

ACQ800

**Firmware Manual
IGBT Supply Control Program 7.x**



ACQ800 IGBT Supply Control Program 7.x

Firmware Manual

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Introduction to the manual

What this chapter contains

This chapter includes a description of the contents of the manual. In addition, it contains information about the compatibility, safety and intended audience.

Compatibility

This manual is compatible with the following programs:

- version IXXR7270 IGBT supply control program. This program is used in the line-side converters of ACQ800 multidrive.
- version ILXR7270 IGBT supply control program. This program is used in the line-side converters of ACQ800-37 and ACQ800-U31.

Safety instructions

Follow all safety instructions delivered with the drive.

- Read the **complete safety instructions** before you install, commission, or use the drive. For single drives, the complete safety instructions are given at the beginning of the hardware manual. For multidrive safety instructions, see *ACQ800 Multidrive Safety Instructions*.
- 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 this 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.

Terms

Term	Description
Line-side converter / converter	In this manual the ACQ800 IGBT supply unit is referred to as line-side converter / converter.
DriveWindow	PC tool for operating, controlling and monitoring ABB drives
APBU/NPBU	Branching unit for parallel connected converters
INT	Main Circuit Interface Board
RDCO	DDCS Communication Option module
RDCU	Drive Control Unit
RMIO	Motor Control and I/O Board

Contents

The manual consists of the following chapters:


- *Start-up* contains the basic start-up procedure of the line-side converter.
- *Program features* contains the feature descriptions and the reference lists of the user settings and diagnostic signals.
- *Actual signals and parameters* describes the actual signals and parameters of the line-side converter.
- *Fieldbus control* describes the communication through serial communication links.
- *Fault tracing* lists the warning and fault messages with the possible causes and remedies.

Start-up

What this chapter contains

This chapter contains the basic start-up procedure of the line-side converter.

How to start-up the converter

SAFETY		
	<p>The start-up can only be carried out by a qualified electrician.</p> <p>The safety instructions must be followed during the start-up procedure. See the safety instructions on the first pages of the appropriate hardware manual or for multidrive, see <i>ACQ800 Multidrive Safety Instructions</i>.</p>	
<input type="checkbox"/>	Check the installation.	
POWER-UP		
<input type="checkbox"/>	<p>Open the earthing switch.</p> <p>Note: The earthing switch and the main disconnecting device are either mechanically coupled or electrically interlocked: The earthing switch can be closed only when the main disconnecting device is open. The disconnecter can be closed only when the earthing switch is open.</p>	Optional device. See delivery-specific circuit diagrams.
<input type="checkbox"/>	Close the main breaker of the supply transformer.	
<input type="checkbox"/>	Close the auxiliary circuit switch-fuse.	Optional device. See delivery-specific circuit diagrams.
<input type="checkbox"/>	<p>Close the main breaker of the drive and start the line-side converter:</p> <ul style="list-style-type: none"> - Reset the starting logic with the RESET button on the cabinet door. - Turn the starting switch on the cabinet door from position 0 to START position for 2 seconds, release and leave it to position 1. 	

Note: Line-side converter parameters do not need to be set in a normal start-up procedure or in normal use!

Program features

What this chapter contains

This chapter describes the control program features.

Note: The parameters listed in this chapter do not need to be set in normal use! They are only mentioned for explaining the program features.

Symbols used

Symbol	Description
1.10 , 11.11	Actual signal or parameter (See chapter Actual signals and parameters.)
113.05	Parameter above 100. These parameters are not visible to the user unless the password is entered for the parameter lock in parameter 16.03 PASS CODE. These parameters are not allowed to be changed without ABB's permission.

Local control vs. external control

The converter can be controlled/monitored:

- locally from control panel (connect the panel cable to the panel interface on the RDCU Drive Control Unit)
- locally from DriveWindow PC tool (connect the fiber optic cables to DDCCS channel CH3 on the RDCO DDCCS Communication Option module)
- externally via I/O connections or fieldbus interface.

With the control panel or DriveWindow PC tool the user can change parameters and view or reset the fault history. When the start key is pressed in the local control mode, the intermediate circuit charges and the converter starts to modulate. For instructions on how to use the control panel, see the *Firmware Manual* of the motor-side converter application program.

For the default I/O connections, see section [RMIO board connection diagrams](#) on page 28.

For information on how to control/monitor the converter through an external control system, see chapter [Fieldbus control](#).

DriveWindow connection

DriveWindow and other tools can be connected to DDCCS channel CH3, either in a ring or a star configuration using NDBU-xx branching units. Before starting the communication, node numbers must be set for each converter. See parameter 70.15 CH3 NODE ADDR. This setting can be made by a point-to-point connection with control panel CDP 312R or DriveWindow. The new node address becomes valid on the next power-up of the RMIO board. DDCCS channel CH3 is the slave in the communication link.

Identification routine

At first start the line-side converter adapts itself to the supply network automatically. No network data needs to be set by the user.

During the Line-side Identification, the supply network voltage level is estimated based on DC voltage measurement. If the value is within the allowed limits, the procedure checks the frequency of the network (50 Hz or 60 Hz) and the phase order. Identification takes approximately four seconds during which the line-side converter may not be loaded.

The automatic Line-side Identification routine is active by default and it is repeated each time the line-side converter receives a start command after the control board (RMIO) is powered. The automatic Line-side Identification routine can be inactivated by a parameter if the identification routine has been performed during the first start-up and the phase order has not been changed after the first start-up. A manual identification can also be chosen instead.

Settings and diagnostics

Parameters	Description
99.07	Activation of the manual Line-side Identification
99.08	Activation of the automatic Line-side Identification
Actual signals	
02.07	Nominal DC voltage reference
Faults	
NET VOLT FLT	Main supply voltage is out of acceptable range.

Charging

After receiving the start command the line-side converter closes the charging contactor, which in turn connects the intermediate DC link capacitors to the AC supply via the charging resistors. The DC link voltage rises and when it is high enough, the main contactor/breaker is closed and the charging contactor is opened. The contactors are controlled by the line-side converter control board (RMIO) via relay outputs RO1 and RO3.

Settings and diagnostics

Faults	Description
CHARGING FLT	Charging has failed.
MAIN CNT FLT	Main contactor fault. Main contactor/breaker is not closed or digital input DI3 signal is missing.

Synchronization

First, the line-side converter is synchronized to the network by a three-phase short circuit. On the basis of the short circuit current, the unit can identify the phase order of the supply network and the starting point for the flux/voltage vector.

There are two alternative means for the synchronization: one with phase order check and the other without. The method can be chosen by a parameter.

No phase order check is performed by default since it is done during the Line-side Identification. If the phase order is changed after the first start, the Line-side Identification routine needs to be repeated.

If the synchronization with phase order check is selected, the phase order can be changed without performing the Line-side Identification routine again.

If the first synchronization trial fails, the unit makes up to 9 additional trials.

Settings and diagnostics

Parameters	Description
99.06	Selection of the synchronization
Faults	
SUPPLY PHASE	Phase missing
SYNCHRO FLT	Short-circuit current is below limit. 9 synchronization trials have failed.

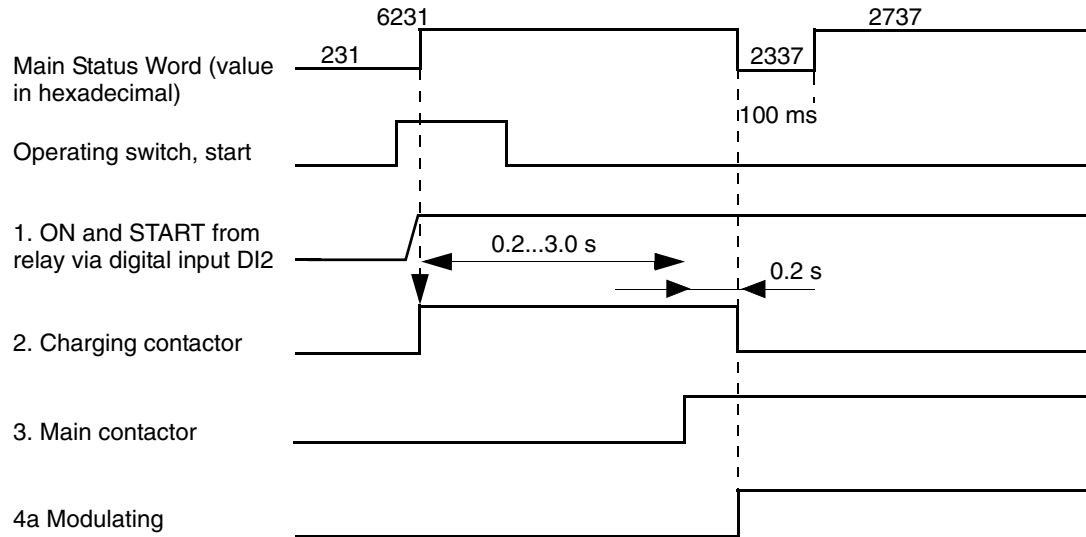
Starting sequence

During the charging procedure the main contactor is closed followed by the Line-side Identification and synchronization routines. When they are completed, the modulator starts and the line-side converter operates normally.

For a description of the starting procedure, see the following sections: [Start by the operating switch \(I/O control\)](#), [Start in local control mode](#) and [Start via fieldbus](#).

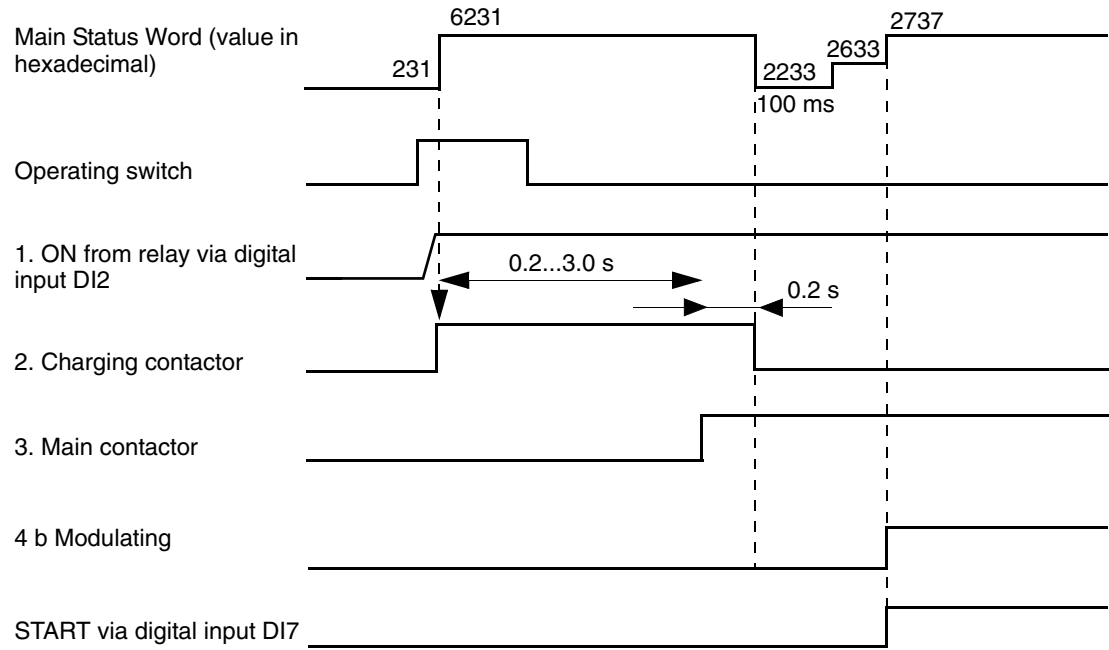
Start by the operating switch (I/O control)

By default, the control commands (ON/OFF/START) of the line-side converter are given by the three-position operating switch on the cabinet door which is wired to digital input DI2. The starting sequence is as follows:



Step	Function
1.	Line-side converter receives the ON and START commands (DI2 rising edge) from the starting switch.
2.	Line-side converter closes the charging contactor control circuit (RO1).
3.	Line-side converter closes the main contactor and the cooling fan control circuit (RO3) and receives the “main contactor on” acknowledgement (DI3) and the “cooling air fan in operation” acknowledgement (DI1).
4 a	Line-side converter synchronises itself to the supply network if the DC voltage level is acceptable (charging is completed successfully). Line-side converter starts modulation and opens the charging contactor control circuit (RO1). The inverter units can be started.
4 b	If parameter 16.01 RUN BIT SEL is set to DI7, the ON command is given via digital input DI2 and the START command is given via digital input DI7. Line-side converter starts modulation and the inverter units can be started. See the following starting sequence figure.
0.2...3.0 s = Charging time. Charging time is shorter if the DC link is charged before start. 0.2 s = Start delay	

When the ON command is given via digital input DI2 and the START command is given via digital input DI7, the starting sequence is as follows.



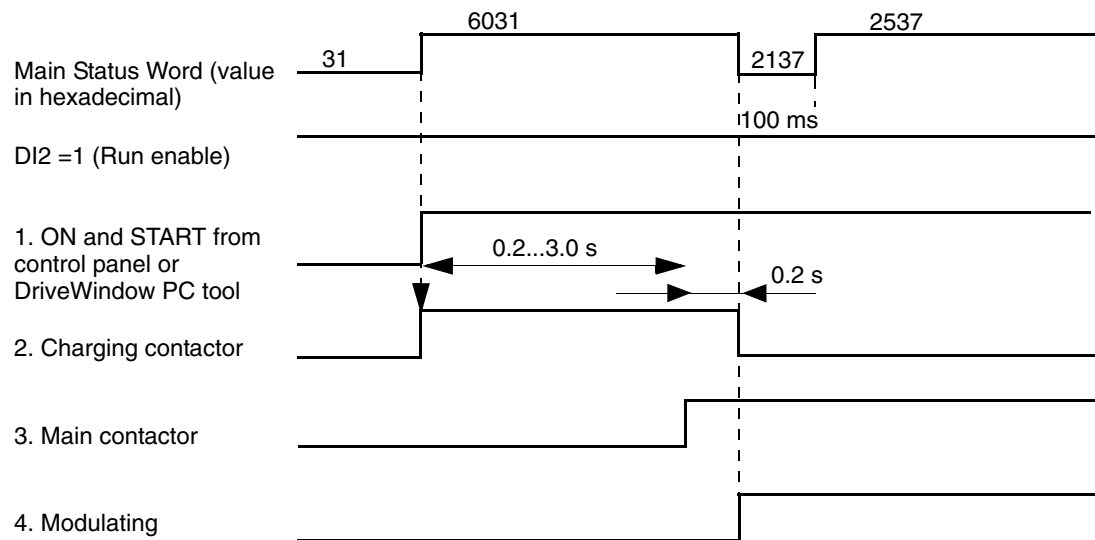
Start in local control mode

The local control mode is mainly used during commissioning and maintenance. The control mode is selected with the LOC/REM key on the CDP 312R control panel or with the DriveWindow PC tool.

Intermediate circuit DC voltage reference [23.01 DC VOLT REF](#) is given from the control panel (REF key) unless an analog input is selected as the reference source by parameter [11.01 DC REF SELECT](#). Reactive power reference is given by parameter [24.01 Q POWER REF](#) unless an analog input is selected as the reference source by parameter [11.02 Q REF SELECT](#).

Note: Run enable signal should be on before the start command is issued (that is, DI2 = 1).

The starting sequence is as follows:

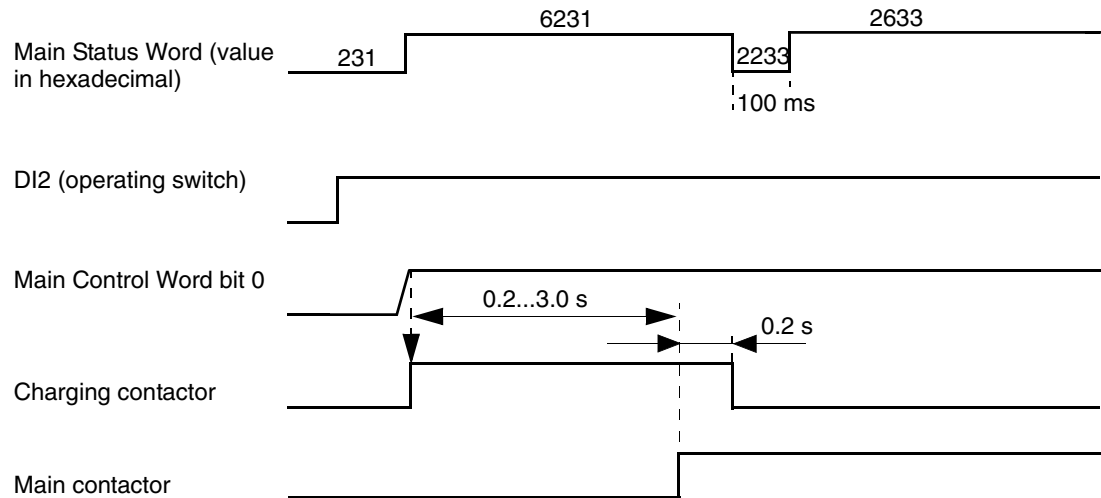


Step	Function
1.	Line-side converter receives the ON and START commands from the control panel or DriveWindow PC tool.
2.	Line-side converter closes the charging contactor control circuit (RO1).
3.	Line-side converter closes the main contactor and the cooling fan control circuit (RO3) and receives the “main contactor on” acknowledgement (DI3) and the “cooling air fan in operation” acknowledgement (DI1).
4.	Line-side converter synchronizes itself to the supply network if the DC voltage level is acceptable (charging is completed successfully). Line-side converter starts modulation and opens the charging contactor control circuit (RO1). The inverter units can be started.
0.2...3.0 s = Charging time. Charging time is shorter if the DC link is charged before start. 0.2 s = Start delay	

Start via fieldbus

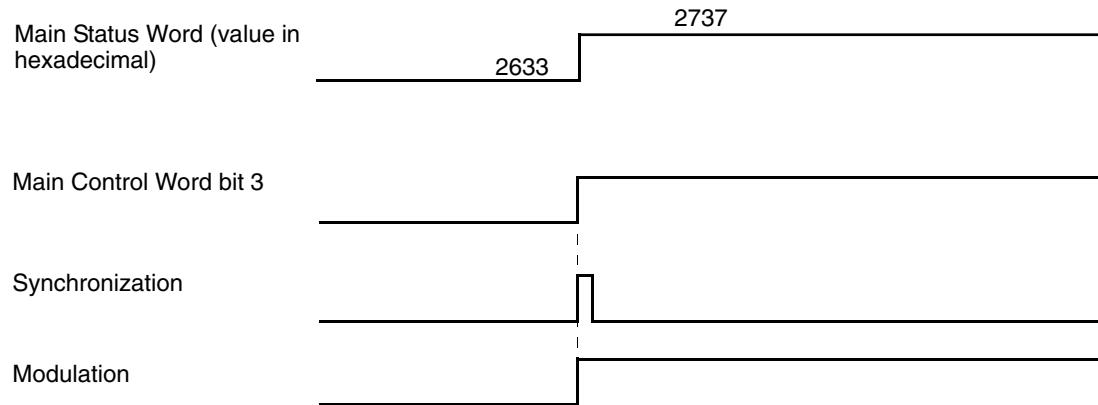
The fieldbus control can be activated by a parameter (parameter group **98 OPTION MODULES**). The DC bus charging and the modulator start can be controlled separately.

When the fieldbus control is active, the DC bus charging can be controlled by a rising edge of Main Control Word (MCW) bit 0 **and** simultaneous high level of digital input DI2 (ie, the operating switch on the cabinet door turned first to position START and thereafter left to position 1).



0.2...3.0 s = Charging time. Charging time is shorter if the DC link is charged before start.
0.2 s = Start delay

The modulator is started by high level of Main Control Word (MCW) bit 3 and stopped by low level of bit 3. The modulator can be started only after the charging of the DC bus is completed.



For more information on fieldbus communication, see chapter [Fieldbus control](#).

Settings and diagnostics

Parameters	Description
16.01	Selection of the source for the ON and START commands in I/O control
16.15	Selects the start mode.
11.01 and 23.01	DC reference
11.02 and 24.01	Reactive power reference
98.01	Selection of the control command interface(s)
98.02	Activation of the fieldbus control
Actual signals	
07.01 MAIN CTRL WORD	Status of the Main Control Word bits
08.01 MAIN STATUS WORD	Status of the Main Status Word bits

Stop

A stop signal (DI2 = 0) from the cabinet door switch stops the modulator and opens the main contactor. A stop command can also be given in the local control mode by pressing the Stop key (⏹) on the control panel or DriveWindow PC tool.

The modulator can be stopped in the remote control mode through an external control system. This function does not open the main contactor. The line-side converter only shifts to the 6-pulse diode bridge mode (no regenerative braking is allowed/possible).

Missing phase

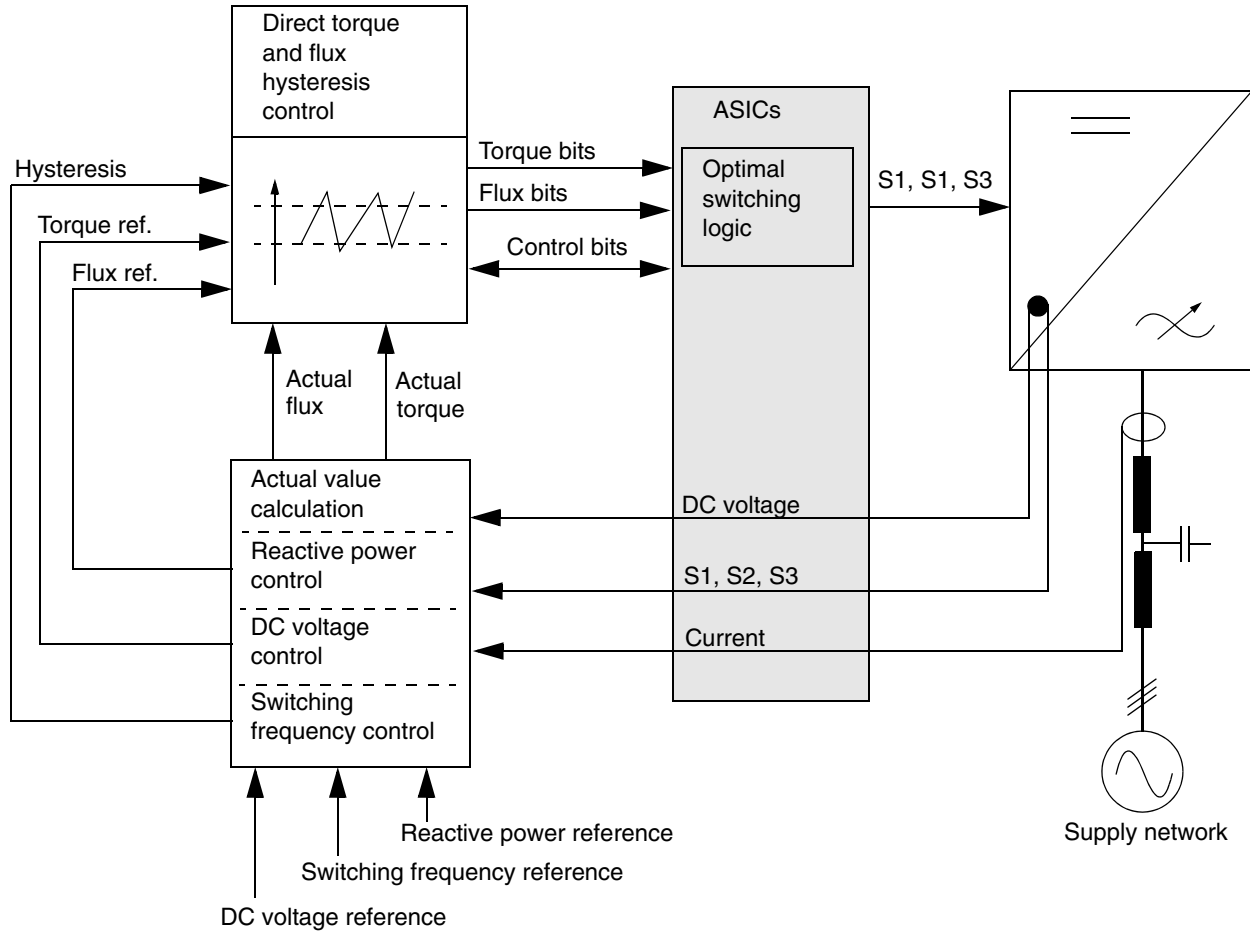
A missing phase is detected by means of AC current and calculated line frequency. When the line-side converter detects that the AC current has been below a fixed limit for 1.5 milliseconds or that the calculated line frequency has exceeded the defined minimum and maximum frequency limits, an alarm is generated. Modulation stops but the main contactor/breaker remains closed. The line-side converter tries to resynchronize as long as the DC voltage is higher than the DC undervoltage trip limit. The resynchronizing checks are made at 20 ms intervals. If the voltage in the DC link falls below the limit, the line-side converter will open the main contactor/breaker and trip on a DC undervoltage fault.

Settings and diagnostics

Parameters	Description
30.12	DC undervoltage fault trip limit
142.05	Minimum limit for the difference between the line frequency and the initialized value of 50 or 60 Hz. With default value 5 Hz, the minimum frequency limit equals 50 Hz - 5 Hz = 45 Hz (or 60 Hz - 5 Hz = 55 Hz).
142.06	Maximum limit for the difference between the line frequency and the initialized value of 50 or 60 Hz. With default value 5 Hz, the maximum frequency limit equals 50 Hz + 5 Hz = 55 Hz (or 60 Hz + 5 Hz = 65 Hz).
Actual signals	
01.05	Calculated line frequency
Warnings	
NET LOST	Supply loss
Faults	
DC UNDERVOLT	Undervoltage trip

Control diagram

A block diagram of the measurements and the principles of the line-side converter control program is shown below. S1, S2 and S3 denote the power switches.



Controllers

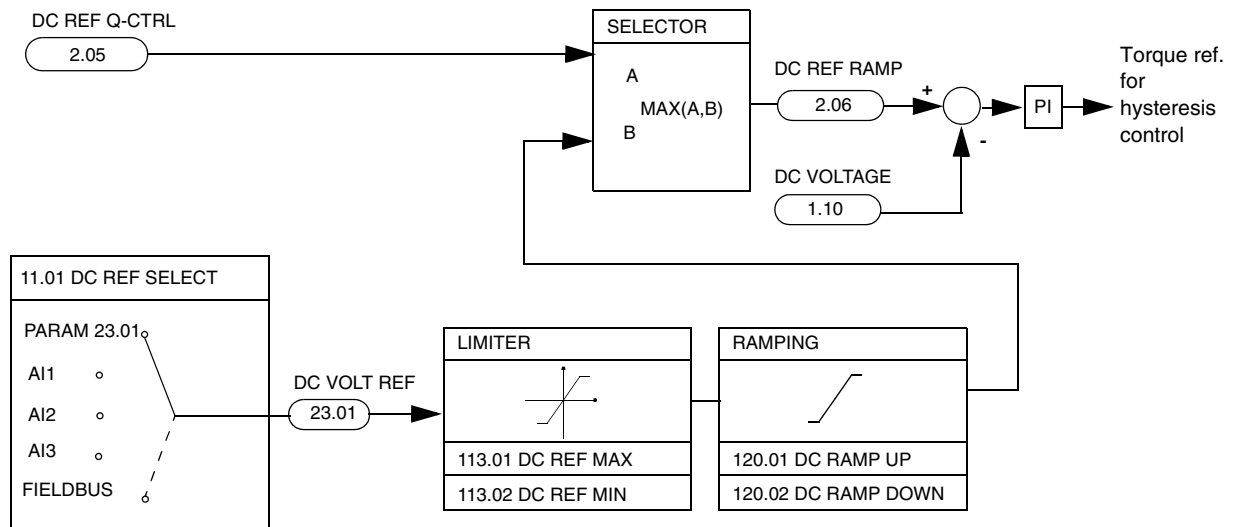
The control includes four main controllers:

- torque and flux hysteresis controllers
- DC voltage and reactive power controllers.

On the basis of measurements, the following four items are calculated:

- actual value for flux
- actual value for torque
- actual value for reactive power
- estimate for frequency.

DC voltage control



DC voltage controller keeps the DC voltage in a preset reference in all load conditions. The controller input, that is, the error value between the reference and the actual measured value, is calculated from DC voltage measurement and ramped and limited DC references. The output of the DC voltage PI controller is the torque reference for hysteresis control.

There are two reference values for the DC voltage control:

- user-given DC voltage reference (a parameter)
- minimum DC voltage reference (calculated by reactive power controller).

In the normal mode, the ramped value of the user-defined reference is used. If it is below the minimum DC voltage reference, the minimum reference is used instead.

The controller parameters are tuned by default. There is no need to reset them.

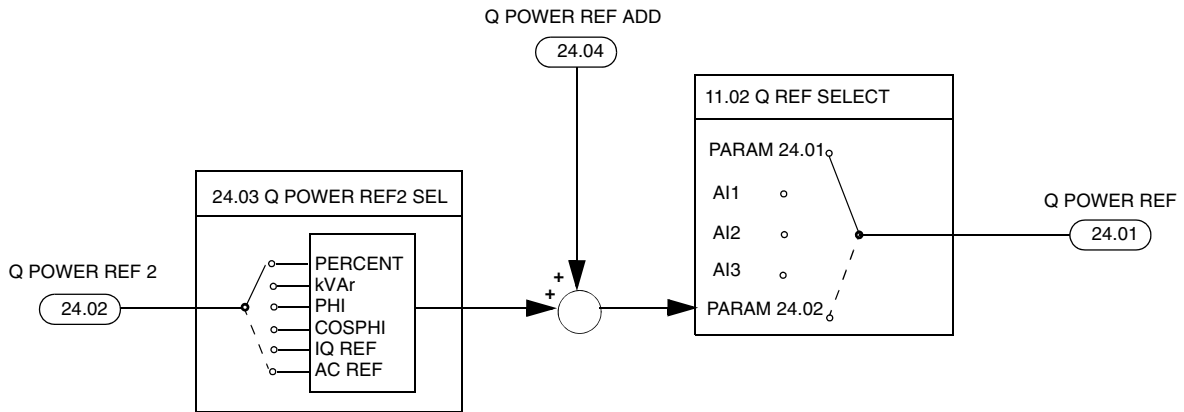
Settings and diagnostics

Parameters	Description
11.01	DC voltage reference source
23.01	User-given reference
113.01	Maximum DC voltage reference limit = $1.1 \cdot \sqrt{2} \cdot$ parameter 04.04 .
113.02	Minimum DC voltage reference limit = $0.65 \cdot \sqrt{2} \cdot$ parameter 04.04 .
120.01	DC voltage reference ramp time from 0 to $\sqrt{2} \cdot$ parameter 04.04 . Default value is 1 s.
120.02	DC voltage reference ramp time from $\sqrt{2} \cdot$ parameter 04.04 to 0. Default value is 1 s.
Actual signals	
01.10 (160.04)	Actual DC voltage
02.05	Reference from reactive power control
02.06	Ramped and limited DC voltage reference

Reactive power control

Reactive power control is capable of generating a preset amount of reactive power to the network (positive = capacitive, negative = inductive) by changing the flux length. This can be set by a parameter. By default no reactive power is generated.

When the flux length exceeds the network flux length, capacitive power is generated to the network and vice versa. Increased flux means that the AC voltage of the line-side converter is higher than the network voltage.



Settings and diagnostics

Parameters	Description
11.02 , 24.01 , 24.02 , 24.04	Reactive power to be generated to network
24.03	Selection of the reference unit
120.03	Reactive power reference ramp up time from 0 kVAr to the absolute value of the converter nominal power (parameter 04.06). Default value is 1 s.
120.04	Reactive power reference ramp down time from the absolute value of the converter nominal power (parameter 04.06) to 0 kVAr. Default value is 1 s.
Actual signals	
01.07	Calculated reactive power

Reduced Run Function

Reduced Run Function is available for parallel connected converters, 2...12 · R8i.

Reduced Run Function makes it possible to continue the operation with limited current if a converter module(s) is out of order. If one of the modules is broken, it must be removed. Parameter change is needed to continue the run with reduced current.

Removing a broken converter module

Note: The number of removed converters is restricted with the following rules:

- Maximum number of removed converters is limited to 50% of the original number of the parallel connected converters.

AND

- When converters share a common line filter, all of them need to be removed if one of them is out of order.

Original number of parallel converters	Number of converters which can be removed
4	2
6	2
8	2 or 4
10	2 or 4
12	2 or 4 or 6



WARNING! The safety instructions must be followed. See the safety instructions on the first pages of the appropriate hardware manual or for multidrive, see *ACQ800 Multidrive Safety Instructions*.

- Disconnect the supply voltage and all auxiliary voltages from the drive.
- Remove the broken converter module from the cabinet. See the appropriate hardware manual.
- If the broken module has a common filter unit with another module, remove all modules that share the filter with the broken module. Disconnect the LCL filter by removing the AC fuses.
- Fasten the air baffle provided with the unit to the top module guide to block airflow through the empty module space.
- Switch on the supply voltage. INT CONFIG fault now indicates that the number of the connected converter modules has changed.
- If the operation is continued with limited current, the number of the existing converter modules must be set to parameter **16.10** INT CONFIG USER.
- Reset the fault and start the converter. PPCS link is reconfigured automatically during DC link charging and parameter **24.01** Q POWER REF range is limited according to the new configuration.

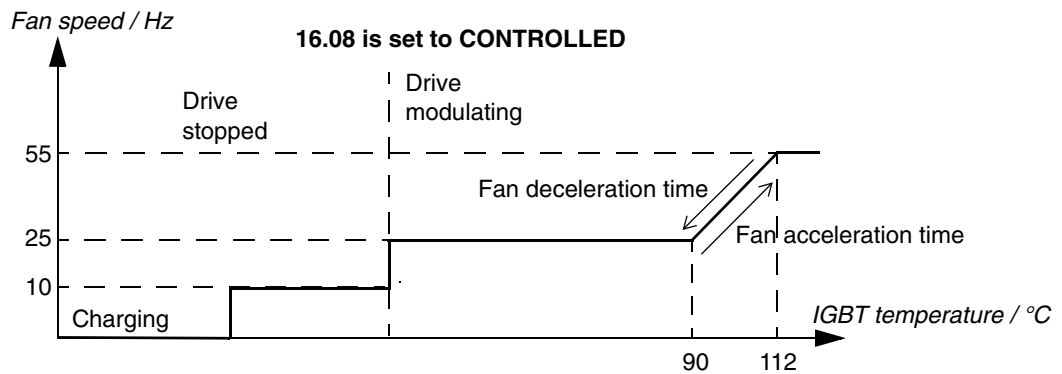
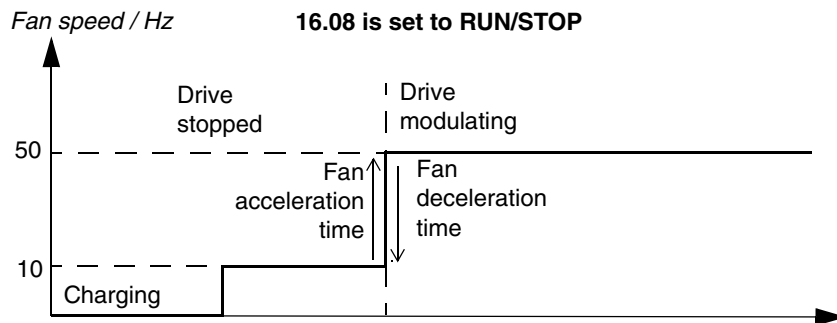
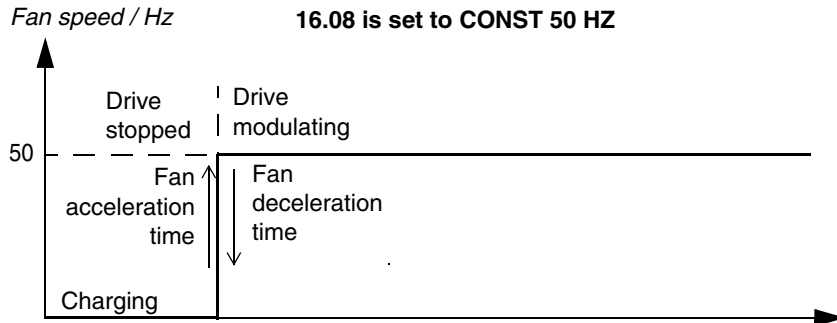
Note: If INT CONFIG fault reappears, the number of the parallel connected converters defined by parameter [16.10](#) INT CONFIG USER is incorrect. See signal [08.22](#) INT CONFIG WORD.

Settings and diagnostics

Parameters	Description
16.10	Number of parallel connected converters
24.01	Reactive power generation reference
Actual signals	
08.22	Converters recognized by the application program

Inverter fan speed control

Converter modules can be equipped with an optional inverter fan. The fan speed can be controlled by adjusting the fan speed control parameters. The following figures present the different fan speed control curves.



Settings

Parameters	Description
16.08	Selection of the inverter fan speed control

RMIO board connection diagrams

Default cable connections to the RMIO board are shown below. For ACQ800-U31 line-side converter RMIO connections, see page 29.

Terminal block size:

cables 0.3 to 3.3 mm² (22 to 12 AWG)

Tightening torque:

0.2 to 0.4 Nm (2 to 4 lbf in.)

1) non-programmable I/O

2) External alarm/fault indication via digital input DI4: See parameter 30.04 DI4 EXT EVENT.

3) External alarm/fault indication via digital input DI5: See parameter 30.05 DI5 EXT EVENT.

4) START command via digital input DI7: See parameter 16.01 RUN BIT SEL.

5) External alarm/fault indication via digital input DI7: See parameter 30.13 DI7 EXT EVENT.

6) Total maximum current shared between this output and optional modules installed on the board.

X20

1	VREF-	Reference voltage -10 V DC,
2	GND	1 kohm ≤ R _L ≤ 10 kohm

X21

1	VREF+	Reference voltage 10 V DC,
2	GND	1 kohm ≤ R _L ≤ 10 kohm
3	AI1+	By default, not in use. 0(2)...10 V, R _{in} > 200 kohm
4	AI1-	
5	AI2+	By default, not in use. 0(4)...20 mA, R _{in} = 100 ohm
6	AI2-	
7	AI3+	By default, not in use. 0(4)...20 mA, R _{in} = 100 ohm
8	AI3-	
9	AO1+	By default, not in use. 0(4)...20 mA, R _L ≤ 700 ohm
10	AO1-	
11	AO2+	By default, not in use. 0(4)...20 mA, R _L ≤ 700 ohm
12	AO2-	

X22

1	DI1	Acknowledgement of converter fan ¹⁾
2	DI2	Stop/Start
3	DI3	Acknowledgement from main contactor ¹⁾
4	DI4	By default, not in use. ²⁾
5	DI5	By default, not in use. ³⁾
6	DI6	Reset ¹⁾
7	+24V	+24 V DC max. 100 mA
8	+24V	
9	DGND	Digital ground
10	DGND	Digital ground
11	DI7(DIIL)	By default, not in use. ^{4) 5)}

X23

1	+24V	Auxiliary voltage output and input, non-isolated, 24 V DC 250 mA ⁶⁾
2	GND	

X25

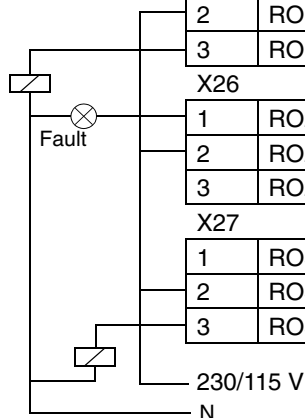
1	RO11	Relay output 1: Charging contactor control ¹⁾
2	RO12	
3	RO13	

X26

1	RO21	Relay output 2: fault (-1)
2	RO22	
3	RO23	

X27

1	RO31	Relay output 3: Main contactor control ¹⁾
2	RO32	
3	RO33	



Default cable connections to the RMIO board for the ACQ800-U31 line-side converter are shown below.

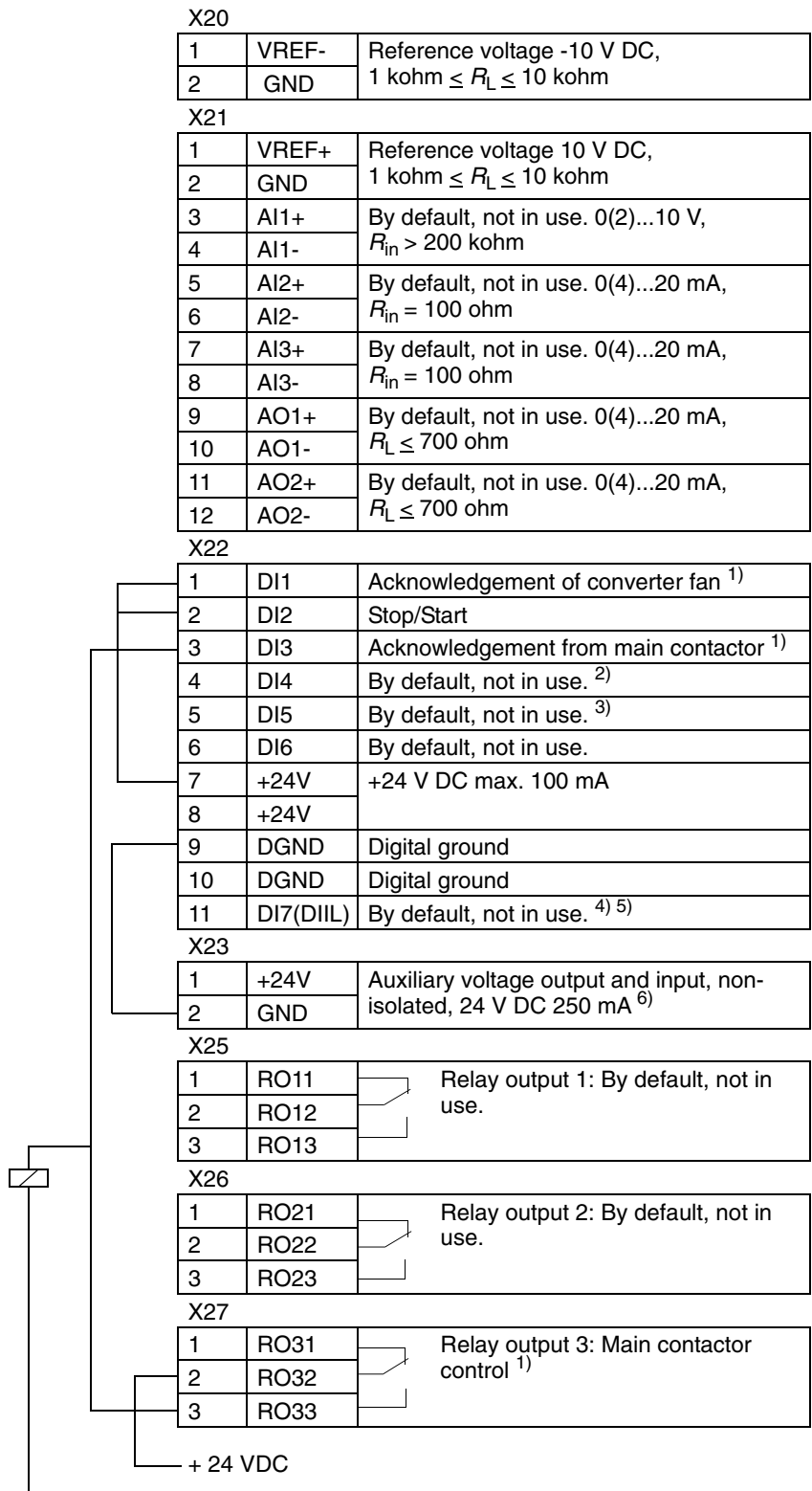
Terminal block size:

cables 0.3 to 3.3 mm² (22 to 12 AWG)

Tightening torque:

0.2 to 0.4 Nm (2 to 4 lbf in.)

- 1) non-programmable I/O
- 2) External alarm/fault indication via digital input DI4: See parameter 30.04 DI4 EXT EVENT.
- 3) External alarm/fault indication via digital input DI5: See parameter 30.05 DI5 EXT EVENT.
- 4) START command via digital input DI7: See parameter 16.01 RUN BIT SEL.
- 5) External alarm/fault indication via digital input DI7: See parameter 30.13 DI7 EXT EVENT.
- 6) Total maximum current shared between this output and optional modules installed on the board.



Temperature sensors

It is possible to measure external temperatures by connecting a temperature sensor to the analog inputs and outputs of the drive.

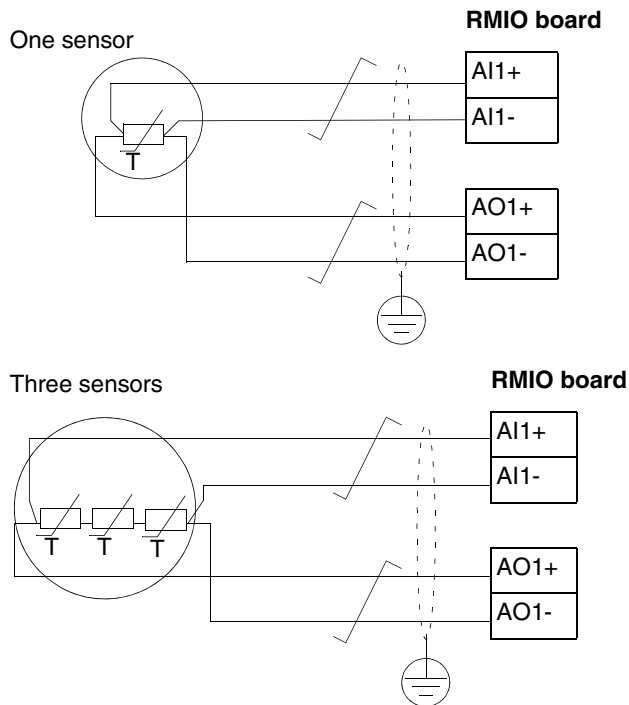
Analog output feeds constant current through the sensor. The sensor resistance increases as the temperature rises, as does the voltage over the sensor. The temperature measurement function reads the voltage through analog input and converts it to degrees centigrade. The IGBT Supply Control program supports four measurement channels: AI1 (of the RMIO or RAIO 1) and AI2 (of the RAIO 1) for EXT TMP 1 and EXT TMP 2 temperature measurements and AI1 (of the RAIO 2) and AI2 (of the RAIO 2) for EXT TMP 3 and EXT TMP 4. The constant current level is automatically set by the application program according to the sensor type selection.

Sensor type	Unit	Scaling
Pt100	°C	
PTC	Ω	normal 0...1.5 kΩ overtemperature ≥ 4 kΩ
KTY84-1xx, (silicon temperature sensor)	Ω	90°C = 936 Ω 110°C = 1063 Ω 130°C = 1197 Ω 150°C = 1340 Ω

The alarm and fault EXT TMP x limits are defined by parameters in group [30 FAULT FUNCTIONS](#) for each measurement circuit.

Thermal sensor connection through I/O

The figure below shows a temperature measurement of one sensor when the RMIO board is used as the connection interface.



Settings

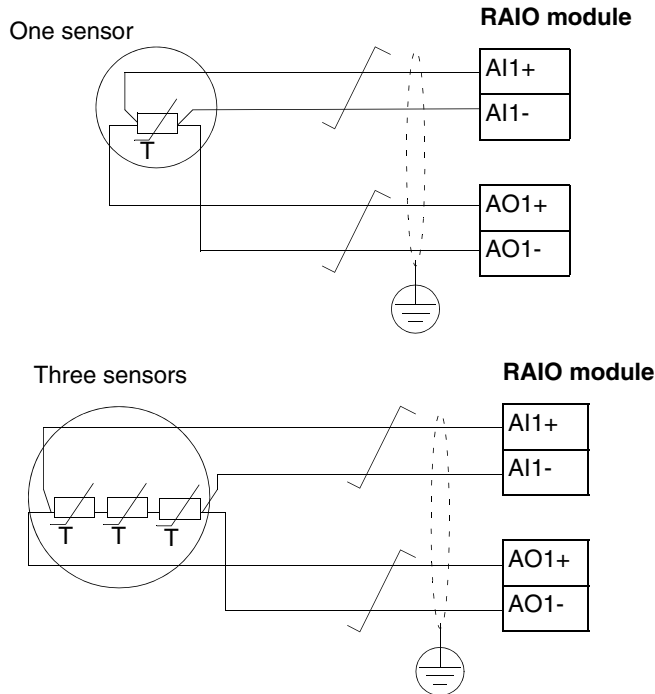
Parameter	Additional information
30.20 EXT TMP 1 AI1	Activation of the EXT TMP 1 AI1 temperature measurement function and selection of the sensor type
30.21...30.24	Alarm and fault limits
30.25 EXT TMP 1 DELAY	Selection of the supervision delay or deactivation of supervision

Diagnostics

Actual value	Additional information
01.32 EXT TMP 1	Measured external temperature measurement 1
Alarm	Signal
EXT TMP 1 HI	Signal 09.04 ALARM WORD 1 bit 2 value is 1
EXT TMP 1 LO	Signal 09.04 ALARM WORD 1 bit 2 value is 1
Fault	Signal
EXT TMP 1 HI	Signal 09.03 FAULT WORD 3 bit 2 value is 1
EXT TMP 1 LO	Signal 09.03 FAULT WORD 3 bit 2 value is 1

Thermal connection through analog I/O extension

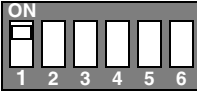
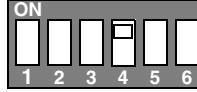
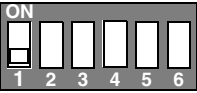
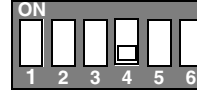
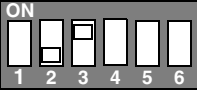
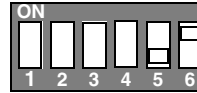
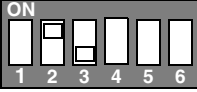
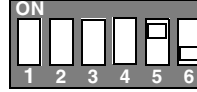
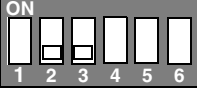
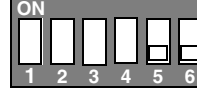
The figure below shows a temperature measurement of one sensor when analog input AI1 of an optional Analog I/O Extension module, RAIO, is used as the connection interface.



Settings

Parameter	Additional information	
30.20 EXT TMP 1 AI1	Activation of the EXT TMP 1 AI1 temperature measurement function and selection of the sensor type	
	Sensor type	RAIO-01 Signal type
	1xPt100	0...2 V
	2xPt100	0...10 V
	3xPt100	0...10 V
	1...3 PTC	0...10 V
30.21...30.24	Alarm and fault limits	
30.25 EXT TMP 1 DELAY	Selection of the supervision delay or deactivation of supervision	
98.11 AI/O EXT MODULE 1	Activation of the communication to the optional analog I/O extension module	

Set RAIO-01 input mode to unipolar (default) and signals type to 0...2 V or 0...10 V depending on sensor type. For more information, see *RAIO-01 Analogue I/O Extension User's Manual* (3AFE64484567 [English]).

Switch S2 (Operating mode) for RAIO-01		
Analog input AI1	Analog input AI2	Input signal
		$\pm 0(4)\dots 20$ mA $\pm 0(2)\dots 10$ V $\pm 0\dots 2$ V
		$0(4)\dots 20$ mA $0(2)\dots 10$ V $0\dots 2$ V (Default)
Switch S2 (Current or voltage signal)		
		Current signal $\pm 0(4)\dots 20$ mA (Default)
		Voltage signal $\pm 0(2)\dots 10$ V
		Voltage signal $\pm 0\dots 2$ V

Diagnostics

Actual value	Additional information
01.32 EXT TMP 1	Measured external temperature measurement 1
Alarm	Signal
EXT TMP 1 HI	Signal 09.04 ALARM WORD 1 bit 2 value is 1
EXT TMP 1 LO	Signal 09.04 ALARM WORD 1 bit 2 value is 1
EXT ANALOG IO	Signal 09.04 ALARM WORD 1 bit 10 value is 1
Fault	Signal
EXT TMP 1 HI	Signal 09.03 FAULT WORD 3 bit 2 value is 1
EXT TMP 1 LO	Signal 09.03 FAULT WORD 3 bit 2 value is 1

Actual signals and parameters

What this chapter contains

This chapter describes the actual signals and parameters. The chapter also lists the fieldbus equivalents, data types and default values.

Note: Parameter values do not need to be set in normal use!

Fieldbus equivalent

Fieldbus equivalent defines the scaling between the value used in the converter control program and the integer used in serial communication.

Fieldbus addresses

Type Rxxx adapter modules (such as RPBA, RCAN, etc.): See the appropriate user's manual.

Interbus-S NIBA-01 module:

- $xyxy \cdot 100 + 12288$ converted into hexadecimal (xx = parameter number and yy = subindex).

Example: The index for drive parameter 13.09 is $1309 + 12288 = 13597 = 351D$ (hex).

Modbus and Modbus Plus address

The drive parameter and dataset information are mapped into the 4xyy (where xy = drive parameter number) register area. This holding register can be read from an external device, which can modify the register values by writing into them.

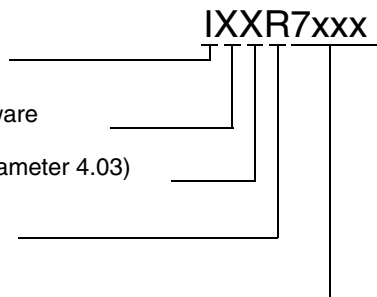
There are no setup parameters for mapping the data to the 4xyy registers. The mapping is pre-defined and corresponds directly to the drive parameter grouping which is being used by the local drive panel.

Terms and abbreviations

Term	Definition
Actual signal	Signal measured or calculated by the converter. Can be monitored by the user. No user setting possible.
B	Boolean
C	Character string
Def.	Default value
FbEq	Fieldbus equivalent: the scaling between the value shown on the panel and the integer used in serial communication
I	Integer
R	Real
T.	Data type (see B, C, I, R)

No.	Name/Value	Description	FbEq / T.
01 ACTUAL SIGNALS			
01.05	FREQUENCY	Calculated line frequency [Hz]	100 = 1 Hz
01.06	LINE CURRENT	Measured line current [A]	1 = 1 A
01.07	REACTIVE POWER	Calculated reactive power (positive = capacitive, negative = inductive) [kVar]	1 = 1 kVar
01.08	POWER	Calculated line-side converter power (positive = power flow from supply network to intermediate circuit, negative = power flow from intermediate circuit to supply network) [kW]	1 = 1 kW
01.09	POWER	Input power in percent of the nominal value (parameter 04.06 CONV NOM POWER) [%]	100 = 1%
01.10	DC VOLTAGE	Measured intermediate circuit voltage [V]	1 = 1 V
01.11	MAINS VOLTAGE	Calculated input voltage [V]	1 = 1 V
01.12	ACQ800 TEMP	IGBT temperature [°C]	1 = 1°C
01.13	TIME OF USAGE	Elapsed time counter. Runs when the RMIO board is powered. [h]	1 = 1 h
01.14	KWH SUPPLY	Counts the kilowatt hours of operation (= 01.16 KWH MOTORING - 01.17 KWH GENERATING). [kWh] The counter can be reset by parameter 16.09 RESET COUNTER.	1 = 100 kWh
01.15	DI7-1 STATUS	Status of digital inputs DI7 to DI1. 0 VDC = "0" +24 VDC = "1". Example: Control panel display when digital inputs DI1 and DI4 are activated is 0001001, where the digits for digital inputs are read from right to left (DI1 to DI7).	1 = 1
01.16	KWH MOTORING	Counts the kilowatt hours of motoring (power flow from supply network to intermediate circuit). [kWh] The counter can be reset by parameter 16.09 RESET COUNTER.	1 = 100 kWh
01.17	KWH GENERATING	Counts the kilowatt hours of regenerative braking (power flow from intermediate circuit to supply network). [kWh] The counter can be reset by parameter 16.09 RESET COUNTER.	1 = 100 kWh
01.19	AI1 [V]	Non-scaled value of analog input AI [V]. See parameters 13.01 AI1 HIGH VALUE and 13.02 AI1 LOW VALUE.	10000 = 10 V or 20 mA
01.20	AI2 [mA]	Non-scaled value of analog input AI2 [mA]. See parameters 13.04 AI2 HIGH VALUE and 13.05 AI2 LOW VALUE.	20000 = 20 mA, 2 V or 10 V
01.21	AI3 [mA]	Non-scaled value of analog input AI3 [mA]. See parameters 13.08 AI3 HIGH VALUE and 13.09 AI3 LOW VALUE.	20000 = 20 mA
01.22	RO3-1 STATUS	Status of the standard I/O board relay outputs Example: Control panel display when relay outputs 2 and 3 are activated is 0000110, where the digits are read from right to left (RO1 to RO3)	1 = 1
01.23	AO1	Value of analog output 1 signal [mA]. See parameter group 15 ANALOG OUTPUTS for signal selection and scaling.	20000 = 20 mA
01.24	AO2	Value of analog output 2 signal [mA]. See parameter group 15 ANALOG OUTPUTS for signal selection and scaling.	20000 = 20 mA
01.26	LED PANEL OUTP	NLMD-01 LED panel output [%]. See parameter group 18 LED PANEL CTRL .	1 = 1

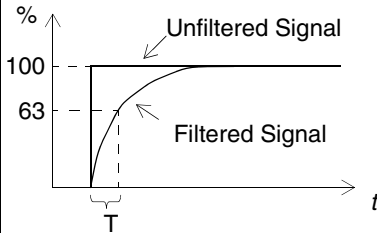
No.	Name/Value	Description	FbEq / T.
01.27	COSFII	Calculated cosfii	100 = 1
01.30	BREAKER COUNTER	Main contactor/breaker counter. Counts the times the main contactor/breaker has been closed. The counter can be reset by parameter 16.09 RESET COUNTER.	1 = 1
01.31	FAN ON-TIME	Running time of the converter cooling fan [h] The counter can be reset by parameter 16.09 RESET COUNTER. Resetting is recommended when the fan is replaced.	1 = 1
01.32	EXT TMP 1	External temperature measurement. See par. 98.11 AI/O EXT MODULE 1.	1=1°C
01.33	EXT TMP 2	External temperature measurement. See par. 98.11 AI/O EXT MODULE 1.	1=1°C
01.34	EXT TMP 3	External temperature measurement. See par. 98.15 AI/O EXT MODULE 2.	1=1°C
01.35	EXT TMP 4	External temperature measurement. See par. 98.15 AI/O EXT MODULE 2.	1=1°C
01.39	EXT1 AI1	Non-scaled value of analog input AI1 of I/O extension module 1	1 = 1
01.40	EXT1 AI2	Non-scaled value of analog input AI2 of I/O extension module 1	1 = 1
01.41	EXT2 AI1	Non-scaled value of analog input AI1 of I/O extension module 2	1 = 1
01.42	EXT2 AI2	Non-scaled value of analog input AI2 of I/O extension module 2	1 = 1
02 ACTUAL SIGNALS			
02.05	DC REF Q-CTRL	Minimum voltage reference of intermediate circuit calculated by reactive power control [V]	1 = 1 V
02.06	DC REF RAMP	Ramped and limited intermediate circuit voltage reference for power control [V]	1 = 1 V
02.07	DC REF INITIALIZ	Initialised intermediate circuit voltage reference based on Line-side Identification [V]. The voltage reference is calculated from DC voltage measurement and is approximately $\sqrt{2}$ · supply network voltage.	1 = 1 V
03 ACTUAL SIGNALS		Monitoring signals	
03.12	PP 1 TEMP	Measured IGBT temperature of converter no. 1 [°C]	1 = 1°C
03.13	PP 2 TEMP	Measured IGBT temperature of converter no. 2 [°C]	1 = 1°C
03.14	PP 3 TEMP	Measured IGBT temperature of converter no. 3 [°C]	1 = 1°C
03.15	PP 4 TEMP	Measured IGBT temperature of converter no. 4 [°C]	1 = 1°C
03.18	TEMP DIF MAX	Maximum phase temperature difference [°C]. Measured from all phases.	1 = 1°C
03.19	PHASE U TEMP DIF	Temperature difference between individual module phase U and the average temperature of the rest of the modules [°C]	1 = 1°C
03.20	PHASE V TEMP DIF	Temperature difference between individual module phase V and the average temperature of the rest of the modules [°C]	1 = 1°C
03.21	PHASE W TEMP DIF	Temperature difference between individual module phase W and the average temperature of the rest of the modules [°C]	1 = 1°C

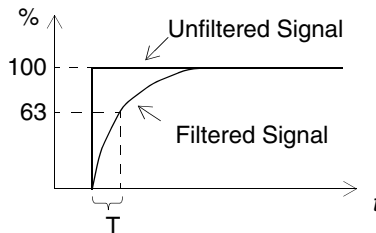
No.	Name/Value	Description	FbEq / T.
04 INFORMATION		Program versions, converter ratings	
04.01	SW PACKAGE VER	<p>Displays the type and version of the firmware package in the converter.</p> <p>Decoding key:</p> <div style="display: flex; align-items: center; margin-left: 40px;"> <div style="margin-right: 20px;"> <p>I = Input bridge</p> <p>X = IGBT supply unit firmware</p> <p>X = Application name (parameter 4.03)</p> <p>R = RMIO control board</p> <p>Firmware version</p> </div>  </div>	-; C
04.02	DTC VERSION	Line-converter control software version. This fixed part of the application program consists of line-converter control, operational system, communication control of the DDCS channels, and Modbus software of the control panel.	-; B
04.03	APPLIC NAME	Displays the type and version of the application program.	-; C
04.04	CONV NOM VOLTAGE	Downloaded nominal supply voltage of the converter [V]	1 = 1 V; R
04.05	CONV NOM CURRENT	Downloaded nominal line current of the converter [A]	1 = 1 A; R
04.06	CONV NOM POWER	Converter nominal power [kW]	1 = 1 kW; R
04.07	CONV MAX VOLTAGE	Maximum value of converter voltage measurement range [V]	1 = 1 V; R
04.08	CONV MAX CURRENT	Maximum value of converter current measurement range [A]	1 = 1 A; R
04.09	INVERTER TYPE	Converter type	-; C
04.10	APBU EPLD VERSION	APBU branching unit logic version. Default: NO LOGIC.	-; C
04.11	BOARD TYPE	<p>Shows the control board type.</p> <p>Note: RMIO - 1X boards have different type of FLASH memory chips than RMIO - 0X. Only software version IXXR7240 or later will operate with the RMIO - 1X and RMIO - 0X boards. Do not restore full backup from RMIO - 0X to RMIO - 1X and vice versa.</p>	-; C
07 CONTROL WORDS			
07.01	MAIN CTRL WORD	16-bit data word. See section 07.01 MAIN CTRL WORD on page 89 .	
07.03	AUX CTRL WORD 2	16-bit data word. See section 07.03 AUX CTRL WORD 2 on page 89 .	

No.	Name/Value	Description	FbEq / T.
08 STATUS WORDS			
08.01	MAIN STATUS WORD	16-bit data word. See section 08.01 MAIN STATUS WORD on page 90.	
08.05	DI STATUS WORD	16-bit data word. See section 08.05 DI STATUS WORD on page 91.	
08.22	INT CONFIG WORD	16-bit data word. Number of converter units recognized by the application during PPCC link initialization. Bit 0 = INT1 = Converter 1 INT board ... Bit 11 = INT12 = Converter 12 INT board	
09 FAULT WORDS			
09.01	FAULT WORD 1	16-bit data word. See section 09.01 FAULT WORD 1 on page 92.	
09.02	FAULT WORD 2	16-bit data word. See section 09.02 FAULT WORD 2 on page 92.	
09.03	FAULT WORD 3	16 bit data word. See section 09.03 FAULT WORD 3 on page 93.	
09.04	ALARM WORD 1	16 bit data word. See section 09.04 ALARM WORD 1 on page 93.	
09.11	SUPPLY FAULT WORD	16-bit data word. See section 09.11 SUPPLY FAULT WORD on page 94.	
09.12	SUPPLY ALARM WORD	16-bit data word. See section 09.12 SUPPLY ALARM WORD on page 95.	
09.13	CURRENT UNBALANCE	16-bit data word. See section 09.13 CURRENT UNBALANCE on page 96.	
09.14	OVERCURRENT FAULT	16-bit data word. See section 09.14 OVERCURRENT FAULT on page 96.	
09.15	SHORT CIRC FAULT	16-bit data word. See section 09.15 SHORT CIRC FAULT on page 97.	
09.16	OVERTEMP WORD	16-bit data word. See section 09.16 OVERTEMP WORD on page 97.	
09.17	TEMP DIF FLT WORD	16-bit data word. See section 09.17 TEMP DIF FLT WORD on page 98.	
09.18	TEMP DIF ALM WORD	16-bit data word. See section 09.18 TEMP DIF ALM WORD on page 98.	
09.30	FAULT CODE 1 LAST	Fieldbus code of the latest fault. See chapter Fault tracing .	
09.31	FAULT CODE 2 LAST	Fieldbus code of the 2nd latest fault	
09.32	FAULT CODE 3 LAST	Fieldbus code of the 3rd latest fault	
09.33	FAULT CODE 4 LAST	Fieldbus code of the 4th latest fault	
09.34	FAULT CODE 5 LAST	Fieldbus code of the 5th latest fault	
09.35	WARN CODE 1 LAST	Fieldbus code of the latest warning	

No.	Name/Value	Description	FbEq / T.
09.36	WARN CODE 2 LAST	Fieldbus code of the 2nd latest warning	
09.37	WARN CODE 3 LAST	Fieldbus code of the 3rd latest warning	
09.38	WARN CODE 4 LAST	Fieldbus code of the 4th latest warning	
09.39	WARN CODE 5 LAST	Fieldbus code of the 5th latest warning	


No.	Name/Value	Description	T./FbEq	Def.
11 REFERENCE SELECT		Reference sources		
11.01	DC REF SELECT	Defines the source for the intermediate circuit DC voltage reference. Note: Value is automatically set to FIELDDBUS if parameter 98.02 COMM. MODULE is set to INU COM LIM. Note: Selection AI1 is disabled when parameter 30.20 EXT TMP 1 AI1 is activated and parameter 98.11 AI/O EXT MODULE 1 is inactive.	1	PARAM 23.01
	PARAM 23.01	Value of parameter 23.01 DC VOLT REF	1	
	AI1	Analog input AI1	2	
	AI2	Analog input AI2	3	
	AI3	Analog input AI3	4	
	FIELDDBUS	23.01 DC VOLT REF from dataset. See section <i>Block diagram: reference select</i> on page 88 .	5	
11.02	Q REF SELECT	Defines the source for the reactive power reference. Note: Value is automatically set to PARAM 24.02 if parameter 98.02 COMM. MODULE is set to INU COM LIM. Note: Selection AI1 is disabled when parameter 30.20 EXT TMP 1 AI1 is activated and parameter 98.11 AI/O EXT MODULE 1 is inactive.	1	PARAM 24.01
	PARAM 24.01	Value of parameter 24.01 Q POWER REF	1	
	AI1	Analog input AI1	2	
	AI2	Analog input AI2	3	
	AI3	Analog input AI3	4	
	PARAM 24.02	Value of parameter 24.02 Q POWER REF2	5	
13 ANALOG INPUTS		Analog input signal processing		
13.01	AI1 HIGH VALUE	Defines the integer value used in serial communication that corresponds to the maximum value of analog input AI1.	1	20000
	-32768...32767	Integer value		
13.02	AI1 LOW VALUE	Defines the integer value used in serial communication that corresponds to the minimum value of analog input AI1.	1	0
	-32768...32767	Integer value		

No.	Name/Value	Description	T/FbEq	Def.
13.03	FILTER AI1	Defines the filter time constant for analog input AI1. The hardware filter time constant (with RMIO) is 20 ms (fixed, cannot be altered).	R	1000 ms
	0...30000 ms	Filter time constant  $O = I \cdot (1 - e^{-t/T})$ <p>I = filter input (step) O = filter output t = time T = filter time constant</p>	1 = 1 ms	
13.04	AI2 HIGH VALUE	Defines the integer value used in serial communication that corresponds to the maximum value of analog input AI2.	I	0
	-32768...32767	Integer value		
13.05	AI2 LOW VALUE	Defines the integer value used in serial communication that corresponds to the minimum value of analog input AI2 (0 or 4 mA).	I	0
	-32768...32767	Integer value		
13.06	MINIMUM AI2	Defines the minimum value for analog input AI2.	I	0 mA
	0 mA	Zero milliamperes	1	
	4 mA	Four milliamperes	2	
13.07	FILTER AI2	Defines the filter time constant for analog input AI2. The hardware filter time constant (with RMIO) is 20 ms (fixed, cannot be altered).	R	1000 ms
	0...30000 ms	Filter time constant. See parameter 13.03 FILTER AI1.	1 = 1 ms	
13.08	AI3 HIGH VALUE	Defines the integer value used in serial communication that corresponds to the maximum value of analog input AI3 (20 mA).	I	10000
	-32768...32767	Integer value		
13.09	AI3 LOW VALUE	Defines the integer value used in serial communication that corresponds to the minimum value of analog input AI3 (0 or 4 mA).	I	0
	-32768...32767	Integer value		
13.10	MINIMUM AI3	Defines the minimum value for analog input AI3.	I	0 mA
	0 mA	Zero milliamperes	1	
	4 mA	Four milliamperes	2	
13.11	FILTER AI3	Defines the filter time constant for analog input AI3. The hardware filter time constant (with RMIO) is 20 ms.	R	1000 ms
	0...30000 ms	Filter time constant. See parameter 13.03 FILTER AI1.	1 = 1 ms	
13.12	MINIMUM AI1	Defines the minimum value for analog input AI1.	I	0 V
	0 V	Zero volts	1	
	-10 V	- ten volts	2	

No.	Name/Value	Description	T./FbEq	Def.
14 DIGITAL OUTPUTS		Relay output control		
14.04	DO2 GROUP+INDEX	Selects relay output RO2 control signal. Output is controlled with a selectable bit (see parameter 14.05 DO2 BIT NUMBER) of the signal selected by this parameter. Example: When bit number 0 (RDY_ON) of parameter 08.01 MAIN STATUS WORD is selected to control relay output R02, the value of parameter 14.04 is set to 801, where 8 indicates the group number and 01 the index of the selected signal. The bit number is specified with parameter 14.05 DO2 BIT NUMBER.	I	801
	-19999...19999	Parameter index 801 denotes signal 08.01. Note: Inversion of the output is set with a minus sign, ie, -801.		
14.05	DO2 BIT NUMBER	Defines the bit number of the signal selected by parameter 14.04 DO2 GROUP+INDEX.	I	0
	0...15	Bit number		
15 ANALOG OUTPUTS		Output signal processing		
15.01	ANALOGUE OUTPUT 1	Connects a measured signal to analog output AO1. An external control system can also control the output. The dataset in which the signal is transmitted to the converter is directed into one of the data parameters (19.01...19.08) using parameters 90.01...90.18. The data parameter is then coupled to the analog output with this parameter. Note: ANALOGUE OUTPUT 1 is not in use when parameter 30.20 EXT TMP 1 AI1 is activated and parameter 98.11 AI/O EXT MODULE 1 is inactive.	I	0
	0...30000	Parameter index 109 denotes signal 01.09 POWER.		
15.02	INVERT AO1	Activates analog output AO1 signal inversion.	B	NO
	NO	Inversion inactive. Minimum signal value corresponds to the minimum output value.	0	
	YES	Inversion active. Maximum signal value corresponds to the minimum output value.	1	
15.03	MINIMUM AO1	Defines the minimum value for analog output AO1.	I	0 mA
	0 mA	Zero milliamperes	1	
	4 mA	Four milliamperes	2	
	10 mA	Ten milliamperes	3	
15.04	FILTER AO1	Defines the filter time constant for analog output AO1.	R	0.10 s
	0.00...10.00 s	Filter time constant  $O = I \cdot (1 - e^{-t/T})$ I = filter input (step) O = filter output t = time T = filter time constant	100 = 1.00 s	

No.	Name/Value	Description	T./FbEq	Def.
15.05	SCALE AO1	Defines the nominal value of the signal connected to analog output AO1. See parameter 15.01 ANALOGUE OUTPUT 1. The value corresponds to 20 mA at the output. Example: Parameter 01.06 LINE CURRENT is indicated through analog output AO1. The nominal value of line current is 100 A. This parameter is set to 100 to match the nominal value (100 A) with the analog output signal maximum (20 mA).	R	100
	0...65536	Real value	1 = 1	
15.06	ANALOGUE OUTPUT 2	Connects a measured signal to analog output AO2.	I	0
	0...30000	Parameter index 109 denotes signal 01.09 POWER.		
15.07	INVERT AO2	Activates analog output AO2 signal inversion.	B	NO
	NO	Inversion inactive. Minimum signal value corresponds to the minimum output value.	0	
	YES	Inversion active. Maximum signal value corresponds to the minimum output value.	1	
15.08	MINIMUM AO2	Defines the minimum value for analog output AO2.	I	0 mA
	0 mA	Zero milliamperes	1	
	4 mA	Four milliamperes	2	
	10 mA	Ten milliamperes	3	
15.09	FILTER AO2	Defines the filter time constant for analog output AO2. See parameter 15.04 FILTER AO1.	R	0.10 s
	0.00...10.00 s	Filter time constant	100 = 1.00 s	
15.10	SCALE AO2	Defines the nominal value of the signal connected to analog output AO2. See parameter 15.06 ANALOGUE OUTPUT 2. The value corresponds to 20 mA at the output. See parameter 15.05 SCALE AO1.	R	100
	0...65536	Real value	1 = 1	
15.11	EXT1 AO1	Connects a measured signal to analog output AO1 of I/O extension module EXT1. Note: AO1 of EXT1 is not in use if temperature measurement 30.20 EXT TMP 1 AI1 SEL is activated.	I	0
	0...30000	Parameter index in (xx)xy format, where (xx)x= parameter group, y = parameter number. For example, value 109 denotes signal 01.09 POWER.		
15.16	EXT1 AO2	Connects a measured signal to analog output AO2 of I/O extension module EXT1. Note: AO2 of EXT1 is not in use if temperature measurement 30.26 EXT TMP 2 AI2 SEL is activated.	I	0
	0...30000	Parameter index in (xx)xy format, where (xx)x= parameter group, y = parameter number. For example, value 109 denotes signal 01.09 POWER.		
15.25	EXT2 AO1	Connects a measured signal to analog output AO1 of I/O extension module EXT2. Note: AO1 of EXT2 is not in use if temperature measurement 30.32 EXT TMP 3 AI1 SEL is activated.	I	0

No.	Name/Value	Description	T./FbEq	Def.
	0...30000	Parameter index in (xx)xyy format, where (xx)x= parameter group, y = parameter number. For example, value 109 denotes signal 01.09 POWER.		
15.26	EXT2 AO2	Connects a measured signal to analog output AO2 of I/O extension module EXT2. Note: AO2 of EXT2 is not in use if temperature measurement 30.38 EXT TMP 4 AI2 SEL is activated.	I	0
	0...30000	Parameter index in (xx)xyy format, where (xx)x= parameter group, y = parameter number. For example, value 109 denotes signal 01.09 POWER.		
16 SYSTEM CTR INPUTS		Parameter lock, parameter back-up etc.		
16.01	RUN BIT SEL	Selects the source for commands ON and START in I/O control. See section Start by the operating switch (I/O control) on page 16. Note: This parameter is not in use in ACX800-U31, ACX800-37 and ACX800-37LC.	B	DI2
	DI2	ON command via digital input DI2 START command via digital input DI2	0	
	DI7	ON command via digital input DI2 START command via digital input DI7 Note: This selection forces the value of parameter 30.13 DI7 EXT EVENT to NO.	1	
16.02	PARAMETER LOCK	Selects the state of the parameter lock. The lock prevents parameter changing.	B	OPEN
	LOCKED	Locked. Parameter values cannot be changed from the control panel. The lock can be opened by entering the valid code to parameter 16.03 PASS CODE.	1	
	OPEN	The lock is open. Parameter values can be changed.	0	
16.03	PASS CODE	Selects the pass code for the parameter lock (see parameter 16.02 PARAMETER LOCK).	I	0
	0...30000	Setting 358 opens the lock. The value reverts automatically back to 0.		
16.06	PARAMETER BACKUP	Saves parameters from the RAM memory to the FEPROM memory. Saving of parameters is needed only when parameter changes through an external control system have to be stored to the FEPROM memory. Note: Parameter changes by CDP 312R control panel or DriveWindow are immediately saved to the FEPROM memory.	I	DONE
	DONE	Parameter saving has been completed.	0	
	SAVE	Parameters are being saved to the FEPROM memory.	1	
16.07	CTRL BOARD SUPPLY	Defines the source of the RMIO control board power supply.	I	2
	INTERNAL 24V	The RMIO control board is supplied from internal power supply from the inverter module. After power fail saving function the RMIO-board is booted.	1	
	EXTERNAL 24V	The RMIO control board is powered from an external supply. After power fail saving function the RMIO-board is not automatically booted.	2	

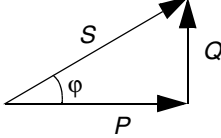
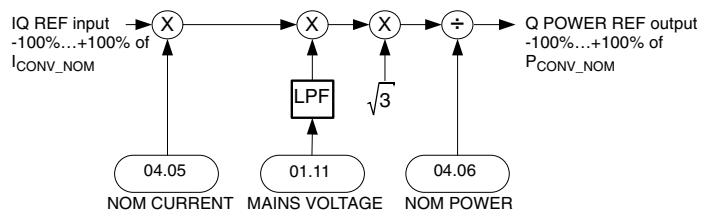
No.	Name/Value	Description	T/FbEq	Def.
16.08	FAN SPD CTRL MODE	Selects the inverter fan speed control. Converters can be equipped with an optional controllable inverter fan. See section Inverter fan speed control on page 27.	1	CONTROLLED
	CONST 50HZ	Fan is always running at constant frequency of 50 Hz when powered.	0	
	RUN/STOP	Fan is running at constant speed of 50 Hz when the drive is running. Fan is running at constant speed of 10 Hz when the drive is stopped.	1	
	CONTROLLED	The speed of the fan is determined from the IGBT temperature vs. the fan speed curve when the drive is running. The speed range is 25...55 Hz. Fan is running at constant speed of 10 Hz when the drive is stopped.	2	
16.09	RESET COUNTER	Resets the selected counter.	1	NO
	NO	No reset. The value automatically restores to NO after a reset.	1	
	BREAKER	Main contactor/breaker counter reset (01.30 BREAKER COUNTER)	2	
	FAN ON TIME	Drive cooling fan running time counter reset (01.31 FAN ON-TIME)	3	
	KWH	kWh counter reset (01.14 KWH SUPPLY , 01.16 KWH MOTORING and 01.17 KWH GENERATING)	4	
16.10	INT CONFIG USER	Number of parallel connected converters. Activates the Reduced Run function. Note: The number of disconnected converters is limited. For more information, see section Reduced Run Function on page 25.	R	0
	1...12	Number of parallel connected converters	1 = 1	
16.14	POWER SIGN CHANGE	Changes the sign of the power. Note: This parameter is not in use in ACX800-U31, ACX800-37 and ACX800-37LC.	B	NO
	NO	No power sign change	0	
	YES	Power sign changed: Signs of signals 01.08 and 01.09 are inverted.	1	
16.15	START MODE	Selects the start mode.	B	EDGE
	LEVEL	Starts converter by level of control command. Control command is selected by parameter 98.01 COMMAND SEL and 98.02 COMM. MODULE .  WARNING! After a fault reset, the converter will start if the start signal is on.	0	
	EDGE	Starts converter by EDGE of control command. Control command is selected by parameter 98.01 COMMAND SEL and 98.02 COMM. MODULE .	1	

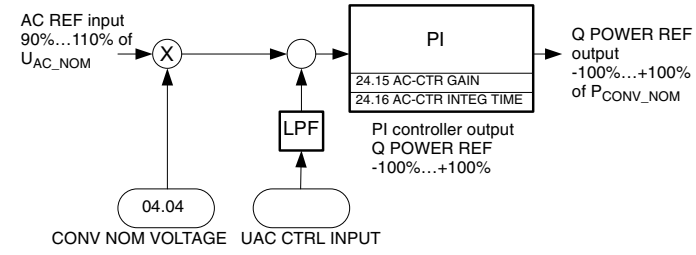
No.	Name/Value	Description	T./FbEq	Def.																						
18 LED PANEL CTRL		<p>The NLMD-01 Monitoring Display has a LED bar to show an absolute real type value.</p> <p style="text-align: center;"> </p> <p>The source and the scale of the display signal are defined by this parameter group.</p> <p>Note: If NLMD-01 and CDP 312R Control Panel are used together, actual signal 01.26 LED PANEL OUTPUT must be the first signal in CDP 312R Actual Signal Display Mode. Otherwise the NLMD-01 LED bar display will show an incorrect value.</p>																								
18.01	LED PANEL OUTPUT	<p>Selects the signal source for the NLMD-01 Monitoring Display.</p> <p>Example: To show signal 01.09 POWER on the display, set parameter 18.01 to value 109.</p>	I	109																						
	0...30000	Parameter index 109 denotes signal 01.09 POWER .																								
18.02	SCALE PANEL	<p>Defines the value of the signal selected by parameter 18.01 LED PANEL OUTPUT which corresponds to 100% on the LED bar display.</p> <p>Example: Signal 01.05 FREQUENCY is shown on the LED display:</p> <p>At 50 Hz the LED display indicates full value (100%) when: Parameter 18.01 is set to 105. Parameter 18.02 is set to 5000 (= 100 · 50 = 5000, where 100 is the integer scale (FbEq) for signal 01.05).</p>	R	100																						
	0...65536	Scaling factor	1 = 1																							
19 DATA STORAGE		Parameters for receiving information from or sending to an external control system. The parameters are unconnected and they can be used for linking, testing and commissioning purposes.																								
19.01	DATA 1	<p>Stores data written from a user-defined source.</p> <p>Example: Monitor a signal written by an external control system to dataset 14 word 2 using the DriveWindow PC tool as follows:</p> <p>Define the dataset 14 word 2 destination address in the converter application program by setting parameter 90.08 DATA SET 14 VAL 2 to 1901 (points to 19.01 DATA 1.)</p> <p>Set DriveWindow monitoring channel to read parameter 19.01.</p> <p>AC 800M / AC 80</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">RMIO</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;">Dataset table</td> <td style="width: 20%;">Address assignment of dataset</td> <td style="width: 40%;">For DriveWindow PC tool</td> </tr> <tr> <td style="text-align: center;">Dataset 14</td> <td> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">Data set</th> <th style="width: 15%;">Index</th> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>14</td> <td>1</td> </tr> <tr> <td> </td> <td>2</td> </tr> <tr> <td> </td> <td>3</td> </tr> </table> </td> <td> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">Group</th> <th style="width: 15%;">Index</th> </tr> <tr> <td>90</td> <td>08</td> </tr> </table> </td> <td style="text-align: center;">→ (19.01)</td> </tr> </table> </div> <p style="text-align: center;">A = value assigned from an external control system</p>		Dataset table	Address assignment of dataset	For DriveWindow PC tool	Dataset 14	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">Data set</th> <th style="width: 15%;">Index</th> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>14</td> <td>1</td> </tr> <tr> <td> </td> <td>2</td> </tr> <tr> <td> </td> <td>3</td> </tr> </table>	Data set	Index			14	1		2		3	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">Group</th> <th style="width: 15%;">Index</th> </tr> <tr> <td>90</td> <td>08</td> </tr> </table>	Group	Index	90	08	→ (19.01)	R	0
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14	1																									
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	-32768...32767	Data value	1 = 1																							
...																						
19.08	DATA 8	See parameter 19.01 .	R	0																						
	-32768...32767	Data Value	1 = 1																							

No.	Name/Value	Description	T./FbEq	Def.																								
21 START/STOP		IGBT bridge start and stop logic parameters to be used when there are two different types of power supply units in parallel: a diode supply unit and an IGBT supply unit. With these parameters the IGBT supply unit can be inactivated during the motoring (forward) mode and the drive takes power from the supply only through the diode supply unit. Note: These parameters change the normal line-side converter start/stop logic.																										
21.01	DC LEVEL START	Activates the DC level start feature. See parameter 21.02 DC VOLTAGE LEVEL. Note: DC level start mode is intended only for the generating mode. Note: Do not use this feature with ACS800-11/U11/17 and ACX800-U31/37/37LC.	B																									
	NO	Inactive	0	NO																								
	YES	Active. This selection is not recommended for units with an LCL filter. Consult your local ABB representative before setting this parameter to YES.	1																									
21.02	DC VOLTAGE LEVEL	Defines the intermediate circuit DC voltage level at which the modulation starts. The DC level start feature needs to be activated. See parameter 21.01 DC LEVEL START.	R	373... 1073 V																								
	210 ... 1174 V	Voltage level. The default value and setting range vary depending on the value of signal 04.04 CONV NOM VOLTAGE as follows: <table border="1" data-bbox="529 982 1235 1264"> <thead> <tr> <th>Par. 04.04</th> <th>Default of par. 21.02 ¹⁾</th> <th colspan="2">Range of par. 21.02 ²⁾</th> </tr> <tr> <th>[V]</th> <th>[V]</th> <th>Min. [V]</th> <th>Max. [V]</th> </tr> </thead> <tbody> <tr> <td>240</td> <td>373</td> <td>220</td> <td>408</td> </tr> <tr> <td>415</td> <td>646</td> <td>380</td> <td>706</td> </tr> <tr> <td>500</td> <td>778</td> <td>457</td> <td>851</td> </tr> <tr> <td>690</td> <td>1073</td> <td>632</td> <td>1174</td> </tr> </tbody> </table> ¹⁾ $1.1 \cdot \sqrt{2} \cdot \text{par. 04.04 CONV NOM VOLTAGE}$ ²⁾ $(65\% \dots 120\%) \cdot \sqrt{2} \cdot \text{par. 04.04 CONV NOM VOLTAGE}$	Par. 04.04	Default of par. 21.02 ¹⁾	Range of par. 21.02 ²⁾		[V]	[V]	Min. [V]	Max. [V]	240	373	220	408	415	646	380	706	500	778	457	851	690	1073	632	1174	1 = 1 V	
Par. 04.04	Default of par. 21.02 ¹⁾	Range of par. 21.02 ²⁾																										
[V]	[V]	Min. [V]	Max. [V]																									
240	373	220	408																									
415	646	380	706																									
500	778	457	851																									
690	1073	632	1174																									

No.	Name/Value	Description	T./FbEq	Def.
21.03	STOP LEVEL TIME	<p>Defines the time delay for the modulator stop function. The control program stops the IGBT bridge modulation when motoring (forward) power is higher than the limit defined by parameter 21.04 STOP LEVEL POWER for a time defined by this parameter.</p> <p>The figure below illustrates the modulation control logic.</p> <p>U_c = Intermediate circuit DC voltage P = Converter supply power</p>	R	1000 ms
	2...999900 ms	Time delay	1 = 1 ms	
21.04	STOP LEVEL POWER	Defines the motoring (forward) power for the modulator stop function. See parameter 21.03 STOP LEVEL TIME.	R	0 kW
	0... 04.06 kW	Motoring (forward) power	1 = 1 kW	
22 CACP PARALL CTRL		Parameter is visible only when 98.02 COMM. MODULE is set to CACP.		
22.01	SUB CONVERTER ID	Sub converter selection. Sets sub converter communication and control parameters.	1	4
	SUB CONV. 1	Sets parameters for sub converter 1.	1	
	SUB CONV. 2	Sets parameters for sub converter 2.	2	
	SUB CONV. 3	Sets parameters for sub converter 3.	3	
	NOT SELECTED	Inactive	4	
22.02	POWER BAL MODE	Selection of sub converter power control mode.		5
	COMM DC PERC	Sets parameters for power control in % with common DC-voltage circuit.	1	
	COMM DC ACT	Sets parameters for power control in kW with common DC-voltage circuit.	2	
	SEP DC PERC	Sets parameters for power control in % with separate DC-voltage circuits.	3	
	SEP DC ACT	Sets parameters for power control in kW with separate DC-voltage circuits.	4	
	NOT SELECTED	Inactive	5	

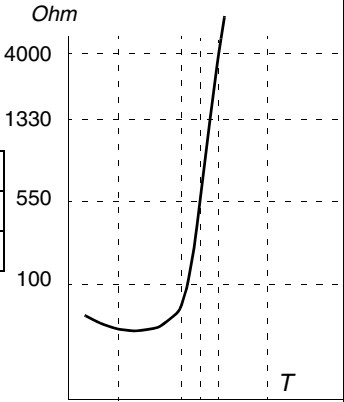
No.	Name/Value	Description	T./FbEq	Def.																	
23 DC VOLT REF		Intermediate circuit DC voltage reference. See sections DC voltage control on page 23 and Block diagram: reference select on page 88.																			
23.01	DC VOLT REF	<p>Defines the intermediate circuit DC voltage reference. By changing this parameter value, the DC link voltage can be raised higher than with a conventional 6-pulse diode rectifier in order to compensate a low voltage level in the network.</p> <p>Example: If the supply voltage is 380 V and the motor voltage 400 V, the voltage difference can be compensated simply by setting the DC voltage reference to 565 V (ie, $\sqrt{2} \cdot 400$ V). However, the line-side converter power is still calculated on the basis of 380 V: $P = \sqrt{3} \cdot 380 \cdot \text{line current}$.</p> <p>⚠ WARNING! If intermediate circuit voltage is increased, also the motor supply voltage at nominal frequency increases. Check that the motor insulation tolerates the change.</p> <p>⚠ WARNING! Beware of the supply unit LCL filter overheating. The heat loss increases as the intermediate circuit level increases. Before changing the voltage reference, consult your local ABB representative.</p>	R	220... 1073 V																	
	V	<p>DC voltage reference. The setting range varies depending on the value of signal 04.04 CONV NOM VOLTAGE as follows:</p> <table border="1" data-bbox="560 892 1242 1144"> <thead> <tr> <th rowspan="2">Par. 04.04 [V]</th> <th colspan="2">DC reference range ¹⁾</th> </tr> <tr> <th>Minimum [V]</th> <th>Maximum [V]</th> </tr> </thead> <tbody> <tr> <td>240</td> <td>220</td> <td>373</td> </tr> <tr> <td>415</td> <td>380</td> <td>646</td> </tr> <tr> <td>500</td> <td>457</td> <td>778</td> </tr> <tr> <td>690</td> <td>632</td> <td>1073</td> </tr> </tbody> </table> <p>¹⁾ (approximately 65%...110%) · $\sqrt{2}$ · par. 4.04 CONV NOM VOLTAGE</p> <p>Note: The program limits the minimum value to $\sqrt{2} \cdot U_{AC}$, where U_{AC} denotes the actual supply voltage.</p>	Par. 04.04 [V]	DC reference range ¹⁾		Minimum [V]	Maximum [V]	240	220	373	415	380	646	500	457	778	690	632	1073	1 = 1 V	
Par. 04.04 [V]	DC reference range ¹⁾																				
	Minimum [V]	Maximum [V]																			
240	220	373																			
415	380	646																			
500	457	778																			
690	632	1073																			
23.10	GEN POWER LIMIT	<p>Defines the generating power limit in percent of the converter nominal power (signal 04.06 CONV NOM POWER).</p> <p>Note: Synchronization to the electrical power network may fail if the value of this parameter is below 10%.</p> <p>Note: This parameter is not in use in ACX800-U31, ACX800-37 and ACX800-37LC.</p>	R	-																	
	0...300%	Generating power limit	100 = 1%																		
24 REACTIVE POWER		Reactive power compensation. See sections Reactive power control on page 24 and Block diagram: reference select on page 88.																			
24.01	Q POWER REF	Defines the reference value for the reactive power generation. Line-side converter can generate reactive power to the supply network. See also parameter 24.02 Q POWER REF2 .	R	0%																	
	-100...+100%	Reactive power in percent of the converter nominal power (signal 04.06 CONV NOM POWER). Positive value denotes capacitive load. Negative value denotes inductive load.	100 = 1%																		

No.	Name/Value	Description	T./FbEq	Def.
24.02	Q POWER REF2	Defines the reference for the reactive power generation written into parameter 24.01 Q POWER REF. The reference unit is selected by parameter 24.03 Q POWER REF2 SEL. Note: Parameter 11.02 Q REF SELECT must be set to PARAM 24.02.	1	0
	-32768...32767 (equals to -327.68...327.67%)	Reference value Example: When parameter 24.03 Q POWER REF2 SEL is set to PERCENT, value 10000 of parameter 24.02 Q POWER REF2 equals value 100% of parameter 24.01 Q POWER REF (ie, 100% of the converter nominal power given in signal 04.06 CONV NOM POWER).	1 = 1	
	-32768...32767 (equals to -32768...32767 kVAr)	Reference value Example: When parameter 24.03 Q POWER REF2 SEL is set to kVAr, value 1000 of parameter 24.02 Q POWER REF2 equals parameter 24.01 Q POWER REF value calculated with the following equation: $100 \cdot (1000 \text{ kVAr divided by converter nominal power in kVAr})\%$.	1 = 1	
	-3000...3000 (equals to -30...30 deg)	Reference value Example: When parameter 24.03 Q POWER REF2 SEL is set to PHI, value 3000 of parameter 24.02 Q POWER REF2 equals approximately parameter 24.01 Q POWER REF value calculated with the following equation (where P is read from actual signal 01.09 POWER): $\cos(\varphi) = \frac{P}{S} = \frac{P}{\sqrt{P^2 + Q^2}}$  Positive reference denotes capacitive load. Negative reference denotes inductive load. Parameter 24.02 values are converted to degrees by the application program: $-3000...3000 \hat{=} -30^\circ...30^\circ$. Values above 3000 or below -3000 equal $-30^\circ/30^\circ$, since the range is limited to -3000/3000.	1 = 1	
	-8600...-9999 (equals to -0.86...-0.9999) and 8600...10000 (equals to 0.86...1.0000)	Reference value when parameter 24.03 Q POWER REF2 SEL is set to COSPHI. Positive reference denotes capacitive load. Negative reference denotes inductive load.	1 = 1	
	-10000...10000 (equals to -100...100% of 04.05 CONV NOM CURRENT)	Reference value when parameter 24.03 Q POWER REF2 SEL is set to IQ REF. 	1 = 1	



No.	Name/Value	Description	T/FbEq	Def.
	8000...9000...10000 (equals to 90...100...110% of 04.04 CONV NOM VOLTAGE)	Reference value when parameter 24.03 Q POWER REF2 SEL is set to AC REF. 	1 = 1	
24.03	Q POWER REF2 SEL	Selects the reference unit. See parameter 24.02 Q POWER REF 2.	I	PERCENT
	PERCENT	In percent of the nominal power	1	
	kVAr	kVAr	2	
	PHI	angle φ	3	
	COSPHI	$\text{Cos}\varphi$	4	
	IQ REF	Reactive current reference selection	5	
	AC REF	AC voltage control reference selection	6	
24.04	Q POWER REF ADD	Adds a defined value to 24.02 Q POWER REF2.	R	0 kVAr
	-30000...30000 kVAr		1 = 1 kVAr	
24.15	AC-CTR GAIN	Defines the relative gain of the AC voltage controller.	R	7.5
	0...32767	If gain is set to 1, a 10% change in error value (reference – actual value) causes the AC voltage controller output to change by 10%.	1 = 1	
24.16	AC-CTR INTEG TIME	Defines the integration time of the AC voltage controller.	R	1 s
	0...32767		1 = 1 s	
30 FAULT FUNCTIONS		Programmable protection functions		
30.02	EARTH FAULT	Selects how the drive reacts when an earth (ground) fault or current unbalance is detected. Note: With parallel connected units, 30.02 EARTH FAULT is forced to value FAULT and the fault message is CUR UNBAL xx instead of EARTH FAULT.	B	FAULT
	WARNING	The converter generates warning EARTH FAULT.	0	
	FAULT	The converter trips on fault EARTH FAULT / CUR UNBAL xx.	1	

No.	Name/Value	Description	T./FbEq	Def.
30.03	EARTH FAULT LEVEL	Selects the earth (ground) fault level. <ul style="list-style-type: none"> Non-parallel connected converters: Defines the earth (ground) fault level. Parallel connected converters: Defines the converter input current imbalance level (eg, a short-circuit). Note: This parameter cannot be changed without a valid pass code. Contact your local ABB representative.	R	3 for ACQ800 4 for ACS600 non-parallel connected
	1	1% unbalance in the sum current	1 = 1	5 for parallel connected
	2	3% unbalance in the sum current		
	3	8% unbalance in the sum current		
	4	13% unbalance in the sum current		
	5	18% unbalance in the sum current		
	6	28% unbalance in the sum current		
	7	39% unbalance in the sum current		
	8	62% unbalance in the sum current		
30.04	DI4 EXT EVENT	Selects how converter reacts to the state of digital input DI4.	I	NO
	NO	Not in use.	1	
	DI4=0 FAULTS	If digital input DI4 is OFF (0), the converter trips on fault EXT EVENT DI4.	2	
	DI4=1 FAULTS	If digital input DI4 is ON (1), the converter trips on fault EXT EVENT DI4.	3	
	DI4=0 ALARMS	If digital input DI4 is OFF (0), the converter generates warning EXT EVENT DI4.	4	
	DI4=1 ALARMS	If digital input DI4 is ON (1), the converter generates warning EXT EVENT DI4.	5	
30.05	DI5 EXT EVENT	Selects how the converter reacts to the state of digital input DI5.	I	NO
	NO	Not in use	1	
	DI5 = 0 FAULTS	If digital input DI5 is OFF (0), the converter first generates warning EXT EVENT DI5 and trips on fault EXT EVENT DI5 after the delay defined by parameter 30.10 DI5 TRIP DELAY has elapsed.	2	
	DI5 = 1 FAULTS	If digital input DI5 is ON (1), the converter first generates warning EXT EVENT DI5 and trips on fault EXT EVENT DI5 after the delay defined by parameter 30.10 DI5 TRIP DELAY has elapsed.	3	
	DI5 = 0 ALARMS	If digital input DI5 is OFF (0), the converter generates warning EXT EVENT DI5.	4	
	DI5 = 1 ALARMS	If digital input DI5 is ON (1), the converter generates warning EXT EVENT DI5.	5	
30.10	DI5 TRIP DELAY	Defines the delay time before the converter trips on fault EXT EVENT DI5. Supervision is selected by parameter 30.05 DI5 EXT EVENT.	R	0 s
	0...3600 s	Delay time	1 = 1	
30.11	DC OVERVOLT TRIP	Defines the intermediate circuit DC overvoltage fault DC OVERVOLT trip limit. Default trip limit is 427 V DC for 240 V units, 740 V DC for 415 V units, 891 V DC for 500 V units and 1230 V DC for 690 V units.	R	427/740/ 891/ 1230 V

No.	Name/Value	Description	T./FbEq	Def.
	30.12...99% of 04.07 V	Trip limit	1 = 1 V	
30.12	DC UNDERVOLT TRIP	Defines the intermediate circuit DC undervoltage fault DC UNDERVOLT trip limit. Default trip limit is 170 V DC for 240 V units, 293 V DC for 415 V units, 354 V DC for 500 V units and 488 V DC for 690 V units. Note: This parameter also determines the DC voltage check limit during charging. See also section Missing phase on page 21.	R	170/293/ 354/488 V
	0...30.11 V	Trip limit	1 = 1 V	
30.13	DI7 EXT EVENT	Selects how the converter reacts to the state of digital input DI7. See parameter 16.01 RUN BIT SEL. Note: This parameter is not in use in ACX800-U31, ACX800-37 and ACX800-37LC.	I	NO
	NO	Not in use	1	
	DI7=0 FAULTS	If digital input DI7 is OFF (0), the converter first generates warning EXT EVENT DI7 and trips on fault EXT EVENT DI7 after the delay defined by parameter 30.14 DI7 TRIP DELAY has elapsed.	2	
	DI7=1 FAULTS	If digital input DI7 is ON (1), the converter first generates warning EXT EVENT DI7 and trips on fault EXT EVENT DI7 after the delay defined by parameter 30.14 DI7 TRIP DELAY has elapsed.	3	
	DI7=0 ALARMS	If digital input DI7 is OFF (0), the converter generates warning EXT EVENT DI7.	4	
	DI7=1 ALARMS	If digital input DI7 is ON (1), the converter generates warning EXT EVENT DI7.	5	
30.14	DI7 TRIP DELAY	Defines the delay time before the converter trips on fault EXT EVENT DI7. Supervision is selected by parameter 30.13 DI7 EXT EVENT. Note: This parameter is not in use in ACX800-U31, ACX800-37 and ACX800-37LC.	R	0 s
	0...3600 s	Delay time	1 = 1	
30.20	EXT TMP 1 AI1	Activates external temperature measurement 1 and selects the sensor type. See section Temperature sensors on page 30 for connection diagrams. Analog I/O extension module RAIO is selected by parameter 98.11 AI/O EXT MODULE 1. If 98.11 AI/O EXT MODULE 1 is set to NOT IN USE, RMIO-board AI1/AO1 is used for temperature measurement. AI1 selection of parameters 11.01 DC REF SELECT and 11.02 Q REF SELECT are disabled. Function of parameter 15.01 ANALOGUE OUTPUT 1 is disabled.	I	NOT IN USE
	NOT IN USE	Inactive	1	
	1xPT100	The temperature is measured with one Pt100 sensor. Analog output AO1 feeds constant current through the sensor. The sensor resistance increases as temperature rises, as does the voltage over the sensor. The temperature measurement function reads the voltage through analog input AI1 and converts it to degrees centigrade. Constant current: 9.1 mA (0...10 V range with RMIO or 0...2 V range with RAIO).	2	
	2xPT100	Temperature is measured using two Pt100 sensors. Constant current: 9.1 mA (0...10 V range with RAIO and RMIO).	3	
	3xPT100	Temperature is measured using three Pt100 sensors. Constant current: 9.1 mA (0...10 V range with RAIO and RMIO).	4	

No.	Name/Value	Description	T./FbEq	Def.						
	1...3 PTC	<p>The temperature is supervised using one to three PTC sensors or one to three KTY84-1xx silicon temperature sensors. Analog output AO1 feeds constant current through the sensor(s).</p> <p>The resistance of the sensor increases sharply as temperature rises over the sensor reference temperature T_{ref}, as does the voltage over the resistor. The temperature measurement function reads the voltage through analog input AI1 and converts it into ohms.</p> <p>The figure below shows typical PTC sensor resistance values as a function of the operating temperature.</p>  <table border="1" data-bbox="483 661 852 787"> <thead> <tr> <th>Temperature</th> <th>PTC resistance</th> </tr> </thead> <tbody> <tr> <td>Normal</td> <td>0...1.5 kohm</td> </tr> <tr> <td>Excessive</td> <td>≥ 4 kohm</td> </tr> </tbody> </table> <p>Constant current: 1.6 mA (0...10 V range with RAIO and RMIO).</p>	Temperature	PTC resistance	Normal	0...1.5 kohm	Excessive	≥ 4 kohm	5	
Temperature	PTC resistance									
Normal	0...1.5 kohm									
Excessive	≥ 4 kohm									
30.21	EXT TMP 1 FLT LO	Defines lower trip limit for external temperature measurement 1.	R	0						
	-250...5000	Limit in °C or Ω	1=1							
30.22	EXT TMP 1 ALM LO	Defines lower alarm limit for external temperature measurement 1.	R	0						
	-250...5000	Limit in °C or Ω	1=1							
30.23	EXT TMP 1 ALM HI	Defines higher alarm limit for external temperature measurement 1.	R	100						
	-250...5000	Limit in °C or Ω	1=1							
30.24	EXT TMP 1 FLT HI	Defines higher trip limit for external temperature measurement 1.	R	110						
	-250...5000	Limit in °C or Ω	1=1							
30.25	EXT TMP 1 DELAY	Delay time before alarm of fault is generated.	R	0						
	0	0 s value disables alarm and fault.	1=1							
	4...3600 s	Delay time	1=1							
30.26	EXT TMP 2 AI2	Activates external temperature measurement 2 and selects the sensor type. See section Temperature sensors on page 30 for connection diagrams. Analog I/O extension module RAIO is selected by parameter 98.11 AI/O EXT MODULE 1.	I	NOT IN USE						
	NOT IN USE	Inactive	1							
	1xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...2 V range with RAIO)	2							
	2xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...10 V range with RAIO)	3							
	3xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...10 V range with RAIO)	4							

No.	Name/Value	Description	T/FbEq	Def.
	1...3 PTC	See parameter 30.20 EXT TMP 1 AI1. Constant current: 1.6 mA (0...10 V range with RAIO)	5	
30.27	EXT TMP 2 FLT LO	Defines lower trip limit for external temperature measurement 2.	R	0
30.28	EXT TMP 2 ALM LO	Defines lower alarm limit for external temperature measurement 2.	R	0
30.29	EXT TMP 2 ALM HI	Defines higher alarm limit for external temperature measurement 2.	R	100
30.30	EXT TMP 2 FLT HI	Defines higher trip limit for external temperature measurement 2.	R	110
30.31	EXT TMP 2 DELAY	Delay time before alarm of fault is generated.	R	0
30.32	EXT TMP 3 AI1	Activates external temperature measurement 3 and selects the sensor type. See section Temperature sensors on page 30 for connection diagrams. Analog I/O extension module RAIO is selected by parameter 98.15 AI/O EXT MODULE 2.	I	NOT IN USE
	NOT IN USE	Inactive	1	
	1xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...2 V range with RAIO)	2	
	2xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...10 V range with RAIO)	3	
	3xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...10 V range with RAIO)	4	
	1...3 PTC	See parameter 30.20 EXT TMP 1 AI1. Constant current: 1.6 mA (0...10 V range with RAIO)	5	
30.33	EXT TMP 3 FLT LO	Defines lower trip limit for external temperature measurement 3.	R	0
30.34	EXT TMP 3 ALM LO	Defines lower alarm limit for external temperature measurement 3.	R	0
30.35	EXT TMP 3 ALM HI	Defines higher alarm limit for external temperature measurement 3.	R	100
30.36	EXT TMP 3 FLT HI	Defines higher trip limit for external temperature measurement 3.	R	110
30.37	EXT TMP 3 DELAY	Delay time before alarm of fault is generated.	R	0
30.38	EXT TMP 4 AI2	Activates external temperature measurement 3 and selects the sensor type. See section Temperature sensors on page 30 for connection diagrams. Analog I/O extension module RAIO is selected by parameter 98.15 AI/O EXT MODULE 2.	I	NOT IN USE
	NOT IN USE	Inactive	1	
	1xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...2 V range with RAIO)	2	
	2xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...10 V range with RAIO)	3	
	3xPT100	See parameter 30.20 EXT TMP 1 AI1. Constant current: 9.1 mA (0...10 V range with RAIO)	4	
	1...3 PTC	See parameter 30.20 EXT TMP 1 AI1. Constant current: 1.6 mA (0...10 V range with RAIO)	5	
30.39	EXT TMP 4 FLT LO	Defines lower trip limit for external temperature measurement 4.	R	0
30.40	EXT TMP 4 ALM LO	Defines lower alarm limit for external temperature measurement 4.	R	0
30.41	EXT TMP 4 ALM HI	Defines higher alarm limit for external temperature measurement 4.	R	100

No.	Name/Value	Description	T./FbEq	Def.
30.42	EXT TMP 4 FLT HI	Defines higher trip limit for external temperature measurement 4.	R	110
30.43	EXT TMP 4 DELAY	Delay time before alarm of fault is generated.	R	0
31 AUTOMATIC RESET		<p>Automatic fault reset</p> <p>Automatic resets are possible only for certain fault types and when the automatic reset function is activated for that fault type.</p> <p>The automatic reset function is not operational if the drive is in local control (L visible on the first row of the control panel display).</p> <p> WARNING! If the start command is selected and it is ON, the converter may restart immediately after automatic fault reset. Ensure that the use of this feature will not cause danger.</p> <p> WARNING! Do not use these parameters when the drive is connected to a common DC bus. The charging resistors may be damaged in an automatic reset.</p>		
31.01	NUMBER OF TRIALS	<p>Defines the number of automatic fault resets the drive performs within the time defined by parameter 31.02 TRIAL TIME.</p> <p>Note: When the value of parameter is not 0 and parameter 98.02 COMM. MODULE is set to INU COM LIM, sending a fault bit of 08.01 MAIN STATUS WORD to inverter side is delayed 1 s to get time for lineconverter automatic reset function.</p>	I	0
	0...5	Number of the automatic resets	0	
31.02	TRIAL TIME	Defines the time for the automatic fault reset function. See parameter 31.01 NUMBER OF TRIALS .	R	30 s
	1.0...180.0 s	Allowed resetting time	100... 18000	
31.03	DELAY TIME	Defines the time the drive will wait after a fault before attempting an automatic reset. See parameter 31.01 NUMBER OF TRIALS .	R	0 s
	0.0...3.0 s	Reset delay	0...300	
31.04	OVERCURRENT	Activates/deactivates the automatic reset for the converter overcurrent fault.	B	NO
	NO	Inactive	0	
	YES	Active	65535	
31.05	OVERVOLTAGE	Activates/deactivates the automatic reset for the intermediate link overvoltage fault.	B	NO
	NO	Inactive	0	
	YES	Active	65535	
31.06	UNDERVOLTAGE	Activates/deactivates the automatic reset for the intermediate link undervoltage fault.	B	NO
	NO	Inactive	0	
	YES	Active	65535	

No.	Name/Value	Description	T/FbEq	Def.
51 MASTER ADAPTER		These parameters are visible and need to be adjusted only when a fieldbus adapter module (optional) is installed and activated by parameter 98.02 COMM. MODULE. For details on the parameters, refer to the manual of the fieldbus adapter module and chapter Fieldbus control . Note: Any changes in these parameters take effect only after the next power-up of the adapter module.		
51.01	FIELD BUS PAR1	(Module type and software version)		
51.02 ... 51.33	FIELD BUS PAR2...33	(According to module type)		
52 STANDARD MODBUS		Settings for the Standard Modbus Link. See chapter Fieldbus control . These settings are only visible when parameter 98.02 COMM. MODULE has been set to STANDARD MODBUS. See the <i>RMBA-01 Modbus Adapter User's Manual</i> (3AFE64498851 [English]).		
52.01	STATION NUMBER	Defines the address of the device. Two units with the same address are not allowed on-line.	I	1
	1...247	Address		
52.02	BAUDRATE	Defines the transfer rate of the link.	I	5
	1	600 bit/s		
	2	1200 bit/s		
	3	2400 bit/s		
	4	4800 bit/s		
	5	9600 bit/s		
	6	19200 bit/s		
52.03	PARITY	Defines the use of parity and stop bit(s). The same setting must be used in all on-line stations.	I	3
	1 = NONE1STOPBIT	No parity bit, one stop bit		
	2 = NONE2STOPBIT	No parity bit, two stop bits		
	3 = ODD	Odd parity indication bit, one stop bit		
	4 = EVEN	Even parity indication bit, one stop bit		
53 USER PARAMETERS		This parameter group consists of unconnected parameters to be used with adaptive programming blocks.		
53.01 ... 53.10	NUMERIC 1...10	User's numeric parameter for adaptive programming purposes.	I	
	-8388608...8388607			
53.11 ... 53.17	STRING 1...7	User's ASCII string type of parameter for the alarm or fault text definition of EVENT block.	S	
	0...9 chars			

No.	Name/Value	Description	T./FbEq	Def.																											
55 ADAPTIVE PROG1		Adaptive programming task 1 settings: - selections of the function blocks and their input connections - diagnostics. See <i>ACS600/ACS800 Application Guide Adaptive Program for System Application Program 7.x</i> (3AFE68420075 [English]). This parameter group is mainly used with the DriveAP 2.x PC tool.																													
55.01	STATUS	Shows the value of the adaptive program task 1 status word.																													
	1...128	The table below shows the alternative bit states and the corresponding values on the panel display. <table border="1" data-bbox="490 548 1094 814"> <thead> <tr> <th>Bit</th> <th>Display</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>Stopped</td> </tr> <tr> <td>1</td> <td>2</td> <td>Running</td> </tr> <tr> <td>2</td> <td>4</td> <td>Faulted</td> </tr> <tr> <td>3</td> <td>8</td> <td>Editing</td> </tr> <tr> <td>4</td> <td>10</td> <td>Checking</td> </tr> <tr> <td>5</td> <td>20</td> <td>Pushing</td> </tr> <tr> <td>6</td> <td>40</td> <td>Popping</td> </tr> <tr> <td>8</td> <td>80</td> <td>Initialising</td> </tr> </tbody> </table>	Bit	Display	Meaning	0	1	Stopped	1	2	Running	2	4	Faulted	3	8	Editing	4	10	Checking	5	20	Pushing	6	40	Popping	8	80	Initialising		
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55.02	FAULTED PAR	Points out the faulted parameter in adaptive program task 1.																													
	0...32768	Value																													
55.05	BLOCK1	Selects the function block type for Block 1 in the adaptive program task 1.																													
	1...26	Function block type																													
55.06	INPUT1	Selects the source for input I1 of Block 1.																													
	-255.255.31 ...+255.255.31 / C -32768...C 32767	Parameter index or a constant value: - Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling boolean inputs. - Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting. Example: The state of digital input DI2 is connected to Input 1 as follows: - Set the source selection parameter (55.06) to +.01.15.01. (The application program stores the state of digital input DI2 to bit 1 of actual signal 01.15.) - If you need an inverted value, switch the sign of the pointer value (- 01.15.01.).																													
55.07	INPUT2	Selects the source for input I2 of Block 1.																													
		See parameter 55.06 INPUT1.																													
55.08	INPUT3	Selects the source for input I3 of Block 1.																													
		See parameter 55.06 INPUT1.																													
55.09	OUTPUT	Stores and displays the output of Block 1.																													
	0...32768	No user-setting possible																													
55.10	BLOCK2	Selects the function block type for Block 2 in the adaptive program task 1.																													
	0...32768	Function block type																													
55.11	INPUT1	Selects the source for input I1 of Block 2.																													

No.	Name/Value	Description	T/FbEq	Def.
	-255.255.31 C - 32768 ...255.255.31 C 32767	See parameter 55.06 INPUT1 .		
55.12	INPUT2	Selects the source for input I2 of Block 2.		
		See parameter 55.06 INPUT1 .		
55.13	INPUT3	Selects the source for input I3 of Block 2.		
		See parameter 55.06 INPUT1 .		
55.14	OUTPUT	Stores and displays the output of Block 2.		
	0...32768	No user-setting possible		
55.15	BLOCK3	Selects the function block type for Block 3 in the adaptive program task 1.		
	0...32768	Function block type		
...		
55.34	OUTPUT	Stores and displays the output of Block 6.		
	0...32768	No user-setting possible		
56 ADAPT PROG1 CNTRL		Adaptive program task 1 control. The update time of task 1 control is 10 ms. See parameter group 55 ADAPTIVE PROG1 .		
56.01	ADAPT PROG CMD	Selects the operation mode for the adaptive program task 1.	1	EDIT
	STOP	Stop. The program can be edited.	1	
	START	Run. The program cannot be edited.	2	
	EDIT	Stop to edit mode (ie, the execution of the task is stopped for editing). The program can be edited.	3	
56.02	EDIT CMD	Selects the command for the block placed in the location defined by parameter 56.03 EDIT BLOCK .	1	NO
	NO	Home value. The value automatically restores to NO after an editing command has been executed. The program must be in the editing mode (see parameter 56.01 ADAPT PROG CMD).	1	
	PUSH	Shifts the block in the location defined by parameter 56.03 EDIT BLOCK and the subsequent blocks one location up. A new block can be placed in the emptied location. The program must be in the editing mode (see parameter 56.01 ADAPT PROG CMD).	2	
	DELETE	Selects the block in the location defined by parameter 56.03 EDIT BLOCK and shifts the subsequent blocks one step down. The program must be in the editing mode (see parameter 56.01 ADAPT PROG CMD).	3	

No.	Name/Value	Description	T./FbEq	Def.																											
	PROTECT	<p>Activation of the task protection: Read protects the input connections of the blocks. Activate as follows:</p> <ul style="list-style-type: none"> - Ensure that the task operation mode is START or STOP (parameter 56.01 ADAPT PROG CMD). - Set the passcode by parameter 56.05 PASS CODE. - Set parameter 56.02 to PROTECT. <p>When protection is activated:</p> <ul style="list-style-type: none"> - All parameters in group 55 ADAPTIVE PROG1 excluding the block output parameters are hidden (read protected). - It is not possible to switch the task operating mode (parameter 56.01 ADAPT PROG CMD) to the editing mode. - Parameter 56.05 PASS CODE value is set to 0. 	4																												
	UNPROTECT	<p>Deactivation of the task protection: no read protection of the inputs of the blocks. Deactivate as follows:</p> <ul style="list-style-type: none"> - Ensure that the task operation mode is START or STOP (parameter 56.01 ADAPT PROG CMD). - Set the passcode by parameter 56.05 PASS CODE. - Set parameter 56.02 to UNPROTECT. 	5																												
56.03	EDIT BLOCK	Defines the block location number for the command selected by parameter 56.02 EDIT CMD.		0																											
	1...15	Block location number																													
56.04	TIMELEV_SEL	Indicates the fixed execution cycle time of 10 ms for the adaptive program task 1.		10 ms																											
56.05	PASSCODE	Defines the passcode, which activates/deactivates the protection of the input connections of the blocks. See parameter 56.02 EDIT CMD.		0																											
	0 h...FFFFFF h	<p>Passcode. The setting restores to 0 after the protection is activated/ deactivated.</p> <p>Note: When you activate the protection, write down the passcode and store it for later use.</p>																													
57 ADAPTIVE PROG2		<p>Adaptive programming task 2 settings:</p> <ul style="list-style-type: none"> - selections of the function blocks and their input connections - diagnostics. <p>See <i>ACS600/ACS800 Application Guide Adaptive Program for System Application Program 7.x</i> (3AFE68420075 [English]).</p> <p>This parameter group is mainly used with the DriveAP 2.x PC tool.</p>																													
57.01	STATUS	Shows the value of the adaptive program task 2 status word.																													
	1...128	<p>The table below shows the alternative bit states and the corresponding values on the panel display.</p> <table border="1"> <thead> <tr> <th>Bit</th> <th>Display</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>Stopped</td> </tr> <tr> <td>1</td> <td>2</td> <td>Running</td> </tr> <tr> <td>2</td> <td>4</td> <td>Faulted</td> </tr> <tr> <td>3</td> <td>8</td> <td>Editing</td> </tr> <tr> <td>4</td> <td>10</td> <td>Checking</td> </tr> <tr> <td>5</td> <td>20</td> <td>Pushing</td> </tr> <tr> <td>6</td> <td>40</td> <td>Popping</td> </tr> <tr> <td>8</td> <td>80</td> <td>Initialising</td> </tr> </tbody> </table>	Bit	Display	Meaning	0	1	Stopped	1	2	Running	2	4	Faulted	3	8	Editing	4	10	Checking	5	20	Pushing	6	40	Popping	8	80	Initialising		
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57.02	FAULTED PAR	Points out the faulted parameter in adaptive program task 2.																													

No.	Name/Value	Description	T./FbEq	Def.
	0...32768	Value		
57.05	BLOCK1	Selects the function block type for Block 1 in the adaptive program task 2.		
	1...26	Function block type		
57.06	INPUT1	Selects the source for input I1 of Block 1.		
	-255.255.31... +255.255.31 / C -32768...C 32767	Parameter index or a constant value: - Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling boolean inputs. - Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting. Example: The state of digital input DI2 is connected to Input 1 as follows: - Set the source selection parameter (57.06) to +.01.15.01. (The application program stores the state of digital input DI2 to bit 1 of actual signal 01.15.) - If you need an inverted value, switch the sign of the pointer value (-01.15.01.).		
57.07	INPUT2	Selects the source for input I2 of Block 1.		
		See parameter 57.06 INPUT1.		
57.08	INPUT3	Selects the source for input I3 of Block 1.		
		See parameter 57.06 INPUT1.		
57.09	OUTPUT	Stores and displays the output of Block 2.		
	0...32768	No user-setting possible		
57.10	BLOCK2	Selects the function block type for Block 2 in the adaptive program task 1.		
	0...32768	Function block type		
57.11	INPUT1	Selects the source for input I1 of Block 2.		
		See parameter 57.06 INPUT1.		
57.12	INPUT2	Selects the source for input I2 of Block 2.		
		See parameter 57.06 INPUT1.		
57.13	INPUT3	Selects the source for input I3 of Block 2.		
		See parameter 57.06 INPUT1.		
57.14	OUTPUT	Stores and displays the output of Block 2.		
	0...32768	No user-setting possible		
57.15	BLOCK3	Selects the function block type for Block 3 in the adaptive program task 2.		
	0...32768	Function block type		
...		
57.154	OUTPUT	Stores and displays the output of Block 30.		
	0...32768	No user-setting possible		

No.	Name/Value	Description	T./FbEq	Def.
58 ADAPT PROG2 CNTRL		Adaptive program task 2 control. The update time of task 2 control is 100 ms. See parameter group 57 ADAPTIVE PROG2 . See <i>ACS600/ACS800 Application Guide Adaptive Program for System Application Program 7.x</i> (3AFE68420075 [English]).		
58.01	ADAPT PROG CMD	Selects the operation mode for the adaptive program task 2.		EDIT
	STOP	Stop. The program can be edited.	1	
	START	Run. The program cannot be edited.	2	
	EDIT	Stop to edit mode (ie, the execution of the task is stopped for editing). The program can be edited.	3	
58.02	EDIT CMD	Selects the command for the block placed in the location defined by parameter 58.03 EDIT BLOCK.		NO
	NO	Home value. The value automatically restores to NO after an editing command has been executed. The program must be in the editing mode (see parameter 58.01 ADAPT PROG CMD).	1	
	PUSH	Shifts the block in the location defined by parameter 58.03 EDIT BLOCK and the subsequent blocks one location up. A new block can be placed in the emptied location. The program must be in the editing mode (see parameter 58.01 ADAPT PROG CMD).	2	
	DELETE	Selects the block in the location defined by parameter 58.03 EDIT BLOCK and shifts the subsequent blocks one step down. The program must be in the editing mode (see parameter 58.01 ADAPT PROG CMD).	3	
	PROTECT	Activation of the task protection: Read protects the input connections of the blocks. Activate as follows: - Ensure that the task operation mode is START or STOP (parameter 58.01 ADAPT PROG CMD). - Set the passcode by parameter 58.05 PASS CODE. - Set parameter 58.02 to PROTECT. When protection is activated: - All parameters in group 57 ADAPTIVE PROG2 excluding the block output parameters are hidden (read protected). - It is not possible to switch the task operating mode (parameter 58.01 ADAPT PROG CMD) to the editing mode. - Parameter 58.05 PASS CODE value is set to 0.	4	
	UNPROTECT	Deactivation of the task protection: no read protection of the inputs of the blocks. Deactivate as follows: - Ensure that the task operation mode is START or STOP (parameter 58.01 ADAPT PROG CMD). - Set the passcode by parameter 58.05 PASS CODE. - Set parameter 58.02 to UNPROTECT.	5	
58.03	EDIT BLOCK	Defines the block location number for the command selected by parameter 58.02 EDIT CMD.		0
	1...15	Block location number		
58.04	TIMELEV_SEL	Indicates the fixed execution cycle time of 10 ms for the adaptive program task 2.		100 ms

No.	Name/Value	Description	T./FbEq	Def.
58.05	PASSCODE	Defines the passcode, which activates/deactivates the protection of the input connections of the blocks. See parameter 58.02 EDIT CMD.		0
	0 h...FFFFFF h	Passcode. The setting restores to 0 after the protection is activated/ deactivated. Note: When you activate the protection, write down the passcode and store it for later use.		
66 ADAPTIVE CONNECT				
66.04	ALM WORD1 BIT7	Selects the source for 09.04 ALARM WORD 1 bit 7.	P	0
	-255.255.31: C -32768 ... 255.255.31: C 32767	Parameter pointer or constant value: - Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling boolean inputs. - Constant value: Inversion and constant fields. The inversion field must have value C to enable the setting of the constant.		
66.05	FLT WORD2 BIT8	Selects the source for 09.02 FAULT WORD2 bit 8.	P	0
	-255.255.31: C -32768 ... 255.255.31: C 32767	Parameter pointer or constant value: - Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling boolean inputs. - Constant value: Inversion and constant fields. The inversion field must have value C to enable the setting of the constant.		
66.06	MSW BIT6	Selects the source for 08.01 MAIN STATUS WORD bit 6.	P	0
	-255.255.31: C -32768 ... 255.255.31: C 32767	Parameter pointer or constant value: - Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling boolean inputs. - Constant value: Inversion and constant fields. The inversion field must have value C to enable the setting of the constant.		
70 DDCS CONTROL				
70.01	CH0 NODE ADDR	Defines the node address for DDCS channel CH0. No two nodes on-line may have the same address. With AC 800M (CI858) DriveBus connection the drives are addressed from 1 to 24. With AC 80 DriveBus connection, the drives are addressed from 1 to 12. In other control systems, the node address is set according to the application. Note: Value is automatically set to 120 if parameter 98.02 COMM. MODULE is set to INU COM LIM.	R	1
	1...254	Node address	1 = 1	
70.02	CH0 LINK CONTROL	Defines the light intensity of the transmission LEDs. LEDs act as light sources for option fibers which are connected to DDCS channel CH0. With the maximum length of optic fiber cable, use value 15.	R	10
	1...15	Light intensity	1 = 1	

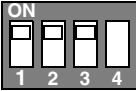
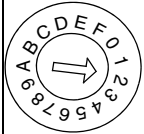
No.	Name/Value	Description	T./FbEq	Def.
70.03	CH0 BAUD RATE	Selects the communication speed of DDCS channel CH0. If FCI (Fieldbus Communication Interface) and fieldbus communication modules are used, parameter has to be set to 4 Mbit/s. Otherwise, the external control system sets the communication speed automatically.	I	4 Mbit/s
	8 Mbit/s	8 Mbit/s (not in use)	0	
	4 Mbit/s	4 Mbit/s	1	
	2 Mbit/s	2 Mbit/s (not in use)	2	
	1 Mbit/s	1 Mbit/s	3	
70.04	CH0 TIMEOUT	Defines the time delay before channel CH0 or type Rxxx fieldbus adapter interface communication break alarm/fault (COMM MODULE) is activated. Time count starts when the link fails to update the communication message. The action taken by the drive on a communication break is defined by parameter 70.05 CH0 COM LOSS CTRL. When parameter is set to zero, time is not monitored and CH0 COMM MODULE fault is not indicated regardless of the value of parameter 70.05 CH0 COM LOSS CTRL.	R	2 s
	0...60000 ms	Time	1 = 1 ms	
70.05	CH0 COM LOSS CTRL	Selects how the drive reacts when communication error on DDCS channel CH0 or on type Rxxx fieldbus adapter interface has been detected. Time delay for the communication break alarm/fault activation is defined by parameter 70.04 CH0 TIMEOUT. Note: This parameter is in use when parameter 98.01 COMMAND SEL is set to MCW and external serial communication is activated by parameter 98.02 COMM. MODULE.	I	FAULT
	NO FAULT	Converter generates warning COMM MODULE.	1	
	FAULT	Converter trips on fault COMM MODULE.	2	
70.06	CH1 LINK CONTROL	Defines the light intensity of the transmission LEDs. LEDs act as light sources for option fibers which are connected to DDCS channel CH1. With the maximum length of optic fiber cable, use value 15.	R	10
	1...15	Light intensity	1 = 1	
70.15	CH3 NODE ADDR	Defines the node address for DDCS channel CH3. No two nodes on-line may have the same address. Typically the setting needs to be changed when the drive is connected in a ring configuration which consists of several converters and a PC with a DriveWindow PC tool. Note: The new node address becomes valid only after the next power-up of the RMIO board.	R	1
	1...254	Node address	1 = 1	
70.16	CH3 LINK CONTROL	Defines the light intensity of the transmission LEDs. LEDs act as light sources for option fibers which are connected to DDCS channel CH3. With the maximum length of optic fiber cable, use value 15.	R	15
	1...15	Light intensity	1 = 1	
70.19	CH0 HW CONNECTION	Selects the topology of the DDCS channel CH0 link. Note: This parameter is not in use in the DriveBus mode. Note: Value is automatically set to RING if parameter 98.02 COMM. MODULE is set to INU COM LIM.	B	STAR

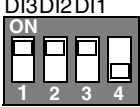

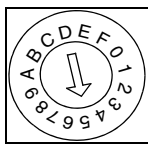
No.	Name/Value	Description	T/FbEq	Def.
	RING	Devices are connected in a ring.	0	
	STAR	Devices are connected in a star.	1	
70.20	CH3 HW CONNECTION	Selects the topology of the DDCS channel CH3 link. *Note: With ACS800-11/U11/17 and ACX800-31/U31/37/37LC, the default value of this parameter is RING.	B	STAR*
	RING	Devices are connected in a ring.	0	
	STAR	Devices are connected in a star.	1	
71 DRIVEBUS COM		DDCS channel CH0 DriveBus settings		
71.01	CH0 DRIVEBUS MODE	Selects the communication mode for the DDCS channel CH0. The new mode becomes valid only after the next power-up of the converter. Data is exchanged 4 times faster in the DriveBus mode than in the DDCS mode. Note: Value is automatically set to NO if parameter 98.02 COMM. MODULE is set to INU COM LIM.	B	YES
	NO	DDCS mode	0	
	YES	DriveBus mode	1	
90 DATA SET RECEIVE ADDRESSES		Addresses into which the received fieldbus datasets are written. The parameters are visible only when parameter 98.02 COMM. MODULE is set to NO, ADVANT/N-FB, CACP, CASCADE and INU COM WIDE. For more information, see chapter Fieldbus control .		
90.01	D SET 10 VAL 1	Selects the address into which dataword 1 of dataset 10 is written. Update time is 2 ms.	I	701
	0...20000	Parameter index		
90.02	D SET 10 VAL 2	Selects the address into which dataword 2 of dataset 10 is written. Update time is 2 ms.	I	0
	0...20000	Parameter index		
90.03	D SET 10 VAL 3	Selects the address into which dataword 3 of dataset 10 is written. Update time is 2 ms.	I	0
	0...20000	Parameter index		
90.04	D SET 12 VAL 1	Selects the address into which dataword 1 of dataset 12 is written. Update time is 4 ms.	I	0
	0...20000	Parameter index		
90.05	D SET 12 VAL 2	Selects the address into which dataword 2 of dataset 12 is written. Update time is 4 ms.	I	0
	0...20000	Parameter index		
90.06	D SET 12 VAL 3	Selects the address into which dataword 3 of dataset 12 is written. Update time is 4 ms.	I	0
	0...20000	Parameter index		
90.07	D SET 14 VAL 1	Selects the address into which dataword 1 of dataset 14 is written. Update time is 10 ms.	I	0
	0...9999	Parameter index		

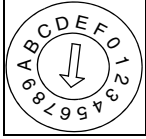
No.	Name/Value	Description	T./FbEq	Def.
90.08	D SET 14 VAL 2	Selects the address into which dataword 2 of dataset 14 is written. Update time is 10 ms.	I	0
	0...9999	Parameter index		
90.09	D SET 14 VAL 3	Selects the address into which dataword 3 of dataset 14 is written. Update time is 10 ms.	I	0
	0...9999	Parameter index		
90.10	D SET 16 VAL 1	Selects the address into which dataword 1 of dataset 16 is written. Update time is 10 ms.	I	0
	0...9999	Parameter index		
90.11	D SET 16 VAL 2	Selects the address into which dataword 2 of dataset 16 is written. Update time is 10 ms.	I	0
	0...9999	Parameter index		
90.12	D SET 16 VAL 3	Selects the address into which dataword 3 of dataset 16 is written. Update time is 10 ms.	I	0
	0...9999	Parameter index		
90.13	D SET 18 VAL 1	Selects the address into which dataword 1 of dataset 18 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
90.14	D SET 18 VAL 2	Selects the address into which dataword 2 of dataset 18 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
90.15	D SET 18 VAL 3	Selects the address into which dataword 3 of dataset 18 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
90.16	D SET 20 VAL 1	Selects the address into which dataword 1 of dataset 20 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
90.17	D SET 20 VAL 2	Selects the address into which dataword 2 of dataset 20 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
90.18	D SET 20 VAL 3	Selects the address into which dataword 3 of dataset 20 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
91 DATA SET RECEIVE ADDRESSES		See 90 DATA SET RECEIVE ADDRESSES .		
91.01	D SET 22 VAL 1	Selects the address into which dataword 1 of dataset 22 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		
...
91.06	D SET 24 VAL 3	Selects the address into which dataword 3 of dataset 24 is written. Update time is 100 ms.	I	0
	0...9999	Parameter index		

No.	Name/Value	Description	T/FbEq	Def.
92 DATA SET TRANSMIT ADDRESSES		Datasets which the converter sends to the fieldbus master station. The parameters are visible only when parameter 98.02 COMM. MODULE is set to NO, ADVANT/N-FB, CACP, CASCADE and INU COM WIDE. For more information, see chapter Fieldbus control .		
92.01	D SET 11 VAL 1	Selects the address from which dataword 1 of dataset 11 is read. Update time is 2 ms.	I	801
	0...20000	Parameter index		
92.02	D SET 11 VAL 2	Selects the address from which dataword 2 of dataset 11 is read. Update time is 2 ms.	I	110
	0...20000	Parameter index		
92.03	D SET 11 VAL 3	Selects the address from which dataword 3 of dataset 11 is read. Update time is 2 ms.	I	0
	0...20000	Parameter index		
92.04	D SET 13 VAL 1	Selects the address from which dataword 1 of dataset 13 is read. Update time is 4 ms.	I	0
	0...20000	Parameter index		
92.05	D SET 13 VAL 2	Selects the address from which dataword 2 of dataset 13 is read. Update time is 4 ms.	I	111
	0...20000	Parameter index		
92.06	D SET 13 VAL 3	Selects the address from which dataword 3 of dataset 13 is read. Update time is 4 ms.	I	106
	0...20000	Parameter index		
92.07	D SET 15 VAL 1	Selects the address from which dataword 1 of dataset 15 is read. Update time is 10 ms.	I	911
	0...9999	Parameter index		
92.08	D SET 15 VAL 2	Selects the address from which dataword 2 of dataset 15 is read. Update time is 10 ms.	I	0
	0...9999	Parameter index		
92.09	D SET 15 VAL 3	Selects the address from which dataword 3 of dataset 15 is read. Update time is 10 ms.	I	0
	0...9999	Parameter index		
92.10	D SET 17 VAL 1	Selects the address from which dataword 1 of dataset 17 is read. Update time is 10 ms.	I	912
	0...9999	Parameter index		
92.11	D SET 17 VAL 2	Selects the address from which dataword 2 of dataset 17 is read. Update time is 10 ms.	I	115
	0...9999	Parameter index		
92.12	D SET 17 VAL 3	Selects the address from which dataword 3 of dataset 17 is read. Update time is 10 ms.	I	122
	0...9999	Parameter index		
92.13	D SET 19 VAL 1	Selects the address from which dataword 1 of dataset 19 is read. Update time is 100 ms.	I	0
	0...9999	Parameter index		

No.	Name/Value	Description	T./FbEq	Def.
92.14	D SET 19 VAL 2	Selects the address from which dataword 2 of dataset 19 is read. Update time is 100 ms.	I	0
	0...9999	Parameter index		
92.15	D SET 19 VAL 3	Selects the address from which dataword 3 of dataset 19 is read. Update time is 100 ms.	I	0
	0...9999	Parameter index		
92.16	D SET 21 VAL 1	Selects the address from which dataword 1 of dataset 21 is read. Update time is 100 ms.	I	108
	0...9999	Parameter index		
92.17	D SET 21 VAL 2	Selects the address from which dataword 2 of dataset 21 is read. Update time is 100 ms.	I	112
	0...9999	Parameter index		
92.18	D SET 21 VAL 3	Selects the address from which dataword 3 of dataset 21 is read. Update time is 100 ms.	I	0
	0...9999	Parameter index		
93 DATA SET TRANSMIT ADDRESSES		See 92 DATA SET TRANSMIT ADDRESSES .		
93.01	D SET 23 VAL 1	Selects the address from which dataword 1 of dataset 23 is read. Update time is 100 ms.	I	0
	0...9999	Parameter index		
...
93.06	D SET 25 VAL 3	Selects the address from which dataword 3 of dataset 25 is read. Update time is 100 ms.	I	0
	0...9999	Parameter index		
98 OPTION MODULES		Activation of external serial communication. See chapter Fieldbus control . See also section Start via fieldbus on page 19.		
98.01	COMMAND SEL	Selects the control command interface(s). See parameter 98.02 COMM. MODULE . Note: With ACS800-11/U11/17 and ACX800-31/U31/37/37LC, the default value of this parameter is MCW.	B	I/O*
	MCW	Via a serial link and through digital input terminals	0	
	I/O	Through digital input terminals	1	
98.02	COMM. MODULE	Activates the external serial communication and selects the interface. See parameters 16.01 RUN BIT SEL and 16.15 START MODE . Note: With ACS800-11/U11/17 and ACX800-31/U31/37/37LC, the default value of this parameter is INU COM LIM.	I	NO
	NO	No external serial communication. The converter is controlled through the I/O interface.	1	

No.	Name/Value	Description	T./FbEq	Def.
	FIELD BUS	The converter communicates through an Rxxx type fieldbus adapter connected to Slot 1 or through an Nxxx type fieldbus adapter connected to RMIO board DDCS channel CH0 using data sets 1 and 2. Data set 1 and 2 are typically used with type Rxxx or Nxxx fieldbus adapter modules. See also parameter group 51 MASTER ADAPTER (fieldbus adapter).	2	
	ADVANT/N-FB	The converter communicates via RMIO board DDCS channel CH0 using datasets 10 to 25. This selection is used with, eg, AC 800M, AC 80, APC2 and Nxxx type fieldbus adapters. See also parameter groups 70 DDCS CONTROL and 71 DRIVEBUS COM .	3	
	STD MODBUS	The converter communicates through RMBA-0x Modbus adapter module connected to option Slot 1 of the drive. Note: With NMBA, use selection FIELD BUS or ADVANT/N-FB. See parameter group 52 STANDARD MODBUS and <i>RMBA-01 Modbus Adapter User's Manual</i> (3AFE64498851 [English]).	4	
	CACP	Converter is controlled by CACP board or inverter via CACP-board. See group 22 CACP PARALL CTRL .	5	
	CASCADE	Converter is controlled by a cascade drive.	6	
	INU COM WIDE	Converter is controlled by another inverter. Wide communication.	7	
	INU COM LIM	Converter is controlled by another inverter. Limited communication.	8	
98.09	DI/O EXT MODULE 1	Activates the communication to the optional digital I/O extension module 1 and defines the type and connection interface of the module. See signals 07.03 AUX CTRL WORD 2 and 08.05 DI STATUS WORD . Faster DC input signal detection can be achieved by disabling the hardware filter of the digital input with the configuration DIP switch on the circuit board of the module. DIP switch S2 (RDIO) DI3DI2DI1  Hardware filtering Enabled Disabled Note: Always enable the hardware filtering with an AC input signal. For more information, see <i>RDIO-01 Digital I/O Extension User's Manual</i> (3AFE64485733 [English]).	1	NOT IN USE
	NOT IN USE	Inactive	2	
	RDIO-SLOT1	Communication active. Module type: RDIO. Connection interface: Option Slot 1 of the drive.	3	
	RDIO-SLOT2	Communication active. Module type: RDIO. Connection interface: Option Slot 2 of the drive.	4	
	RDIO-DDCS	Communication active. Module type: RDIO. Connection interface: Optional I/O module adapter (AIMA) that communicates with the wind turbine converter through a fiber optic DDCS link CH1. Note: Module node number must be set to 2 with switch S1. 	5	

No.	Name/Value	Description	T./FbEq	Def.		
98.10	DI/O EXT MODULE 2	<p>Activates the communication to the optional digital I/O extension module 2 and defines the type and connection interface of the module.</p> <p>See signals 07.03 AUX CTRL WORD 2 and 08.05 DI STATUS WORD. Faster DC input signal detection can be achieved by disabling the hardware filter of the digital input with the configuration DIP switch on the circuit board of the module.</p> <p style="text-align: center;">DIP switch S2 (RDIO)</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">Hardware filtering</div> <div style="margin-right: 10px;">Enabled</div> <div style="margin-right: 10px;">Disabled</div>  </div> <p>Note: Always enable the hardware filtering with an AC input signal.</p> <p>For more information, see <i>RDIO-01 Digital I/O Extension User's Manual</i> (3AFE64485733 [English]).</p>	1	NOT IN USE		
	NOT IN USE	Inactive	2			
	RDIO-SLOT1	Communication active. Module type: RDIO. Connection interface: Option Slot 1 of the drive.	3			
	RDIO-SLOT2	Communication active. Module type: RDIO. Connection interface: Option Slot 2 of the drive.	4			
	RDIO-DDCS	<p>Communication active. Module type: RDIO. Connection interface: Optional I/O module adapter (AIMA) that communicates with the wind turbine converter through a fiber optic DDCS link CH1.</p> <p>Note: Module node number must be set to 3 with switch S1.</p>	Switch S1		5	
98.11	AI/O EXT MODULE 1	Activates the communication to the optional analog I/O extension module 1. Only used for external temperature measurement.	1	NOT IN USE		
	NOT IN USE	Inactive. See parameter 30.20 to use RMIO-board AI1/AO1.	2			
	RAIO-SLOT 1	Communication active. Module type: RAIO. See parameters 30.20 and 30.26 .	3			
	RAIO-SLOT 2	Communication active. Module type: RAIO. See parameters 30.20 and 30.26 .	4			
	RAIO-DDCS	<p>Communication active. Module type: RAIO. Connection interface: Optional I/O module adapter (AIMA) that communicates with the wind turbine converter through a fiber optic DDCS link CH1.</p> <p>Note: Module node number must be set to 5 with switch S1.</p>	Switch S1		5	
98.15	AI/O EXT MODULE 2	Activates the communication to the optional analog I/O extension module 2. Only used for external temperature measurement.	1	NOT IN USE		
	NOT IN USE	Inactive	2			
	RAIO-SLOT1	Communication active. Module type: RAIO. See parameters 30.32 and 30.38 .	3			
	RAIO-SLOT2	Communication active. Module type: RAIO. See parameters 30.32 and 30.38 .	4			

No.	Name/Value	Description	T./FbEq	Def.
	RAIO-DDCS	<p>Communication active. Module type: RAIO.</p> <p>Connection interface: Optional I/O module adapter (AIMA) that communicates with the wind turbine converter through a fiber optic DDCS link CH1.</p> <p>Note: Module node number must be set to 6 with switch S1.</p> 	5	
99 START UP DATA		Language, identification run selection etc.		
99.01	LANGUAGE	Selects the display language.	1	ENGLISH
	ENGLISH	English	0	
	DEUTSCH	German	2	
99.02	DEVICE NAME	<p>Defines the name for the drive or application. The name is visible on the control panel display in the Drive Selection Mode or on the DriveWindow main menu.</p> <p>Note: The name can be typed only by using a drive PC tool.</p>	C	
		Name		
99.06	FAST SYNC	Activates the fast synchronization of the line-side converter at start. See section Synchronization on page 15.	B	YES
	NO	Inactive: synchronization with phase order check	0	
	YES	Active: synchronization without phase order check	1	
99.07	LINE SIDE ID RUN	Enables the manual Line-side Identification. See section Identification routine on page 14.	B	NO
	NO	Disabled	0	
	YES	Enabled. The identification starts when the line-side converter receives the start command. (Identification takes about 4 seconds. It is not allowed to load the line-side converter during the identification.)	1	
99.08	AUTO LINE ID RUN	Enables the automatic Line-side Identification. See section Identification routine on page 14.	B	YES
	NO	Disabled	0	
	YES	Enabled. The identification is requested automatically after the RMIO board power-up. The identification starts automatically when the line-side converter receives the start command. The parameter actually forces parameter 99.07 LINE SIDE ID RUN to YES. (Identification takes about 4 seconds. It is not allowed to load the line-side converter during the identification.)	1	
99.09	APPLIC RESTORE	Restores the original parameter settings.	B	NO
	NO	No	0	
	YES	Yes	1	
99.10	SUPPLY ID NUMBER	This parameter can be used by an external control system to check the right connections of the optical cables to the converter. This parameter requires support from the external control system to verify the correct connection.	1	0
	0...32767			

Fieldbus control

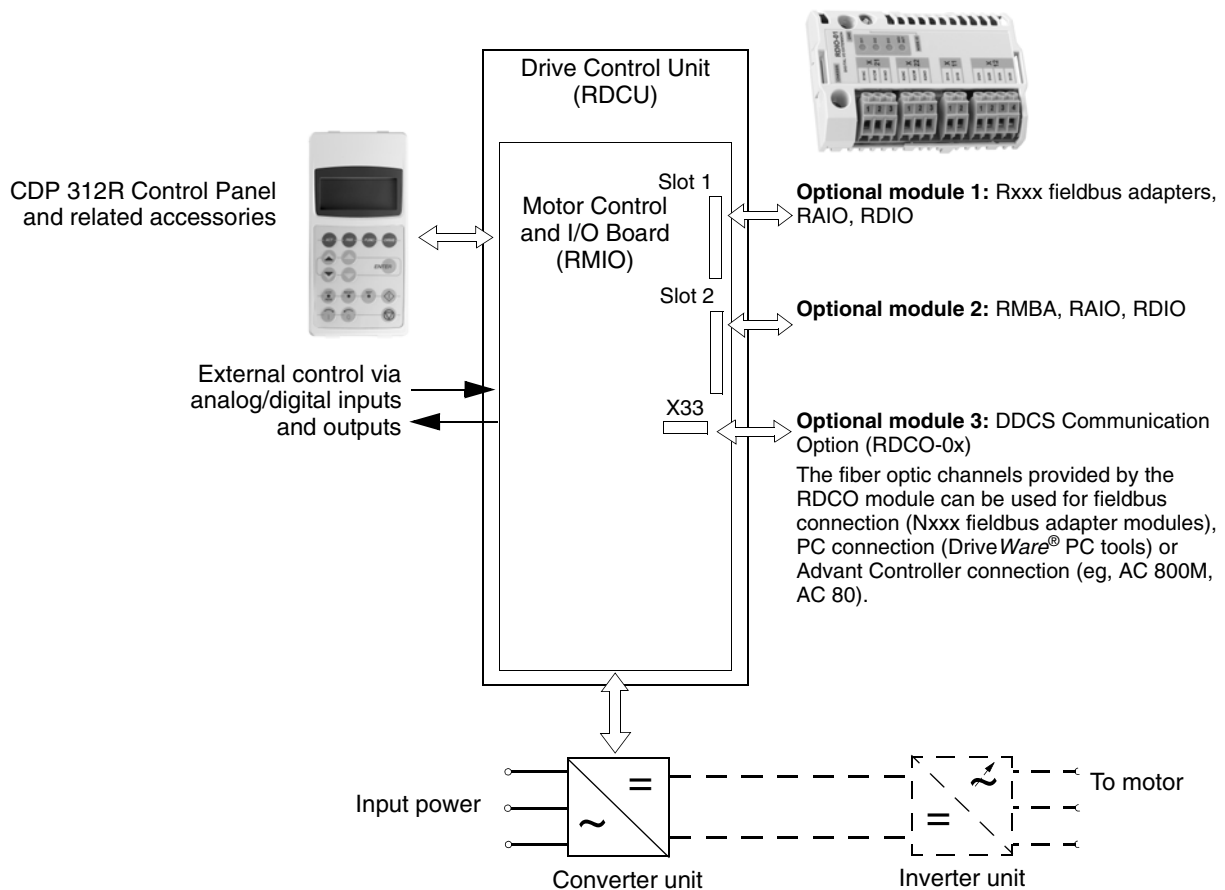
What this chapter contains

This chapter describes how the drive can be controlled by external devices over a communication network.

System overview

The drive can be connected to an external control system – usually a fieldbus controller – via an adapter module. The drive can be set to receive all of its control information through the external control interface, or the control can be distributed between the external control interface and other available sources, for example, digital and analog inputs.

The following diagram shows the control interfaces and I/O options of the supply unit.



The line-side converter can also be controlled by another inverter.

The following table gives information on the DDCS (Distributed Drives Communication System) channels CH0...CH3 of the RDCO module. The RDCO module is connected to the RMIO board.

Channel	Interfaces	RDCO-01	RDCO-02	RDCO-03
CH0	Advant Controller Fieldbus Interface	10 MBd DDCS/DriveBus	5 MBd	5 MBd
CH1	Basic I/O / Optional I/O	5 MBd	5 MBd	5 MBd
CH2	Master/Follower	10 MBd	10 MBd	5 MBd
CH3	DriveWindow (PC, 1 Mbit/s)	10 MBd	10 MBd	5 MBd

Setting up communication through fieldbus

Fieldbus adapters for several communication protocols are available (for example, PROFIBUS and Modbus). Rxxx type fieldbus adapter modules are mounted in expansion Slot 1 of the drive. Nxxx type fieldbus adapter modules are connected to channel CH0 of the RDCO module.

Note: For instructions on setting up an RMBA-01 module, see section [Setting up communication through the Standard Modbus Link](#) on page 78.

Before configuring the drive for fieldbus control, the adapter module must be mechanically and electrically installed according to the instructions given in the hardware manual of the drive and the module manual.

The following table lists the parameters which need to be defined when setting up communication through a fieldbus adapter.

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
98.01 COMMAND SEL	MCW I/O	MCW	Selects the control command interface(s).
98.02 COMM. MODULE	NO FIELDBUS ADVANT/N-FB STD MODBUS CACP CASCADE INU COM WIDE INU COM LIM	FIELDBUS (with Rxxx or Nxxx) ADVANT/N-FB (with Nxxx)	Initialises communication between drive and fieldbus adapter module. Activates module set-up parameters for type Nxxx and Rxxx fieldbus modules (group 51 MASTER ADAPTER).
70.01 CH0 NODE ADDR	1-125	1	Defines the node address for DDCS channel CH0 (type Nxxx adapter).
71.01 CH0 DRIVEBUS MODE *	YES = DriveBus mode NO = DDCS mode	NO	Selects the communication mode for DDCS channel CH0 (type Nxxx adapter).
70.04 CH0 TIMEOUT	0-60000 ms		Defines the delay time before channel CH0 (type Nxxx adapter) or type Rxxx fieldbus adapter interface communication break alarm/fault is indicated.
70.05 CH0 COM LOSS CTRL	NO FAULT FAULT		Defines the action taken after CH0 (type Nxxx adapter) or type Rxxx fieldbus adapter interface communication fault.
70.19 CH0 HW CONNECTION	RING STAR	Default value is STAR, which is typically used with branching units. This parameter has no effect in the DriveBus mode.	Selects the topology of the DDCS channel CH0 (type Nxxx adapter) link.
Groups 90 DATA SET RECEIVE ADDRESSES... 93 DATA SET TRANSMIT ADDRESSES			Addresses for receive and transmit data. Note: When 98.02 COMM.MODULE is set to FIELDBUS, the addresses for receive and transmit data are fixed. See section Fieldbus control interface on page 85.

* Parameter is valid after the next power-up of the drive.

Setting up communication through the Standard Modbus Link

An RMBA-01 Modbus Adapter connected to Slot 1 of the RMIO board forms an interface called the Standard Modbus Link. The Standard Modbus Link can be used for external control of the drive by a Modbus controller (RTU protocol only).

Before configuring the drive for Modbus control, the adapter module must be mechanically and electrically installed according to the instructions given in the hardware manual of the drive and the module manual.

The following table lists the parameters which need to be defined when setting up communication through the Standard Modbus link.

Note: With NMBA-01 Modbus Adapter, parameter [98.02](#) COMM. MODULE must be set to FIELDBUS or ADVANT/N-FB. See section [Setting up communication through fieldbus](#) on page [77](#).

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
98.01 COMMAND SEL	MCW I/O	MCW	Selects the control command interface(s).
98.02 COMM. MODULE	NO FIELDBUS ADVANT/N-FB STD MODBUS CACP CASCADE INU COM WIDE INU COM LIM	STD MODBUS	Initializes communication between drive (Standard Modbus Link) and Modbus protocol controller. Activates communication parameters in group 52 STANDARD MODBUS .

When [98.02](#) COMM.MODULE is set to STD MODBUS, the addresses for receive and transmit data are fixed. See section [Fieldbus control interface](#) on page [85](#).

More information on Modbus communication is available at <http://www.modbus.org>.

Setting up communication through Advant Controller

The Advant Controller is connected via a DDCS link to channel CH0 of the RDCO module.

- **AC 800M Advant Controller**

DriveBus connection: CI858 DriveBus Communication Interface required. See *CI858 DriveBus Communication Interface User's Manual* (3AFE68237432 [English]).

Optical ModuleBus connection: TB811 (5 MBd) or TB810 (10 MBd) Optical ModuleBus Port Interface required. See section [Optical ModuleBus connection](#) below.

For more information, see *AC 800M Controller Hardware Manual* (3BSE027941 [English]), *AC 800M/C Communication, Protocols and Design manual* (3BSE028811 [English]) ABB Industrial Systems, Västerås, Sweden.

- **AC 80 Advant Controller**

DriveBus connection: Connectable to RMIO-0x/1x board with RDCO-01.

Optical ModuleBus connection: TB811 (5 MBd) or TB810 (10 MBd) Optical ModuleBus Port Interface required. See section [Optical ModuleBus connection](#) below.

- **CI810A Fieldbus Communication Interface (FCI)**

Optical ModuleBus connection

TB811 (5 MBd) or TB810 (10 MBd) Optical ModuleBus Port Interface required.

The TB811 Optical ModuleBus Port Interface is equipped with 5 MBd optical components, while the TB810 is equipped with 10 MBd components. All optical components on a fiber optic link must be of the same type since 5 MBd components do not match with 10 MBd components. The choice between TB810 and TB811 depends on the equipment it is connected to. With RDCO Communication Option Module, the Interface is selected as follows:

Optional ModuleBus Port Interface	DDCS Communication Option Module		
	RDCO-01	RDCO-02	RDCO-03
TB811		×	×
TB810	×		

If branching unit NDBU-85/95 is used with CI810A, TB810 Optical ModuleBus Port Interface must be used.

The following table lists the parameters which need to be defined when setting up communication between the drive and Advant Controller.

Parameter	Alternative settings	Setting for fieldbus control	Function/Information
98.01 COMMAND SEL	MCW I/O	MCW	Selects the control command interface(s).
98.02 COMM. MODULE	NO FIELDBUS ADVANT/N-FB STD MODBUS CACP CASCADE INU COM WIDE INU COM LIM	ADVANT/N-FB	Initializes communication between drive (fiber optic channel CH0) and Advant Controller. The transmission speed is 4 Mbit/s.
70.01 CH0 NODE ADDR	1-125	AC 800M DriveBus (CI858) $\hat{=}$ 1...24 AC 800M ModuleBus $\hat{=}$ 1...125 AC 80 DriveBus $\hat{=}$ 1-12 AC 80 ModuleBus $\hat{=}$ 17-125 FCI (CI810A) $\hat{=}$ 17-125 APC2 $\hat{=}$ 1	Defines the node address for DDCCS channel CH0.
71.01 CH0 DRIVEBUS MODE *	YES = DriveBus mode NO = DDCCS mode	AC 800M DriveBus (CI858) $\hat{=}$ YES AC 800M ModuleBus $\hat{=}$ NO AC 80 DriveBus $\hat{=}$ YES APC2/AC 80 ModuleBus/FCI (CI810A) $\hat{=}$ NO	Selects the communication mode for DDCCS channel CH0.
70.04 CH0 TIMEOUT	0-60000 ms		Defines the delay time before channel CH0 communication break alarm/fault is indicated.
70.05 CH0 COM LOSS CTRL	NO FAULT FAULT		Defines the action taken after a CH0 communication fault.
70.19 CH0 HW CONNECTION	RING STAR	Default value is STAR, which is typically used with branching units. This parameter has no effect in the DriveBus mode.	Selects the topology of the DDCCS channel CH0 link.
Groups 90 DATA SET RECEIVE ADDRESSES...9 3 DATA SET TRANSMIT ADDRESSES			Addresses for receive and transmit data. See section <i>Fieldbus control interface</i> on page 85.

* Parameter is valid after the next power-up of the drive.

Setting up communication through inverter module

Before configuring the drive for control, connect fiber optic cables between inverter DDCS channel CH1 and line-side converter DDCS channel CH0.

The following table lists the parameters which need to be defined when setting up communication between inverter channel CH1 and converter channel CH0.

Converter parameter	Alternative settings	Setting for inverter control	Function/Information
98.01 COMMAND SEL	MCW I/O	MCW I/O	Selects the control command interface(s): MCW = Control commands through inverter. I/O = Control commands via converter digital inputs.
98.02 COMM. MODULE	NO FIELD BUS ADVANT/N-FB STD MODBUS CACP CASCADE INU COM WIDE INU COM LIM	INU COM LIM	Initialises line-side converter channel CH0 communication for inverter control.
11.01 DC REF SELECT		FIELD BUS	Defines the source for the intermediate circuit DC voltage reference. Value is automatically set to FIELD BUS if parameter 98.02 COMM. MODULE is set to INU COM LIM.
11.02 Q REF SELECT		PARAM 24.02	Defines the source for the reactive power reference. Value is automatically set to PARAM 24.02 if parameter 98.02 COMM. MODULE is set to INU COM LIM.
70.01 CH0 NODE ADDR		120	Defines the node address for DDCS channel CH0. Value is automatically set to 120 if parameter 98.02 COMM. MODULE is set to INU COM LIM.
71.01 CH0 DRIVEBUS MODE *		NO	Selects the communication mode for the DDCS channel CH0. Value is automatically set to NO if parameter 98.02 COMM. MODULE is set to INU COM LIM.
70.19 CH0 HW CONNECTION		RING	Selects the topology of the DDCS channel CH0 link. Value is automatically set to RING if parameter 98.02 COMM. MODULE is set to INU COM LIM.
70.20 CH3 HW CONNECTION		RING	Selects the topology of the DDCS channel CH3 link.
201.09 PANEL DRIVE ID *	1...65535	2...65535	Defines the panel ID number. If ID number is set to 1, it is automatically changed to 2, because number 1 is reserved for the inverter.
202.01 LOCAL LOCK	TRUE FALSE	TRUE	Disables entering the local control mode (LOC/REM key of the panel), ie, local control is not allowed because of inverter control. Value is automatically set to TRUE if parameter 98.02 COMM. MODULE is set to INU COM LIM.

Inverter parameter	Alternative settings	Setting for line-side converter control	Function/Information
112.04 SUPPLY CTRL MODE	NONE LINE CONV	LINE CONV	Initializes inverter channel CH1 communication, ie, enables line-side converter control.

* Parameter is valid after the next power-up of the drive.

Setting up communication through CACP

The following table list the parameters which are set automatically when parameter [98.02 COMM. MODULE](#) is set to CACP for the first time and [22.01 SUB CONVERTER ID](#) is selected according to parallel configuration. After the parameter [98.02 COMM. MODULE](#) has been set, the parameter values are alterable. **Note:** Blank cell means that the current value of the cell is not changed.

98.02 COMM. MODULE = CACP				
Converter parameter	Value	Value	Value	Value
22.01 SUB CONVERTER ID	NOT SELECTED	SUB CONV. 1	SUB CONV. 2	SUB CONV. 3
11.01 DC REF SELECT	PARAM 23.01			
11.02 Q REF SELECT	PARAM 24.02			
24.03 Q POWER REF2 SEL	kVAr			
70.01 CH0 NODE ADDR		1	2	3
70.19 CH0 HW CONNECTION	STAR			
70.20 CH3 HW CONNECTION	STAR			
71.01 CH0 DRIVEBUS MODE	NO			
90.01 D SET 10 VAL 1		701	0	0
90.02 D SET 10 VAL 2		0	701	0
90.03 D SET 10 VAL 3		0	0	701
90.04 D SET 12 VAL 1	2301			
90.07 D SET 14 VAL 1		24.02	0	0
90.08 D SET 14 VAL 2		0	24.02	0
90.09 D SET 14 VAL 3		0	0	24.02
92.01 D SET 11 VAL 1	801			
92.02 D SET 11 VAL 2	108			
92.03 D SET 11 VAL 3	107			
92.04 D SET 13 VAL 1	115			
92.05 D SET 13 VAL 2	111			
92.06 D SET 13 VAL 3	106			
92.07 D SET 15 VAL 1	205			
92.09 D SET 15 VAL 3	112			
92.10 D SET 17 VAL 1	911			
92.11 D SET 17 VAL 2	912			
92.12 D SET 17 VAL 3	117			
98.01 COMMAND SEL	MCW			
90.02 D SET 10 VAL 2	0			

98.02 COMM. MODULE = CACP				
Converter parameter	Value	Value	Value	Value
90.02 D SET 10 VAL 2	0			
139.02 LOAD BALAN GAIN		0	0.1	0.1

The following table list the parameters which are set automatically when parameter [98.02](#) COMM. MODULE is set to CACP and [22.02](#) POWER BAL MODE is selected according to parallel configuration. **Note:** Blank cell means that the current value of the cell is not changed.

98.02 COMM. MODULE = CACP					
Converter parameter	Value	Value	Value	Value	Value
22.02 POWER BAL MODE	NOT SELECTED	COMM DC PERC	COMM DC ACT	SEP DC PERC	SEP DC ACT
90.05 D SET 12 VAL 2		13706	13703	13901	13906
137.05 POWER REF ENA		ON	ON	OFF	OFF
137.10 POWREF DC-CTRL		YES	YES	NO	NO

Setting up communication by CASCADE or INU COM WIDE

The following table list the parameters which are set automatically when parameter **98.02** COMM. MODULE is set to CASCADE or INU COM WIDE. **Note:** Blank cell means that the current value of the cell is not changed.

Converter parameter	Value	Value
98.02 COMM. MODULE	CASCADE	INU COM WIDE
11.01 DC REF SELECT	PARAM 23.01	PARAM 23.01
11.02 Q REF SELECT	PARAM 24.02	PARAM 24.02
70.01 CH0 NODE ADDR	1	120
70.15 CH3 NODE ADDR *	2	2
70.19 CH0 HW CONNECTION	RING	RING
70.20 CH3 HW CONNECTION	RING	RING
71.01 CH0 DRIVEBUS MODE	NO	NO
90.01 D SET 10 VAL 1	701	701
90.02 D SET 10 VAL 2	2301	2301
90.03 D SET 10 VAL 3	2402	2402
90.04 D SET 12 VAL 1	15804	
92.01 D SET 11 VAL 1	801	801
92.02 D SET 11 VAL 2	108	108
92.03 D SET 11 VAL 3	107	107
92.04 D SET 13 VAL 1	911	115
92.05 D SET 13 VAL 2	912	111
92.06 D SET 13 VAL 3	115	106
92.07 D SET 15 VAL 1	122	
92.08 D SET 15 VAL 2	106	
92.09 D SET 15 VAL 3	111	
92.10 D SET 17 VAL 1	119	911
92.11 D SET 17 VAL 2	120	912
92.12 D SET 17 VAL 3	121	112
92.13 D SET 19 VAL 1	112	
92.14 D SET 19 VAL 2	406	
92.15 D SET 19 VAL 3	132	
92.16 D SET 21 VAL 1	133	
92.17 D SET 21 VAL 2	134	
92.18 D SET 21 VAL 3	135	
98.01 COMMAND SEL	MCW	MCW
201.09 PANEL DRIVE ID *		2

* Parameter is valid after the next power-up of the drive.

Fieldbus control interface

The communication between an external control system and the drive consists of datasets. The link sends the dataset into the dataset table in the drive program and returns the content of the next dataset to the external control system as a return message.

If the DriveBus protocol is used, the DriveBus master can send one message which contains one dataset for 10 drives during a 1 ms time period.

One dataset (DS) consists of three 16-bit words called data words (DW). The IGBT Supply Control Program supports the use of datasets 1, 2 or datasets 10...25. The first transmitted dataset number can be assigned by setting the offset parameter in group [51 MASTER ADAPTER](#). For example, by setting the offset to 9, the first dataset is written to dataset 10.

Datasets 1 and 2

The contents of datasets 1 and 2 vary depending on the setting of parameter [98.02 COMM. MODULE](#).

When parameter [98.02](#) is set to FIELDBUS and Nxxx or RMBA-0x type of a module is used, the contents of datasets 1 and 2 are as follows:

DS	DW	Signal	Default address	Signal update time
1	1	Main Control Word	07.01 MAIN CTRL WORD	10 ms
	2	Reference 1	23.01 DC VOLT REF	10 ms
	3	Reference 2	24.02 Q POWER REF2	10 ms
2	1	Main Status Word	08.01 MAIN STATUS WORD	10 ms
	2	Actual 1	01.08 POWER	10 ms
	3	Actual 2	01.07 REACTIVE POWER	10 ms

When parameter [98.02](#) is set to FIELDBUS and Anybus modules are used (eg, RPBA-0x, RDNA-0x...), the contents of datasets 1 and 2 are as follows:

DS	DW	Signal	Default address	Signal update time
1	1	Main Control Word	07.01 MAIN CTRL WORD	10 ms
	2	Reference 1	23.01 DC VOLT REF	10 ms
2	1	Main Status Word	08.01 MAIN STATUS WORD	10 ms
	2	Actual 1	01.08 POWER	10 ms

Datasets 10...25

The contents of datasets 10...25 can be selected by parameter groups [90 DATA SET RECEIVE ADDRESSES...93 DATA SET TRANSMIT ADDRESSES](#). Transmit and receive addresses are defined in an external control system application.

Received datasets

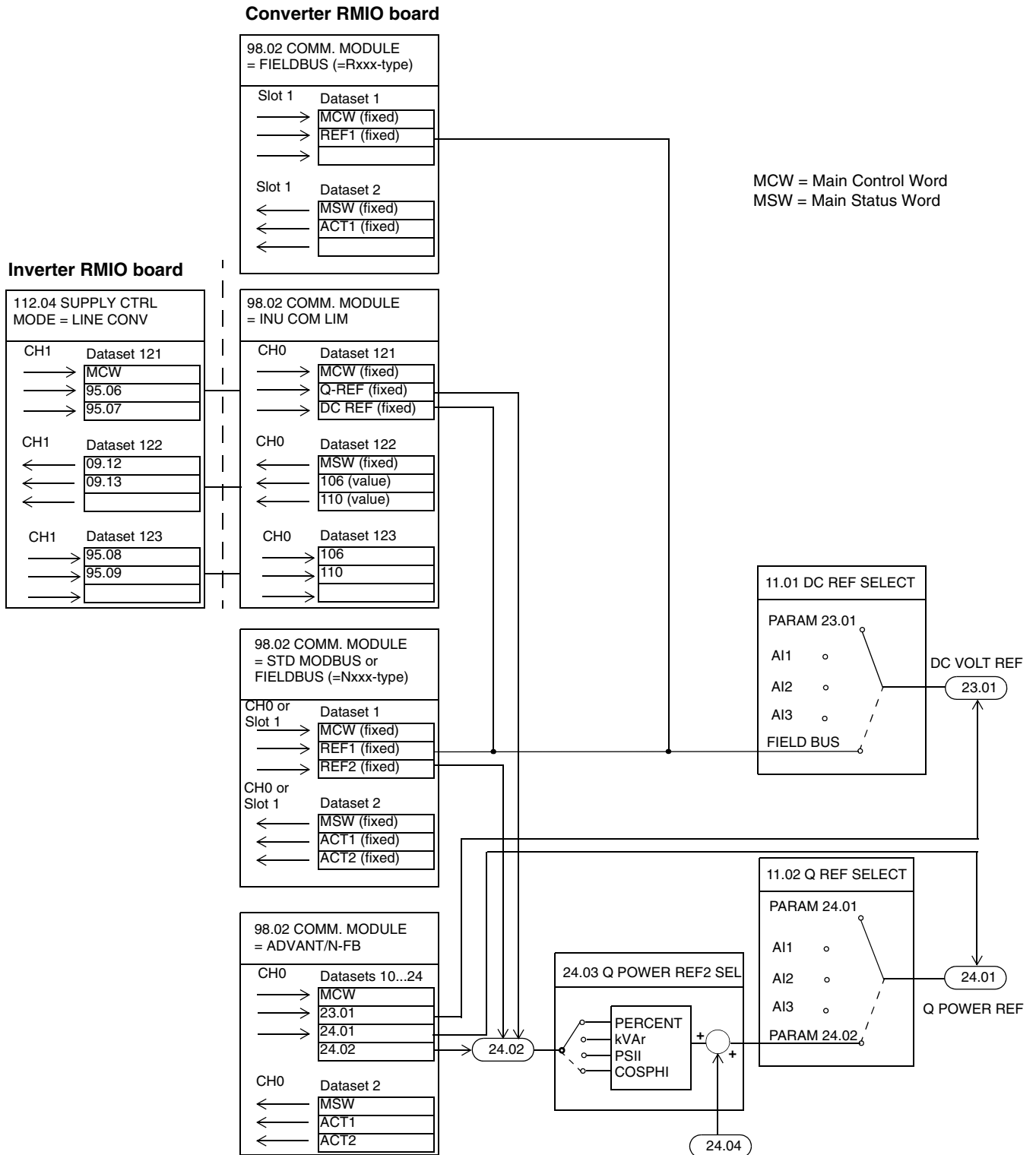
DS	DW	time*	Default address	Address
10**	1	2 ms	7.01 MAIN CTRL WORD	90.01
	2	2 ms		90.02
	3	2 ms		90.03
12**	1...3	4 ms		90.04...90.06
14	1...3	10 ms		90.07...90.09
16	1...3	10 ms		90.10...90.12
18	1...3	100 ms		90.13...90.15
20	1...3	100 ms		90.16...90.18
22	1...3	100 ms		91.01...91.03
24	1...3	100 ms		91.04...91.06
* Time within which the drive reads data from the datasets to the parameter table or writes data from the parameter table to the datasets. Since the drive is a follower of the communication master, the actual communication cycle time depends on the communication speed of the master.				
** Boolean data type parameters are not supported. If boolean data type parameters need to be set from the external control system, use datasets 14...24.				

Transmitted datasets

DS	DW	time*	Default address	Address
11**	1	2 ms	8.01 MAIN STATUS WORD	92.01
	2	2 ms	1.10 DC VOLTAGE	92.02
	3	2 ms		92.03
13**	1	4 ms		92.04
	2	4 ms	1.11 MAINS VOLTAGE	92.05
	3	4 ms	1.06 LINE CURRENT	92.06
15	1	10 ms	9.11 SUPPLY FAULT WORD	92.07
	2	10 ms		92.08
	3	10 ms		92.09
17	1	10 ms	9.12 SUPPLY ALARM WORD	92.10
	2	10 ms	1.15 DI6-1 STATUS	92.11
	3	10 ms	1.22 RO3-1 STATUS	92.12
19	1...3	100 ms		92.13...92.15
21	1	100 ms	1.08 POWER	92.16
	2	100 ms	1.12 ACQ800 TEMP	92.17
	3	100 ms		92.18
23	1...3	100 ms		93.01...93.03
25	1...3	100 ms		93.04...93.06
* Time within which the drive reads data from the datasets to the parameter table or writes data from the parameter table to the datasets. Since the drive is a follower of the communication master, the actual communication cycle time depends on the communication speed of the master.				
** Boolean data type parameters are not supported. If boolean data type parameters need to be set to the external control system, use datasets 15...25.				

Block diagram: reference select

The figure below shows the parameters for DC and reactive power reference selection.



Data words

The Control Word (CW) is the principal means of controlling the drive from a fieldbus system. The Control Word is sent by the external control system to the drive. The drive switches between its states according to the bit-coded instructions of the Control Word.

The Status Word (SW) is a word containing status information, sent by the drive to the external control system.

07.01 MAIN CTRL WORD

Actual signal 07.01 MAIN CTRL WORD is the main control word of the converter. On the control panel the value is shown in hexadecimal format. See also section [Starting sequence](#) on page 15. (Update interval is 10 ms.)

Bit	Name	Value	Description
0	ON/OFF	0 ⇒ 1	Start charging (close charging contactor).
		0	Open main contactor (switch power off).
1, 2	Not in use		
3	START	1	Start modulation.
		0	Stop modulation.
4...6	Not in use		
7	RESET	0 ⇒ 1	Reset.
		0	–
8...15		0	Not in use

07.03 AUX CTRL WORD 2

Auxiliary Control Word 2 (ACW2). A 16-bit data word.

Bit	Name	Description
0	EXT1 DO1 CONTROL	RDIO Extension module 1 digital output DO1 control
1	EXT1 DO2 CONTROL	RDIO Extension module 1 digital output DO2 control
2	EXT2 DO1 CONTROL	RDIO Extension module 2 digital output DO1 control
3	EXT2 DO2 CONTROL	RDIO Extension module 2 digital output DO2 control
4...15	Not in use	

08.01 MAIN STATUS WORD

Actual signal 08.01 MAIN STATUS WORD is the main status word of the converter. On the control panel the value is shown in hexadecimal format. See also section [Starting sequence](#) on page 15. (Update interval is 4 ms.)

Bit	Name	Value	STATE/Description
0	RDY_ON	1	Ready to switch on = no fault
		0	Not ready to switch on = fault
1	RDY_RUN	1	Ready to operate = DC bus charged
		0	Not ready to operate
2	RDY_REF	1	Operation enabled
		0	
3	TRIPPED	1	Fault
		0	No fault
4, 5		–	Not in use
6	SELECTABLE	1	Selected by parameter 66.06 MSW BIT6.
		0	
7	ALARM	1	Warning
		0	No Warning
8	MODULATING	1	Converter modulates.
		0	Converter is not modulating.
9	REMOTE	1	Drive control location: REMOTE
		0	Drive control location: LOCAL
10	NET OK	1	Network voltage is OK.
		0	Network voltage is lost.
11		–	Not in use
12		–	Not in use
13	CHARGING OR RDY_RUN		Combines bits 14 and 1.
		1	Ready to operate = DC bus charged or Charging contactor closed
		0	Not ready to operate or Charging contactor open
14	CHARGING	1	Charging contactor closed
		0	Charging contactor open
15		–	Not in use

8.01 MAIN STATUS WORD value at usual states of converter.

STATE	MSW in integer	MSW in hex	MSW in binary
No fault	561	231	0000 0010 0011 0001
Charging	25137	6231	0110 0010 0011 0001
ID-run	9783	2637	0010 0110 0011 0111
Modulating	10039	2737	0010 0111 0011 0111
Network voltage is lost, NET LOST alarm	8887	22B7	0010 0010 1011 0111
Tripped	568	238	0000 0010 0011 1000

08.05 DI STATUS WORD

Digital input status word. A 16-bit data word.

Bit	Name	Description
0	DI1	RMIO board digital input DI1 status
1	DI2	RMIO board digital input DI2 status
2	DI3	RMIO board digital input DI3 status
3	DI4	RMIO board digital input DI4 status
4	DI5	RMIO board digital input DI5 status
5	DI6	RMIO board digital input DI6 status
6	DI7 (DIIL)	RMIO board digital input DI7 status
7	EXT1 DI1	Optional digital I/O Extension module 1 RDIO digital input DI1 status
8	EXT1 DI2	Optional digital I/O Extension module 1 RDIO digital input DI2 status
9	EXT1 DI3	Optional digital I/O Extension module 1 RDIO digital input DI3 status
10	EXT2 DI1	Optional digital I/O Extension module 2 RDIO digital input DI1 status
11	EXT2 DI2	Optional digital I/O Extension module 2 RDIO digital input DI2 status
12	EXT2 DI3	Optional digital I/O Extension module 2 RDIO digital input DI3 status
13...15	Not in use	

Fault and alarm words

09.01 FAULT WORD 1

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 100 ms.)

Bit	Name	Description
0	SHORT CIRC	Short circuit in the main circuit
1	OVERCURRENT	Overcurrent
2	DC OVERVOLT	Intermediate circuit DC overvoltage
3	ACQ800 TEMP	IGBT overtemperature
4	EARTH FAULT	Internally detected earth (ground) fault
5, 6	Not in use	
7	Internals faults	Internal fault. If the bit is 1, write down the fault message from the fault logger and contact your local ABB representative.
8...15	Not in use	
Bit value: 1 = fault, 0 = no fault		

09.02 FAULT WORD 2

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 100 ms.)

Bit	Name	Description
0	SUPPLY PHASE	Missing phase during synchronization
1	Not in use	
2	DC UNDERVOLT	Intermediate circuit DC undervoltage
3...5	Not in use	
6	IO FAULT	I/O device fault on DDCS channel CH1
7	CTRL B TEMP	RMIO control board overtemperature
8	Not in use	
9	OVER SWFREQ	Switching overfrequency
10	Not in use	
11	PPCC LINK	PPCC link fault
12	COMM MODULE	Communication error between drive and type Rxxx fieldbus module or between drive and external control system
13...15	Not in use	
Bit value: 1 = fault, 0 = no fault		

09.03 FAULT WORD 3

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 100 ms).

Bit	Name	Description
0...1	Not in use	
2	EXT TMP 1	External over/undertemperature 1
3	EXT TMP 2	External over/undertemperature 2
4	EXT TMP 3	External over/undertemperature 3
5	EXT TMP 4	External over/undertemperature 4
6...11	Not in use	
12	INV OVERTEMP	Converter module temperature is excessive.
13	MOD CHOKE T	Overtemperature in choke of liquid cooled R8i inverter module.
14	MOD BOARD T	Overtemperature in AINT board of inverter module.
15	Not in use	

09.04 ALARM WORD 1

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 100 ms).

Bit	Name	Description
0, 1	Not in use	
2	EXT TMP 1	External over/undertemperature 1
3	EXT TMP 2	External over/undertemperature 2
4	EXT TMP 3	External over/undertemperature 3
5	EXT TMP 4	External over/undertemperature 4
6	T MEAS CIRC	External temperature measurement circuit error
7...9	Not in use	
10	EXT ANALOG IO	RAIO analog I/O error
11	Not in use	
12	INV OVERTEMP	Converter module temperature is excessive.
13	MOD CHOKE T	Overtemperature in choke of liquid cooled R8i inverter module.
14	MOD BOARD T	Overtemperature in AINT board of inverter module.
15	Not in use	

09.11 SUPPLY FAULT WORD

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 100 ms.)

Bit	Name	Description
0	CHARGING FLT	DC link short-circuit during charging
1	OVERCURRENT	Overcurrent
2	EXT EVENT DI5	External fault indicated via digital input DI5
3	ACS 800 TEMP	IGBT overtemperature
4	EXT EVENT DI4	External fault indicated via digital input DI4
5	DI1	Fan failure. Fault is activated 5 seconds after failure.
6	MAIN CNT FLT	Main contactor failure
7	SHORT CIRC	Short-circuit in the main circuit
8	Internal fault	Internal fault. If this bit is 1, write down the fault message from the fault logger and contact your local ABB representative.
9	NET VOLT FLT	Supply voltage out of range during synchronization
10	COMM MODULE	Communication error between drive and type Rxxx fieldbus module or between drive and external control system
11	EXT EVENT DI7	External fault indicated via digital input DI7
12	EARTH FAULT	Internally detected earth (ground) fault
13	SYNCHRO FLT	Synchronization to supply failed
14	DC UNDERVOLT	Intermediate circuit DC undervoltage
15	DC OVERVOLT	Intermediate circuit DC overvoltage
Bit value: 1 = fault, 0 = no fault		

09.12 SUPPLY ALARM WORD

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 100 ms.)

Bit	Name	Description
0	COMM MODULE	Communication break detected
1	PANEL LOST	Local control lost.
2	DI1	DI1 alarm. Alarm is activated 0.5 seconds after failure.
3	AI<MIN FUNC	Current below 4 mA (4 mA minimum selected)
4	ACS 800 TEMP	IGBT overtemperature
5	CURRENT LIM	Current limit exceeded
6...9	Not in use	
10	NET LOST	Network voltage lost
11	EXT EVENT DI7	External fault indicated via digital input DI7
12	Not in use	
13	EARTH FAULT	Internally detected earth (ground) fault
	EXT EVENT DI4	External fault indicated via digital input DI4
14	EXT EVENT DI5	External fault indicated via digital input DI5
15	Not in use	
Bit value: 1 = fault, 0 = no fault		

09.13 CURRENT UNBALANCE

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 2 ms.)

Bit	Name	Description
0	CUR UNBAL 1	Excessive output current unbalance in converter module 1 of parallel connected converter modules
1	CUR UNBAL 2	Excessive output current unbalance in converter module 2 of parallel connected converter modules
2	CUR UNBAL 3	Excessive output current unbalance in converter module 3 of parallel connected converter modules
...
11	CUR UNBAL 12	Excessive output current unbalance in converter module 12 of parallel connected converter modules
12...15	Not in use	
Bit value: 1 = fault, 0 = no fault		

09.14 OVERCURRENT FAULT

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 2 ms.)

Bit	Name	Description
0	OVERCURRE 1	Excessive input current in converter module 1 of parallel connected converter modules
1	OVERCURRE 2	Excessive input current in converter module 2 of parallel connected converter modules
2	OVERCURRE 3	Excessive input current in converter module 3 of parallel connected converter modules
...
11	OVERCURRE 12	Excessive input current in converter module 12 of parallel connected converter modules
12...15	Not in use	
Bit value: 1 = fault, 0 = no fault		

09.15 SHORT CIRC FAULT

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 2 ms.)

Bit	Name	Description
0	SC INV U 1	Short circuit in converter module 1 of parallel connected converter modules
1	SC INV U 2	Short circuit in converter module 2 of parallel connected converter modules
2	SC INV U 3	Short circuit in converter module 3 of parallel connected converter modules
...
11	SC INV U 12	Short circuit in converter module 12 of parallel connected converter modules
12	SC PHASE U	Short circuit in phase U in the faulted module
13	SC PHASE V	Short circuit in phase V in the faulted module
14	SC PHASE W	Short circuit in phase W in the faulted module
Bit value: 1 = fault, 0 = no fault		

09.16 OVERTEMP WORD

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 2 ms.)

Bit	Name	Description
0	ACS TEMP INV1	Overtemperature in converter module 1 of parallel connected converter modules
1	ACS TEMP INV2	Overtemperature in converter module 2 of parallel connected converter modules
2	ACS TEMP INV3	Overtemperature in converter module 3 of parallel connected converter modules
...
11	ACS TEMP INV12	Overtemperature in converter module 12 of parallel connected converter modules
12	OVERTEMP PHASE U	Overtemperature in phase U in the faulted module
13	OVERTEMP PHASE V	Overtemperature in phase V in the faulted module
14	OVERTEMP PHASE W	Overtemperature in phase W in the faulted module
Bit value: 1 = fault, 0 = no fault		

09.17 TEMP DIF FLT WORD

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 2 ms.)

Bit	Name	Description
0	TEMPD INV1	Temperature difference fault in converter module 1 of parallel connected converter modules
1	TEMPD INV2	Temperature difference fault in converter module 2 of parallel connected converter modules
2	TEMPD INV3	Temperature difference fault in converter module 3 of parallel connected converter modules
...
11	TEMPD INV12	Temperature difference fault in converter module 12 of parallel connected converter modules
12	TEMPD PHASE U	Temperature difference fault in phase U in the faulted module
13	TEMPD PHASE V	Temperature difference fault in phase V in the faulted module
14	TEMPD PHASE W	Temperature difference fault in phase W in the faulted module
Bit value: 1 = fault, 0 = no fault		

09.18 TEMP DIF ALM WORD

For the possible causes and remedies, see chapter [Fault tracing](#). (Update interval is 2 ms.)

Bit	Name	Description
0	TEMPD INV1	Temperature difference alarm in converter module 1 of parallel connected converter modules
1	TEMPD INV2	Temperature difference alarm in converter module 2 of parallel connected converter modules
2	TEMPD INV3	Temperature difference alarm in converter module 3 of parallel connected converter modules
...
11	TEMPD INV12	Temperature difference alarm in converter module 12 of parallel connected converter modules
12	TEMPD PHASE U	Temperature difference alarm in phase U in the faulted module
13	TEMPD PHASE V	Temperature difference alarm in phase V in the faulted module
14	TEMPD PHASE W	Temperature difference alarm in phase W in the faulted module
Bit value: 1 = fault, 0 = no fault		

Fault tracing

What this chapter contains

This chapter lists all alarm and fault messages including the possible causes and corrective actions.

Safety



WARNING! Only qualified electricians are allowed to maintain the drive. The safety instructions on the first pages of the appropriate hardware manual or safety manual must be read before you start working with the drive.

Alarm and fault indications

An alarm or a fault message on the panel display indicates abnormal drive status. Most alarm and fault causes can be identified and corrected using this information. If not, an ABB representative should be contacted.

It is assumed that there is a control panel connected to the line-side converter. For instructions on how to use the control panel, see the firmware manual of the motor-side converter application program. If the converter is operated with the control panel detached, the red LED in the panel mounting platform indicates the fault condition. (**Note:** Some converter types are not fitted with the LEDs as standard.)

The four digit code number in brackets after the message is for the fieldbus communication. See chapter [Fieldbus control](#).

How to reset

The converter can be reset either by pressing the keypad **RESET** key, by digital input or fieldbus or switching the supply voltage off for a while. When the fault has been removed, the drive can be restarted.

Fault history

When a fault is detected, it is stored in the fault history. The latest faults and alarms are stored together with the time stamp at which the event was detected.

The fault logger collects 64 of the latest faults. When the drive power is switched off, 16 of the latest faults are stored.

The Fault History can be viewed by pressing the control panel double arrow keys (⏪ or ⏩) in the Actual Signal Display Mode. The fault history can then be scrolled with arrow keys (⏴ and ⏵). To exit the fault history, press an arrow key (⏪ or ⏩). The fault history can be cleared by pressing the **RESET** key.

Warning messages

Warning	Cause	What to do
ACQ 800 TEMP (4210) (09.12 SUPPLY ALARM WORD bit 4)	Converter IGBT temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check line current against converter current.
AI<MIN FUNC (8110) (09.12 SUPPLY ALARM WORD bit 3)	Analog control signal 4...20 mA is below minimum allowed value 3.1 mA. This can be caused by incorrect signal level or failure in control wiring.	Check for proper analog control signal level. Check minimum limit settings (parameters 13.06 MINIMUM AI2 and 13.10 MINIMUM AI3). Check control wiring.
ALM (xx) (08.01 MAIN STATUS WORD bit 7)	Converter internal alarm	Check connections in converter cabinet. Write down alarm code (in brackets). Contact your local ABB representative.
BATT FAILURE (5581)	APBU branching unit memory backup battery error caused by - incorrect APBU switch S3 setting - too low battery voltage	With parallel connected converters, enable backup battery by setting actuator 6 of switch S3 to ON. Replace backup battery. Note: Actuator 6 of switch S3 is normally activated (ON) during commissioning. Note: Set actuator 6 of switch S3 to OFF when APBU is stored as spare part.
COMM MODULE (7510) (09.12 SUPPLY ALARM WORD bit 0) (Programmable fault or alarm: See parameters 70.04 and 70.05.)	Cyclical communication between drive and type Rxxx fieldbus module or between drive and external control system connected to DDCS channel CH0 is lost.	Check fieldbus communication status. See chapter <i>Fieldbus control</i> , or appropriate fieldbus adapter manual. Check group 51 MASTER ADAPTER (fieldbus adapter) parameter settings. Check group 52 STANDARD MODBUS (Standard Modbus link) parameter settings. Check that channel CH0 node address is correct (parameter 70.01 CH0 NODE ADDR). Check that bus master is communicating and correctly configured. Check cable connections and earthings. Check optic fibers between Advant Controller (or type Nxxx fieldbus adapter) and RMIO board DDCS channel CH0. Replace fiber optic cables.
CURRENT LIM (2212) (09.12 SUPPLY ALARM WORD bit 5)	Current limit is exceeded.	Limit inverter actual power or decrease reactive power generation reference value (parameter 24.01 Q POWER REF).
DI1 (9081) (09.12 SUPPLY ALARM WORD bit 2)	Fan is not rotating or fan contactor connection is loose. This supervision is valid only when converter is in RDY_RUN state (ie, 08.01 Main Status Word bit 1 = 1).	Check acknowledge circuit connected to digital input DI1. Check fan. Replace fan.

Warning	Cause	What to do
EARTH FAULT (2330) (09.12 SUPPLY ALARM WORD bit 13) (Programmable fault or alarm: See parameter 30.02 .)	Earth fault in Earthed/Grounded Network Sum of line currents measured with internal current transducers is too high. Earth (ground) fault in LCL filter, converter, DC link, inverter(s), motor cables or motor, or current imbalance in parallel connected converter modules. Earth (ground) fault level can be too sensitive.	Check converters fuses (parallel connected converter modules). Check converter and LCL filter for earth leakages. Check motors. Check motor cables. Check inverter(s). Check parameter 30.03 EARTH FAULT LEVEL settings.
EXT ANALOG IO (7081) (09.04 ALARM WORD 1 bit 10)	Analog I/O error on RAIO I/O Extension module.	Check cabinet temperature. Replace RAIO module if alarm is continuously active.
EXT EVENT DI4 (9084) (09.12 SUPPLY ALARM WORD bit 13) (Programmable fault or alarm: See parameter 30.04)	Digital input DI4 alarm	Check digital input DI4. Check parameter 30.04 DI4 EXT EVENT setting.
EXT EVENT DI5 (9085) (09.12 SUPPLY ALARM WORD bit 14) (Programmable fault or alarm: See parameter 30.05 .)	Digital input DI5 alarm	Check digital input DI5. Check parameter 30.05 DI5 EXT EVENT setting.
EXT EVENT DI7 (9087) (09.12 SUPPLY ALARM WORD bit 11) (Programmable fault or alarm: See parameter 30.13)	Digital input DI7 alarm	Check digital input DI7. Check parameters 30.13 DI7 EXT EVENT setting.
EXT TMP x LO (4495 - 4498) (09.04 ALARM WORD 1 bits 2...5)	External undertemperature x	Check limits of external temperature measurement in group 30 FAULT FUNCTIONS .
EXT TMP x HI (4491 - 4494) (09.04 ALARM WORD 1 bits 2...5)	External overtemperature x	Check limits of external temperature measurement in group 30 FAULT FUNCTIONS .
GEN P LI<10% (FFCD)	The value of parameter 23.10 GEN POWER LIMIT has been set below 10%. The converter start-up may have failed.	Check and adjust parameter 23.10 GEN POWER LIMIT setting.
INV OVERTEMP (4290) (09.04 ALARM WORD 1 bit 12)	Converter module temperature is excessive.	Check internal cooling system. Check coolant inlet temperature. Check operation of liquid cooled unit.
MOD BOARD T (FF88) (09.04 ALARM WORD 1 bit 14)	Overtemperature in AINT board of inverter module.	Check inverter fan. Check ambient temperature.

Warning	Cause	What to do
MOD CHOKE T (FF89) (09.04 ALARM WORD 1 bit 13)	Overtemperature in choke of liquid cooled R8i inverter module.	Check inverter fan. Check ambient temperature. Check liquid cooled system.
NET LOST (32A3) (09.12 SUPPLY ALARM WORD bit 10)	Network voltage is lost during modulation. Line current is below supervision limit or line frequency differs more than 5 Hz from initialized value of 50 or 60 Hz. For more information, see section <i>Missing phase</i> on page 21.	Check network conditions (power breaks, voltage transients). Check input power connections. Check input fuses.
PANEL LOST (5300) (09.12 SUPPLY ALARM WORD bit 1)	Local control device (control panel or DriveWindow PC tool) selected as active control location has ceased communicating. Note: Converter shifts to remote control mode automatically.	Check control panel or PC tool connection. Check control panel connector. See hardware manual. Replace control panel.
NO COMMUNICATION (x)	This alarm message is generated by control panel. - Cabling problem or hardware malfunction detected on panel link. - If (x) = (4), panel type is not compatible with converter program version.	Check panel link connections. Press RESET key. Reset may take up to half a minute, please wait. Check panel type and version of converter application program (see parameter group 04 INFORMATION). Panel type is printed on panel cover.
ID N CHANGED (FF68)	Converter ID number has been changed from 1 (change is not displayed on control panel).	To change ID number back to 1 go to Drive Selection Mode by pressing DRIVE . Press ENTER . Set ID number to 1. Press ENTER .
LOAD FACTORY (FF69)	Factory parameter settings are being restored.	Wait until restore is completed.
REPLACE FAN (4280)	Running time of converter cooling fan has exceeded its estimated life time.	Change fan. Reset fan run time counter. See parameter 01.31 FAN ON-TIME.
TEMP DIF x y (4380) (09.18 TEMP DIF ALM WORD)	Excessive temperature difference between several parallel connected converter modules. x (1...12 R8i) refers to converter module number and y (U, V, W) refers to phase. Excessive temperature can be caused, eg, by unequal current sharing between parallel connected converters.	Check cooling fan. Replace fan. Check air filters.
T MEAS CIRC (FF91) (09.04 ALARM WORD 1 bit 6)	Error in external temperature measurement circuit. This can be caused by broken temperature sensor or cable.	Check connections of external temperature measurement circuit. See section <i>Temperature sensors</i> on page 30 for connection diagrams.

Fault messages

Fault Text	Cause	What to do
ACQ 800 TEMP (4210) (09.01 FAULT WORD 1 bit 3) (09.11 SUPPLY FAULT WORD bit 3)	Converter IGBT temperature is excessive.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check line current against converter current.
ACS TEMP x y (4210) (09.16 OVERTEMP WORD)	Excessive internal temperature in converter module of several parallel connected converter modules. x (1...12 R8i) refers to faulty converter module number and y (U, V, W) refers to phase.	Check ambient conditions. Check air flow and fan operation. Check heatsink fins for dust pick-up. Check motor power against converter power.
CTRL B TEMP (4110) (09.02 FAULT WORD 2 bit 7)	RMIO control board temperature exceeds 88°C.	Check air flow and fan operation.
CHARGING FLT (3230) (09.11 SUPPLY FAULT WORD bit 0)	DC link voltage is not high enough after charging. DC link voltage has not exceeded minimum limit or current is not below preset limit. Faulty PPCC link (DC voltage measurement is zero)	Check charging circuit fuses. Check charging circuit. Check possible short circuit in DC link. Check undervoltage trip limit (parameter 30.12 DC UNDERVOLT TRIP). Check PPCC link. See fault message PPCC LINK.
COMM MODULE (7510) (09.02 FAULT WORD 2 bit 12) (09.11 SUPPLY FAULT WORD bit 10) (Programmable fault or alarm: See parameters 70.04 and 70.05.)	Cyclical communication between drive and type Rxxx fieldbus module or between drive and external control system connected to DDCS channel CH0 is lost.	Check fieldbus communication status. See chapter <i>Fieldbus control</i> , or appropriate fieldbus adapter manual. Check group 51 MASTER ADAPTER (fieldbus adapter) parameter settings. Check group 52 STANDARD MODBUS (Standard Modbus link) parameter settings. Check that channel CH0 node address is correct (parameter 70.01 CH0 NODE ADDR). Check that bus master is communicating and correctly configured. Check cable connections and earthings. Check optic fibers between Advant Controller (or type Nxxx fieldbus adapter) and RMIO board DDCS channel CH0. Replace fiber optic cables.
CUR UNBAL xx (2330) (09.13 CURRENT UNBALANCE)	Excessive output current unbalance in converter module of several parallel connected converter modules. xx (2...12) refers to faulty converter module number.	Check motor. Check motor cable. Check converter fuses. Check converter. Check inverter(s). Check LCL filter.
DC OVERVOLT (3210) (09.01 FAULT WORD 1 bit 2) (09.11 SUPPLY FAULT WORD bit 15)	Excessive intermediate circuit DC voltage. This can be caused by - static or transient overvoltages in mains, or - excessive supply voltage during synchronization. Default trip limit is - 427 V DC for 240 V units - 740 V DC for 415 V units - 891 V DC for 500 V units - 1230 V DC for 690 V units.	Check level of supply voltage, DC voltage and converter nominal voltage. Check DC overvoltage trip limit (parameter 30.11).

Fault Text	Cause	What to do
DC UNDERVOLT (3220) (09.02 FAULT WORD 2 bit 2) (09.11 SUPPLY FAULT WORD bit 14)	Intermediate circuit DC voltage is not sufficient due to missing mains phase, blown fuse or converter internal fault. Default trip limit is - 170 V DC for 240 V units - 293 V DC for 415 V units - 354 V DC for 500 V units - 488 V DC for 690 V units.	Check supply and converter fuses. Check supply voltage. Check DC undervoltage trip limit (parameter 30.12).
DI1 (9081) (09.11 SUPPLY FAULT WORD bit 5)	Fan is not rotating or fan contactor connection is loose. This supervision is valid only when converter is in RDY_RUN state (ie, 08.01 Main Status Word bit 1 = 1).	Check acknowledge circuit connection to digital input DI1. Check fan. Replace fan.
EARTH FAULT (2330) (09.01 FAULT WORD 1 bit 4) (09.11 SUPPLY FAULT WORD bit 12) (Programmable fault or alarm: See parameter 30.02.)	Earth fault in Earthed/grounded Network Sum of line currents measured with internal current transducers is too high. Earth (ground) fault in LCL filter, converter, DC link, inverter(s), motor cables or motor, or current imbalance in parallel connected converters. Earth (ground) fault level can be too sensitive.	Check converter fuses (parallel connected converter modules). Check converter and LCL filter for earth leakages. Check motors. Check motor cables. Check inverter(s). Check parameter 30.03 EARTH FAULT LEVEL settings.
EXT EVENT DI4 (9084) (09.11 SUPPLY FAULT WORD bit 4) (Programmable fault or alarm: See parameter 30.04)	Digital input DI4 fault	Check digital input DI4. Check parameter 30.04 DI4 EXT EVENT setting.
EXT EVENT DI5 (9085) (09.11 SUPPLY FAULT WORD bit 2) (Programmable fault or alarm: See parameters 30.05 and 30.10.)	Digital input DI5 fault	Check digital input DI5. Check parameter 30.05 DI5 EXT EVENT and 30.10 DI5 TRIP DELAY settings.
EXT EVENT DI7 (9087) (09.11 SUPPLY FAULT WORD bit 11) (Programmable fault or alarm: See parameters 30.13 and 30.14)	Digital input DI7 fault	Check digital input DI7. Check parameters 30.13 DI7 EXT EVENT and 30.14 DI7 TRIP DELAY settings.
EXT TMP x LO (4495 - 4498) (09.03 FAULT WORD 3 bits 2...5)	External undertemperature x	Check limits of external temperature measurement in group 30 FAULT FUNCTIONS.
EXT TMP x HI (4491 - 4494) (09.03 FAULT WORD 3 bits 2...5)	External overtemperature x	Check limits of external temperature measurement in group 30 FAULT FUNCTIONS.

Fault Text	Cause	What to do
FLT (xx) (08.01 MAIN STATUS WORD bit 3)	Converter internal fault	Check connections inside converter cabinet. Write down Fault code (in brackets). Contact your local ABB representative.
INT CONFIG (5410)	Number of parallel connected converter modules defined by parameter 16.10 INT CONFIG USER is incorrect.	Check parameter 16.10 INT CONFIG USER setting.
INV OVERTEMP (4290) (09.03 FAULT WORD 3 bit 12)	Converter module temperature is excessive.	Check internal cooling system. Check coolant inlet temperature. Check operation of liquid cooled unit.
IO FAULT (7000) (09.02 FAULT WORD 2 bit 6)	I/O communication fault or error detected on channel CH1 of RDCO module. This can be caused by fault in RDCO module or control board (RMIO) or faulty/loose fiber optic cable connection.	Check connections between RMIO and RDCO module. Test with new fiber optic cables. Replace RDCO module / RMIO board.
MAIN CNT FLT (FF17) (09.11 SUPPLY FAULT WORD bit 6)	Main contactor is not functioning properly, or connection is loose.	Check main contactor control circuit wiring. Check main contactor operating voltage level (should be 230 V). Check digital input DI3 connections.
MOD BOARD T (FF88) (09.03 FAULT WORD 3 bit 14)	Overtemperature in AINT board of inverter module.	Check inverter fan. Check ambient temperature.
MOD CHOKE T (FF89) (09.03 FAULT WORD 3 bit 13)	Overtemperature in choke of liquid cooled R8i inverter module.	Check inverter fan. Check ambient temperature. Check liquid cooled system.
NET VOLT FLT (3100) (09.11 SUPPLY FAULT WORD bit 9)	Main supply voltage is out of acceptable range during synchronization or Line-side Identification. Trip limit is - 115 V for 230 V units - 208 V for 415 V units - 250 V for 500 V units - 345 V for 690 V units.	Check main supply voltage. Restart unit.
OVERCURR xx (2310) (09.01 FAULT WORD 1 bit 1 09.11 SUPPLY FAULT WORD bit 1 09.14 OVERCURRENT FAULT)	Overcurrent fault in converter module of several parallel connected converter modules. xx (2...12) refers to faulty converter module number.	Check motor load. Check supply voltage. Check that there are no power factor compensation capacitors in supply. Check converter power semiconductors (IGBTs) and current transducers.
OVERCURRENT (2310) (09.01 FAULT WORD 1 bit 1 09.11 SUPPLY FAULT WORD bit 1)	Excessive input current. There are two overcurrent trip limits: - 0.98 · converter maximum current (parameter 04.08) - approximately 190% of converter nominal current (parameter 04.05).	Check motor load. Check supply voltage. Check that there are no power factor compensation capacitors in supply. Check converter power semiconductors (IGBTs) and current transducers.
OVER SWFREQ (FF55) (09.02 FAULT WORD 2 bit 9)	Switching overfrequency fault. This may be due to hardware fault in electronic boards.	Replace RMIO board. Replace INT board. With parallel connected converter modules replace APBU (or NPBU) branching unit.

Fault Text	Cause	What to do
POWERF INV xx (3381)	INT board powerfail in converter unit of several parallel connected converter modules. xx refers to faulty converter module number.	Check that INT board power cable is connected. Check that POW board is working correctly. Replace INT board.
PPCC LINK xx (5210) (09.02 FAULT WORD 2 bit 11)	<p>INT board current measurement or communication fault between RMIO and INT boards</p> <p>Fault indication is activated when charging is completed and DC link voltage is high, but not when DC link voltage is disconnected and RMIO board has external power supply.</p> <p>xx (1...12) refers to faulty converter module number.</p> <p>Fault can be caused by faulty power plate.</p> <p>Branching unit type defined by parameter 112.16 PBU BOARD TYPE is incorrect.</p>	<p>Check fiber optic cable connection between RMIO and INT boards. With parallel connected converter modules, also check cabling to APBU (or NPBU) branching unit.</p> <p>If fault is still active, replace APBU (or NPBU) branching unit (only with parallel connected converter modules), RMIO and INT board (in this order) until fault disappears.</p> <p>Replace fiber optic cables.</p> <p>If RMIO is powered from external supply, ensure that supply is on.</p> <p>Check converter power semiconductors (IGBTs).</p> <p>Check that there is no short circuit in power stage. Short circuit or overcurrent caused by faulty IGBTs can activate PPCC LINK fault.</p> <p>With parallel connected converters, check parameter 112.16 PBU BOARD TYPE setting.</p> <p>Note: Parameters above 100 are not visible unless password is entered for parameter lock in parameter 16.03 PASS CODE. These parameters are not allowed to be changed without ABB's permission.</p>
SHORT CIRC (2340) (09.01 FAULT WORD 1 bit 0)	Short circuit fault	<p>Measure resistances of converter power semiconductors (IGBTs).</p> <p>If faulty IGBTs are found, replace IGBTs and/or INT and/or NGDR boards or converter module.</p> <p>Check main circuit.</p>
SC INV xx y (2340) (09.01 FAULT WORD 1 bit 0 09.11 SUPPLY FAULT WORD bit 7 09.15 SHORT CIRC FAULT)	Short circuit in phase module of several parallel connected converter modules. xx (1...12) refers to faulty converter module number and y (U, V, W) refers to faulty phase.	<p>Measure resistances of converter power semiconductors (IGBTs).</p> <p>If faulty IGBTs are found, replace IGBTs and/or INT and/or NGDR boards or converter module.</p> <p>Check main circuit.</p>
SUPPLY PHASE (3130) (09.02 FAULT WORD 2 bit 0)	Missing phase during synchronization	<p>Check supply fuses.</p> <p>Check supply for network imbalance.</p>
SYNCHRO FLT (8180) (09.11 SUPPLY FAULT WORD bit 13)	Synchronization to supply network has failed. Supply frequency has changed remarkably since Line-side Identification routine.	Perform Line-side Identification routine again. See parameter 99.07 LINE SIDE ID RUN.
TEMP DIF x y (4380) (09.17 TEMP DIF FLT WORD)	<p>Excessive temperature difference between several parallel converter modules. x (1...12 R8i) refers to converter module number and y (U, V, W) refers to phase.</p> <p>Excessive temperature can be caused, eg, by unequal current sharing between parallel connected converter modules.</p>	<p>Check cooling fan.</p> <p>Replace fan.</p> <p>Check air filters.</p>
USER MACRO (FFA1)	No User Macro saved or file is defective.	Create User Macro again.

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/drives and selecting *Sales, Support and Service network*.

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

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