 VAC
		= 10	450 VAC - 990 VAC

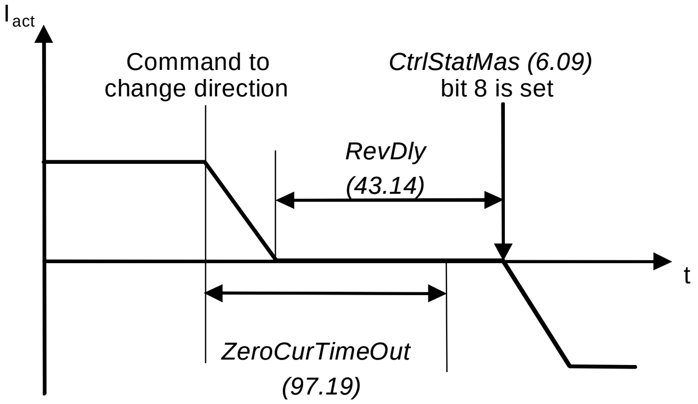
Int. Scaling: 1 == 1 Type: C Volatile: Y

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
97.02	**S ConvScaleCur (set: converter current scaling)** Adjustment of current measuring channels (SDCS-PIN-4 or SDCS-PIN-51). *S ConvScaleCur (97.02)* is write protected, unless *ServiceMode (99.06)* = **SetTypeCode***:* **0 A** = take value from *TypeCode (97.01)* **1 A to 30000 A** = take value from *S ConvScaleCur (97.02)* This value overrides the type code. The new value is taken over and visible in *ConvNomCur (4.05)* after the next power up. **Int. Scaling: 1 == 1 A Type: I Volatile: N**	0	30000	0	A	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
97.03	**S ConvScaleVolt (set: converter voltage scaling)** Adjustment of voltage measuring channels (SDCS-PIN-4 or SDCS-PIN-51). *S ConvScaleVolt (97.03)* is write protected, unless *ServiceMode (99.06)* = **SetTypeCode**: **0 V** = take value from *TypeCode (97.01)* **1 V to 2000 V** = take value from *S ConvScaleVolt (97.03)* This value overrides the type code. The new value is taken over and visible in *ConvNomVolt (4.04)* after the next power up. **Int. Scaling: 1 == 1 V Type: I Volatile: N**	0	2000	0	V	E
97.04	**S MaxBrdgTemp (set: maximum bridge temperature)** Adjustment of the converters heat sink temperature tripping level in degree centigrade: **0 °C** = take value from *TypeCode (97.01)* **1 °C to 150 °C** = take value from *S MaxBrdgTemp (97.04)* This value overrides the type code and is immediately visible in *MaxBridgeTemp (4.17)*. **Note1:** Maximum bridge temperature for converters size D6 and D7 is 50 °C. **Int. Scaling: 1 == 1 °C Type: I Volatile: N**	0	150	0	°C	E
97.05	**ConvTempDly (converter temperature delay)** Instead of measuring the converter temperature it is possible to measure the converter fan current by means of the PW-1002/3 board. *ConvTempDly (97.05)* avoids false fault messages during the fan acceleration: **0s** = Converter temperature measurement is released. The drive trips with **F504 ConvOverTemp** [*FaultWord1 (9.01)* bit 4] in case of excessive converter temperature. **1 s to 300 s** = Converter fan current measurement is released when the drive is in **On** state [*UsedMCW (7.04)* bit 0 **On** = 1]. The drive trips with **F511 ConvFanCur** [*FaultWord1 (9.01)* bit 10] in case of missing or excessive converter fan current, after *ConvTempDly (97.05)* is elapsed. **Int. Scaling: 1 == 1 s Type: I Volatile: N**	0	300	0	s	E
97.06	**Unused**					
97.07	**S BlockBridge2 (set: block bridge 2)** Bridge 2 can be blocked: 0 = **Auto** operation mode is taken from *TypeCode (97.01)*, default 1 = **BlockBridge2** block bridge 2 (== 2-Q operation) 2 = **RelBridge2** release bridge 2 (== 4-Q operation) This value overrides the type code and is immediately visible in *QuadrantType (4.15)*. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Auto	RelBridge2	Auto	-	E
97.08	**Unused**					
97.09	**MainsCompTime (mains compensation time)** Mains voltage compensation filter time constant. Is used for the mains voltage compensation at the current controller output. Setting MainsCompTime (97.09) to 1000 ms disables the mains voltage compensation. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	1000	10	ms	E
97.10	**Unused**					
97.11	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
97.12	**CompUkPLL (phase locked loop to compensate for uk)** The measured phase angle of the firing unit's PLL can be corrected in order to compensate the error caused by the commutation related voltage drops. The compensation depends on the uk (short circuit voltage) of the mains. *CompUkPLL (97.12)* defines the mains short circuit voltage - in percent of *NomMainsVolt (99.10)* - which is caused by the converter's nominal current for the PLL correction: $\mathrm{CompUkPLL} = \mathrm{uk} * \frac{S_c}{S_t} * 100\%$ with: uk = related mains short circuit voltage, S_c = apparent power of converter and S_t = apparent power of transformer **Commissioning hint:** *CompUkPLL (97.12)* is used to compensate for measurement faults of the mains due to commutation notches, in case the mains are measured on the secondary side of the dedicated transformer. The whole situation leads to unstable armature current during high motor loads. Increase *CompUkPLL (97.12)* slowly (1 by 1) until the armature current becomes stable. **Int. Scaling: 10 == 1 % Type: I Volatile: N**	0	15	0	%	E
97.13	**DevLimPLL (phase locked loop deviation limit)** Maximum allowed deviation of the mains cycle time between two measurements. The drive trips with **F514 MainsNotSync** [*FaultWord1 (9.01)* bit 13], if limit is overshot: – for 50Hz mains is valid: $360° == 20ms = \frac{1}{50Hz}$ – for 60Hz mains is valid: $360° == 16.67ms = \frac{1}{60Hz}$ **Int. Scaling: 100 == 1 ° Type: I Volatile: N**	5	20	10	°	E
97.14	**KpPLL (phase locked loop p-part)** Gain of firing unit's phase lock loop. **Int. Scaling: 100 == 1 Type: I Volatile: N**	0.25	8	3.75	-	E
97.15	**Unused**					
97.16	**AdjIDC (adjust DC current)** *AdjIDC (97.16)* is used to cover drives with different current measuring circuits for bridge 1 and bridge 2. It rescales the measured armature current if bridge2 is active. **Int. Scaling: 10 == 1 % Type: I Volatile: N**	12.5	800	100	%	E
97.17	**OffsetIDC (offset DC current measurement)** Offset value - in percent of *M1NomCur (99.03)* - added to the armature current measurement. *OffsetIDC (97.17)* adjusts *ConvCurAct (1.16)* and the real armature current. Setting *OffsetIDC (97.17)* to 0 disables the manual offset. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	-5	5	0	%	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
97.18	**ZeroCurDetect (zero current detection)** Selects the zero current detection method. Use a binary signal, if the zero current detection is done by another converter: 0 = **Current** based on the converter's own zero current detection resistors, default 1 = **Voltage** based on the converter's own thyristor voltages 2 = **CurAndVolt** based on both, zero current detection resistors and thyristor voltages 3 = **DI1** 1 = zero current detected, 0 = current not zero 4 = **DI2** 1 = zero current detected, 0 = current not zero 5 = **DI3** 1 = zero current detected, 0 = current not zero 6 = **DI4** 1 = zero current detected, 0 = current not zero 7 = **DI5** 1 = zero current detected, 0 = current not zero 8 = **DI6** 1 = zero current detected, 0 = current not zero 9 = **DI7** 1 = zero current detected, 0 = current not zero 10 = **DI8** 1 = zero current detected, 0 = current not zero 11 = **DI9** 1 = zero current detected, 0 = current not zero, only available with digital extension board 12 = **DI10** 1 = zero current detected, 0 = current not zero, only available with digital extension board 13 = **DI11** 1 = zero current detected, 0 = current not zero, only available with digital extension board 14 = **MCW Bit11** 1 = zero current detected, 0 = current not zero, *MainCtrlWord (7.01)* bit 11 15 = **MCW Bit12** 1 = zero current detected, 0 = current not zero, *MainCtrlWord (7.01)* bit 12 16 = **MCW Bit13** 1 = zero current detected, 0 = current not zero, *MainCtrlWord (7.01)* bit 13 17 = **MCW Bit14** 1 = zero current detected, 0 = current not zero, *MainCtrlWord (7.01)* bit 14 18 = **MCW Bit15** 1 = zero current detected, 0 = current not zero, *MainCtrlWord (7.01)* bit 15 19 = **ACW Bit12** 1 = zero current detected, 0 = current not zero, *AuxCtrlWord (7.02)* bit 12 20 = **ACW Bit13** 1 = zero current detected, 0 = current not zero, *AuxCtrlWord (7.02)* bit 13 21 = **ACW Bit14** 1 = zero current detected, 0 = current not zero, *AuxCtrlWord (7.02)* bit 14 22 = **ACW Bit15** 1 = zero current detected, 0 = current not zero, *AuxCtrlWord (7.02)* bit 15 **Note1:** If zero current is detected by means of the thyristor voltages either 10% of *MainsVoltAct (1.11)* or 10 V is undershot. **Int. Scaling: 1 == 1 Type: C Volatile: N**	Current	ACW Bit15	Current	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
97.19	**ZeroCurTimeOut (zero current timeout)** After a command to change current direction the opposite current direction has to be reached before *ZeroCurTimeOut (97.19)* plus *RevDly (43.14)* has been elapsed otherwise the drive trips with **F533 ReversalTime** [*FaultWord3 (9.03)* bit 0].  The reversal delay time starts when zero current has been detected, after a command to change current direction has been given. *ZeroCurTimeOut (97.19)* must have the same setting for 12-pulse master and 12-pulse slave with one exception only: – If there is no current measurement in the 12-pulse serial slave [*OperModeSel (43.01)* = **12PserSlave**], set *ZeroCurTimeOut (97.19)* in the 12-pulse serial slave to maximum (600 ms). **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	12000	20	ms	E
97.20	**TorqActFiltTime (actual torque filter time)** Torque actual filter time constant for *MotTorqFilt (1.07).* Is used for the EMF controller and the EMF feed forward. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	1000	ms	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
97.21	**ResetAhCounter (reset ampere hour counter)** Binary signal to reset *AhCounter (1.39):* 0 = **NotUsed** default 1 = **DI1** **Reset** by rising edge (0 → 1) 2 = **DI2** **Reset** by rising edge (0 → 1) 3 = **DI3** **Reset** by rising edge (0 → 1) 4 = **DI4** **Reset** by rising edge (0 → 1) 5 = **DI5** **Reset** by rising edge (0 → 1) 6 = **DI6** **Reset** by rising edge (0 → 1) 7 = **DI7** **Reset** by rising edge (0 → 1) 8 = **DI8** **Reset** by rising edge (0 → 1) 9 = **DI9** **Reset** by rising edge (0 → 1)**,** only available with digital extension board 10 = **DI10** **Reset** by rising edge (0 → 1)**,** only available with digital extension board 11 = **DI11** **Reset** by rising edge (0 → 1)**,** only available with digital extension board 12 = **MCW Bit11** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 11 13 = **MCW Bit12** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 12 14 = **MCW Bit13** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 13 15 = **MCW Bit14** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 14 16 = **MCW Bit15** **Reset** by rising edge (0 → 1), *MainCtrlWord (7.01)* bit 15 17 = **ACW Bit12** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 12 18 = **ACW Bit13** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 13 19 = **ACW Bit14** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 14 20 = **ACW Bit15** **Reset** by rising edge (0 → 1), *AuxCtrlWord (7.02)* bit 15 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	ACW Bit15	NotUsed	-	E
97.22	**Unused**					
97.23	**AdjUDC (adjust DC voltage)** *AdjUDC (97.23)* is used to cover drives with different voltage measuring circuits for armature and mains voltage. It rescales the armature voltage measurement. **Int. Scaling: 10 == 1 % Type: I Volatile: N**	12.5	800	100	%	E
97.24	**OffsetUDC (offset DC voltage measurement)** Offset value - in percent of *M1NomVolt (99.02)* - added to the armature voltage measurement. *OffsetUDC (97.24)* adjusts *ArmVoltAct (1.14)* and the real armature voltage. Setting *OffsetUDC (97.24)* to 5.1 % disables the manual offset. **Int. Scaling: 100 == 1 % Type: I Volatile: N**	-5.0	5.1	5.1	%	E
97.25	**EMF ActFiltTime (actual EMF filter time)** EMF actual filter time constant for *EMF VoltActRel (1.17).* Is used for the EMF controller and the EMF feed forward. **Int. Scaling: 1 == 1 ms Type: I Volatile: N**	0	10000	10	ms	E
97.26	**HW FiltUDC (hardware filter DC voltage)** Hardware filter for the UDC measuring circuit: 0 = **FilterOff** the filter time is set to 200 µs 1 = **FilterOn** the filter time is set to 10 ms, default **Int. Scaling: 1 == 1 Type: C Volatile: N**	FilterOff	FilterOn	FilterOn	-	E
Group 98	**Option modules**					
98.01	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.02	**CommModule (communication modules)** For the communication modules following selections are available:	NotUsed	FldBusModbus	NotUsed	-	E

	Fieldbus (Rxxx)	DDCS (e.g. AC 800M)	DDCS (Nxxx)	Modbus (RMBA-xx)
0	**-**	**-**	**-**	**-**
1	**X**	**-**	**-**	**-**
2	**-**	**X**	**-**	**-**
3	**-**	**-**	**X**	**-**
4	**-**	**-**	**-**	**X**
5	**X (read only)**	**X**	**-**	**-**
6	**-**	**X**	**-**	**X (read only)**
7	**-**	**-**	**X**	**X (read only)**
8	**X**	**-**	**-**	**X /read only)**

0 = **NotUsed** no communication used, default

1 = **Fieldbus** The drive communicates with the overriding control via a fieldbus adapter (Rxxx) connected in option slot 1. The dataset start address is 1. This choice is not valid for the Modbus.

2 = **COM-8/AC800x** The drive communicates with the ABB overriding control via SDCS-COM-8 connected in option slot 3. The dataset start address is selected by means of *Ch0 DsetBaseAddr (70.24).*

3 = **COM-8/Nxxx** The drive communicates with the overriding control via SDCS-COM-8 connected in option slot 3 and a fieldbus adapter (Nxxx). The dataset start address is selected by means of *Ch0 DsetBaseAddr (70.24).*

4 = **Modbus** The drive communicates with the overriding control via the Modbus (RMBA-xx) connected in option slot 1 [see *ModBusModule2 (98.08)*]. The dataset start address is 1

5 = **AC800xFldbus** The drive communicates with the ABB overriding control via SDCS-COM-8 connected in option slot 3. The dataset start address is selected by means of *Ch0 DsetBaseAddr (70.24).*
An additional fieldbus adapter (Rxxx) connected in option slot 1 is used for monitoring purposes only. This choice is not valid for the Modbus.

6 = **AC800xModbus** The drive communicates with the ABB overriding control via SDCS-COM-8 connected in option slot 3. The dataset start address is selected by means of *Ch0 DsetBaseAddr (70.24).*
An additional Modbus (RMBA-xx) connected in option slot 1 or 2 [see *ModBusModule2 (98.08)*] is used for monitoring purposes only.

7 = **NxxxModbus** The drive communicates with the overriding control via SDCS-COM-8 connected in option slot 3 and a fieldbus adapter (Nxxx). The dataset start address is selected by means of *Ch0 DsetBaseAddr (70.24).*
An additional Modbus (RMBA-xx) connected in option slot 1 or 2 [see *ModBusModule2 (98.08)*] is used for monitoring purposes only.

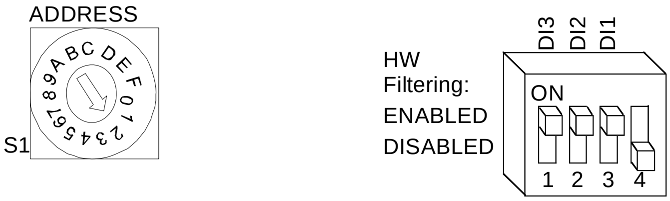
8 = **FldBusModbus** The drive communicates with the overriding control via a fieldbus adapter (Rxxx) connected in option slot 1. The dataset start address is 1 [see *Ch0 DsetBaseAddr (70.24)*]. This choice is not valid for the Modbus.
An additional Modbus (RMBA-xx) connected in option slot 2 or 3 [see *ModBusModule2 (98.08)*] is used for monitoring purposes only.

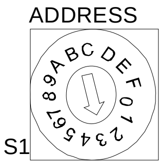
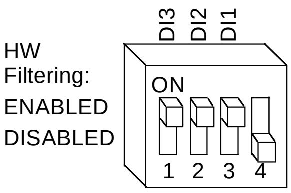
The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the communication module configuration is not met.

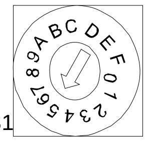
Attention:

To ensure proper connection and communication of the communication modules with the SDCS-CON-4 use the screws included in the scope of delivery.

Int. Scaling: 1 == 1 Type: C Volatile: N

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.03	**DIO ExtModule1 (digital extension module 1)** First RDIO-xx extension module interface selection. *DIO ExtModule1 (98.03)* releases DI9, DI10, DI11, DO9 and DO10. The module can be connected in option slot 1, 2, 3 or alternatively onto the external I/O module adapter (AIMA) connected via SDCS-COM-8. The node ID 2 (see switch S1) is only required for connection via AIMA: 0 = **NotUsed** no first RDIO-xx is used, default 1 = **Slot1** first RDIO-xx is connected in option slot 1 2 = **Slot2** first RDIO-xx is connected in option slot 2 3 = **Slot3** first RDIO-xx is connected in option slot 3 4 = **AMIA** first RDIO-xx is connected onto the external I/O module adapter (AIMA), node ID = 2 The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the DIO extension module is chosen, but not connected or faulty. **Note1:** For faster input signal detection disable the hardware filters of the RDIO-xx by means of dip switch S2. Always have the hardware filter enabled when an AC signal is connected. **Note2:** The digital outputs are available via *DO CtrlWord (7.05)*. **Attention:** To ensure proper connection and communication of the RDIO-xx board with the SDCS-CON-4 use the screws included in the scope of delivery. **1st RDIO:** **Switch S1** **Switch S2**  **Int. Scaling: 1 == 1** **Type: C** **Volatile: N**	NotUsed	AMIA	NotUsed	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.04	**DIO ExtModule2 (digital extension module 2)** Second RDIO-xx extension module interface selection. *DIO ExtModule2 (98.04)* releases DI12, DI13, DI14, DO11 and DO12. The module can be connected in option slot 1, 2, 3 or alternatively onto the external I/O module adapter (AIMA) connected via SDCS-COM-8. The node ID 3 (see switch S1) is only required for connection via AIMA: 0 = **NotUsed** no second RDIO-xx is used, default 1 = **Slot1** second RDIO-xx is connected in option slot 1 2 = **Slot2** second RDIO-xx is connected in option slot 2 3 = **Slot3** second RDIO-xx is connected in option slot 3 4 = **AMIA** second RDIO-xx is connected onto the external I/O module adapter (AIMA), node ID = 3 The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the DIO extension module is chosen, but not connected or faulty. **Note1:** For faster input signal detection disable the hardware filters of the RDIO-xx by means of dip switch S2. Always have the hardware filter enabled when an AC signal is connected. **Note2:** The digital inputs are available via *DI StatWord (8.05)* The digital outputs are available via *DO CtrlWord (7.05).* **Attention:** To ensure proper connection and communication of the RDIO-xx board with the SDCS-CON-4 use the screws included in the scope of delivery. **2nd RDIO:** **Switch S1**  **Switch S2**  **Int. Scaling: 1 == 1** **Type: C** **Volatile: N**	NotUsed	AMIA	NotUsed	-	E
98.05	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.06	**AIO ExtModule (analog extension module)** First RAIO-xx extension module interface selection. *AIO ExtModule (98.06)* releases AI5, AI6, AO3 and AO4. The module can be connected in option slot 1, 2, 3 or alternatively onto the external I/O module adapter (AIMA) connected via SDCS-COM-8. The node ID 5 (see switch S1) is only required for connection via AIMA: 0 = **NotUsed** no first RAIO-xx is used, default 1 = **Slot1** first RAIO-xx is connected in option slot 1 2 = **Slot2** first RAIO-xx is connected in option slot 2 3 = **Slot3** first RAIO-xx is connected in option slot 3 4 = **AMIA** first RAIO-xx is connected onto the external I/O module adapter (AIMA), node ID = 5 The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the AIO extension module is chosen, but not connected or faulty. **Attention:** To ensure proper connection and communication of the RAIO-xx board with the SDCS-CON-4 use the screws included in the scope of delivery. **1st RAIO:** **Switch S1** ADDRESS  S1 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	AMIA	NotUsed	-	E
98.07	**Unused**					
98.08	**ModBusModule2 (Modbus module 2)** The Modbus module (RMBA-xx) can be connected in option slot 1, 2 or 3 [see also *CommModule (98.02)*]: 0 = **NotUsed** no RMBA-xx is used, default 1 = **Slot1** RMBA-xx is connected in option slot 1 2 = **Slot2** RMBA-xx is connected in option slot 2 3 = **Slot3** RMBA-xx is connected in option slot 3 **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	Slot3	NotUsed	-	E
98.09	**Unused**					
98.10	**Unused**					
98.11	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.12	**AIO MotTempMeas (analog extension module for motor temperature measurement)**	NotUsed	AMIA	NotUsed	-	E

Second RAIO-xx extension module interface selection. *AIO MotTempMeas (98.12)* releases AI7, AI8, AO5 and AO6. The analog in- and outputs are only used for motor temperature measurement [see *M1TempSel (31.05)* and *M2TempSel (49.33)*]
The module can be connected in option slot 1, 2, 3 or alternatively onto the external I/O module adapter (AIMA) connected via SDCS-COM-8. The node ID 9 (see switch S1) is only required for connection via AIMA:

- 0 = **NotUsed** no second RAIO-xx is used, default
- 1 = **Slot1** second RAIO-xx is connected in option slot 1
- 2 = **Slot2** second RAIO-xx is connected in option slot 2
- 3 = **Slot3** second RAIO-xx is connected in option slot 3
- 4 = **AMIA** second RAIO-xx is connected onto the external I/O module adapter (AIMA), node ID = 9

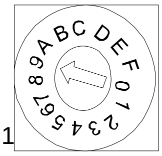
The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the AIO extension module is chosen, but not connected or faulty.

Attention:
To ensure proper connection and communication of the RAIO-xx board with the SDCS-CON-4 use the screws included in the scope of delivery.

2nd RAIO:

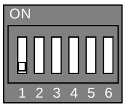
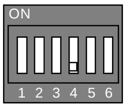
Switch S1

ADDRESS

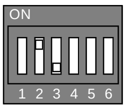
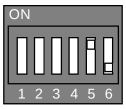
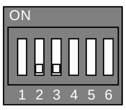
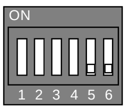
S1 

Switch S2

Set the operating mode to unipolar:

DIP switch setting (unipolar)		Input signal type
Analogue input AI1	Analogue input AI2	
		0(4)...20 mA 0(2)...10 V 0...2 V (Default)

Set the number of connected PT100 per channel:

Input signal type	DIP switch settings	
	Analogue input AI1	Analogue input AI2
2 or 3 PT100 set the voltage signal to 0...10 V		
1 PT100 set the voltage signal to 2...10 V		

Int. Scaling: 1 == 1 **Type: C** **Volatile: N**

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.13	**Unused**					

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
98.14	**Unused**					
98.15	**IO BoardConfig (I/O board configuration)** *IO BoardConfig (98.15)* selects the optional interface boards (SDCS-IOB-2 and / or SDCS-IOB-3) for the standard I/O of the SDCS-CON-4: 0 = **NotUsed** no optional interface boards connected, default 1 = **SDCS-IOB-2** only SDCS-IOB-2 connected 2 = **SDCS-IOB-3** only SDCS-IOB-3 connected 3 = **IOB-2+IOB-3** SDCS-IOB-2 and SDCS-IOB-3 connected The drive trips with **F508 I/OBoardLoss** [*FaultWord1 (9.01)* bit 7], if the IO board configuration is not met. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	IOB-2+IOB-3	NotUsed	-	E
98.16	**Unused**					
Group 99	**Start-up data**					
99.01	**Language (language)** Select language: 0 = **English** default 1 = **English AM** not implemented jet 2 = **Deutsch** not implemented jet 3 = **Italiano** not implemented jet 4 = **Español** not implemented jet 5 = **Português** not implemented jet 6 = **Nederlands** not implemented jet 7 = **Français** not implemented jet 8 = **Dansk** not implemented jet 9 = **Suomi** not implemented jet 10 = **Svenska** not implemented jet 11 = **Po-Russki** not implemented jet 12 = **Polski** not implemented jet 13 = **Turkish** not implemented jet 14 = **Cesky** not implemented jet **Int. Scaling: 1 == 1 Type: C Volatile: N**	English	Cesky	English	-	C
99.02	**M1NomVolt (motor 1 nominal voltage)** Motor 1 nominal armature voltage (DC) from the motor rating plate. **Note1:** In 12-pulse serial mode, this parameter has to be set to the value of the voltage the converter itself is providing. This is usually 50 % of the rated motor voltage, if one motor is connected. In case 2 motors in series are connected it is 100 % of one motor’s rated voltage. **Note2:** The hardware of the measuring circuit has to be adapted for motor voltages lower than 50V. **Int. Scaling: 1 == 1 V Type: I Volatile: N**	5	2000	350	V	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
99.03	**M1NomCur (motor 1 nominal current)** Motor 1 nominal armature current (DC) from the motor rating plate. If several motors are connected to the drive, enter the total current of all motors. **Note1:** In 12-pulse parallel mode, this parameter has to be set to the value of the current the converter itself is providing. This is usually 50 % of the rated motor current, if one motor is connected. In case 2 motors in parallel are connected it is 100 % of one motor's rated current. **Note2:** In case the converter is used as a 3-phase field exciter use *M1NomCur (99.03)* to set the nominal field current. **Int. Scaling: 1 == 1 A Type: I Volatile: N**	0	30000	0	A	C
99.04	**M1BaseSpeed (motor 1 base speed)** Motor 1 base speed from the rating plate, usually the field weak point. *M1BaseSpeed (99.04)* is must be set in the range of: 0.2 to 1.6 times of *SpeedScaleAct (2.29).* If the scaling is out of range **A124 SpeedScale** [*AlarmWord2 (9.07)* bit 7] is generated. **Int. Scaling: 10 == 1 rpm Type: I Volatile: N**	10	6500	1500	rpm	C
99.05	**Unused**					
99.06	**ServiceMode (service mode)** *ServiceMode (99.06)* contains several test modes, auto- and manual tuning procedures. The drive mode is automatically set to **NormalMode** after an autotuning procedure or after the thyristor diagnosis is finished or failed. In case errors occur during the selected procedure **A121 AutotuneFail** [*AlarmWord2 (9.07)* bit 4] is generated. The reason of the error can be seen in *Diagnosis (9.11).* **SetTypeCode** is automatically set to **NormalMode** after the next power up. 0 = **NormalMode** normal operating mode depending on *OperModeSel (43.01)*, default 1 = **ArmCurAuto** autotuning armature current controller 2 = **FieldCurAuto** autotuning field current controller 3 = **EMF FluxAuto** autotuning EMF controller and flux linearization 4 = **SpdCtrlAuto** autotuning speed controller step response 5 = **SpdFbAssist** test speed feedback 6 = **ArmCurMan** manual tuning of armature current controller 7 = **FieldCurMan** manual tuning of field current controller 8 = **ThyDiagnosis** thyristor diagnosis 9 = **FldRevAssist** test field reversal 10 = **SetTypeCode** set type code, release for: *TypeCode (97.01)* *S ConvScaleCur (97.02)* *S ConvScaleVolt (97.03)* *S M1FldScale (45.20)* *S M2FldScale (45.21)* The new values will be taken over after the next power up 11 = **SpdCtrlMan** manual tuning of speed controller step response 12 = **EMF Man** manual tuning of EMF controller; not implemented jet 13 = reserved 14 = **TachFineTune** tacho fine tuning **Note1:** The reference chain is blocked while ServiceMode (99.06) ≠ **NormalMode**. **Note1:** Depending on *MotSel (8.09)* the field current of motor 1 or motor 2 is tuned. **Note2:** A 3-phase field exciter cannot be tuned by means of its armature converter. Tune it by setting *ServiceMode (99.06)* = **FieldCurAuto** in the 3-phase field exciter itself. **Int. Scaling: 1 == 1 Type: C Volatile: Y**	NormalMode	SetTypeCode	NormalMode	-	C

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
99.07	**ApplRestore (application restore)** Setting *ApplRestore (99.07)* = **Yes** starts the loading / storing of the macro (preset parameter set) selected by means of *ApplMacro (99.08). ApplRestore (99.07)* is automatically set back to **Done** after the chosen action is finished: 0 = **Done** no action or macro change completed, default 1 = **Yes** macro selected with ApplMacro (99.08) will be loaded into the drive **Note1:** Macro changes are only accepted in **Off** state [*MainStatWord (8.01)* bit 1 = 0]. **Note2:** It takes about 2s, until the new parameter values are active. **Int. Scaling: 1 == 1 Type: C Volatile: Y**	Done	Yes	Done	-	C
99.08	**ApplMacro (application macro)** *ApplMacro (99.08)* selects the macro (preset parameter sets) to be loaded / stored into the RAM and FLASH. In addition to the preset macros, two user-defined macros (**User1** and **User2**) are available. The operation selected by *ApplMacro (99.08)* is **started** immediately by setting *ApplRestore (99.07)* = **Yes**. *ApplMacro (99.08)* is automatically set back to **NotUsed** after the chosen action is finished. The selected macro is shown in *MacroSel (8.10)*: 0 = **NotUsed** default 1 = **Factory** load macro factory (default parameter set) into RAM and FLASH 2 = **User1Load** load macro **User1** into RAM and FLASH 3 = **User1Save** save actual parameter set form RAM into macro **User1** 4 = **User2Load** load macro **User2** into RAM and FLASH 5 = **User2Save** save actual parameter set form RAM into macro **User2** 6 = **Standard** load macro standard into RAM and FLASH 7 = **Man/Const** load macro manual / constant speed into RAM and FLASH 8 = **Hand/Auto** load macro hand (manual) / automatic into RAM and FLASH 9 = **Hand/MotPot** load macro hand (manual) / motor potentiometer into RAM and FLASH 10 = reserved reserved 11 = **MotPot** load macro motor potentiometer into RAM and FLASH 12 = **TorqCtrl** load macro torque control into RAM and FLASH **Note1:** When loading a macro, group 99 is set / reset as well. **Note2:** If **User1** is active AuxStatWord (8.02) bit 3 is set. If **User2** is active AuxStatWord (8.02) bit 4 is set. **Note3:** It is possible to change all preset parameters of a loaded macro. On a macro change or an application restore command of the actual macro the macro depending parameters are restored to the macro's default values. **Note4:** In case macro **User1** or **User2** is loaded by means of *ParChange (10.10)* it is not saved into the FLASH and thus not valid after the next power on. **Note5:** The DriveWindow backup function only saves the active macro. Thus both macros **User1** and **User2** must be backed-up separately. **Int. Scaling: 1 == 1 Type: C Volatile: Y**	NotUsed	TorqCtrl	NotUsed	-	C
99.09	**DeviceNumber (device number) / DeviceName (device name)** The user can set a drive number by means of the control panel or DriveWindow Light. With DriveWindow it is possible to fill in a string (name) with a maximum of 12 characters. This name will override the numbers and is shown as well in the control panel and in DriveWindow **Note1:** With a SDCS-CON-8 parameter (99.09) is named *DeviceNumber*, otherwise *DeviceName*. **Int. Scaling: 1 == 1 Type: I/C Volatile: N**	0	65535	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
99.10	**NomMainsVolt (nominal mains voltage)** Nominal mains voltage (AC) of the supply. The default and maximum values are preset automatically according to TypeCode (97.01) respectively S ConvScaleVolt (97.03). Absolute max. is 2000 V **Int. Scaling: 1 == 1 V Type: I Volatile: N**	0	(97.01) / (97.03)	(97.01) / (97.03)	V	C
99.11	**M1NomFldCur (motor 1 nominal field current)** Motor 1 nominal field current from the motor rating plate. **Note1:** In case the converter is used as a 3-phase field exciter use *M1NomCur (99.03)* to set the nominal field current. **Int. Scaling: 100 == 1 A Type: I Volatile: N**	0.3	655	0.3	A	C
99.12	**M1UsedFexType (motor 1 used field exciter type)** Select motor 1 used field exciter type: 0 = **NotUsed** no or foreign field exciter connected 1 = **OnBoard** integrated 2-Q field exciter (for sizes D1 - D4 only), default 2 = **FEX-425-Int** internal 2-Q 25 A field exciter (for size D5 only) 3 = **DCF803-0035** external 2-Q 35 A field exciter used for field currents from 0.3 A to **35 A** (terminals X100.1 and X100.3) 4 = **DCF803-0050** external 2-Q 50 A field exciter 5 = **DCF804-0050** external 4-Q 50 A field exciter 6 = **DCF803-0060** external 2-Q 60 A field exciter 7 = **DCF804-0060** external 4-Q 60 A field exciter 8 = **DCS800-S01** external 2-Q 3-phase field exciter 9 = **DCS800-S02** external 4-Q 3-phase field exciter 10 = reserved to 19 = reserved 20 = **FEX-4-Term5A** external 2-Q 35 A field exciter used for field currents from 0.3 A to **5 A** (terminals X100.2 and X100.3) 21 = reserved If the fex type is changed its new value is taken over after the next power-up. **Int. Scaling: 1 == 1 Type: C Volatile: N**	NotUsed	reserved	OnBoard	-	C
99.13	**Unused**					
99.14	**Unused**					
99.15	**Pot1 (potentiometer 1)** Constant test reference 1 for the manual tuning functions - see *ApplMacro (99.08)* - and the square wave generator. **Note1:** The value is depending on the chosen destination of the square wave [e.g. *SqrWaveIndex (99.18)* = 2301 relates to *SpeedScaleAct (2.29)*]: – 100% voltage == 10000 – 100% current == 10000 – 100% torque == 10000 – 100% speed == *SpeedScaleAct (2.29)* == 20000 **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
99.16	**Pot2 (potentiometer 2)** Constant test reference 2 for the manual tuning functions - see *ApplMacro (99.08)* - and the square wave generator. **Note1:** The value is depending on the chosen destination of the square wave [e.g. *SqrWaveIndex (99.18)* = 2301 relates to *SpeedScaleAct (2.29)*]: – 100% voltage == 10000 – 100% current == 10000 – 100% torque == 10000 – 100% speed == *SpeedScaleAct (2.29)* == 20000 **Int. Scaling: 1 == 1 Type: SI Volatile: N**	-32768	32767	0	-	E
99.17	**SqrWavePeriod (square wave period)** The time period of the square wave generator. **Int. Scaling: 100 == 1 s Type: I Volatile: N**	0.01	655	10	s	E
99.18	**SqrWaveIndex (square wave index)** Index pointer to the source (signal/parameter) of the square wave signal [e.g. 2301 equals *SpeedRef (23.01)*]. **Note1:** After a power-up *SqrWaveIndex (99.18)* is set back to 0 and thus disables the square wave function. **Int. Scaling: 1 == 1 Type: I Volatile: Y**	0	9999	0	-	E

DCS800 panel operation

Chapter overview

This chapter describes the handling of the DCS800 panel..

Start-up

The commissioning configures the drive and sets parameters that define how the drive operates and communicates. Depending on the control and communication requirements, the commissioning requires any or all of the following:

- The Start-up Assistant (via DCS800 panel or DriveWindow Light) steps you through the default configuration. The DCS800 panel Start-up Assistant runs automatically at the first power up, or can be accessed at any time using the main menu.
- Application macros can be selected to define common, alternate system configurations. See *chapter Application Macros*.
- Additional adjustments can be made using the DCS800 panel to manually select and set individual parameters. See *chapter Signal and parameter list*.

Control panel

Use the DCS800 panel to control the DCS800, to read status data, to adjust parameters and to use the pre-programmed assistants.

Features:

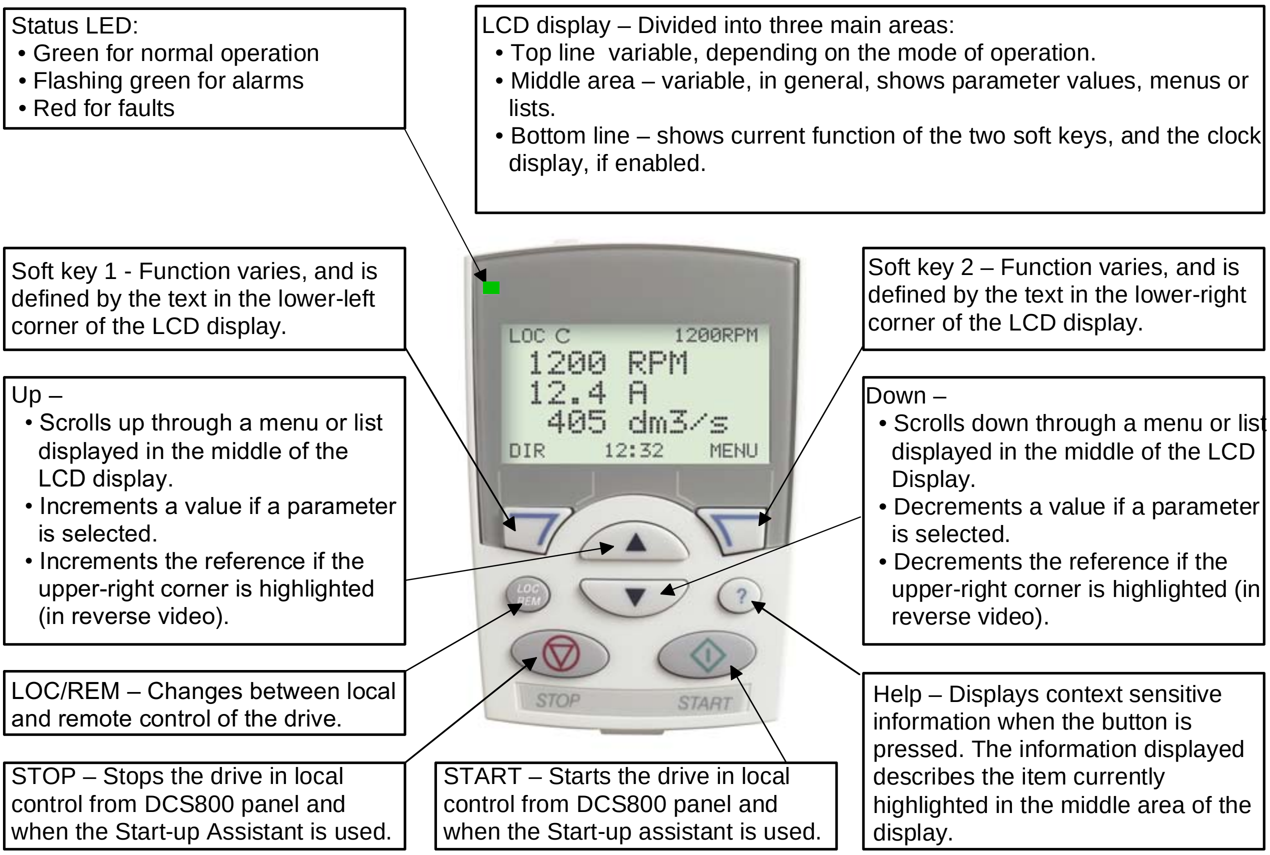
The DCS800 panel features:

- Alphanumeric LCD display
- Language selection for the display by means of *Language (99.01)*
- Drive connection can be made or detached at any time
- Start-up Assistant for ease drive commissioning
- Copy function, parameters can be copied into the DCS800 panel memory to be downloaded to other drives or as backup
- Context sensitive help

Fault- and alarm messages including fault history

Display overview

The following table summarizes the button functions and displays of the DCS800 panel.



DCS800 FW pan sum.dsf

General display features

Soft key functions:

The soft key functions are defined by the text displayed just above each key.

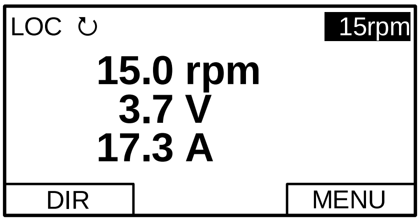
Display contrast:

To adjust display contrast, simultaneously press the MENU key and UP or DOWN, as appropriate.

Output mode

Use the output mode to read information on the drive's status and to operate the drive. To reach the output mode, press EXIT until the LCD display shows status information as described below.

Status information:



Top: The top line of the LCD display shows the basic status information of the drive:
- LOC indicates that the drive control is local from the DCS800 panel.
- REM indicates that the drive control is remote, via local I/O or overriding control.
- indicates the drive and motor rotation status as follows:

DCS800 panel display	Significance
Rotating arrow (clockwise or counter clockwise)	– Drive is running and at setpoint – Shaft direction is forward or reverse
Rotating dotted blinking arrow	Drive is running but not at setpoint
Stationary dotted arrow	Start command is present, but motor is not running. E.g. start enable is missing

- Upper right position shows the active reference, when in local from panel.

Middle: Using parameter Group 34, the middle of the LCD display can be configured to display up to three parameter values:
- By default, the display shows three signals.
- Use *DispParam1Set (34.01)*, *DispParam2Set (34.08)* and *DispParam3Set (34.15)* to select signals or parameters to display. Entering value 0 results in no value displayed. For example, if 34.01 = 0 and 34.15 = 0, then only the signal or parameter specified by 34.08 appears on the DCS800 panel display.

Bottom: The bottom of the LCD display shows:
- Lower corners show the functions currently assigned to the two soft keys.
- Lower middle displays the current time (if configured to do so).

Operating the Drive:
LOC/REM: Each time the drive is powered up, it is in remote control (REM) and is controlled as specified in *CommandSel (10.01)*.
To switch to local control (LOC) and control the drive using the DCS800 panel, press the button.
- When switching from remote control (REM) to local control (LOC) the

drive's status (e.g. **On**, **Run**) and the remotely set speed reference are copied and used. Thus the drive e.g. keeps on running when switching from remote control (REM) to local control (LOC).
- When switching from local control (LOC) to remote control (REM) the drive's status (e.g. **On**, **Run**) and the speed reference of the remote control are taken.

To switch back to remote control (REM) press the 

button.

Start/Stop: To start and stop the drive press the START and STOP buttons.

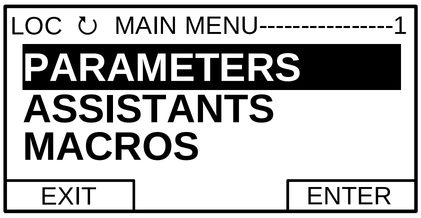
Shaft direction: To change the shaft direction press DIR.

Speed reference: To modify the speed reference (only possible if the display in the upper right corner is highlighted) press the UP or DOWN button (the reference changes immediately).
The speed reference can be modified via the DCS800 panel when in local control (LOC).

Note:
The START / STOP buttons, shaft direction (DIR) and reference functions are only valid in local control (LOC).

Other modes

Below the output mode, the DCS800 panel has:
- Other operating modes are available through the MAIN MENU.
- A fault mode that is triggered by faults. The fault mode includes a diagnostic assistant mode.
- An alarm mode that is triggered by drive alarms.



Access to the MAIN MENU and other modes:
To reach the MAIN MENU:
1. Press EXIT, as necessary, to step back through the menus or lists associated with a particular mode. Continue until you are back to the output mode.
2. Press MENU from the output mode. At this point, the middle of the display is a listing of the other modes, and the top-right text says "MAIN MENU".
3. Press UP/DOWN to scroll to the desired mode.
4. Press ENTER to enter the mode that is highlighted.

Following modes are available in the MAIN MENU:
1. Parameters mode
2. Start-up assistants mode

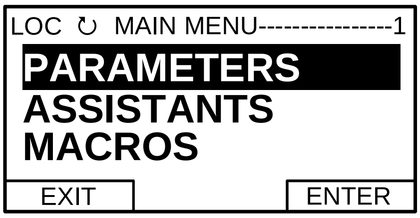
3. Macros mode (currently not used)
4. Changed parameters mode
5. Fault logger mode
6. Clock set mode
7. Parameter backup mode
8. I/O settings mode (currently not used)

The following sections describe each of the other modes.

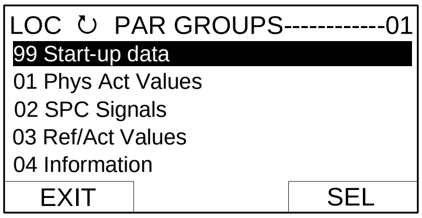
Parameters mode:

Use the parameters mode to view and edit parameter values:

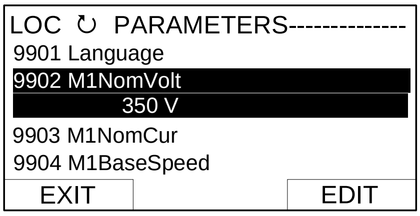
1. Press UP/DOWN to highlight PARAMETERS in the MAIN MENU, then press ENTER.



2. Press UP/DOWN to highlight the appropriate parameter group, then press SEL.

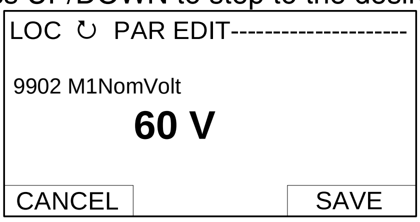


3. Press UP/DOWN to highlight the appropriate parameter in a group, then press EDIT to enter PAR EDIT mode.



Note:
The current parameter value appears below the highlighted parameter.

4. Press UP/DOWN to step to the desired parameter value.



Note:
To get the parameter default value press UP/DOWN simultaneously.

5. Press SAVE to store the modified value and leave the PAR EDIT mode or press CANCEL to leave the PAR EDIT mode without modifications.

6. Press EXIT to return to the listing of parameter groups, and again to step back to the MAIN MENU.

Start-up assistants mode:
Use the start-up assistants mode for basic commissioning of the drive.
When the drive is powered up the first time, the start-up assistants guides you through the setup of the basic parameters.
There are seven start-up assistants available. They can be activated one after the other, as the ASSISTANTS menu suggests, or independently. The use of the assistants is not required. It is also possible to use the parameter mode instead.
The assistant list in the following table is typical:

1. Name plate data	– Enter the motor data, the mains (supply) data, the most important protections and follow the instructions of the assistant. – After filling out the parameters of this assistant it is - in most cases - possible to turn the motor for the first time.
2. Macro assistant	– Selects an application macro.
3. Autotuning field current controller	– Enter the field circuit data and follow the instructions of the assistant. – During the autotuning the main respectively field contactor will be closed, the field circuit is measured by means of nominal field current and the field current control parameters are set. The armature current is not released while the autotuning is active and thus the motor should not turn. – When the autotuning is finished successfully the parameters changed by the assistant are shown for confirmation. If the assistant fails it is possible to enter the fault mode for more help.
4. Autotuning armature current controller	– Enter the motor nominal current, the basic current limitations and follow the instructions of the assistant. – During the autotuning the main contactor will be closed, the armature circuit is measured by means of armature current bursts and the armature current control parameters are set. The field current is not released while the autotuning is active and thus the motor should not turn, but due to remanence in the field circuit about 40% of all motors will turn. These motors have to be locked. – When the autotuning is finished successfully the parameters changed by the assistant are shown for confirmation. If the assistant fails it is possible to enter the fault mode for more help.
5. Speed feedback assistant	– Enter the EMF speed feedback parameters, - if applicable - the parameters for the pulse encoder respectively the analog tacho and follow the instructions of the assistant. – The speed feedback assistant detects the kind of speed feedback the drive is using and provides help to set up pulse encoders respectively to fine tune analog tachometers. – During the autotuning the main contactor and the field contactor - if existing - will be closed and the motor will run up to base speed [*M1BaseSpeed (99.04)*]. During the whole procedure the drive will be in EMF speed control despite the setting of *M1SpeedFbSel (50.03).* – When the assistant is finished successfully the speed feedback is set. If the assistant fails it is possible to enter the fault mode for more help.
6. Autotuning speed controller	– Enter the motor base speed, the basic speed limitations, the speed filter time and follow the instructions of the assistant. – During the autotuning the main contactor and the field contactor - if existing - will be closed, the ramp is bypassed and torque respectively current limits are valid. The speed controller is tuned by means of speed bursts up to base speed [*M1BaseSpeed (99.04)*] and the speed controller parameters are set. – When the autotuning is finished successfully the parameters changed by the assistant are shown for confirmation. If the assistant fails it is possible to enter the fault mode for more help.

	Attention: This assistant is using the setting of *M1SpeedFbSel (50.03)*. If using setting **Encoder** or **Tacho** make sure the speed feedback is working properly!
7. Field weakening assistant (only used when maximum speed is higher than base speed)	– Enter the motor data, the field circuit data and follow the instructions of the assistant. – During the autotuning the main contactor and the field contactor - if existing - will be closed and the motor will run up to base speed [*M1BaseSpeed (99.04)*]. The EMF controller data are calculated, the flux linearization is tuned by means of a constant speed while decreasing the field current and the EMF controller respectively flux linearization parameters are set. – When the autotuning is finished successfully the parameters changed by the assistant are shown for confirmation. If the assistant fails it is possible to enter the fault mode for more help.

1. Press UP/DOWN to highlight ASSISTANTS in the MAIN MENU, then press ENTER.
2. Press UP/DOWN to highlight the appropriate start-up assistant, then press SEL to enter PAR EDIT mode.
3. Make entries or selections as appropriate.
4. Press SAVE to save settings. Each individual parameter setting is valid immediately after pressing SAVE.
5. Press EXIT to step back to the MAIN MENU.

Macros mode:
Currently not used!

Changed parameters mode:
Use the changed parameters mode to view and edit a listing of all parameter that have been changed from their default values:

1. Press UP/DOWN to highlight CHANGED PAR in the MAIN MENU, then press ENTER.
2. Press UP/DOWN to highlight a changed parameter, then press EDIT to enter PAR EDIT mode.
   Note:
   The current parameter value appears below the highlighted parameter.

3. Press UP/DOWN to step to the desired parameter value.
   Note:
   To get the parameter default value press UP/DOWN simultaneously.

4. Press SAVE to store the modified value and leave the PAR EDIT mode or press CANCEL to leave the PAR EDIT mode without modifications.
   Note:
   If the new value is the default value, the parameter will no longer appear in the changed parameter list.

5. Press EXIT to step back to the MAIN MENU.

Fault logger mode:
Use the fault logger mode to see the drives fault, alarm and event history, the fault state details and help for the faults:

1. Press UP/DOWN to highlight FAULT LOGGER in the MAIN MENU, then press ENTER to see the latest faults (up to 20 faults, alarms and events are logged).
2. Press DETAIL to see details for the selected fault. Details are available for the three latest faults, independent of the location in the fault logger.
3. Press DIAG to get additional help (only for faults).
4. Press EXIT to step back to the MAIN MENU.

Clock set mode:
Use the Clock set mode to:
- Enable or disable the clock function.
- Select the display format.
- Set date and time.

1. Press UP/DOWN to highlight CLOCK SET in the MAIN MENU, then press ENTER.
2. Press UP/DOWN to highlight the desired option, then press SEL.
3. Choose the desired setting, then press SEL or OK to store the setting or press CANCEL to leave without modifications.
4. Press EXIT to step back to the MAIN MENU.

Note:
To get the clock visible on the LCD display at least one change has to be done in the clock set mode and the DCS800 panel has to be de-energized and energized again.

Parameter backup mode:
The DCS800 panel can store a full set of drive parameters.
- AP programs will be uploaded and downloaded when they are not protected see *EditCmd (83.02)*.
- The type code of the drive is write protected and has to be set manually by means of *ServiceMode (99.06)* = **SetTypeCode** and *TypeCode (97.01)*.

The parameter backup mode has following functions:

UPLOAD TO PANEL: Copies all parameters from the drive into the DCS800 panel. This includes both user sets (**User1** and **User2**) - if defined - and internal parameters such as those created by tacho fine tuning. The DCS800 panel memory is non-volatile and does not depend on its battery. Can only be done in drive state **Off** and **local** from panel.

DOWNLOAD FULL SET: Restores the full parameter set from the DCS800 panel into the drive. Use this option to restore a drive, or to configure identical drives. Can only be done in drive state **Off** and **local** from panel.

Note:
This download does not include the user sets.

DOWNLOAD APPLICATION: Currently not used!

The general procedure for parameter backup operations is:
1. Press UP/DOWN to highlight PAR BACKUP in the MAIN MENU, then press

ENTER.
2. Press UP/DOWN to highlight the desired option, then press SEL.
3. Wait until the service is finished, then press OK.
4. Press EXIT to step back to the MAIN MENU.

I/O settings mode:
Currently not used!

Fault tracing

Chapter overview

This chapter describes the protections and fault tracing of the drive.

General

Fault modes

Depending on the trip level of the fault the drive reacts differently. The drive's reaction to a fault with trip level 1 and 2 is fixed. See also paragraph *Fault signals* of this manual. The reaction to a fault of level 3 and 4 can be chosen by means of *SpeedFbFltMode (30.36)* respectively *FaultStopMode (30.30)*.

Converter protection

Auxiliary undervoltage

If the auxiliary supply voltage fails while the drive is in **RdyRun** state (MSW bit 1), fault **F501 AuxUnderVolt** is generated.

Auxiliary supply voltage	Trip level
230 VAC	< 185 VAC
115 VAC	< 96 VAC

Armature overcurrent

The nominal value of the armature current is set with *M1NomCur (99.02)*.

The overcurrent level is set by means of *ArmOvrCurLev (30.09)*.
Additionally the actual current is monitored against the overcurrent level of the converter module. The converter's actual overcurrent level can be read from *ConvOvrCur (4.16)*.

Exceeding one of the two levels causes **F502 ArmOverCur**.

Converter overtemperature / converter fan current

Converter overtemperature:
The maximum temperature of the bridge can be read from *MaxBridgeTemp (4.17)* and is automatically set by *TypeCode (97.01)* or manually set by *S MaxBrdgTemp (97.04)*.
Note:
When setting the air entry temperature for D6 and D7 modules manually use *MaxBrdgTemp (97.04)* = 50 °C as absolute maximum.

Exceeding this level causes **F504 ConvOverTemp**. The threshold for **A104 ConvOverTemp**, is 5°C below the tripping level. The measured temperature can be read from *BridgeTemp (1.24)*.

If the measured temperature drops below minus 10°C, **F504 ConvOverTemp** is generated in order to monitor the temperature sensor against short circuit.

Auto-reclosing (mains undervoltage)

Auto-reclosing allows to continue drive operation immediately after a short mains undervoltage without any additional functions of the overriding control system.

In order to keep the overriding control system and the drive control electronics running through short mains undervoltage, an UPS is needed for the 115/230 VAC auxiliary voltages. Without the UPS all DI like e.g. E-stop, start inhibition, acknowledge signals etc. would have false states and trip the drive although the system itself could stay alive. Also the control circuits of the main contactor must be supplied during the mains undervoltage.

Auto-reclosing defines whether the drive trips immediately with **F512 MainsLowVolt** or if the drive will continue running after the mains voltage returns.

Short mains undervoltage

The supervision of mains undervoltage has two levels:

1. *UNetMin1 (30.22)* alarm, protection and trip level
2. *UNetMin2 (30.23)* trip level

If the mains voltage falls below *UNetMin1 (30.22)* but stays above *UNetMin2 (30.23)*, the following actions take place:

1. the firing angle is set to *ArmAlphaMax (20.14)*,
2. single firing pulses are applied in order to extinguish the current as fast as possible,
3. the controllers are frozen,
4. the speed ramp output is updated from the measured speed and
5. **A111 MainsLowVolt** is set as long as the mains voltage recovers before *PowrDownTime (30.25)* is elapsed, otherwise **F512 MainsLowVolt** is generated.

If the mains voltage returns before *PowrDownTime (30.25)* is elapsed and the overriding control keeps the commands **On** (MCW bit 0) and **Run** (MCW bit 3) = 1, the drive will start again after 2 seconds. Otherwise the drive trips with **F512 MainsLowVolt**.

When the mains voltage drops below *UNetMin2 (30.23)*, the action is selected by means of *PwrLossTrip (30.21)*:

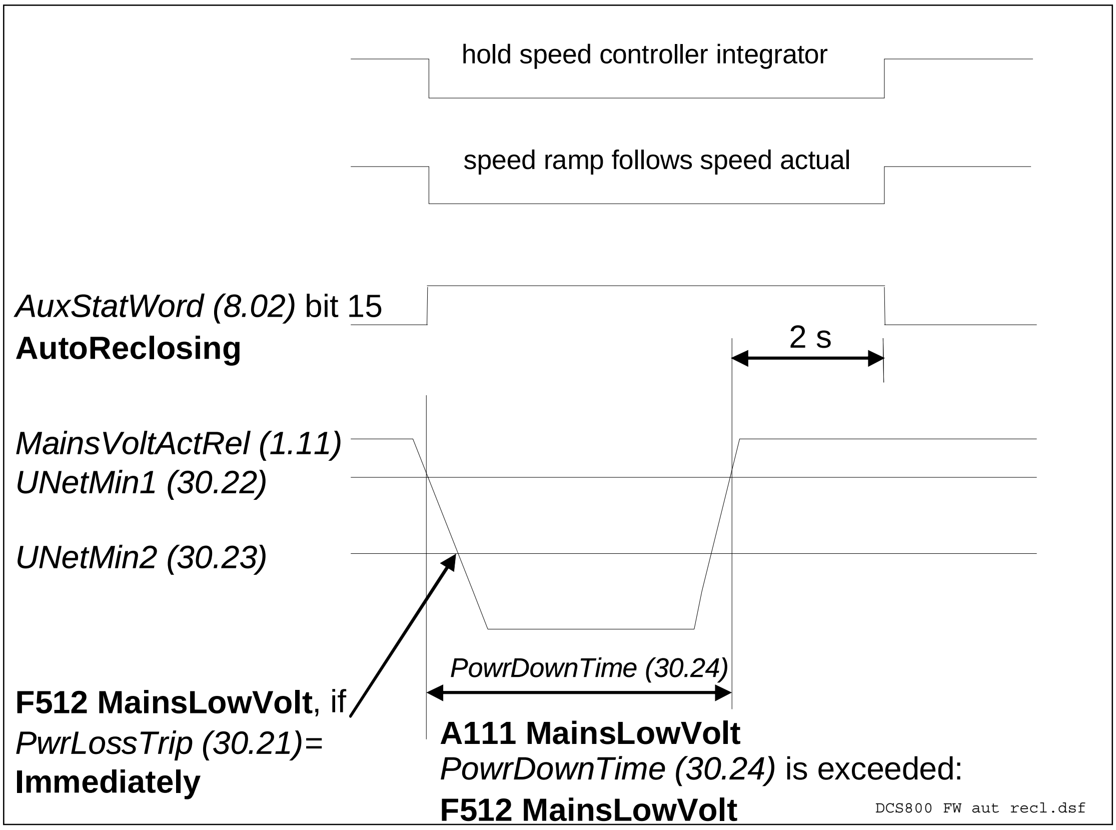
1. the drive is immediately tripped with **F512 MainsLowVolt** or
2. the drive starts up automatically, see description for *UNetMin1 (30.22)*. Below *UNetMin2 (30.23)* the field acknowledge signals are ignored and blocked

Note1:
UNetMin2 (30.23) isn't monitored, unless the mains voltage drops below *UNetMin1 (30.22)*. Thus, for proper operation, *UNetMin1 (30.22)* must be larger than *UNetMin2 (30.23)*.

Note2:
If no UPS is available, set *PwrLossTrip (30.21)* to **Immediately**. Thus the drive will

trip with **F512 MainsLowVolt** avoiding secondary phenomena due to missing power for AI's and DI's.

Drive behavior during auto-reclosing

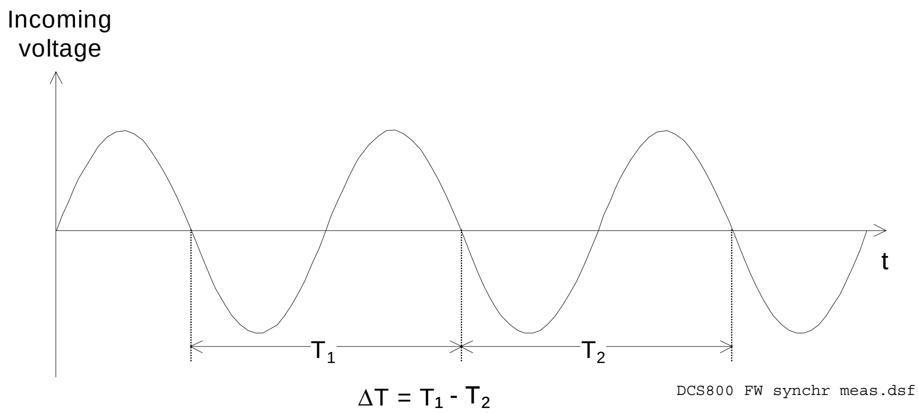


Auto-reclosing

Mains synchronism

As soon as the main contactor is closed and the firing unit is synchronized with the incoming voltage, supervising of the synchronization is activated. If the synchronization fails, **F514 MainsNotSync** will be generated.

The permitted deviation of the cycle time between 2 measurements is set by means of *DevLimPLL (97.13)*.
The synchronization of the firing unit takes typically 300 ms before the current controller is ready.



Synchronization measurement

If ΔT is longer than *DevLimPLL (97.13)* fault **F514 MainsNotSync** will be generated. The actual value of the PLL can bee seen in *PLLOut (3.20)*.

Note:
at 50 Hz one period == 360° == 20 ms = 20000 µs
at 60 Hz one period == 360° == 16.7 ms = 16667 µs

Mains overvoltage

The overvoltage level is fixed to 1.3 * *NomMainsVolt (99.10)*. Exceeding this level causes **F513 MainsOvrVolt.**

Communication loss

The communication to several devices is supervised. The reaction to a communication loss can be chosen by means of *LocalLossCtrl (30.27)* respectively *ComLossCtrl (30.28)*.

The time out is set by the parameters listed in the table as well as all dependent fault- and alarm messages.

Overview local and communication loss:				
Device	**Loss control**	**Time out**	**Related fault**	**Related alarm**
Control panel	*LocalLossCtrl (30.27)*	fixed to 5s	**F546 LocalCmdLoss**	**A130 LocalCmdLoss**
DW				
DWL				
Rxxx (Fieldbus)	*ComLossCtrl (30.28)*	*FB TimeOut (30.35)*	**F528 FieldBusCom**	**A128 FieldBusCom**
DCSLink		*MailBoxCycle1 (94.13), MailBoxCycle2 (94.19), MailBoxCycle3 (94.25), MailBoxCycle4 (94.31)*	**F544 P2PandMFCom**	**A112 P2PandMFCom**
	-	*12P TimeOut (94.03)*	**F535 12PulseCom**	-
	-	*FexTimeOut (94.07)*	**F516 M1FexCom** **F519 M2FexCom**	-
SDCS-COM-8	*Ch0ComLossCtrl (70.05)*	*Ch0TimeOut (70.04)*	**F543 COM8Com**	**A113 COM8Com**
	Ch2ComLossCtrl (70.15)	*Ch2TimeOut (70.14)*		

Overview local and communication loss

Fan, field and mains contactor acknowledge

When the drive is switched **On** (MCW bit 0), the program closes the fan contactor and waits for acknowledge. After it is received, the field contactor is closed respectively the field converter is started and the program waits for the field acknowledge. Finally the main contactor is closed and its acknowledge is waited for.

If the acknowledges are not received during 10 seconds after the **On** command (MCW bit 0) is given, the corresponding fault is generated. These are:

1. **F521 FieldAck**, see *Mot1FexStatus (6.12)*
2. **F523 ExtFanAck**, see *MotFanAck (10.06)*
3. **F524 MainContAck**, see *MainContAck (10.21)*
4. **F523 ConvFanAck**, see *ConvFanAck (10.20)*

Note:
F521 FieldAck is the sum fault for all field related faults like:

1. **F515 M1FexOverCur**, see *M1FldOvrCurLev (30.13)*
2. **F516 M1FexCom**, see *FexTimeOut (94.07)*
3. **F529 M1FexNotOK**, fault during self-diagnosis
4. **F537 M1FexRdyLost**, AC missing or not in synchronism
5. **F541 M1FexLowCur**, see *M1FldMinTrip (30.12)*

External fault

The user has the possibility to connect external faults to the drive. The source can be connected to DI's, *MainCtrlWord (7.01)* or *AuxCtrlWord (7.02)* and is selectable by *ExtFaultSel (30.31)*. External faults generate **F526 ExternalDI**.

ExtFaultOnSel (30.33) selects the reaction:

1. external fault is always valid independent from drive state
2. external fault is only valid when drive state is **RdyRun** (MSW bit 1) for at least 6 s

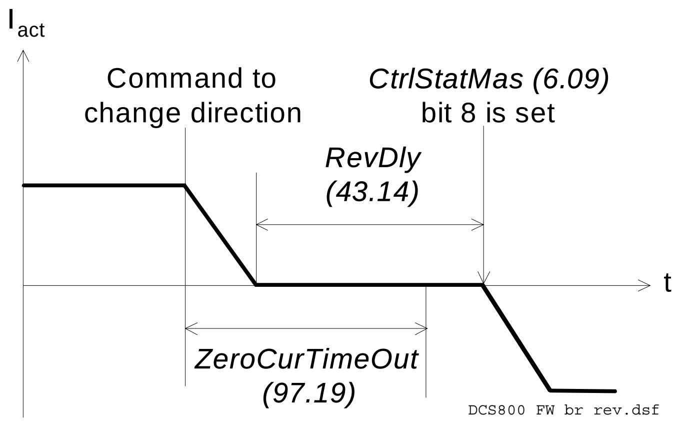
Note:
In case inverted fault inputs are needed, it is possible to invert the DI's.

Bridge reversal

With a 6-pulse converter, the bridge reversal is initiated by changing the polarity of the current reference (command to change direction). Upon zero current detection, the bridge reversal is started. Depending on the moment involved, the new bridge may be "fired" either in the same or in the next current cycle.

The switchover can be delayed by *RevDly (43.14)*. The delay starts after zero current has been detected. Thus *RevDly (43.14)* is the length of the forced current gap during a bridge changeover. This feature may prove useful when operating with large inductances. After the reversal delay is elapsed the system changes to the selected bridge without any further consideration.

After a command to change current direction the opposite current direction has to be reached before *ZeroCurTimeOut (97.19)* plus *RevDly (43.14)* has been elapsed otherwise the drive trips with **F533 ReversalTime** [*FaultWord3 (9.03)* bit 0].



Bridge reversal

Analog input monitor

In case the analog input is set to 2 V to 10 V respectively 4 mA to 20 mA it is possible to check for wire breakage by means of *AI Mon4mA (30.29)*.

In case the threshold is undershoot one of the following actions will take place:

1. the drive stops according to *FaultStopMode (30.30)* and trips with **F551 AIRange**
2. the drive continues to run at the last speed and sets **A127 AIRange**
3. the drive continues to run with *FixedSpeed1 (23.02)* and sets **A127 AIRange**

Motor protection

Armature overvoltage

The nominal value of the armature voltage is set with *M1NomVolt (99.02)*.

The overvoltage level is set by means of *ArmOvrVoltLev (30.08)*. Exceeding this level causes **F503 ArmOverVolt**.

Residual current

The residual current detection (earth fault) is based on:
- a sum current transformer at the AC-side of the converter or
- an external device (e.g. Bender relays).

If a current transformer is used its secondary winding is connected to AI4 (X3:11 and X3:12) on the SDCS-IOB-3 board. The sum current of all three phases has to be zero, otherwise a residual current is detected and **F505 ResCurDetect** is set.

ResCurDetectSel (30.05) activates the residual current detection and selects the choice of connected hardware (transformer or external device).

The residual current detection tripping level is set with *ResCurDetectLim (30.06)*, if a sum current transformer is used. In case an external device is used *ResCurDetectLim (30.06)* is deactivated.

ResCurDetectDel (30.07) delays **F505 ResCurDetect**.

Measured motor temperature

General

The temperatures of motor 1 and motor 2 (parameter for motor 2 see group 49) can be measured at the same time. Alarm and tripping levels are selected by means of *M1AlarmLimTemp (31.06)* and *M1FaultLimTemp (31.07)*. If the levels are exceeded **A106 M1OverTemp** respectively **F506 M1OverTemp** is set. The motor fan will continue to work until the motor is cooled down to alarm limit.

The measurement is configured by means of *M1TempSel (31.05)* and the measured temperature is shown in *Mot1TempMeas (1.22)*. The unit of the measurement depends on the selected measurement mode. For PT100 the unit is degree Celsius and for PTC the unit is Ω.

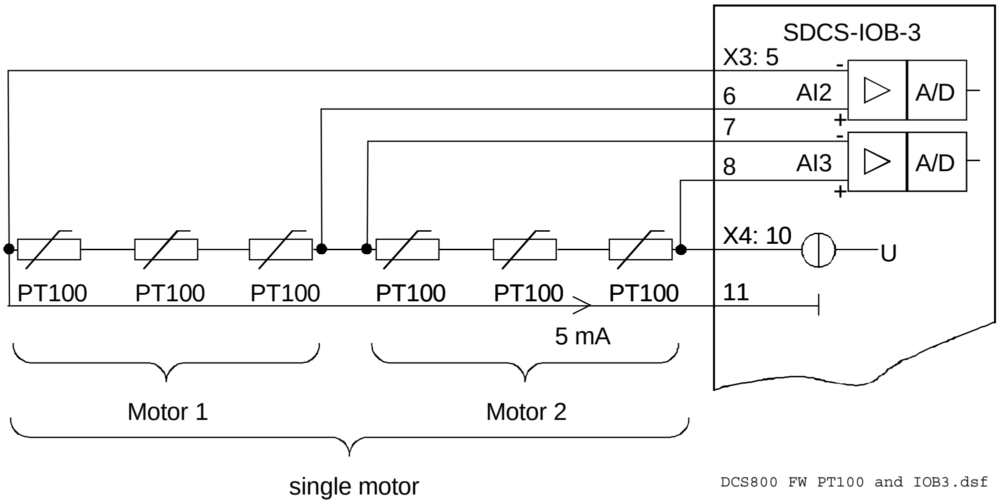
The temperature measurements uses either AI2 and AI3 of the SDCS-IOB-3 or AI7 and AI8 of the RAIO for motor temperature measurement. Additionally the SDCS-IOB-3 features a selectable constant current source for PT100 (5 mA) or PTC (1.5 mA).

Measurement selection

Connection possibilities for PT100:
- max. 3 PT100 for motor 1 and max. 3 PT100 for motor 2 or
- up to 6 PT100 for a single motor.

SDCS-IOB-3:

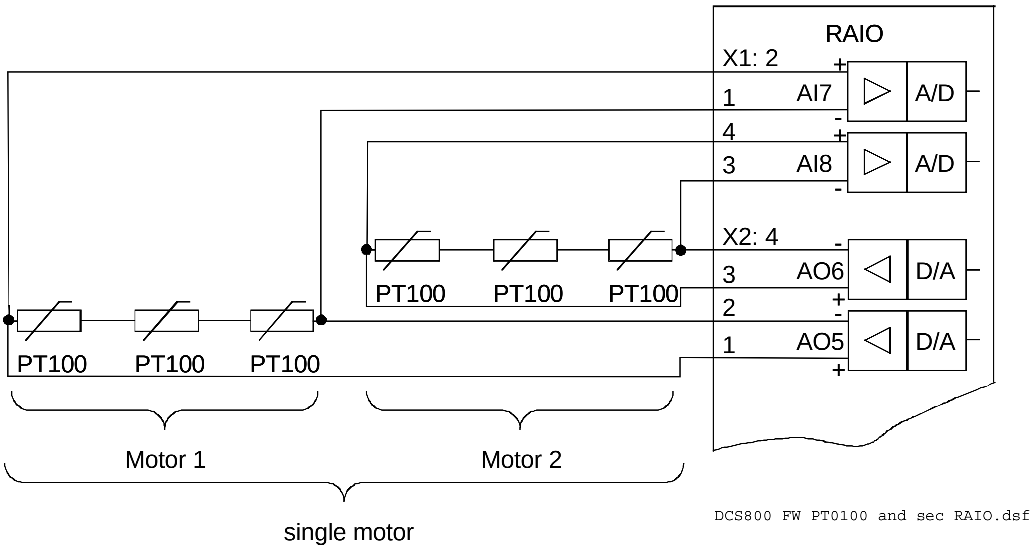
AI2 (motor 1) and AI3 (motor 2) are used for the temperature measurement with PT100. In case only one PT100 is connected to an AI the input range must be configured by jumpers to a gain of 10. Jumper settings for input range and constant current source see *Hardware Manual*.



PT100 and SDCS-IOB-3

For more information see *section Analog Inputs*.

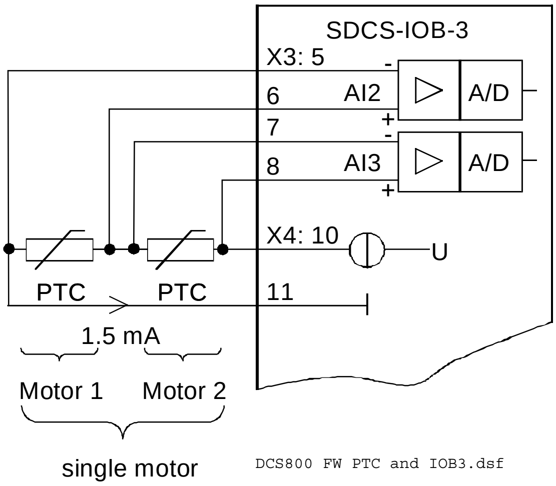
RAIO for motor temperature measurement:
AI7 (motor 1) and AI8 (motor 2) are used for the temperature measurement with PT100. AI7 and AI8 have to be activated by means of *AIO MotTempMeas (98.12)*.



PT100 and second RAIO

SDCS-IOB-3:
Connection possibilities for PTC:
- max. 1 PTC for motor 1 and max. 1 PTC for motor 2 or
- up to 2 PTC for a single motor.

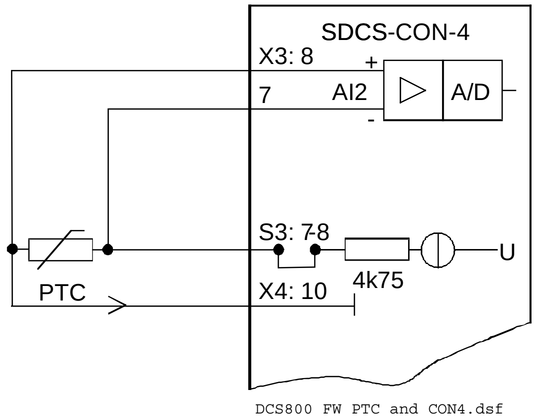
AI2 (motor 1) and AI3 (motor 2) are used for the temperature measurement with PTC. Jumper settings see *Hardware Manual*.



PTC and SDCS-IOB-3

SDCS-CON-4:
Connection possibilities for PTC:
- max. 1 PTC for motor 1 or max. 1 PTC for motor 2.

Only AI2 can be used for the temperature measurement with PTC. Jumper settings see *Hardware Manual*.



PTC and SDCS-CON-4

Klixon

The temperature of motor 1 and motor 2 can be supervised by means of klixons. The klixon is a thermal switch, opening its contact at a defined temperature. This can be used for supervision of the temperature by means of connecting the switch to a digital input of the drive. The digital input for the klixon(s) is selected with *M1KlixonSel (31.08)*. The drive trips with **F506 M1OverTemp** when the klixon opens. The motor fan will continue to work until the klixon is closed again.

Note:
It is possible to connect several klixons in series.

Motor thermal model

General

The drive includes two thermal models one for motor 1 and one for motor 2. The models can be used at the same time. Two models are needed in case one converter is shared by two motors (e.g. shared motion). During normal operation only one thermal model is needed.

It is recommended to use the thermal model of the motor if a direct motor temperature measurement isn't available and the current limits of the drive are set higher than the motor nominal current.

The thermal model is based on the actual motor current related to motor nominal current and rated ambient temperature. Thus the thermal model does not directly calculate the temperature of the motor, but it calculates the ***temperature rise*** of the motor. This is based on the fact that the motor will reach its end temperature after the specified time when starting to run the cold motor (40°C) with nominal current. This time is about four times the motor thermal time constant.

The temperature rise of the motor behaves like the time constant which is proportional with the motor current to the power of two:

$$\Phi = \frac{I_{act}^2}{I_{Motn}^2} * \left(1 - e^{-\frac{t}{\tau}}\right) \quad (1)$$

When the motor is cooling down, the temperature model follows:

$$\Phi = \frac{I_{act}^2}{I_{Motn}^2} * e^{-\frac{t}{\tau}} \quad (2)$$

with:
Φ_{alarm} = temperature rise == [*M1AlarmLimLoad (31.03)*]^2
Φ_{trip} = temperature rise == [*M1FaultLimLoad (31.04)*]^2
Φ = temperature rise == *Mot1TempCalc (1.20)*
I_{act} = actual motor current (overload e.g. 170%)
I_{Motn} = nominal motor current (100%)
t = length of overload (e.g. 60 s)
τ = temperature time constant (in seconds) == *M1ModelTime (31.01)*

As from the formulas (1) and (2) can be seen, the temperature model uses the same time constant when the motor is heating or cooling down.

Alarm and tripping levels

Alarm and tripping levels are selected by means of *M1AlarmLimLoad (31.03)* and *M1FaultLimLoad (31.04)*. If the levels are exceeded **A107 M1OverLoad** respectively **F507 M1OverLoad** is set. The motor fan will continue to work until the motor is cooled down to alarm limit.

The default values are selected in order to achieve quite high overload ability. Recommended value for alarming is 102 % and for tripping 106 % of nominal motor current. Thus the temperature rise is:

– Φ_{alarm} == [*M1AlarmLimLoad (31.03)*]^2 = (102%)^2 = 1.02^2 = 1.04 and
– Φ_{trip} == [*M1FaultLimLoad (31.04)*]^2= (106%)^2 = 1.06^2 = 1.12.

The temperature rise output of the model is shown in *Mot1TempCalc (1.20)*.

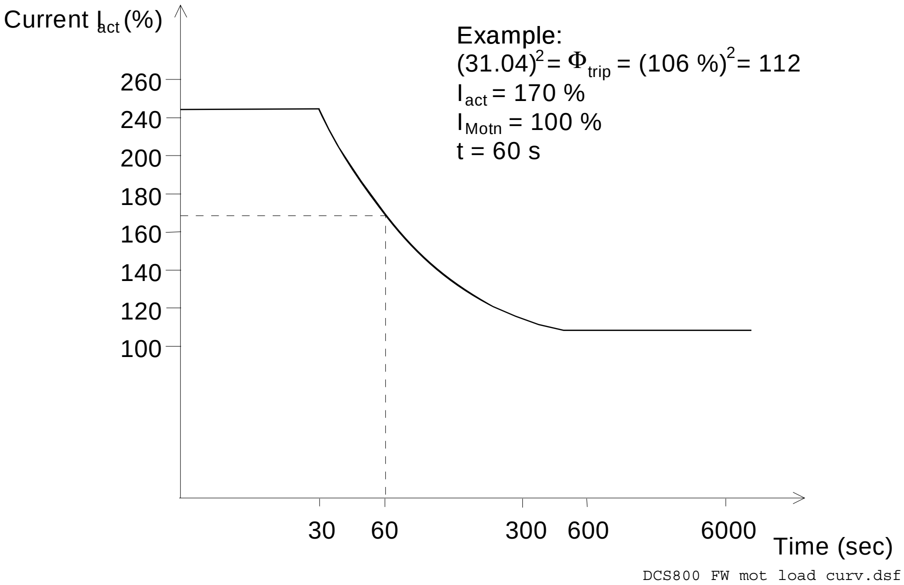
Thermal model selection

The activation of the thermal models is made by setting *M1ModelTime (31.01)* greater than zero.

Thermal time constant

The time constant for the thermal model is set by means of *M1ModelTime (31.01)*. If the thermal time constant of a motor is given by the manufacturer just write it into *M1ModelTime (31.01)*.
In many cases the motor manufacturer provides a curve that defines how long the motor can be overloaded by a certain overload factor. In this case the proper thermal time constant must be calculated.

Example:
The drive is desired to trip if the motor current exceeds 170 % of motor nominal current for more than 60 seconds.
Selected tripping base level is 106 % of nominal motor current, thus *M1FaultLimLoad (31.04)* = 106 %.



Motor load curve

Note:
This is an example and does not necessarily correspond to any motor!

Using formula (1) we can calculate the correct value for τ, when starting with a cold motor.
With:

$$(31.04)^2 = \Phi_{trip} = \frac{I_{act}^2}{I_{Motn}^2} * \left(1 - e^{-\frac{t}{\tau}}\right)$$

Follows:

$$\tau = -\frac{t}{\ln\left(1 - (31.04)^2 * \frac{I_{Motn}{}^2}{I_{act}{}^2}\right)} = -\frac{60s}{\ln\left(1 - 1.06^2 * \frac{1.0^2}{1.7^2}\right)} = 122s$$

Set *M1ModelTime (31.01)* = 122 s.

Field overcurrent

The nominal value of the field current is set with *M1NomFldCur (99.11)*.

The overcurrent level is set by means of *M1FldOvrCurLev (30.13)*. Exceeding this level causes **F515 M1FexOverCur**.

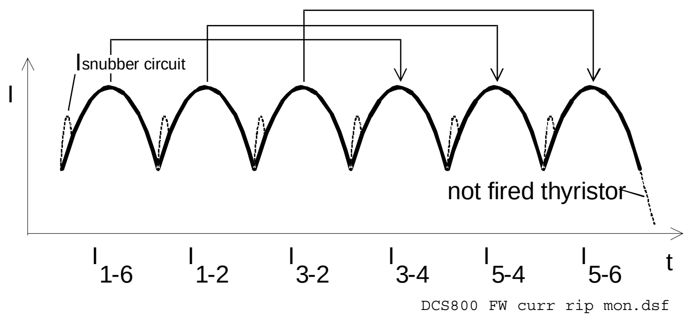
Armature current ripple

The current control is equipped with a current ripple monitor.
This function detects:

1. a broken fuse or thyristor
2. too high gain of the current controller
3. a broken current transformer (T51, T52)

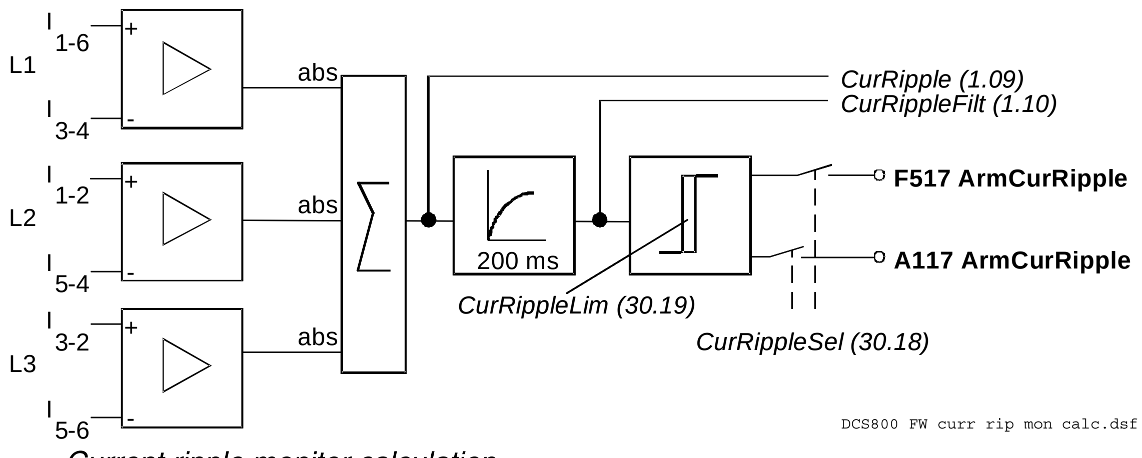
The current ripple monitor level is set by means of *CurRippleLim (30.19)*. Exceeding this level causes either **F517 ArmCurRipple** or **A117 ArmCurRipple** depending on *CurRippleSel (30.18)*.

Current ripple monitor method is based on comparing positive and negative currents of each phase. The calculation is done per thyristor pair:



Current ripple monitor method

CurRipple (1.09) is calculated as abs(I_{1-6}-I_{3-4}) + abs(I_{1-2}-I_{5-4}) + abs(I_{3-2}-I_{5-6}). By low-pass filtering with 200 ms *CurRippleFilt (1.10)* is generated and compared against *CurRippleLim (30.19)*.



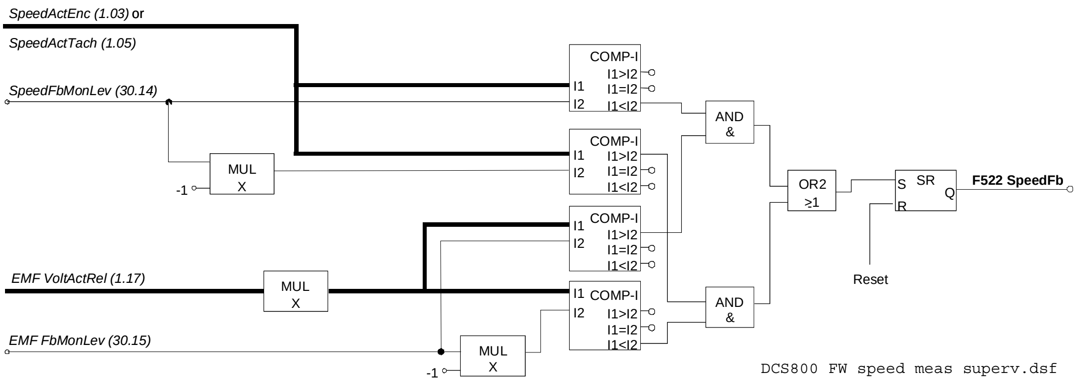
Current ripple monitor calculation

Note:
The load influences the error signal *CurRippleFilt (1.10)*.
Current near discontinuous level will create values of about 300 % * *ConvCurActRel (1.15)* if a thyristor is not fired.
High inductive loads will create values of about 90% * *ConvCurActRel (1.15)* if a thyristor is not fired.

Commissioning hint:
It is not possible to pre-calculate clear levels.
The current control reacts to unstable current feedback.
The load is continuously driving the current if a thyristor is not fired.

Speed feedback monitor

The speed feedback monitor supervises an attached analog tacho or encoder for proper function by means of measured speed and measured EMF. Above a certain EMF the measured speed feedback must be above a certain threshold. The sign of the speed measurement must be correct as well:



Speed measurement supervision

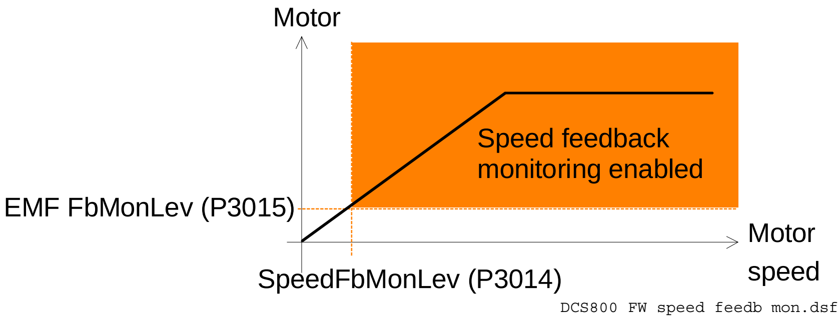
The drive reacts according to *SpeedFbFltSel (30.17)* when:

1. the measured EMF is greater than *EMF FbMonLev (30.15)* and
2. the measured speed feedback *SpeedActEnc (1.03)* respectively *SpeedActTach (1.05)* is lower than *SpeedFbMonLev (30.14)*.

Example:

- *SpeedFbMonLev (30.14)* = 15 rpm
- *EMF FbMonLev (30.15)* = 50 V

The drive trips when the EMF is greater than 50 V while the speed feedback is ≤ 15 rpm.



Speed feedback monitor

SpeedFbFltSel (30.17) selects the reaction to a speed feedback problem:

1. the drive is immediately tripped with **F522 SpeedFb**
2. the speed feedback is switched to EMF and the drive is stopped according to *E StopRamp (22.11),* then **F522 SpeedFb** is set
3. the speed feedback is switched to EMF and **A125 SpeedFb** is set

In case the field is weakened the drive is immediately tripped with **F522 SpeedFb**.

Stall protection

The stall protection trips the converter with **F531 MotorStalled** when the motor is in apparent danger of overheating. The rotor is either mechanically stalled or the load is otherwise continuously too high. It is possible to adjust the supervision (time, speed and torque).

The stall protection trips the drive if:

1. the actual speed is below *StallSpeed (30.02)* and
2. the actual torque exceeds *StallTorq (30.03)*
3. for a time longer than programmed in *StallTime (30.01).*

Overspeed protection

The motor is protected against overspeed e.g. in a case when the drive is in torque control mode and the load drops unexpected.

The overspeed level is set by means of *M1OvrSpeed (30.16)*. Exceeding this level causes **F532 MotOverSpeed**.

Current rise

The protection against fast current rise during generating is configured by means of *ArmCurRiseMax (30.10)*.

Exceeding this level causes **F539 FastCurRise**. If present the DC-breaker is tripped and the main contactor is opened.

Field undercurrent

The nominal value of the field current is set with *M1NomFldCur (99.11)*.

The minimum field current level is set by means of *M1FldMinTrip (30.12)*. Undershooting this level causes **F541 M1FexLowCur**.

FldMinTripDly (45.18) delays **F541 M1FexLowCur**.

Tacho polarity

The polarity of the analog tacho is checked against the EMF. If the polarity is wrong **F553 TachPolarity** is generated.

Tacho range

If an overflow of the AITacho input is imminent **F554 TachoRange** is generated. Check for the right connections (X3:1 to X3:4) on the SDCS-CON-4.

Status messages

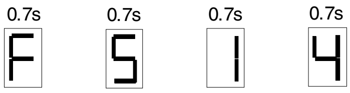
Display of status, fault and alarm signals

Categories of signals and display options

The thyristor power converters series DCS800 generate general messages, power-up errors, fault and alarm signals:

8.	general messages
E 2	power-up errors
F	fault signals
A	alarm signals

The messages are indicated on the seven-segment display (H2500) of the SDCS-CON-4 control board. On the seven-segment display the messages appear in code. The letters and numbers of multi-character codes are displayed one after the other for 0.7 seconds at a time. Plain text messages are available on the control panels and in the fault logger of DriveWindow and DriveWindow Light.



F514 = mains not in synchronism

For evaluation via digital outputs or communication to the overriding control 16 bit words are available, containing all fault and alarm signals as binary code:

- *FaultWord1 (9.01),*
- *FaultWord2 (9.02),*
- *FaultWord3 (9.03),*
- *FaultWord4 (9.04),*
- *UserFaultWord (9.05),*
- *AlarmWord1 (9.06),*
- *AlarmWord2 (9.07),*
- *AlarmWord3 (9.08) and*
- *UserAlarmWord (9.09)*

General messages

SDCS-CON-4

General messages will only be indicated on the seven-segment display of the SDCS-CON-4.

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition	Remark
8	not available	firmware is not running	1
.	not available	firmware is running, no faults, no alarms	-
-	not available	indication while loading firmware into SDCS-CON-4	-
d	not available	indication while loading panel texts into SDCS-CON-4	-
u	not available	panel text loading completed, disconnect download tool	-

Power-up errors (E)

SDCS-CON-4

Power-up errors will only be indicated on the seven segment display of the SDCS-CON-4. With a power-up error active it is not possible to start the drive.

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition	Remark
E01	not available	Checksum fault firmware flash	1,2
E02	not available	SDCS-CON-4 ROM memory test error	1,2
E03	not available	SDCS-CON-4 RAM memory test error (even addresses)	1,2
E04	not available	SDCS-CON-4 RAM memory test error (odd addresses)	1,2
E05	not available	SDCS-CON-4 hardware is not compatible, unknown board	1,2
E06	not available	SDCS-CON-4 watchdog timeout occurred	1,2

1. Units should be de-energized and energized. If the fault occurs again check the SDCS-CON-4, SDCS-PIN-4 respectively SDCS-POW-4 boards and change them if necessary.
2. Power-up errors are only enabled immediately after power on. If a power-up error is indicated during normal operation the reason is usually caused by EMC. In this case please check for proper grounding of cables, converter and cabinet.

Fault signals (F)

To avoid dangerous situations, damage of the motor, the drive or any other material some physical values must not exceed certain limits. Therefore limit values can be specified for these values by parameter setting which cause an alarm or a fault when the value exceeds the limits (e.g. max. armature voltage, max. converter temperature). Faults can also be caused by situations which inhibit the drive from normal operation (e.g. blown fuse).

A fault is a condition which requires an immediate stop of the drive in order to avoid danger or damage. The drive is stopped automatically and cannot be restarted before removing its cause.

All fault signals, with the exception of:

- **F501 AuxUnderVolt,**
- **F525 TypeCode,**
- **F547 HwFailure and**
- **F548 FwFailure**

are resetable in case the fault is eliminated.
To reset a fault following steps are required:

- remove the **Run** and **On** commands [*UsedMCW (7.04)* bit 3 and 0]
- eliminate the faults
- acknowledge the fault with **Reset** [*UsedMCW (7.04)* bit 7] via digital input, overriding control system or in **Local** mode with control panel, DriveWindow or DriveWindow Light
- depending on the systems condition, generate **Run** and **On** commands [*UsedMCW (7.04)* bit 3 and 0] again

The fault signals will switch the drive off completely or partly depending on its trip level.

Trip level 1:

- main contactor is switched off immediately
- field contactor is switched off immediately
- fan contactor is switched off immediately

Trip level 2:

- main contactor is switched off immediately
- field contactor is switched off immediately
- fan contactor stays on as long as the fault is pending or as long as *FanDly (21.14)* is running

Trip level 3:

The drive is stopping via *SpeedFbFltMode (30.36)* , thus the

- main contactor is switched off immediately
- field contactor is switched off immediately in case of *SpeedFbFltMode (30.36)* = **CoastStop**, but it stays on in case of field heating or *SpeedFbFltMode (30.36)* = **DynBraking**
- fan contactor stays on

At standstill the

- main contactor cannot be switched on again
- field contactor stays on in case of field heating
- fan contactor stays on as long as *FanDly (21.14)* is running

Trip level 4:
As long as the drive is stopping via *FaultStopMode (30.30)* , the

- main contactor is switched off immediately in case of *FaultStopMode (30.30)* = **CoastStop** or **DynBraking**, but it stays on in case of *FaultStopMode (30.30)* = **RampStop** or **TorqueLimit**
- field contactor is switched off immediately in case of *FaultStopMode (30.30)* = **CoastStop**, but it stays on in case of field heating or *FaultStopMode (30.30)* = **RampStop**, **TorqueLimit** or **DynBraking**
- fan contactor is switched off immediately in case of *FaultStopMode (30.30)* = **CoastStop**, but stays on in case of *FaultStopMode (30.30)* = **RampStop**, **TorqueLimit** or **DynBraking**

At standstill the

- main contactor is switched off immediately
- field contactor stays on in case of field heating
- fan contactor stays on as long as *FanDly (21.14)* is running

Trip level 5
As long as the drive is stopping via any communication loss control [*LocalLossCtrl (30.27), ComLossCtrl (30.28), Ch0ComLossCtrl (70.05)* or *Ch2ComLossCtrl (70.15)*], the

- main contactor is switched off immediately or stays on depending on the selected communication loss control
- field contactor is switched off immediately or stays on depending on the selected communication loss control, but it stays on in case of field heating
- fan contactor is switched off immediately or stays on depending on the selected communication loss control

At standstill

- main contactor is switched off immediately
- field contactor stays on in case of field heating
- fan contactor stays on as long as *FanDly (21.14)* is running

In case a fault occurs, it stays active until the cause is eliminated an a **Reset** [*UsedMCW (7.04)* bit 7] is given

<table>
<tr><th>7-segment display</th><th>Text on control panel, DriveWindow and DriveWindow Light</th><th>Definition / Action</th><th>Fault-word</th><th>Fault is active when</th><th>Triplevel</th></tr>
<tr><td>F501</td><td>501 AuxUnderVolt</td><td>Auxiliary undervoltage:
The auxiliary voltage is too low while the drive is in operation. If resetting fails, check:
- internal auxiliary voltages (SDCS-CON-4)
- and change SDCS-CON-4 and / or SDCS-PIN-4 respectively SDCS-POW-4 board
<table>
<tr><td>Auxiliary supply voltage</td><td>Trip level</td></tr>
<tr><td>230 VAC</td><td>< 185 VAC</td></tr>
<tr><td>115 VAC</td><td>< 96 VAC</td></tr>
</table></td><td>9.01, bit 0</td><td>RdyRun = 1</td><td>1</td></tr>
<tr><td>F502</td><td>502 ArmOverCur</td><td>Armature overcurrent:
Check:
- ArmOvrCurLev (30.09)
- parameter settings of group 43 (current control: armature current controller tuning)
- current and torque limitation in group 20
- all connections in the armature circuit
- for faulty thyristors
- armature cabling
- in case of a rebuild kit proper connection of firing pulses and CT’s</td><td>9.01, bit 1</td><td>always</td><td>3</td></tr>
<tr><td>F503</td><td>503 ArmOverVolt</td><td>Armature overvoltage (DC):
Check:
- if setting of ArmOvrVoltLev (30.08) is suitable for the system
- parameter settings of group 44 (field excitation: field current controller tuning, EMF controller tuning, flux linearization)
- too high field current (e.g. problems with field weakening)
- if the motor was accelerated by the load,
- overspeed
- does the speed scaling fit, see SpeedScaleAct (2.29)
- proper armature voltage feedback
- connector X12 and X13 on SDCS-CON-4
- connector X12 and X13 on SDCS-PIN-4/51
- cutting of resistors for voltage coding on SDCS-PIN-51</td><td>9.01, bit 2</td><td>always</td><td>1</td></tr>
<tr><td>F504</td><td>504 ConvOverTemp</td><td>Converter overtemperature:
Wait until the converter is cooled down.
Shutdown temperature see MaxBridgeTemp (4.17) .
Check:
- converter door open
- converter fan supply voltage
- converter fan direction of rotation
- converter fan components
- converter cooling air inlet (filter)
- ambient temperature
- inadmissible load cycle
- connector X12 on SDCS-CON-4
- connector X12 and X22 on SDCS-PIN-4/51</td><td>9.01, bit 3</td><td>always</td><td>2</td></tr>
</table>

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F505	505 ResCurDetect	**Residual current detection (sum of I_{L1}, I_{L2}, $I_{L3} \neq$ zero):** Check: - *ResCurDetectSel (30.05) , ResCurDetectLim (30.06) , ResCurDetectDel (30.07)* - sum current transformer, if necessary change transformer or SDCS-IOB-3 - disconnect the mains, verify zero voltage in armature and field circuits and make insulation tests for the complete installation	9.01, bit 4	always	1
F506	506 M1OverTemp	**Motor 1 measured overtemperature:** Wait until the motor is cooled down. The motor fan will continue to work until the motor is cooled down to alarm limit. Check: - *M1FaultLimTemp (31.07)* , *M1KlixonSel (31.08)* - motor temperature - motor fan supply voltage - motor fan direction of rotation - motor fan components - motor cooling air inlet (filter) - motor temperature sensors and cabling - ambient temperature - inadmissible load cycle - inputs for temperature sensors on SDCS-CON-4 and SDCS-IOB-3	9.01, bit 5	always	2
F507	507 M1OverLoad	**Motor 1 calculated overload**: Wait until the motor is cooled down. The motor fan will continue to work until the motor is calculated down to alarm limit. Check: - *M1FaultLimLoad (31.04)*	9.01, bit 6	always	2
F508	508 I/OBoardLoss	**I/O board not found or faulty:** Check: - *DCSLinkNodeID (94.01) , CommModule (98.02), DIO ExtModule1 (98.03) , DIO ExtModule2 (98.04) , AIO ExtModule (98.06) , AIO MotTempMeas (98.12) , IO BoardConfig (98.15)* - flat cable connections between SDCS-CON-4 and SDCS-IOB-2/3	9.01, bit 7	always	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F509	509 M2OverTemp	**Motor 2 measured overtemperature:** Wait until the motor is cooled down. The motor fan will continue to work until the motor is cooled down to alarm limit. Check: - *M2FaultLimTemp (49.37)* , *M2KlixonSel (49.38)* - motor temperature (let motor cool down and restart) - motor fan supply voltage - motor fan direction of rotation - motor fan components - motor cooling air inlet (filter) - motor temperature sensors and cabling - ambient temperature - inadmissible load cycle - inputs for temperature sensors on SDCS-CON-4 and SDCS-IOB-3	9.01, bit 8	always	2
F510	510 M2OverLoad	**Motor 2 calculated overload**: Wait until the motor is cooled down. The motor fan will continue to work until the motor is cooled down to alarm limit. Check: - *M2FaultLimLoad (49.34)*	9.01, bit 9	always	2
F511	511 ConvFanCur	**Converter fan current:** only with *ConvTempDly (97.05)* ≠ 0 and a PW-10002/3 board connected to SDCS-PIN-4/51. Check: - converter fan supply voltage - converter fan direction of rotation - converter fan components - converter cooling air inlet - connector X12 on SDCS-CON-4 - connector X12 and X22 on SDCS-PIN-4/51	9.01, bit 10	RdyRun = 1	4
F512	512 MainsLowVolt	**Mains low (under-) voltage (AC):** Check: - *PwrLossTrip (30.21)* , *UNetMin1 (30.22)* , *UNetMin2 (30.23)* - If all 3 phases are present - if the mains voltage is within the set tolerance - if the main contactor closes and opens - if the mains voltage scaling is correct *[NomMainsVolt (99.10)]* - connector X12 and X13 on SDCS-CON-4 - connector X12 and X13 on SDCS-PIN-4/51 - cutting of resistors for voltage coding on SDCS-PIN-51	9.01, bit 11	RdyRun = 1	3

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F513	513 MainsOvrVolt	**Mains overvoltage (AC):** Actual mains voltage is > 1.3 * *NomMainsVolt (99.10)* for more than 10 s and RdyRun = 1. Check: - if the mains voltage is within the set tolerance - if the mains voltage scaling is correct *[NomMainsVolt (99.10)]* - connector X12 and X13 on SDCS-CON-4 - connector X12 and X13 on SDCS-PIN-4/51 - cutting of resistors for voltage coding on SDCS-PIN-51	9.01, bit 12	RdyRun = 1	1
F514	514 MainsNotSync	**Mains not in synchronism (AC):** The synchronization with the mains frequency has been lost. Check: - *DevLimPLL (97.13)* - mains supply - fuses etc - mains frequency (50Hz ±5Hz; 60Hz ±5Hz) and stability (df/dt = 17%/s) *[PLLOut (3.20)]*	9.01, bit 13	RdyRun = 1	3
F515	515 M1FexOverCur	**Motor 1 field exciter overcurrent:** Check: - *M1FldOvrCurLev (30.13)* , - parameter settings of group 44 (field excitation: field current controller tuning) - connections of field exciter - insulation of cables and field winding - resistance of field winding - fault message of or at field exciter (7-segment display or flashing LED's)	9.01, bit 14	RdyRun = 1	1
F516	516 M1FexCom	**Motor 1 field exciter communication loss:** Check: - *FexTimeOut (94.07)* - flat cable connections between SDCS-CON-4 and SDCS-PIN-4 - auxiliary voltage for integrated and external field exciter - DCSLink cable connections - DCSLink termination set dip switch S1100:1 = ON (DCF803-0035 and FEX-425-Int) - DCSLink node ID settings *[DCSLinkNodeID (94.01) , M1FexNode (94.08)* respectively switches S800 and S801 on DCF803-0035 and FEX-425-Int] - fault message of or at field exciter (7-segment display or flashing LED's)	9.01, bit 15	RdyRun = 1	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F517	517 ArmCurRipple	**Armature current ripple:** One or several thyristors may carry no current. Check: - *CurRippleSel (30.18) ,CurRippleLim (30.19)* - for too high gain of current controller *[M1KpArmCur (43.06)]* - current feedback with oscilloscope (6 pulses within one cycle visible?) - branch fuses - thyristor gate-cathode resistance - thyristor gate connection - current transformers (T51, T52)	9.02, bit 0	RdyRef = 1	3
F518	518 M2FexOverCur	**Motor 2 field exciter overcurrent:** Check: - *M2FldOvrCurLev (49.09)* - parameter settings of group 49 (field excitation: field current controller tuning) - connections of field exciter - insulation of cables and field winding - resistance of field winding - fault message of or at field exciter (7-segment display or flashing LED's)	9.02, bit 1	RdyRun = 1	1
F519	519 M2FexCom	**Motor 2 field exciter communication loss:** Check: - *FexTimeOut (94.07)* - flat cable connections between SDCS-CON-4 and SDCS-PIN-4 - auxiliary voltage for integrated and external field exciter - DCSLink cable connections - DCSLink termination - DCSLink node ID settings *[DCSLinkNodeID (94.01) , M2FexNode (94.09)]* - fault message of or at field exciter (7-segment display or flashing LED's)	9.02, bit 2	RdyRun = 1	1
F521	521 FieldAck	**Selected motor, field acknowledge missing:** Check: - *M1UsedFexType (99.12)* , if selection matches the field exciter type, *Mot1FexStatus (6.12) , Mot2FexStatus (6.13)* - fault message of or at field exciter (7-segment display or flashing LED's)	9.02, bit 4	RdyRun = 1	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F522	522 SpeedFb	**Selected motor, speed feedback:** The comparison of the speed feedback from pulse encoder or analog tacho has failed. Check: - *M1SpeedFbSel (50.03) , SpeedFbFltMode (30.36) , SpeedFbFltSel (30.17)* - pulse encoder: encoder itself, alignment, cabling, coupling, power supply (feedback might be too low), mechanical disturbances - analog tacho: tacho itself, tacho polarity and voltage, alignment, cabling, coupling, mechanical disturbances, jumper S1 on SDCS-CON-4 - EMF: connection converter - armature circuit closed - SDCS-CON-4, SDCS-IOB-3, SDCS-POW-4	9.02, bit 5	always	3
F523	523 ExtFanAck	**External fan acknowledge missing:** Check: - *MotFanAck (10.06)* - external fan contactor - external fan circuit - external fan supply voltage - used digital inputs and outputs (group 14)	9.02, bit 6	RdyRun = 1	4
F524	524 MainContAck	**Main contactor acknowledge missing:** Check: - *MainContAck (10.21)* - switch on - off sequence - auxiliary contactor (relay) switching the main contactor after On/Off command - safety relays - used digital inputs and outputs (group 14)	9.02, bit 7	RdyRun = 1	3
F525	525 TypeCode	**Type code mismatch:** Check: - *TypeCode (97.01)* setting	9.02, bit 8	always	1
F526	526 ExternalDI	**External fault via binary input:** There is no problem with the drive itself! Check: - *ExtFaultSel (30.31)* , *ExtFaultOnSel (30.33)*	9.02, bit 9	Always or RdyRun = 1	1
F527	527 ConvFanAck	**Converter fan acknowledge missing**: Check: - *ConvFanAck (10.20)* - converter fan contactor - converter fan circuit - converter fan klixon - converter fan supply voltage - used digital inputs and outputs (group 14)	9.02, bit 10	RdyRun = 1	4

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F528	528 FieldBusCom	**Fieldbus communication loss**: **F528 FieldBusCom** is only activated after the first dataset from the overriding control is received by the drive. Before the first dataset is received only **A128 FieldBusCom** is active. The reason is to suppress unnecessary faults (the starts up of the overriding control is usually slower than the one of the drive). Check: - *CommandSel (10.01), ComLossCtrl (30.28), FB TimeOut (30.35), CommModule (98.02)* - parameter settings of group 51 (fieldbus) - fieldbus cable - fieldbus termination - fieldbus adapter	9.02, bit 11	always if *FB TimeOut (30.35)* ≠ 0	5
F529	529 M1FexNotOK	**Motor 1 field exciter not okay:** A fault was found during self-diagnosis of field exciter or power failure in field exciter 1. Check: - field exciter operation and change the field exciter, if necessary - fault message of or at field exciter (7-segment display or flashing LED's)	9.02, bit 12	always	1
F530	530 M2FexNotOK	**Motor 2 field exciter not okay:** A fault was found during self-diagnosis of field exciter or power failure in field exciter 2. Check: - field exciter operation and change the field exciter, if necessary - fault message of or at field exciter (7-segment display or flashing LED's)	9.02, bit 13	always	1
F531	531 MotorStalled	**Selected motor, motor stalled:** The motor torque exceeded *StallTorq (30.03)* for a time longer than *StallTime (30.01)* while the speed feedback was below *StallSpeed (30.02)* . Check: - motor stalled (mechanical couplings of the motor) - proper conditions of load - correct field current - parameter settings of group 20 (limits: current and torque limits)	9.02, bit 14	RdyRef = 1	3

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F532	532 MotOverSpeed	**Selected motor, motor overspeed:** Check: - *M1OvrSpeed (30.16)* - parameter settings of group 24 (speed control: speed controller) - scaling of speed controller loop *[SpeedScaleAct (2.29)]* - drive speed *[MotSpeed (1.04)]* vs. measured motor speed (hand held tacho) - field current - speed feedback (encoder, tacho) - connection of speed feedback - if the motor was accelerated by the load - in case of EMF control if the DC-voltage measurement (C1, D1) might be swapped	9.02, bit 15	always	3
F533	533 ReversalTime	**Reversal time:** Current direction not changed before *ZeroCurTimeOut (97.19)* plus *RevDly (43.14)* is elapsed or *12P RevTimeOut (47.05*) is elapsed. Check: - for high inductive motor - too high motor voltage compared to mains voltage	9.03, bit 0	RdyRef = 1	3
F534	534 12PCurDiff	**12-pulse current difference (only for 12-pulse parallel operation):** Check: - *DiffCurLim (47.02) , DiffCurDly (47.03)* - parameter settings of group 43 (current control: armature current controller),	9.03, bit 1	always	3
F535	535 12PCom	**12-pulse communication:** Check: - *12P TimeOut (94.03)* - DCSLink cable connections - DCSLink termination - DCSLink node ID settings *[DCSLinkNodeID (94.01) , 12P SlaNode (94.04)]*	9.03, bit 2	RdyOn = 1	3
F536	536 12PSlaveFail	**12-pulse slave failure:** 12-pulse master is tripped by a fault of the 12-pulse slave. Check: - Fault logger of 12-pulse slave	9.03, bit 3	RdyOn = 1	4
F537	537 M1FexRdyLost	**Motor 1 field exciter ready lost:** Field exciter lost ready-for-operation message while working. AC-voltage missing or not in synchronism. Check: - if all phases are present - if the mains voltage is within the set tolerance - fault message of or at field exciter (7-segment display or flashing LED's)	9.03, bit 4	RdyRun = 1	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F538	538 M2FexRdyLost	**Motor 2 field exciter ready lost:** Field exciter lost ready-for-operation message while working. AC-voltage missing or not in synchronism. Check: - if all phases are present - if the mains voltage is within the set tolerance - fault message of or at field exciter (7-segment display or flashing LED's)	9.03, bit 5	RdyRun = 1	1
F539	539 FastCurRise	**Fast current rise:** Actual current di/dt too fast. Check: - *ArmCurRiseMax (30.10)*	9.03, bit 6	RdyRef = 1 and generating	1
F540	540 COM8Faulty	**SDCS-COM-8 faulty or not found:** Check: - *SysComBoard (98.16)* - and change SDCS-COM-8 and / or SDCS-CON-4	9.03, bit 7	RdyOn = 1	1
F541	541 M1FexLowCur	**Motor 1 field exciter low (under-) current:** Check: - *M1FldMinTrip (30.12) , FldMinTripDly (45.18)* - parameter settings of group 44 (field excitation: field current controller tuning, EMF controller tuning, flux linearization) - motor name plate for minimum current at maximum field weakening (maximum speed) - field circuit fuses - if the field current oscillates - if the motor has a high armature reaction - fault message of or at field exciter (7-segment display or flashing LED's)	9.03, bit 8	always	1
F542	542 M2FexLowCur	**Motor 2 field exciter low (under-) current:** Check: - *M2FldMinTrip (49.08) , FldMinTripDly (45.18)* - parameter settings of group 44 (field excitation: field current controller tuning, EMF controller tuning, flux linearization) - motor name plate for minimum current at maximum field weakening (maximum speed) - field circuit fuses - if the field current oscillates - if the motor has a high armature reaction - fault message of or at field exciter (7-segment display or flashing LED's)	9.03, bit 9	always	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F543	543 COM8Com	**Communication between SDCS-COM-8 and overriding control respectively master-follower link:** Check: - *CommandSel (10.01), Ch0ComLossCtrl (70.05), Ch0TimeOut (70.04), Ch2ComLossCtrl (70.15), Ch2TimeOut (70.14*) - fiber optic cables to overriding control (channel 0), - overriding control adapters, - fiber optic cables between master and followers (channel 2)	9.03, bit 10	RdyOn = 1	5
F544	544 P2PandMFCom	**Peer to peer respectively master-follower link communication loss:** Check: - *ComLossCtrl (30.28), MailBox1 (94.12), MailBox2 (94.18), MailBox3 (94.24), MailBox4 (94.30), MailBoxCycle1 (94.13), MailBoxCycle2 (94.19), MailBoxCycle3 (94.25), MailBoxCycle4 (94.31)* - DCSLink cable connections - DCSLink termination - DCSLink node ID settings *[DCSLinkNodeID (94.01)]*	9.03, bit 11	always	5
F545	545 ApplLoadFail	**Application load failure:** Check: - *Diagnosis (9.11)*	9.03, bit 12	always	1
F546	546 LocalCmdLoss	**Local command loss:** Communication fault with control panel, DriveWindow or DriveWindow Light during local mode. Check: - *LocalLossCtrl (30.27)* - if control panel is disconnected, - connection adapter - cables	9.03, bit 13	local	5
F547	547 HwFailure	**Hardware failure:** For more details check *Diagnosis (9.11)* .	9.03, bit 14	always	1
F548	548 FwFailure	**Firmware failure:** For more details check *Diagnosis (9.11)*.	9.03, bit 15	always	1
F549	549 ParComp	**Parameter compatibility:** When setting parameters or during power-up the firmware attempts to write their values. If the setting is not possible or not compatible the parameter is set to default. The parameters causing the fault can be identified in *Diagnosis (9.11)*. Check: - parameter setting	9.04, bit 0	always	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F550	550 ParMemRead	**Parameter Memory Card read:** Reading the actual parameter set or a user parameter set from either parameter flash or Memory Card failed (checksum fault) Check: - Memory Card and - SDCS-CON-4	9.04, bit 1	always	1
F551	551 AIRange	**Analog input range:** Undershoot of one of the analog input values under 4mA / 2V. Check: - *AI Mon4mA (30.29)* - used analog inputs connections and cables - polarity of connection	9.04, bit 2	always	4
F552	552 MechBrake	**Selected motor, mechanical brake:** Acknowledge brake applied (closed) is missing or torque actual does not reach *StrtTorqRef (42.08)*, during torque proving. Check: - *BrakeFaultFunc (42.06) , StrtTorqRefSel (42.07)* - brake - brake cabling - used digital inputs and outputs (group 14)	9.04, bit 3	always	3
F553	553 TachPolarity	**Selected motor, tacho polarity:** Polarity of analog tacho signal incorrect. Check: - polarity of tacho cable - polarity of armature and field cables - direction of motor rotation	9.04, bit 4	always	3
F554	554 TachoRange	**Selected motor, tacho range:** Overflow of AITacho input Check: - for the right connections (X3:1 to X3:4) on the SDCS-CON-4	9.04, bit 5	always	3
F601	601 APFault1	**User defined fault by Adaptive Program**	9.04, bit 11	always	1
F602	602 APFault2	**User defined fault by Adaptive Program**	9.04, bit 12	always	1
F603	603 APFault3	**User defined fault by Adaptive Program**	9.04, bit 13	always	1
F604	604 APFault4	**User defined fault by Adaptive Program**	9.04, bit 14	always	1
F605	605 APFault5	**User defined fault by Adaptive Program**	9.04, bit 15	always	1
F610	610 UserFault1	**User defined fault by application program**	9.05, bit 0	always	1
F611	611 UserFault2	**User defined fault by application program**	9.05, bit 1	always	1
F612	612 UserFault3	**User defined fault by application program**	9.05, bit 2	always	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Fault-word	Fault is active when	Triplevel
F613	613 UserFault4	**User defined fault by application program**	9.05, bit 3	always	1
F614	614 UserFault5	**User defined fault by application program**	9.05, bit 4	always	1
F615	615 UserFault6	**User defined fault by application program**	9.05, bit 5	always	1
F616	616 UserFault7	**User defined fault by application program**	9.05, bit 6	always	1
F617	617 UserFault8	**User defined fault by application program**	9.05, bit 7	always	1
F618	618 UserFault9	**User defined fault by application program**	9.05, bit 8	always	1
F619	619 UserFault10	**User defined fault by application program**	9.05, bit 9	always	1
F620	620 UserFault11	**User defined fault by application program**	9.05, bit 10	always	1
F621	621 UserFault12	**User defined fault by application program**	9.05, bit 11	always	1
F622	622 UserFault13	**User defined fault by application program**	9.05, bit 12	always	1
F623	623 UserFault14	**User defined fault by application program**	9.05, bit 13	always	1
F624	624 UserFault15	**User defined fault by application program**	9.05, bit 14	always	1
F625	625 UserFault16	**User defined fault by application program**	9.05, bit 15	always	1

Alarm signals (A)

An alarm is a message, that a condition occurred, which may lead to a dangerous situation. It is displayed and written into the fault logger. However, the cause for the alarm can inhibit the drive from continuing with normal operation. If the cause of the alarm disappears the alarm will be automatically reset.

The alarm handling must provides 4 alarm levels.

Alarm level 1:

- the main contactor cannot be switched on again, after the drive stopped (no re-start possible)

Alarm level 2:

- fan contactor stays on as long as the alarm is pending
- if the alarm disappears *FanDly (21.14)* will start

Alarm level 3:

- **AutoReclosing** (auto re-start) is [*AuxStatWord (8.02)* bit 15] active
- **RdyRun** [*MainStatWord (8.01)* bit 1] is disabled, but the drive is automatically restarted when the alarm condition vanishes
- α is set to 150°
- single firing pulses

Alarm level 4:

- drive keeps on running and the alarm is indicated

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A101	101 Off2ViaDI	**Off2 (Emergency Off / Coast stop) pending via digital input - start inhibition:** There is no problem with the drive itself! Check: - *Off2 (10.08)*, if necessary invert the signal (group 10)	9.06, bit 0	RdyRun = 1	1
A102	102 Off3ViaDI	**Off3 (E-stop) pending via digital input:** There is no problem with the drive itself! Check: - *E Stop (10.09)*, if necessary invert the signal (group 10)	9.06, bit 1	RdyRun = 1	1
A103	103 DCBreakAck	**Selected motor, DC-Breaker acknowledge missing:** α is set to 150° and single firing pulses are given, thus the drive cannot be started or re-started while the DC-breaker acknowledge is missing. Check: - *DCBreakAck (10.23)*, if necessary invert the signal (group 10)	9.06, bit 2	RdyRun = 1	3
A104	104 ConvOverTemp	**Converter overtemperature:** Wait until the converter is cooled down. Shutdown temperature see *MaxBridgeTemp (4.17)* . The converter overtemperature alarm will already appear at approximately 5°C below the shutdown temperature. Check: - *ConvFanAck (10.20)* - converter door open - converter fan supply voltage - converter fan direction of rotation - converter fan components - converter cooling air inlet (filter) - ambient temperature - inadmissible load cycle - connector X12 on SDCS-CON-4 - connector X12 and X22 on SDCS-PIN-4/51	9.06, bit 3	always	2
A105	105 DynBrakeAck	**Selected motor, dynamic braking is still pending:** α is set to 150° and single firing pulses are given, thus the drive cannot be started or re-started while dynamic braking is active. Check: - DynBrakeAck (10.22)	9.06, bit 4	RdyRun = 1	1

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A106	106 M1OverTemp	**Motor 1 measured overtemperature:** Check: - *M1AlarmLimTemp (31.06)* - motor temperature - motor fan supply voltage - motor fan direction of rotation - motor fan components - motor cooling air inlet (filter) - motor temperature sensors and cabling - ambient temperature - inadmissible load cycle - inputs for temperature sensors on SDCS-CON-4 and SDCS-IOB-3	9.06, bit 5	always	2
A107	107 M1OverLoad	**Motor 1 calculated overload**: Check: - *M1AlarmLimLoad (31.04)*	9.06, bit 6	always	2
A109	109 M2OverTemp	**Motor 2 measured overtemperature:** Check: - *M2AlarmLimTemp (49.36)* - motor temperature - motor fan supply voltage - motor fan direction of rotation - motor fan components - motor cooling air inlet (filter) - motor temperature sensors and cabling - ambient temperature - inadmissible load cycle - inputs for temperature sensors on SDCS-CON-4 and SDCS-IOB-3	9.06, bit 8	always	2
A110	110 M2OverLoad	**Motor 2 calculated overload**: Check: - *M2AlarmLimLoad (49.33)*	9.06, bit 9	always	2
A111	111 MainsLowVolt	**Mains low (under-) voltage (AC):** α is set to 150°; single firing pulses Check: - *PwrLossTrip (30.21), UNetMin1 (30.22), UNetMin2 (30.23)*, - If all 3 phases are present - if the mains voltage is within the set tolerance - if the main contactor closes and opens - if the mains voltage scaling is correct *[NomMainsVolt (99.10)]* - connector X12 and X13 on SDCS-CON-4 - connector X12 and X13 on SDCS-PIN-4/51 - cutting of resistors for voltage coding on SDCS-PIN-51	9.06, bit 10	RdyRun = 1	3

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A112	112 P2PandMFCom	**Peer to peer and master-follower communication loss:** Check: - *ComLossCtrl (30.28), MailBox1 (94.12), MailBox2 (94.18), MailBox3 (94.24), MailBox4 (94.30), MailBoxCycle1 (94.13), MailBoxCycle2 (94.19), MailBoxCycle3 (94.25), MailBoxCycle4 (94.31)* - DCSLink cable connections - DCSLink termination - DCSLink node ID settings *[DCSLinkNodeID (94.01)]*	9.06, bit 11	always	4
A113	113 COM8Com	**SDCS-COM-8 communication (overriding control and master-follower):** Check: - *Ch0ComLossCtrl (70.05), Ch0TimeOut (70.04), Ch2ComLossCtrl (70.15), Ch2TimeOut (70.14)* - fiber optic cables to overriding control (channel 0) - overriding control adapters - fiber optic cables between master and followers (channel 2)	9.06, bit 12	always	4
A114	114 ArmCurDev	**Armature Current Deviation:** Is shown, if the current reference [*CurRefUsed (3.12)*] differs from current actual [*MotCur (1.06)*] for longer than 5 sec by more than 20% of nominal motor current. α is set to 150°; single firing pulses Check: - ratio between mains supply voltage and EMF - *ArmAlphaMin (20.15)* is set too high	9.06, bit 13	RdyRef = 1	3
A115	115 TachoRange	**Selected motor, tacho range:** If **A115 TachoRange** comes up for longer than 10 seconds there is an overflow of the AITacho input. Check: - for the right connections (X3:1 to X3:4) on the SDCS-CON-4 If **A115 TachoRange** comes up for 10 seconds and vanishes again *M1OvrSpeed (30.16)* or *M2OvrSpeed (49.21)* has been changed. In this case a new tacho fine tuning has to be done [*ServiceMode (99.06)* = **TachFineTune**].	9.06, bit 14	always	4

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A117	117 ArmCurRipple	**Armature current ripple:** One or several thyristors may carry no current. Check: - *CurRippleSel (30.18)* ,*CurRippleLim (30.19)* - for too high gain of current controller *[M1KpArmCur (43.06)]* - current feedback with oscilloscope (6 pulses within one cycle visible?) - branch fuses - thyristor gate-cathode resistance - thyristor gate connection - current transformers (T51, T52)	9.07, bit 0	RdyRef = 1	4
A118	118 FoundNewAppl	**Found new application on Memory Card**: Activate application on Memory Card by means of *ParSave (16.06)* = **EableAppl**	9.07, bit 1	directly after energizing of auxiliary supply	1
A119	119 ApplDiff	**Application on drive and Memory Card are different**: Activate application on Memory Card by means of *ParSave (16.06)* = **EableAppl**	9.07, bit 2	directly after energizing of auxiliary supply	1
A120	120 OverVoltProt	**Overvoltage protection active:** Overvoltage protection DCF806 is active and converter is blocked. α is set to 150°; single firing pulses Check: - *OvrVoltProt (10.13)* if necessary invert the signal (group 10) - field converter cables and connections	9.07, bit 3	always	3
A121	121 AutotuneFail	**Autotuning failed:** For more details check *Diagnosis (9.11)* To clear the alarm set *ServiceMode (99.06)* = **NormalMode**	9.07, bit 4	always	4
A122	122 MechBrake	**Selected motor, mechanical brake:** Acknowledge brake applied (closed) is missing or torque actual does not reach *StrtTorqRef (42.08)*, during torque proving. Check: - *BrakeFaultFunc (42.06)* , *StrtTorqRefSel (42.07)* - brake - brake cabling - used digital inputs and outputs (group 14)	9.07, bit 5	always	4
A123	123 FaultSuppres	**Fault suppressed:** At least one fault message is mask. Check: - *FaultMask (30.25)*	9.07, bit 6	always	4

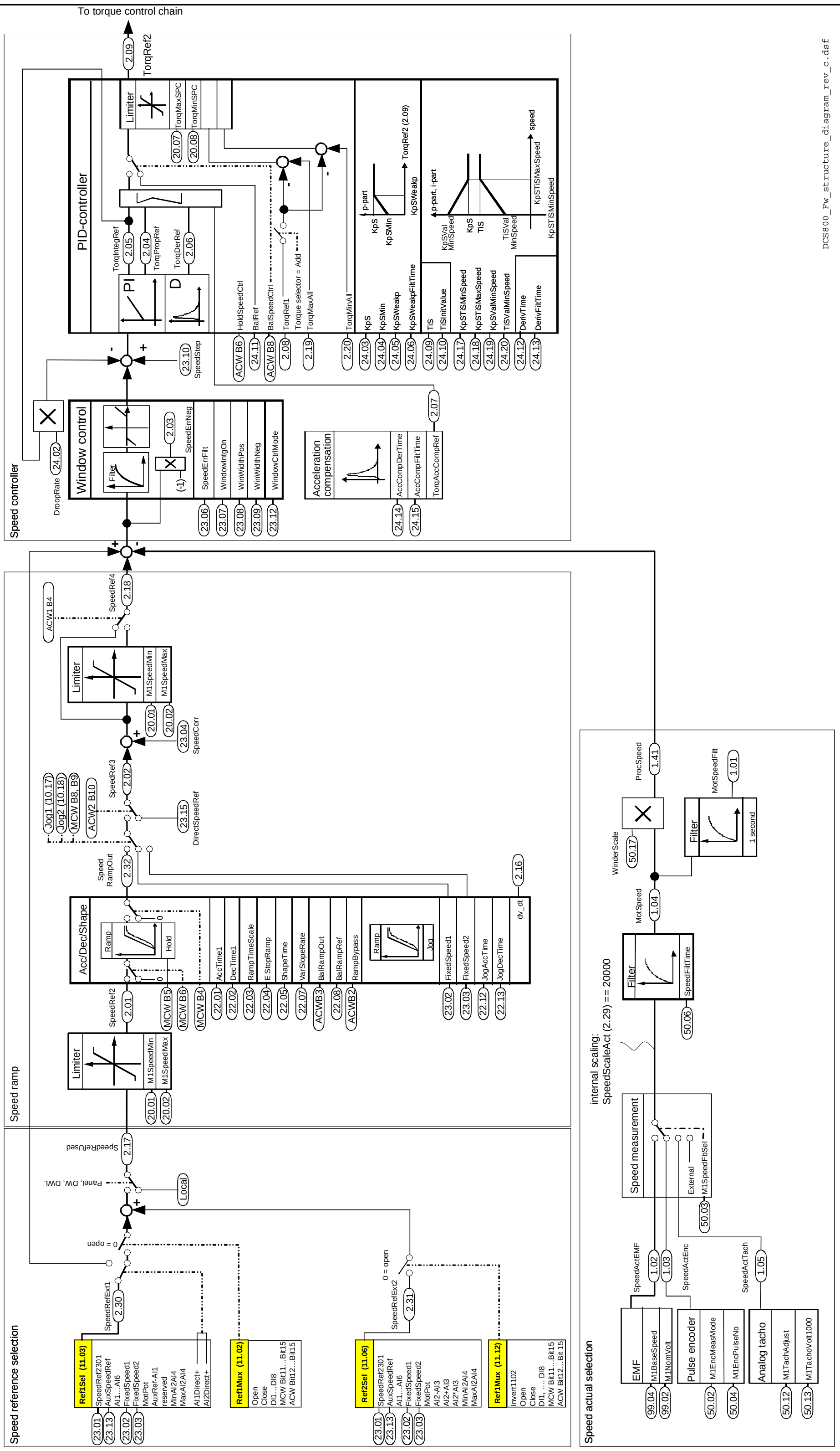
<table>
<tr><th>7-segment display</th><th>Text on control panel, DriveWindow and DriveWindow Light</th><th>Definition / Action</th><th>Alarm-word</th><th>Alarm is active when</th><th>Alarmlevel</th></tr>
<tr><td>A124</td><td>124 SpeedScale</td><td>Speed scaling out of range:
The parameters causing the alarm can be identified in Diagnosis (9.11).
α is set to 150°; single firing pulses
Check:
- M1SpeedMin (20.01), M1SpeedMax (20.02), M2BaseSpeed (49.03), M2SpeedMin (49.19), M2SpeedMax (49.20), M2SpeedScale (49.22), M1SpeedScale (50.01), M1BaseSpeed (99.04)</td><td>9.07, bit 7</td><td>always</td><td>3</td></tr>
<tr><td>A125</td><td>125 SpeedFb</td><td>Selected motor, speed feedback:
The comparison of the speed feedback from pulse encoder or analog tacho has failed.
Check:
- M1SpeedFbSel (50.03) , SpeedFbFltMode (30.36) , SpeedFbFltSel (30.17)
- pulse encoder: encoder itself, alignment, cabling, coupling, power supply (feedback might be too low), mechanical disturbances
- analog tacho: tacho itself, tacho polarity and voltage, alignment, cabling, coupling, mechanical disturbances, jumper S1 on SDCS-CON-4
- EMF: connection converter - armature circuit closed
- SDCS-CON-4, SDCS-IOB-3, SDCS-POW-4</td><td>9.07, bit 8</td><td>always</td><td>4</td></tr>
<tr><td>A126</td><td>126 ExternalDI</td><td>External alarm via binary input:
There is no problem with the drive itself!
Check:
- ExtAlarmSel (30.32), alarm = 0, ExtAlarmOnSel (30.34)</td><td>9.07, bit 9</td><td>always</td><td>4</td></tr>
<tr><td>A127</td><td>127 AIRange</td><td>Analog input range:
Undershoot of one of the analog input values under 4mA / 2V.
Check:
- AI Mon4mA (30.29)
- used analog inputs connections and cables
- polarity of connection</td><td>9.07, bit 10</td><td>always</td><td>4</td></tr>
<tr><td>A128</td><td>128 FieldBusCom</td><td>Fieldbus communication loss:
F528 FieldBusCom is only activated after the first dataset from the overriding control is received by the drive. Before the first dataset is received only A128 FieldBusCom is active. The reason is to suppress unnecessary faults (the starts up of the overriding control is usually slower than the one of the drive).
Check:
- ComLossCtrl (30.28) , FB TimeOut (30.35) , CommModule (98.02)
- parameter settings of group 51 (fieldbus)
- fieldbus cable
- fieldbus termination
- fieldbus adapter</td><td>9.07, bit 11</td><td>always if FB TimeOut (30.35) ≠ 0</td><td>4</td></tr>
</table>

7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A129	129 ParRestored	**Parameter restored:** The parameters found in the flash memory were invalid at power-up (checksum fault). All parameters were restored from the parameter backup.	9.07, bit 12	always	4
A130	130 LocalCmdLoss	**Local command loss:** Connection fault with control panel, DriveWindow or DriveWindow Light. Check: - *LocalLossCtrl (30.27)* - if control panel is disconnected - connection adapter - cables	9.07, bit 13	local	4
A131	131 ParAdded	**Parameter added:** A new firmware with a different amount of parameters was downloaded. The new parameters are set to their default values. The parameters causing the alarm can be identified in *Diagnosis (9.11)*. Check: - new parameters and set them to the desired values	9.07, bit 14	after download of firmware for max. 10 s	4
A132	132 ParConflict	**Parameter setting conflict:** Is triggered by parameter settings conflicting with other parameters. The parameters causing the alarm can be identified in *Diagnosis (9.11)*.	9.07, bit 15	always	4
A134	134 ParComp	**Parameter compatibility:** When downloading parameter sets the firmware attempts to write the parameters. If the setting is not possible or not compatible the parameter is set to default. The parameters causing the alarm can be identified in *Diagnosis (9.11)* . Check: - parameter setting	9.08, bit 1	after download of a parameter set for max. 10 s	4
A135	135 ParUpDwnLoad	**Parameter up- or download failed:** The checksum verification failed during up- or download of parameters. Please try again. Two or more parameter set actions were requested at the same time. Please try again.	9.08, bit 2	after up- or download of parameters for max. 10 s	4
A136	136 NoAPTaskTime	**Adaptive program task time not set:** The task time for the Adaptive Program is not set, while the Adaptive Program is started. Check: - that *TimeLevSel (83.04)* is set to **5ms, 20ms, 100ms** or **500ms** when *AdapProgCmd (83.01)* is set to **Start**, **SingleCycle** or **SingleStep**	9.08, bit 3	always	4

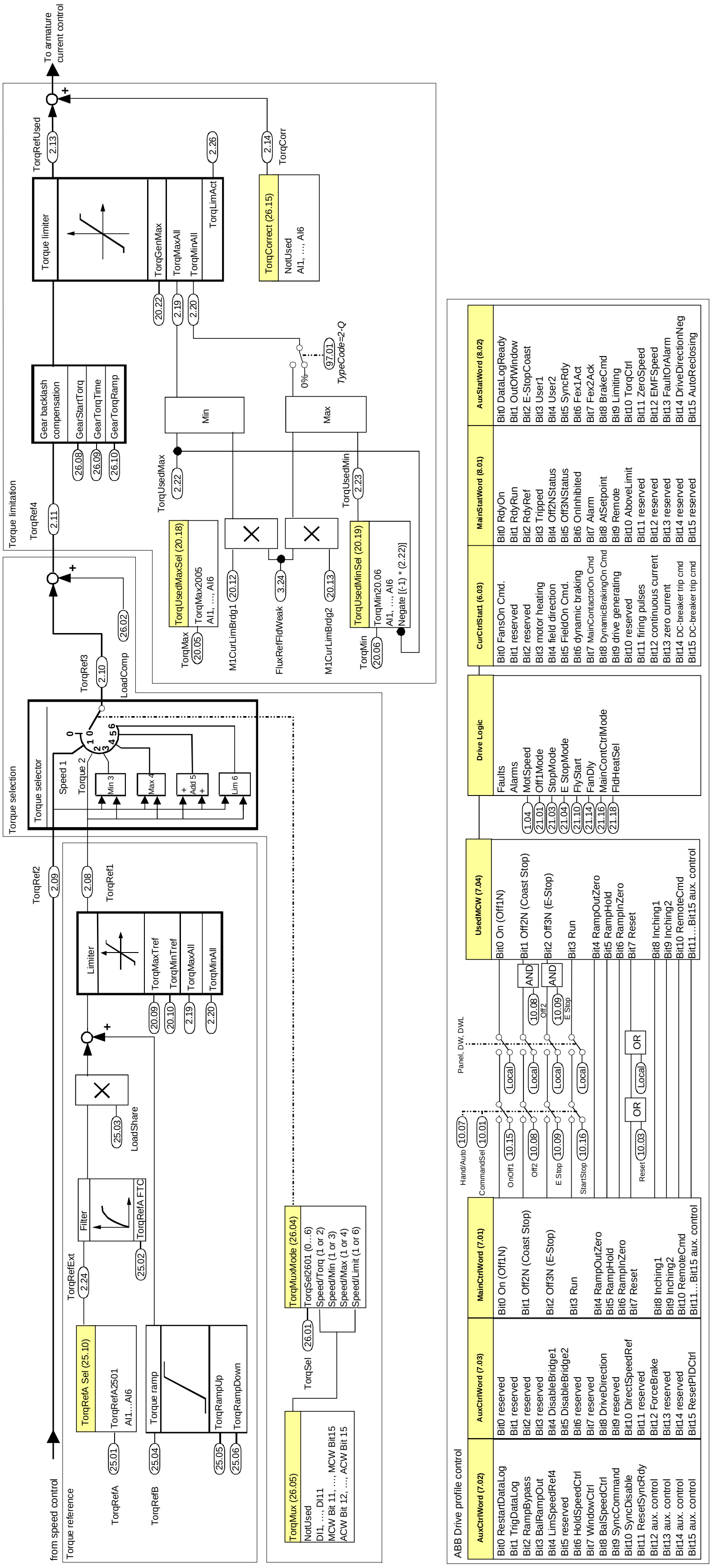
7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A137	137 SpeedNotZero	**Speed not zero:** Re-start of drive is not possible. Speed zero has not been reached [only in case *FlyStart (21.10)* = **StartFrom0**]. Check: - *ZeroSpeedLim (20.03)* - *FlyStart (21.10)* - *M1SpeedFbSel (50.03)* - *M2SpeedFbSel (49.24)*	9.08, bit 4	Not active if RdyRef = 1	1
A138	138 Off2FieldBus	**Off2 (Emergency Off / Coast Stop) pending via** *MainCtrlWord (7.01)* **/ fieldbus - start inhibition:** There is no problem with the drive itself! Check: - *MainCtrlWord (7.01)* bit1 **Off2N**	9.08, bit 5	RdyRun = 1	1
A139	139 Off3FieldBus	**Off3 (E-stop) pending via** *MainCtrlWord (7.01)* **/ fieldbus:** There is no problem with the drive itself! Check: - *MainCtrlWord (7.01)* bit2 **Off3N**	9.08, bit 6	RdyRun = 1	1
A140	140 IllgFieldBus	**Illegal fieldbus settings:** The fieldbus parameters in group 51 (fieldbus) are not set according to the fieldbus adapter or the device has not been selected. Check: - group 51 (fieldbus) - configuration of fieldbus adapter	9.08, bit 7	always	4
A141	141 COM8FwVer	**SDCS-COM-8 firmware version conflict:** Invalid combination of SDCS-CON-4 firmware and SDCS-COM-8 firmware. Check: - for valid combination of SDCS-CON-4 [*FirmwareVer (4.01)*] and SDCS-COM-8 [*Com8SwVersion (4.11)*] firmware version according to the release notes	9.08, bit 8	always	4
A142	142 MemCardMiss	**Memory Card missing:** There is an application loaded in the drive. The Memory Card belonging to the application is not found. Check: - if the Memory Card is properly plugged into the SDCS-CON-4 (X20) - de-energize the electronics, insert the proper Memory Card and reenergize - *ParSave (16.06)*	9.08, bit 9	directly after energizing of electronics	1
A143	143 MemCardFail	**Memory Card failure:** Checksum failure or wrong Memory Card Check: - Memory Card - if proper ABB Memory Card is used - *ParSave (16.06)*	9.08, bit 10	directly after energizing of electronics	1

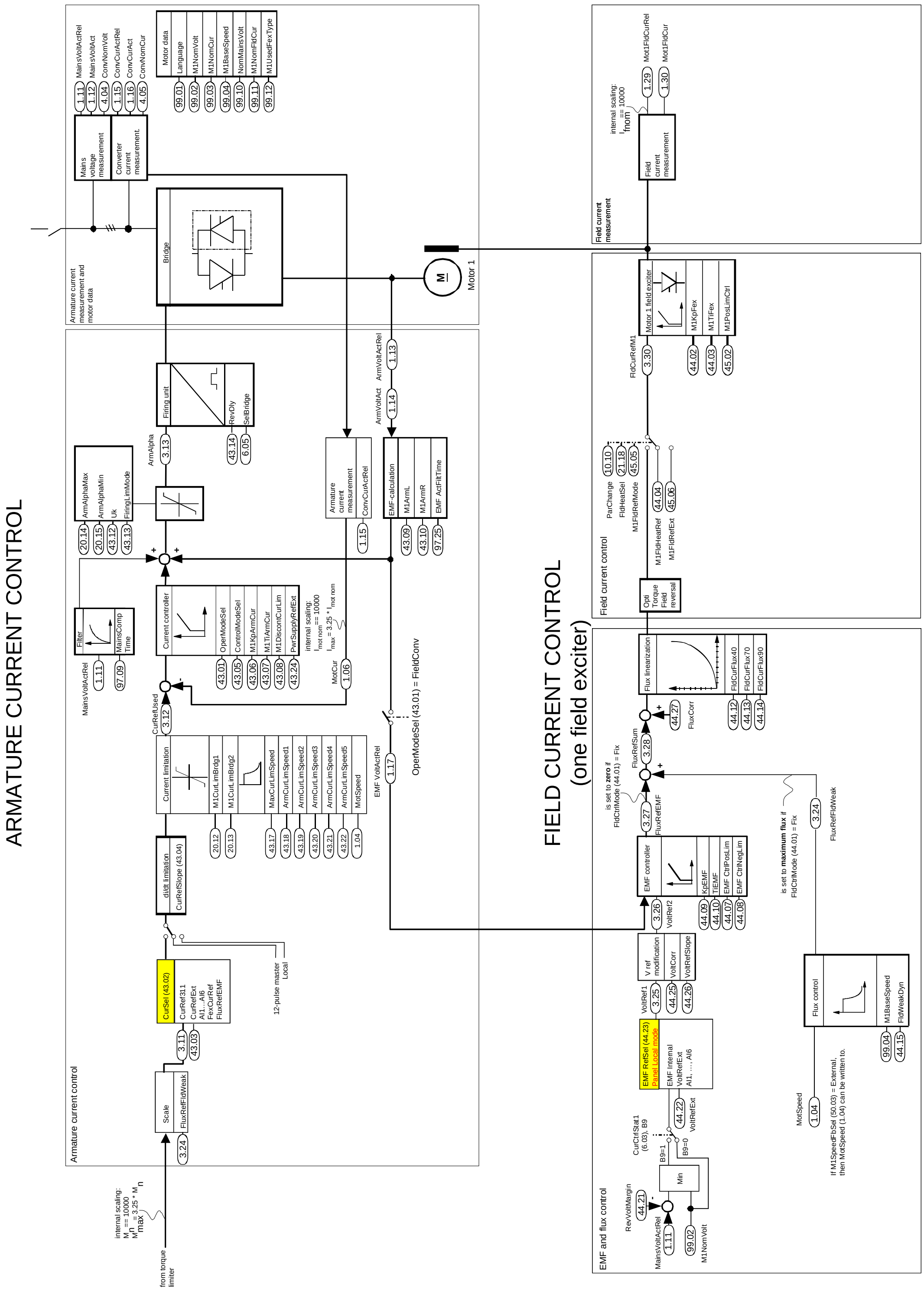
7-segment display	Text on control panel, DriveWindow and DriveWindow Light	Definition / Action	Alarm-word	Alarm is active when	Alarmlevel
A301	301 APAlarm1	**User defined alarm by Adaptive Program**	9.08, bit 11	always	4
A302	302 APAlarm2	**User defined alarm by Adaptive Program**	9.08, bit 12	always	4
A303	303 APAlarm3	**User defined alarm by Adaptive Program**	9.08, bit 13	always	4
A304	304 APAlarm4	**User defined alarm by Adaptive Program**	9.08, bit 14	always	4
A305	305 APAlarm5	**User defined alarm by Adaptive Program**	9.08, bit 15	always	4
A310	310 UserAlarm1	User defined fault by application program	9.09, bit 0	always	4
A311	311 UserAlarm1	User defined fault by application program	9.09, bit 1	always	4
A312	312 UserAlarm2	User defined fault by application program	9.09, bit 2	always	4
A313	313 UserAlarm3	User defined fault by application program	9.09, bit 3	always	4
A314	314 UserAlarm4	User defined fault by application program	9.09, bit 4	always	4
A315	315 UserAlarm5	User defined fault by application program	9.09, bit 5	always	4
A316	316 UserAlarm6	User defined fault by application program	9.09, bit 6	always	4
A317	317 UserAlarm7	User defined fault by application program	9.09, bit 7	always	4
A318	318 UserAlarm8	User defined fault by application program	9.09, bit 8	always	4
A319	319 UserAlarm9	User defined fault by application program	9.09, bit 9	always	4
A320	320 UserAlarm10	User defined fault by application program	9.09, bit 10	always	4
A321	321 UserAlarm11	User defined fault by application program	9.09, bit 11	always	4
A322	322 UserAlarm12	User defined fault by application program	9.09, bit 12	always	4
A323	323 UserAlarm13	User defined fault by application program	9.09, bit 13	always	4
A324	324 UserAlarm14	User defined fault by application program	9.09, bit 14	always	4
A325	325 UserAlarm16	User defined fault by application program	9.09, bit 15	always	4

Appendix A: Firmware structure diagram

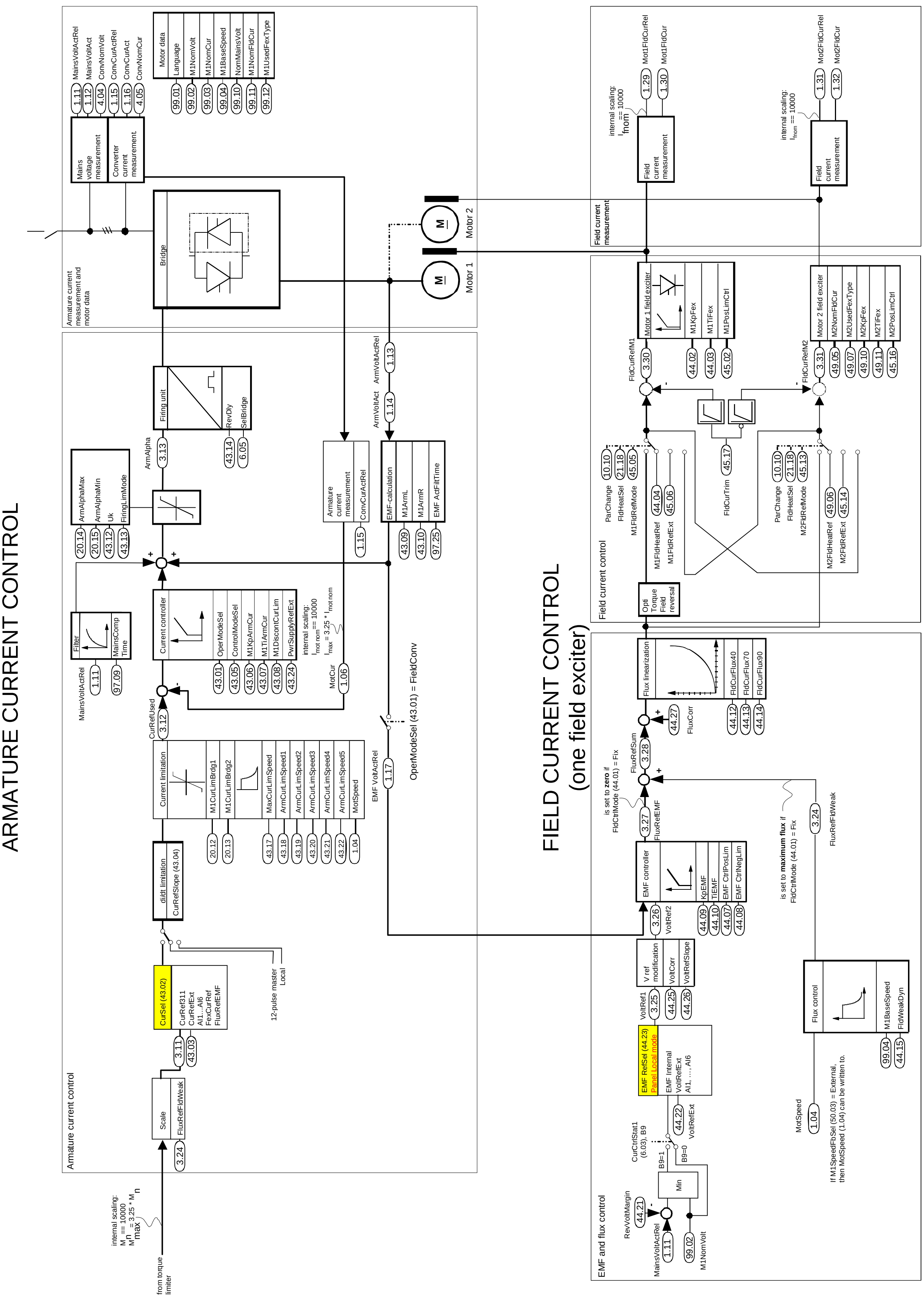


TORQUE CONTROL CHAIN





ARMATURE CURRENT CONTROL
Armature current control
Armature current measurement and motor data
FIELD CURRENT CONTROL
(one field exciter)
EMF and flux control
Field current control
Field current measurement
Motor data
Current controller
Current limitation
di/dt limitation
Firing unit
Bridge
Motor 1
Mains voltage measurement
Converter current measurement
Armature current measurement
EMF-calculation
EMF controller
Flux linearization
Flux control
Motor 1 field exciter
Field current measurement
OperModeSel (43.01) = FieldConv


ARMATURE CURRENT CONTROL
FIELD CURRENT CONTROL
(one field exciter)
Armature current control
Armature current measurement and motor data
Field current measurement
Field current control
EMF and flux control
Current limitation
Current controller
Firing unit
Bridge
Motor 1
Motor 2
EMF-calculation
Flux linearization
EMF controller
Flux control
OperModeSel (43.01) = FieldConv

Appendix B: Index of signals and parameters

Index of signals and parameters (alphabetic order)

Appendix B – Index of signals and parameters

ABB

ABB Automation Products
Wallstadter-Straße 59
68526 Ladenburg • Germany
Tel: +49 (0) 6203-71-0
Fax: +49 (0) 6203-71-76 09
www.abb.com/motors&drives

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