ABB industrial drives

ACS580MV primary control program
Troubleshooting manual

List of related manuals in English

Drive hardware manuals and guides	Code (English)
ACS580MV hardware manual	*2UBB004520*
ACS-AP-X assistant control panels user's manual	*3AUA0000085685*
ACS580MV Engineering Guideline	*2UBB013672*
ACS580MV Wiring Diagram	*2UBB004441*
Warranty directive	*3BHS104420*

Drive firmware manuals and guides	
ACS580MV primary control program firmware manual	*3BHS811381*
CPU Firmware Update Description AC500 / AC500-eCo	*3ADR025122M0205*
ACS580MV SW compatibility table	*2UBB017471*

PC tools manuals and guides	
User's manual Start-up and maintenance PC tool Drive composer	*3AUA0000094606*

Option manuals and guides
Manuals and quick guides for I/O extension modules, fieldbus adapters, etc.

You can find manuals and other product documents in PDF format on the Internet. See *http://www.abb.com/motors&drives*. For manuals not available in the Document library, contact your local ABB representative.

Troubleshooting manual

ACS580MV primary control program

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2UBB005092 Rev Q
EN
EFFECTIVE: 2023-12-30

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6. Drive Composer Support Package

7. POF Link Test

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Further information

1

Introduction to the Manual

What this chapter contains

This chapter describes the contents of the manual. It also contains information on the compatibility, safety and intended audience.

Applicability

This manual applies to the ACS580MV primary control program version:

- MHDRE 2.74

(or newer). The loading packages are available in the Medium Voltage Drives Portal.

The firmware version of the control program is visible in parameter *07.05 Firmware version*, or in the System info in the main menu on the control panel.

Safety instructions

Follow all safety instructions delivered with the drive.

- Only ABB Service and ABB certified service partners are allowed to service the drive and change any of the parameters described in this manual.
- Read the **complete safety instructions** before you install, commission, or use the drive. The complete safety instructions are delivered with the drive as part of the *ACS580MV hardware manual*.
- Read the **firmware function-specific warnings and notes** before changing parameter values. These warnings and notes are included in the parameter descriptions presented in chapters *Fault Tracing* and *Service Level Parameters*, as well as in the Parameters chapter of the *ACS580MV primary control program firmware manual*.

Target audience

This manual is intended for ABB Service and ABB certified service partner personnel who commission and troubleshoot the drives.

Contents of the manual

This manual contains the following chapters:

- *Loading of the Control Software*: describes procedures for loading the software/firmware to all parts of control hardware.
- *Fault Tracing*: lists the warning and fault messages with possible causes and actions to remove the source of the fault.
- *Service Level Parameters*: describes all parameters that require service access level. This chapter is an addition to the description of End user level parameters provided in the *ACS580MV primary control program firmware manual*.
- *Using ACS580MV Data Analyzer*: short guidelines for using the ACS580MV data analyzer PC tool. This tool can be used to analyze diagnostic data that are continuously stored on SD card in BCU.
- *Drive Composer Support Package*: describes creating and using the Support package functionality of the PC tool Drive composer. This option is typically used for fast collection of a short history data from a drive.
- *POF Link Test*: describes a procedure to test the communication between control hub and power modules.
- *Inspecting Power Modules*: describes procedure for inspection of power modules to determine potential malfunction.

Related documents

A list of related manuals is printed on the inside of the front cover.

Terms and abbreviations

Term/abbreviation	Definition
AC500 or AC500eco	Type of PLC used as IO controller in ACS580MV drives
ACS-AP-S	Type of control panel used with ACS580MV drives
AI	Analog input; interface for analog input signals
AO	Analog output; interface for analog output signals
BCU	BCON Control Unit - The control unit used in ACS580MV drives
DC link	DC circuit in the Power module between rectifier and inverter
DDCS	Distributed drives communication system; a protocol used in optical fiber communication
DI	Digital input; interface for digital input signals
DIIL	Digital input interlock
DIO	Digital input/output; interface that can be used as a digital input or output
DO	Digital output; interface for digital output signals
Drive	Frequency converter for controlling AC motors. The drive consists of a several power modules which are connecting the grid side to the inverter side.
FAIO-01	Optional analog I/O extension module
FBA	Fieldbus adapter
FENA-11	Optional Ethernet/IP adapter
FIO-01	Optional digital I/O extension module
FIO-11	Optional digital and analog I/O extension module
FPBA-0x	Optional PROFIBUS DP adapter
FSCA-0x	Optional Modbus adapter
HTL	High-threshold logic
IGBT	Insulated gate bipolar transistor; a voltage-controlled semiconductor type widely used in inverters and IGBT supply units due to their easy controllability and high switching frequency.
I/O	Input/Output
Network control	With fieldbus protocols based on the Common Industrial Protocol (CIP™), such as DeviceNet and Ethernet/IP, denotes the control of the drive using the Net Ctrl and Net Ref objects of the ODVA AC/DC Drive Profile. For more information, see www.odva.org, and the following manuals: • *FDNA-01 DeviceNet adapter module User's manual* (3AFE68573360 [English]), and • *FENA-01/-11 Ethernet adapter module User's manual* (3AUA0000093568 [English]).

Term/abbreviation	Definition
Parameter	User-adjustable operation instruction to the drive, or signal measured or calculated by the drive
PID controller	Proportional–integral–derivative controller
PM	Power module (semiconductor stack)
PLC	Programmable logic controller
Power unit	Contains the power electronics and power connections of the drive (or inverter module). The drive control unit is connected to the power unit.
PTC	Positive temperature coefficient
RFG	Ramp function generator
RO	Relay output; interface for a digital output signal. Implemented with a relay.
TTL	Transistor-transistor logic
UPS	Uninterrupted power supply; power supply equipment with battery to maintain output voltage during power failure.

Cybersecurity disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

2

Loading of the Control Software

What this chapter contains

This chapter contains the description of equipment, tools and procedures for downloading software to all parts of control hardware in the ACS580MV converter.

Warnings

WARNING! Only ABB Service and ABB certified service partners are allowed to service the drive. Obey the safety instructions in chapter *Introduction to the Manual* on page 9. If you ignore them, injury or death, or damage to the equipment can occur.

Preparing the SW loading

Equipment checklist

☑	Following equipment should be prepared before SW download can start:
☐	SD Memory Card adapter for AC500eco MC503 **(**Art. Nr.**:** 1TNE968901R0100)
☐	SD Memory Card MC502 **(**Art. Nr.**:** 1SAP180100R0001)
☐	XILINX platform cable USB II for downloading control hub
☐	USB to mini USB cable for downloading BCON SW (USB 2.0 Cable Type A - Mini-B, m-m)
☐	USB to FO serial cable for downloading Power modules (needed in case there are problems with normal SW download procedure)
☐	SD Memory Card adapter TA5350 (1SAP187500R0050) and MC5102 (1SAP180100R0002)

Software checklist

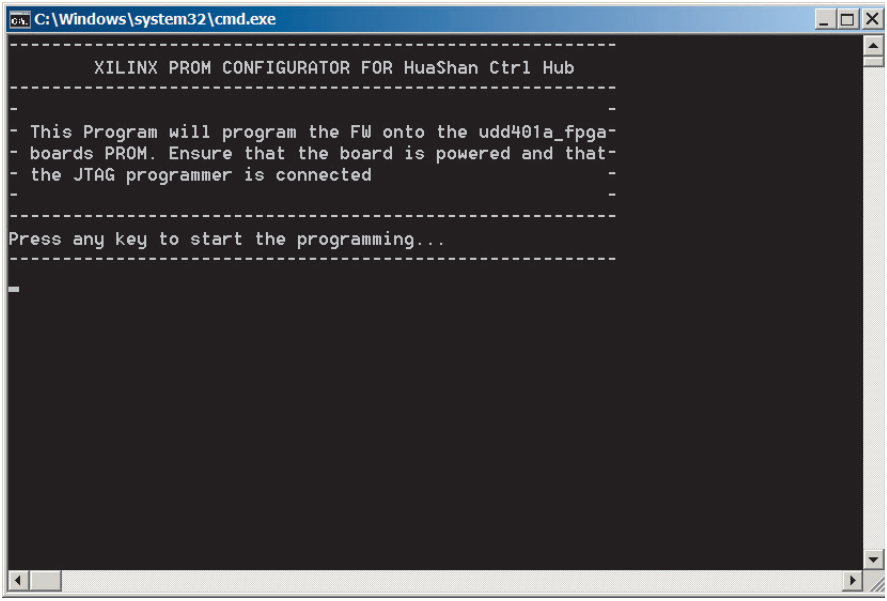
☐	The latest MHDRE loading package (available in Medium Voltage Drives Portal)
☐	Drive loader 2 (available in ABB intranet)
☐	Drive composer pro ver. 1.9 or newer
☐	DriveStartup ver. 5.0 or newer (recommended ver. is 5.2 or newer available in DriveStartup installer)
☐	DriveStartup step definitions for ACS580MV (contained in the MHDRE loading package)
☐	Tera Term PC tool (available at *TeraTerm*)

Software loading to ACS580MV converter

Loading control hub firmware

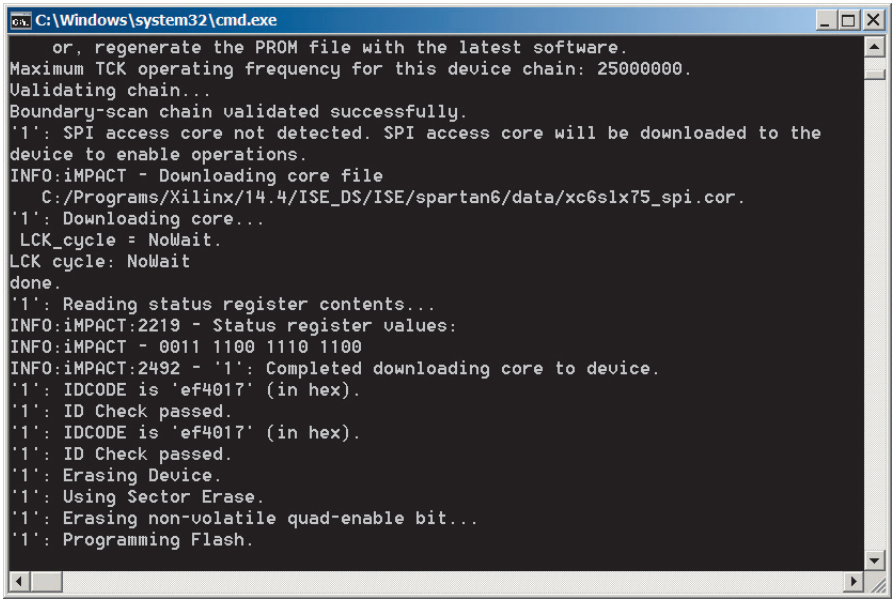
Control hub firmware version can be checked in parameter 07.16 Control hub FW version. To upgrade the Control hub firmware, follow the steps below:

1. Switch off the control power.
2. Remove the daughter boards DB2 and DB3.
3. Connect XILINX platform cable USB II to X5 connector on control hub
4. Switch on the control power
5. Run PROG_MHDCH.bat batch file to program the control hub. Following window will open:



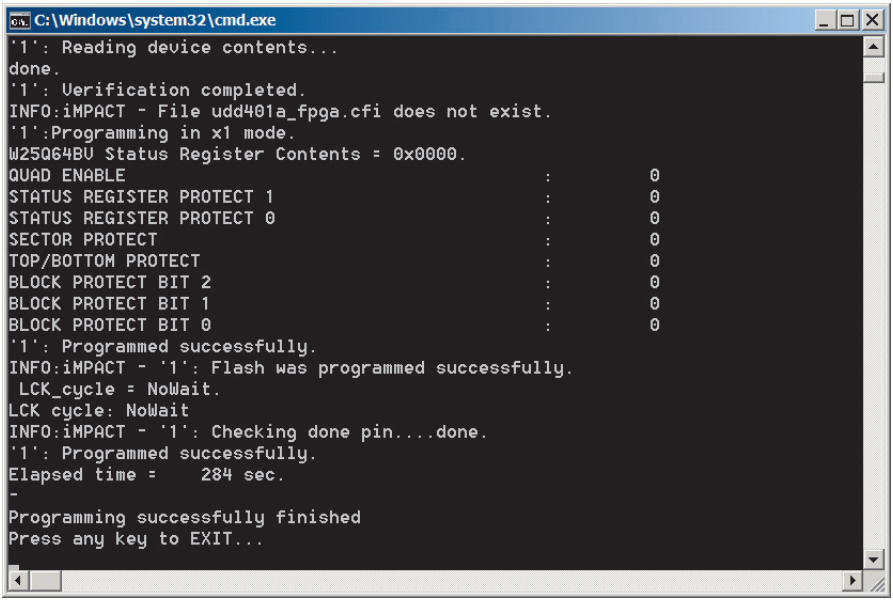
6. After pressing Enter many messages will be shown on screen and finally the

screen will stay longer with the following message:



Downloading of the control hub takes 3-4 minutes.

7. When the downloading is over following screen will show:



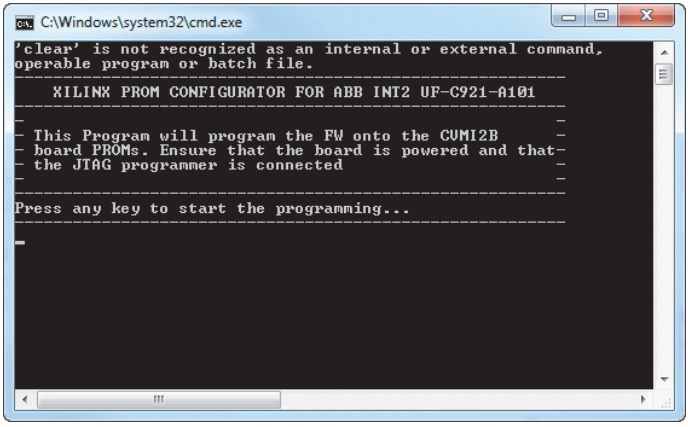
   press any key to exit.

8. Turn off the control power.
9. Remove the XILINX platform cable USB II.
10. Restore all daughter boards on control hub.

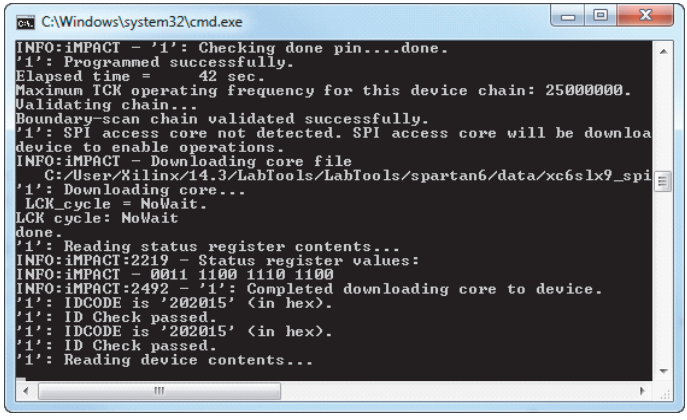
Loading CVMI2 firmware

CVMI2 firmware version can be checked in parameter 07.17 CVMI2 FW version. To upgrade the CVMI2 firmware, follow the steps below:

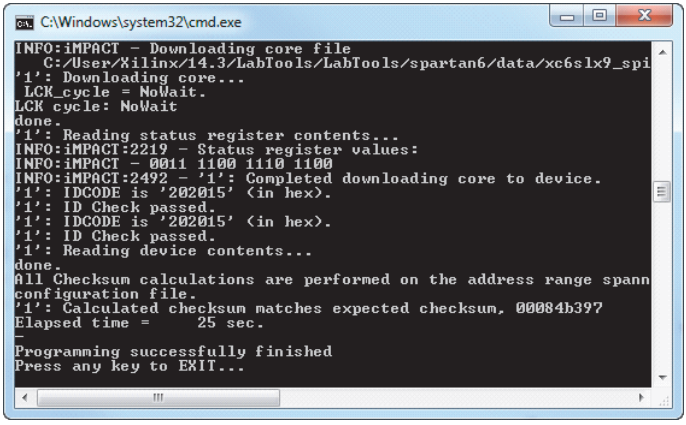
1. Switch off the control power.
2. Connect XILINX platform cable USB II to X1301 connector on CVMI2.
3. Switch on the control power.
4. Run PROG_LXES.bat batch file to program the CVMI2. Following window will open:



5. After pressing Enter many messages will be shown on screen and finally the screen will stay longer with the following message:



6. When the downloading is over following screen will show:



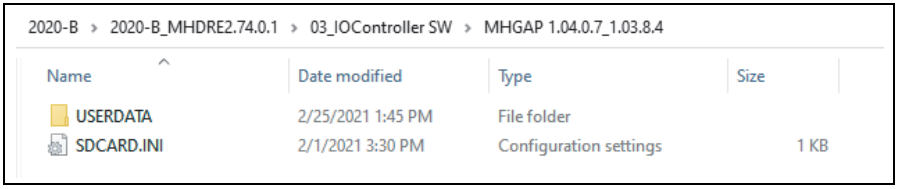
Press any key to exit.

7. Turn off the control power .
8. Remove the XILINX platform cable USB II.

Loading IO controller (AC500eco) software

IO controller software version can be checked in parameter 81.7 IO controller version. To upgrade the IO controller software, follow the steps below:

1. Save the following files and folders to the SD card (MC502) root folder. Files can be found in the MHDRE release package (folder \03_IOController SW):



Note: Only MC502 SD card can be used. This is not the same SD card which is plugged into the BCU.

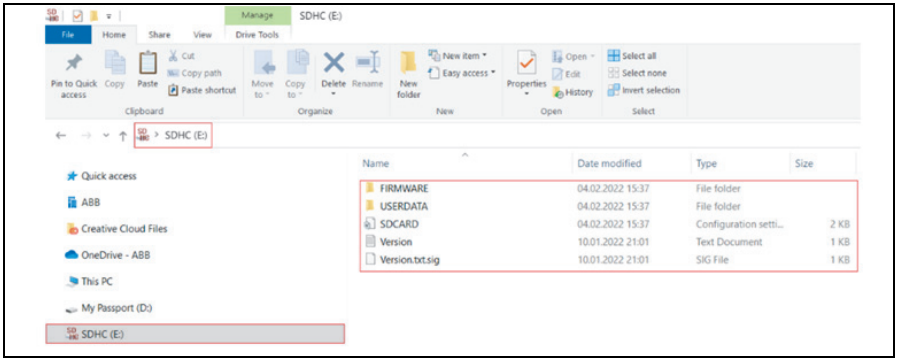
2. Switch off the control power
3. Install SD card adapter (MC503) into CPU PM55x
4. Insert SD memory card (MC502) into adapter MC503
5. Switch on the control power. Update operation starts. Observe the LEDs on PM55x:

RUN LED flashing	reading from SD memory card
RUN and ERR LED fast blinking	programing in progress
RUN LED slow blinking	SW download successful
ERR LED slow blinking	Error

6. After SW update operation finishes, switch off the control power and remove SD card and the adapter. New SW is activated after IO controller AC500eco CPU is restarted.

Loading the IO controller (AC500eco) software (AC500 V3 CPU)

1. Save the following files and folders to the SD card (TA5350 and MC5102) root folder. Files can be found in the loading package (folder \04_IOController SW).



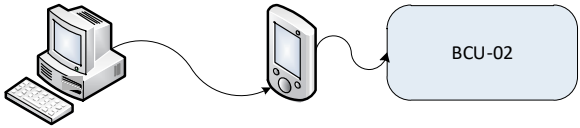
2. Swithc off PLC and CPU.
3. Insert SD memory card (MC5102) into CPU PM5032.
4. Swith on the control supply. Update starts. Check the LED on PM5032.

RUN and ERR LED blinking alternately	downloading
RUN LED blinking, ERR LED off	download successed
ERR LED blinking, RUN LED off	download failed

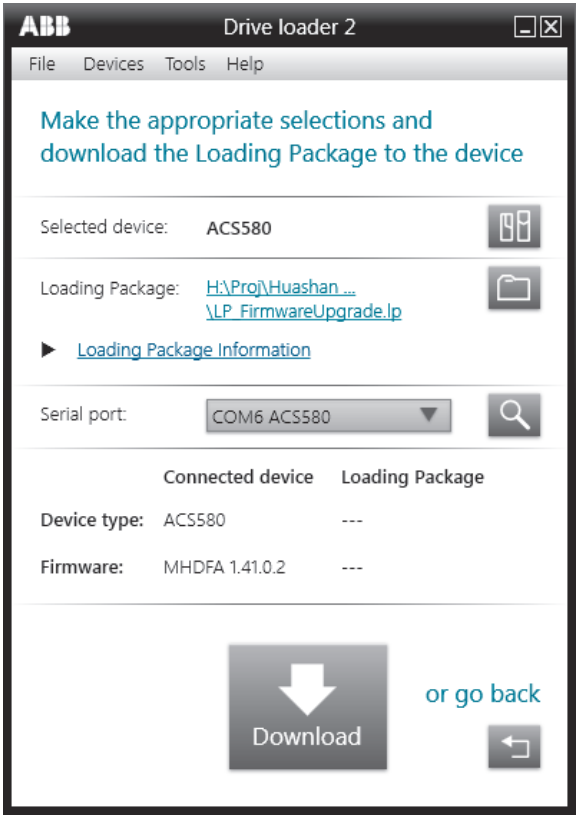
5. After the update, switch off the control supply.
6. Romove SD card and IO controller.
7. After the reboot of AC500eco CPU, new software will be activated.

Loading BCON software

1. Connect PC to the assistant control panel (ACS-AP-S) with USB to mini USB cable.



2. Start Drive loader 2 and select the file LP_FirmwareUpgrade.lp from the MHDRE release package (folder \01_BCON SW). Select ACS580 for the drive type and wait until the tool identifies the connection to the drive. Click “Download” button when ready:



Note: Drive composer and DriveStartup PC tools must be closed to enable connection to the drive.

3. Downloading of a loading package lasts approximately 10 minutes. If download is successful close the Drive loader 2 tool.

   Note: If the BCON SW version MHDRE 2.0.0.3 (2016-B) or newer has never been loaded to a BCON before, a ZMU-02 already containing the new software will not work. In other words, on a new drive it is not possible to simply insert the ZMU-02 containing new software but the software must be loaded using Drive loader tool as described above.

Loading the ACS-AP-S assistant panel firmware

The instructions for download of the ACS-AP-S firmware are available in the document “ACS-AP_ControlPanelUpdateInstructions.pdf” that is available with the MHDRE loading package in Medium Voltage Drives Portal (folder: \05_ControlPanel FW). Panel type and revision can be checked from the bar code sticker. HW version is defined by the first letter of serial number in the bar code sticker. Other way to check panel type and revision is to hold down the “?” key in panel power up. Appropriate info with mentioned information appears then. Refer to the *ACS580MV SW compatibility table* for the compatibility between BCON software and panel firmware. Update the panel firmware if not compatible.

Loading the DSP software manually to power modules

The software of power module DSP is contained in the BCON software. After the drive is charged and power modules DSPs are turned on, BCON software is checking if all the power modules have the correct software version. Only one DSP software version is compatible with one version of BCON software. If one or more power modules report different software version than the one that is required by BCON, the DSP software download from BCON is started. See description of the fault *607E PM Software update in progress* for more details.
In some exceptional cases the DSP software download from BCON might not succeed. The following cases might lead to unsuccessful software download:

- Power modules have incompatible DSP SW version (see the note below).
- One or more power modules have no SW programmed.
- There is a fault activated on one or more power modules before the software download could start.

Note: BCON SW version *MHDRE 2.74* is not compatible with the DSP SW version 01.00.02 (2015-A release) and older.
In case of unsuccessful DSP software download from BCON, the DSP software must be downloaded directly to all power modules. The instructions how to download the DSP software directly to power modules is given in the remainder of this chapter.

DANGER

High voltage!

Loading of the DSP software directly to power modules requires opening the inverter unit cabinet and accessing the power modules!

Obey the instructions given in chapter 1 ***Safety instruction*** and chapter 12 ***Maintenance*** of the *ACS580MV hardware manual*. If you ignore them, injury or death, or damage to the equipment can occur.

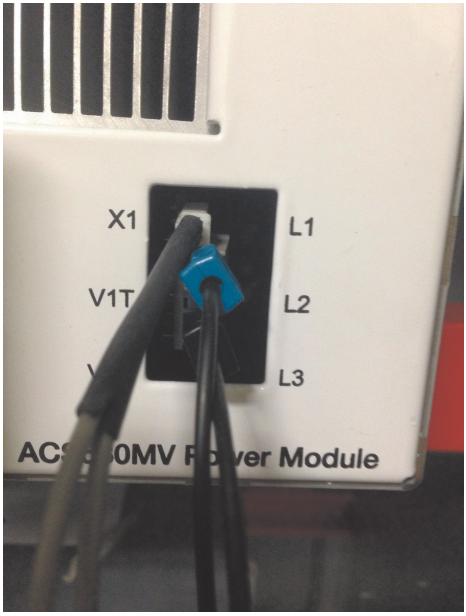
Before starting to work on the drive, make sure:

- that the main and auxiliary power supply to the drive is switched off, locked out, and tagged out
- that the drive is dead
- that safety ground connections are in place
- that personal protective equipment is provided and used when required
- that everyone involved is informed.

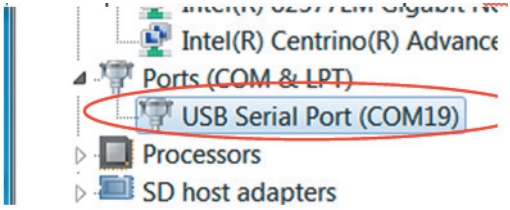
Before energizing the drive, make sure:

- that all foreign objects are removed from the drive
- that all internal and external covers are securely fastened and all doors are closed, locked and / or bolted
- that the release dials of safety switches are in the locked position.

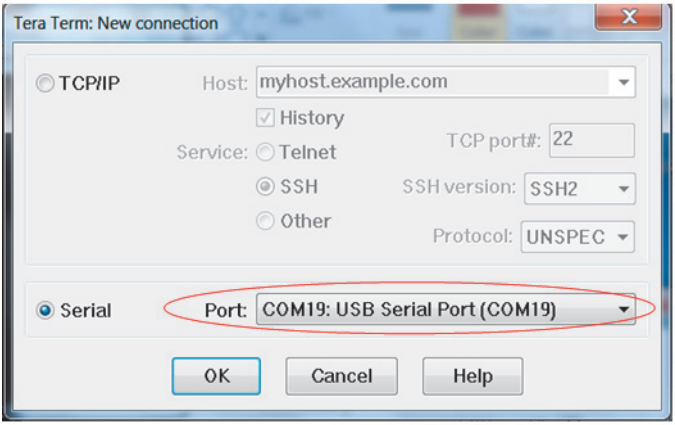
1. Disconnect the original POF links from the first power module. Connect the USB to FO serial cable to power module's POF links. Make sure that the correct POF link is connected to TX and RX channel by obeying the color of the POF link cable and POF link connectors on power module.

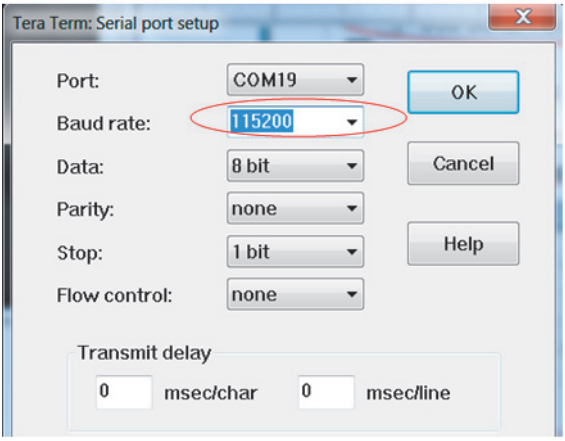


2. Check the port of the USB to FO serial cable on your PC (Control panel -> System -> Device Manager):

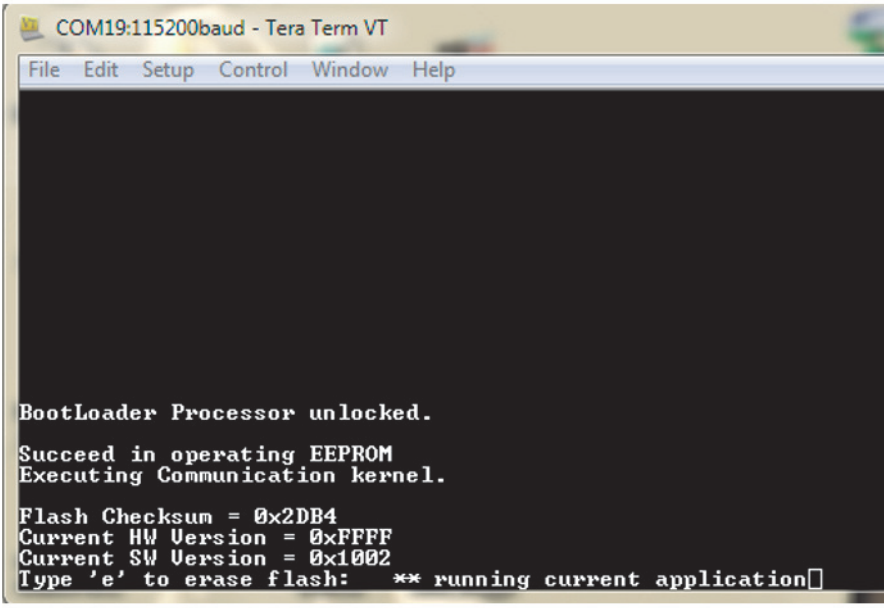


3. Open the “Tera Term” PC tool and set the serial port to the one where Serial to POF link cable is connected (COM19 in the example here). Set the baud rate to 115200.

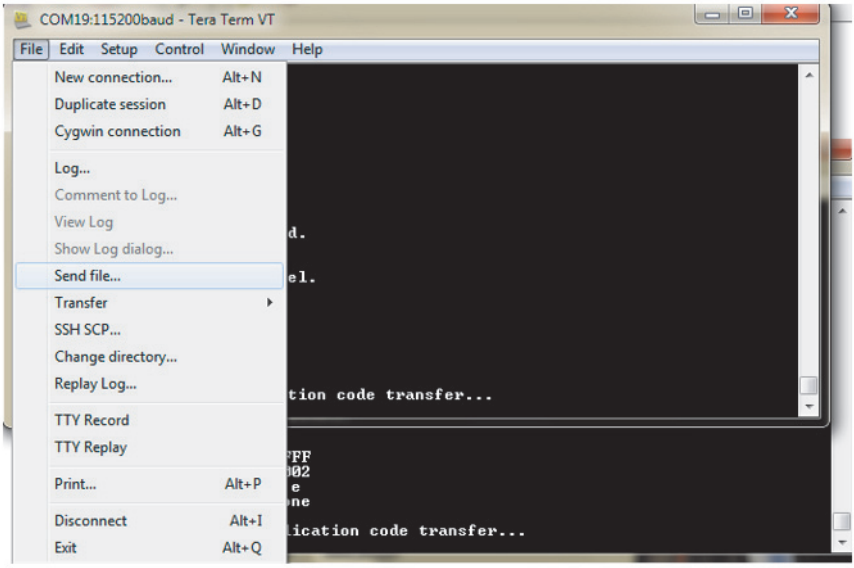




4. Connect the auxiliary +5.5V power supply cable (part of the USB-POF link cable) to +5.5V power supply connector on the power module. After that the DSP of the power module will boot up. After the DSP boots up the Tera Term receives information from DSP:

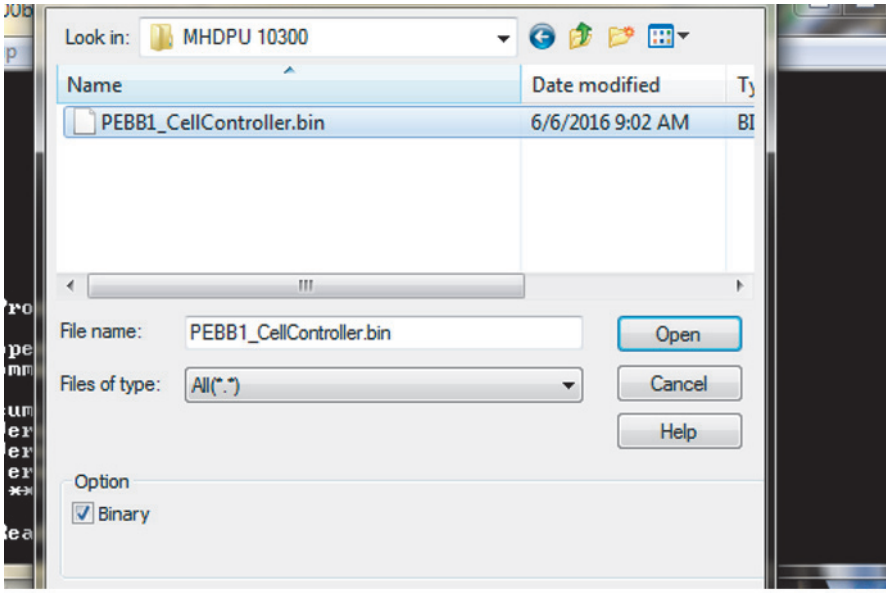


5. After Tera Term displays the text “Type ‘e’ to erase flash:” just press letter “e” on the keyboard.
6. Open the File menu and chose “Send file”:

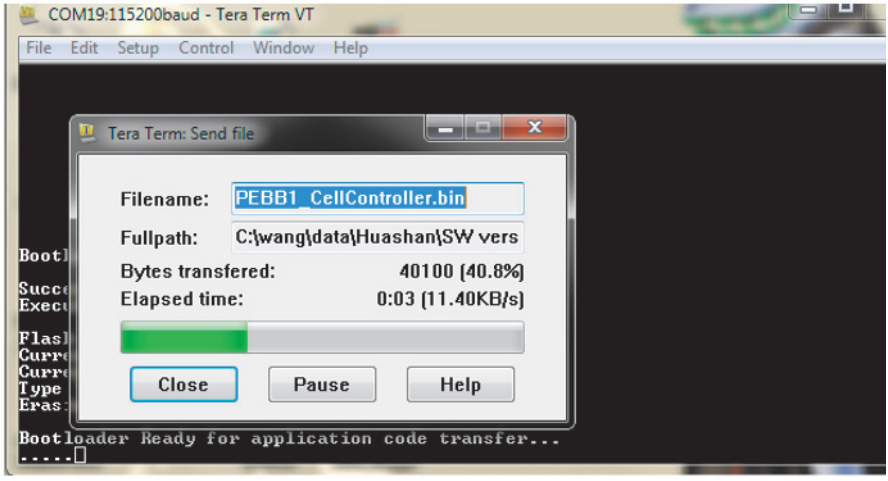


Select the PEBB1_CellController.bin file from the MHDRE loading package (folder \02_PowerModule SW).

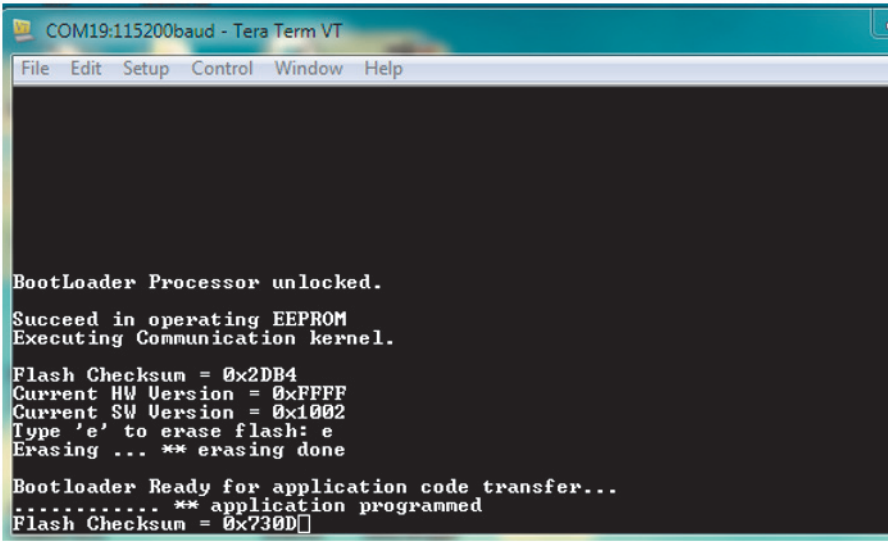
Important: Make sure to select the option “Binary”! If not selected, the software download will fail.



7. Press “Open” to start the download:



8. Once the download is successfully finished the following message will be shown:



9. Close the Tera Term PC tool. Disconnect the USB-POF link cable and +5.5V power supply cable, and reconnect the original POF link. Proceed to the next power module.

3

Fault Tracing

What this chapter contains

The chapter lists the warning and fault messages including possible causes and corrective actions. The causes of most warnings and faults can be identified and corrected using the information in this chapter. The basic procedures for troubleshooting that can be carried out by End user are already described in *ACS580MV primary control program firmware manual* and are repeated here. In addition to that, troubleshooting procedures that are only allowed for ABB Service or ABB certified service partners are described in this chapter. If it is not possible to resolve a problem using information from this chapter, the ABB support line should be contacted.

Warnings and faults are listed below in separate tables. Each table is sorted by warning/fault code.

Safety

WARNING! Only ABB Service and ABB certified service partners are allowed to service the drive. Obey the safety instructions in chapter *Introduction to the Manual* on page 9. If you ignore them, injury or death, or damage to the equipment can occur.

Indications

Warnings and faults

Warnings and faults indicate an abnormal drive status. The codes and names of active warnings/faults are displayed on the control panel of the drive as well as

the Drive composer PC tool. Only the codes of warnings/faults are available over fieldbus.

Warnings do not need to be reset; they stop showing when the cause of the warning ceases. Warnings do not latch and the drive will continue to operate the motor.

Faults do latch inside the drive and cause the drive to trip. When a fault is activated the modulation is stopped and the MCB contacts are opened. After the cause of a fault has been removed, the fault can be reset from a selectable source such as the control panel, Drive composer PC tool, the digital inputs of the drive or fieldbus (see parameter *31.11 Fault reset selection*). After the fault is reset, the drive can be restarted. Note that some faults require a reboot of the control unit either by switching the control power off and on, or using parameter *96.08 Control board boot* – this is mentioned in the fault listing wherever appropriate.

Pure events

In addition to warnings and faults, there are pure events that are only recorded in the event log of the drive. The codes of these events are included in the *Warning messages* table.

Editable messages

For some warnings and faults, the message text can be edited and instructions and contact information added. To edit these messages, choose **Menu - Settings - Edit texts** on the control panel.

Warning/fault history and analysis

Event log

All indications are stored in the event log with a time stamp and other information. The event log stores information on the last 5 faults that tripped the drive, and the last 20 secondary events that occurred. The event log can be accessed from the main Menu on the control panel. It can also be accessed (and reset) using the Drive composer PC tool.

Auxiliary codes

Some events generate an auxiliary code that often helps in pinpointing the problem. On the control panel, the auxiliary code is stored as part of the details of the event; in the Drive composer PC tool, the auxiliary code is shown in the event listing.

Fault data logger

The drive has a preset fault data logger that samples preselected drive values at 500-microsecond intervals. Approximately 22000 samples recorded 400ms before and 100ms after the tripping fault are saved into the memory unit of the drive. The fault data is accessible in the event log when viewed in the Drive composer PC tool. (The fault data is not accessible through the control panel). All fault data loggers are copied to the SD card and can be analyzed later using ACS50MV Data analyzer PC tool (see *Using ACS580MV Data Analyzer*).

The values that are recorded in the fault data log are *01.07 Motor current*, *01.10 Motor torque%*, *01.11 DC voltage*, *01.24 Flux actual%*, *01.40 Phase U2 motor current*, *01.41 Phase V2 motor current*, *01.42 Phase W2 motor current*, *01.43 Phase U2 motor voltage*, *01.44 Phase V2 motor voltage*, *01.45 Phase W2 motor voltage*, *01.46 Phase A average DC voltage*, *01.47 Phase B average DC voltage*, *01.48 Phase C average DC voltage*, *01.49 Phase U1 grid current*, *01.50 Phase V1 grid current*, *01.51 Phase W1 grid current*, *01.52 Phase A average secondary voltage*, *01.53 Phase B average secondary voltage*, *01.54 Phase C average secondary voltage*, *24.01 Used speed reference*, *30.01 Limit word 1* and *90.01 Motor speed for control*. The selection of parameters cannot be changed by the user.

Other data loggers

User data logger

A custom data logger can be configured using the Drive composer PC tool. This functionality enables the free selection of up to eight drive parameters to be sampled at selectable intervals. The triggering conditions and the length of the monitoring period can also be defined by the user within the limit of approximately 8000 samples. The collected data is not automatically saved. Minimum sampling time for User data logger is 500ms.

Parameters that contain warning/fault information

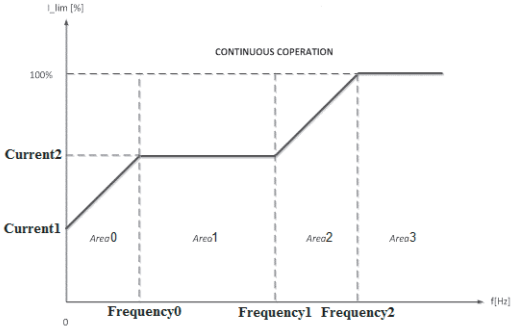
The drive is able to store a list of the active faults actually causing the drive to trip at the present time. The faults are displayed in parameter group *04 Warnings and faults*. The parameter group also displays a list of faults and warnings that have previously occurred.

Warning messages

Note: The list also contains events that only appear in the Event log.

Code (hex)	Warning	Cause	What to do
64FF	Fault reset	Fault reset has been demanded.	If the root cause for some of the active faults is still present after the reset, those faults will remain active. Root cause for the faults should be removed before reset is attempted.
A186	PM states mismatch	Control hub has detected a combination of power modules' (PM) states that is not valid.	Check POF wiring to PMs (or replace). Check control hub daughter boards (or replace). Check PM SW version and update if required. Contact your local ABB representative.
A190	Low frequency operation	Low frequency operation within 2Hz lasts more than 30s.	It's better to stop the drive rather than running it with low frequency.
A187	Trafo offset current out of range U1	Transformer primary current has exceeded internal limit with open MCB.	Check current sensor. Check CVMI2 measurement board. Check the event log for an auxiliary code. The code indicates current p.u. value * 100, when warning is activated. For example, 0xA (Dec 10) means 0.10 * 30.41 Rated input current * sqrt(2) is measured. After warning is activated, trafo current offset compensation stops. 1.49 Phase U1 grid current, 1.50 Phase V1 grid current, 1.51 Phase W1 grid current show measured current without offset compensation.
A188	Trafo offset current out of range V1	Transformer primary current has exceeded internal limit with open MCB.	Check current sensor. Check CVMI2 measurement board. Check the event log for an auxiliary code. The code indicates current p.u. value * 100, when warning is activated. For example, 0xA (Dec 10) means 0.10 * 30.41 Rated input current * sqrt(2) is measured. After warning is activated, trafo current offset compensation stops. 1.49 Phase U1 grid current, 1.50 Phase V1 grid current, 1.51 Phase W1 grid current show measured current without offset compensation.

Code (hex)	Warning	Cause	What to do
A189	Motor offset current out of range U2	Measured motor phase currents are exceeding an internal limit with modulation stopped.	Check current sensor. Check CVMI2 measurement board. Check the event log for an auxiliary code. The code indicates current p.u. value * 100, when warning is activated. For example, 0xA (Dec 10) means 0.10 * 30.40 Rated output current * sqrt(2) is measured. After warning is activated, motor current offset compensation stops. 1.40 Phase U2 motor current, 1.41 Phase V2 motor current, 1.42 Phase W2 motor current show measured current without offset compensation.
A18A	Motor offset current out of range V2	Measured motor phase currents are exceeding an internal limit with modulation stopped.	Check current sensor. Check CVMI2 measurement board. Check the event log for an auxiliary code. The code indicates current p.u. value * 100, when warning is activated. For example, 0xA (Dec 10) means 0.10 * 30.40 Rated output current * sqrt(2) is measured. After warning is activated, motor current offset compensation stops. 1.40 Phase U2 motor current, 1.41 Phase V2 motor current, 1.42 Phase W2 motor current show measured current without offset compensation.
A283	Motor overload alarm	Motor average current (absolute value) is high.	Check that the motor parameters in group *99 Motor data* correspond to the motor rating plate. Check for proper delta/star connection of the motor. Check overload settings for the motor and settings for this alarm function (contact your local ABB representative).
A284	Drive Overload Alarm	Current is high either on transformer side or Invertor side. Or motor current is higher than user defined limit. (30.17)	Check that the motor parameters in group 99 Motor data correspond to the motor rating plate. Check for proper delta/star connection of the motor. Check the auxiliary code for triggered limit. 0b001 means user current (30.17) is limiting current while 0b100 means limit on transformer side is active and 0b010 means limit on inverter side is working. Check overload settings for the transformer or inverter or motor based on auxiliary code.
A290	LF current limit effective	Low frequency current limit is effective.	Check motor load and drive ratings.

Code (hex)	Warning	Cause	What to do
	 Current limitation curve method at low frequency Long time running at low speed may lead to reduced expected lifetime of drive. By default, when output frequency is running around low values (Frequency2=10Hz, Frequency1=7Hz, Frequency0=2Hz), maximum current is limited (Current2=74%, Current1=58%), which can affect the maximum torque output capability in the low frequency region. This current limit function is only activated once a parameterable delay time is reached (default 10 seconds).		
A291	Motor pullout alarm	The motor cannot produce any more torque.	Check and reduce actual load applied on motor
A2B1	Overcurrent	Output current has exceeded internal alarm limit.	Check motor load. Check acceleration times in parameter group *23 Speed reference ramp* (rpm operation mode) or *28 Frequency reference chain* (Hz operation mode). Also check parameters *46.01 Speed scaling* and *46.02 Frequency scaling*. Check motor and motor cable (including phasing and delta/star connection). Check there are no contactors opening and closing in motor cable. Check that the data in parameter group *99 Motor data* corresponds to the motor rating plate. Check that there are no power factor correction capacitors or surge absorbers in motor cable.
A2B3	Earth leakage	Drive has detected load unbalance typically due to earth fault in motor or motor cable.	Check that there are no power factor correction capacitors or surge absorbers in motor cable. Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. If no earth fault can be detected, contact your local ABB representative.

Code (hex)	Warning	Cause	What to do
A2B4	Short circuit	Short-circuit in motor cable(s) or motor.	Check motor and motor cable for cabling errors. Check that there are no power factor correction capacitors or surge absorbers in motor cable.
A3D0	Grid ridethrough	Grid voltage is below the internal threshold so the drive is operating in low voltage ridethrough mode.	Check the transformer secondary voltage.
A480	Motor cable overload(Editable message text)	Calculated motor cable temperature has exceeded warning limit.	Check the dimensioning of the motor cable in regard to required load. Check the settings in parameter group *35 Motor thermal protection*.
A490	Incorrect temperature sensor setup	Sensor type mismatch	Check the settings of parameters *35.11 Temperature 1 source* and *35.21 Temperature 2 source*
			Check the wiring of the sensor. The auxiliary code (see the event log) identifies the interface module. (0 = Module 1, 1 = Module 2).
A491	External temperature 1 (Editable message text)	Measured temperature 1 has exceeded warning limit.	Check the value of parameter *35.02 Measured temperature 1*. Check the cooling of the motor (or other equipment whose temperature is being monitored). Check the setting of parameter *35.13 Temperature 1 warning limit*.
A492	External temperature 2 (Editable message text)	Measured temperature 2 has exceeded warning limit.	Check the value of parameter *35.03 Measured temperature 2*. Check the cooling of the motor (or other equipment whose temperature is being monitored). Check the setting of parameter *35.23 Temperature 2 warning limit*.
A4A0	Control board temperature	Control unit temperature is excessive.	Check the auxiliary code. See actions for each code below.
	1	Temperature above warning limit	Check ambient conditions.
	2	Thermistor damaged	Contact your local ABB representative for control unit replacement.
A5EA	Measurement circuit temperature	Problem with internal temperature measurement of the drive.	Contact your local ABB representative. For software version 2.00.0.3 and previous, download latest software (version after v2.00.0.3)
A5ED	Measurement circuit ADC	Measurement circuit problem.	Contact your local ABB representative.
A5EE	Measurement circuit DFF	Measurement circuit problem.	Contact your local ABB representative.
A5F4	Control unit battery	The battery of the control unit is low.	Replace control unit battery. Refer to the HW manual for instructions on battery replacement. This warning can be suppressed using parameter *31.40*.

Code (hex)	Warning	Cause	What to do
A684	SD card	Error related to SD card used to store data on BCU	Check the auxiliary code. See actions for all the codes below.
	1	No SD card	Insert a compatible, writable SD card into the SD CARD slot of the BCU
	2	SD card write-protected	
	3	SD card unreadable	
A685	Power fail saving	Power fail saving is requested too frequently due to oscillating power supply to the control unit. Some of the requests may have been discarded, potentially causing data loss.	Check the power supply of the control unit. If power internally from the drive, check the supply voltage of the drive.
A686	Checksum mismatch Programmable warning: *96.54 Checksum action*	The calculated parameter checksum does not match any enabled reference checksum.	Check that all necessary approved (reference) checksums (*96.56*…*96.59*) are enabled in *96.55 Checksum control word*. Check the parameter configuration. Using *96.55 Checksum control word*, enable a checksum parameter and copy the actual checksum into that parameter.
A690	SD card write failed	Error happened while writing data to SD card located in BCON.	Customer should change a new SD card
	0x01	change directory fail	
	0x02	make directory fail	
	0x04	open file fail	
	0x10	read space fail	
	0x20	seek file current writing position fail	
	0x40	remove file fail	
	0x80	remove directory fail	
	0x640008	Write BCON information fail	
	0xC80008	Write event logger fail	
	0x0Y0008 (YY=2…E)	Write Data logger (2…14) fail	
A692	Flash erase speed exceeded	The flash memory (in the memory unit) has been erased too frequently, compromising the lifetime of the memory.	Pure event – Avoid forcing unnecessary parameter saves by parameter *96.07* or cyclic parameter writes (such as user logger triggering through parameters). Check the auxiliary code (format XYYY YZZZ). “X” specifies the source of event (1: generic flash erase supervision). “ZZZ” specifies the flash subsector number that generated the event.

Code (hex)	Warning	Cause	What to do
A6A4	Motor nominal value	The motor parameters are set incorrectly. The drive is not dimensioned correctly.	Check the settings of the motor parameters in parameter group *99 Motor data*. Check that the drive is sized correctly for the motor.
A6A5	No motor data	Parameters in group 99 have not been set.	Check that all the required parameters in parameter group *99 Motor data* have been set. **Note:** It is normal for this warning to appear during the start-up and continue until the motor data is entered.
A6A6	Supply voltage unselected	The supply voltage has not been defined.	Set supply voltage parameter (contact your local ABB representative).
A6D1	FBA A parameter conflict	The drive does not have a functionality requested by a PLC (overriding system), or requested functionality has not been activated.	Check PLC (overriding system) programming. Check settings of parameter groups *50 Fieldbus adapter (FBA)* and *51 FBA A settings*.
A6D2	FBA B parameter conflict	The drive does not have a functionality requested by a PLC AC500, or requested functionality has not been activated.	Contact your local ABB representative. **WARNING!** FBA B communication is reserved for drive internal communication and should not be changed by user.
A6E5	AI parametrization	The current/voltage hardware setting of an analog input does not correspond to parameter settings.	Check the event log for an auxiliary code. The code identifies the analog input whose settings are in conflict. Adjust either the hardware setting (dip switches on BCU) or parameter *12.15*/*12.25*. **Note:** Control board reboot (either by cycling the power or through parameter *96.08 Control board boot*) is required to validate any changes in the hardware settings.
A6FA	Trial mode active	The drive is running in trial mode. After the trial mode has expired the drive will trip immediately and license update shall not be possible.	Contact ABB support line to get a valid license key. Enter a valid license key in parameters *96.71 License key part 1*, *96.72 License key part 2*, *96.73 License key part 3*, *96.74 License key part 4* and then set the parameter *96.75 License key refresh* to "Refresh".
A6FB	Trial mode expires soon	The trial mode expires soon. After the trial mode has expired the drive will trip immediately and license update shall not be possible.	Contact ABB support line to get a valid license key. Enter a valid license key in parameters *96.71 License key part 1*, *96.72 License key part 2*, *96.73 License key part 3*, *96.74 License key part 4* and then set the parameter *96.75 License key refresh* to "Refresh".

Code (hex)	Warning	Cause	What to do
A6FD	Rating parametrization failed	When the drive is modulating, it is not possible to change some parameters.	Check the auxiliary code. The code identifies the parameter whose writing was not possible. The format of the code is 0x0GGG 0III."GGG" represents the parameter group in decimal representation."III" represents the parameter index in decimal representation. This warning indicates that the entered license key has a different setting in a very important parameter. The parametrization is successful only if the drive is not modulating. If you are sure that the settings in the license key are correct, you can apply the changes by stopping the drive and refreshing the license key. If you are not sure if the settings in the license key are correct contact your local ABB representative and provide the auxiliary code.
A6FE	Rating not valid	The entered license key provides an invalid setting.	Check the auxiliary code. The code identifies the parameter whose setting was not valid. The format of the code is 0x0GGG 0III."GGG" represents the parameter group in decimal representation."III" represents the parameter index in decimal representation. Contact your local ABB representative and provide the auxiliary code.
A6FF	PIL PLL error	PIL PLL error is out of limit.	Monitor parameter 245.20. Check HW configuration. Check if grid is connected to converter output. Check if there is problem with CVMI board.
A780	Motor stall Programmable warning: *31.24 Stall function*	Motor is operating in stall region because of e.g. excessive load or insufficient motor power.	Check motor load and drive ratings. Check fault function parameters *31.24*…*31.28*.
A781	Motor fan Programmable warning: *35.106 DOL starter event type*	No feedback received from external fan.	Check external fan (or other equipment controlled) by the logic. Check settings of parameters *35.100*…*35.106*.
A799	Ext I/O comm loss Programmable warning: *31.55 Ext I/O comm loss event*	The I/O extension module types specified by parameters do not match the detected configuration.	Check the auxiliary code (format XXYY YYYY). “XX” specifies the number of the I/O extension module (**01:** parameter group *14 I/O extension module 1*, **02:** *15 I/O extension module 2*, **03:** *16 I/O extension module 3*). “YY YYYY” indicates the problem (see actions for each code below).

Code (hex)	Warning	Cause	What to do
	00 0001	Communication with module failed.	Check that the module is properly seated in its slot. Check that the module and the slot connector is not damaged. Try installing the module into another slot.
	00 0002	Module not found.	Check the type and location settings of the modules (parameters *14.01*/*14.02*, *15.01*/*15.02* or *16.01*/*16.02*). Check that the module is properly seated in its slot. Check that the module and the slot connector is not damaged. Try installing the module into another slot.
	00 0003	Configuration of module failed.	
	00 0004	Configuration of module failed.	
A7AA	Extension AI parameterization	The hardware current/voltage setting of an analog input (on an I/O extension module) does not correspond to parameter settings.	Check the event log for an auxiliary code (format XX00 00YY). “XX” specifies the number of the I/O extension module (**01:** parameter group *14 I/O extension module 1*, **02:** *15 I/O extension module 2*, **03:** *16 I/O extension module 3*). “YY” specifies the analog input on the module. For example, in case of I/O extension module 1, analog input AI1 (auxiliary code 0100 0001), the hardware current/voltage setting on the module is shown by parameter *14.29*. The corresponding parameter setting is *14.30*. Adjust either the hardware setting on the module or the parameter to solve the mismatch. **Note:** Control board reboot (either by cycling the power or through parameter *96.08 Control board boot*) is required to validate any changes in the hardware settings.
A7AB	Extension I/O configuration failure	The I/O extension module types and locations specified by parameters do not match the detected configuration.	Check the event log for an auxiliary code. The code indicates which I/O extension module is affected. Check the type and location settings of the modules (parameters *14.01*, *14.02*, *15.01*, *15.02*, *16.01* and *16.02*). Check that the modules are properly installed.
A7CB	MF comm loss Programmable warning: *60.09 M/F comm loss function*	Master/follower communication is lost.	Check the auxiliary code. The code indicates which node address (defined by parameter *60.02* in each drive) on the master/follower link is affected. Check settings of parameter group *60 DDCS communication*. Check cable connections. If necessary, replace cables.

Code (hex)	Warning	Cause	What to do
AFE7	Follower	A follower drive has tripped.	Check the auxiliary code. Add 2 to the code to find out the node address of the faulted drive. Correct the fault in the follower drive.
A7C1	FBA A communication Programmable warning: *50.02 comm loss func*	Cyclical communication between drive and fieldbus adapter module A or between PLC (overriding system) and fieldbus adapter module A is lost.	Check status of fieldbus communication. See user documentation of fieldbus interface. Check settings of parameter groups *50 Fieldbus adapter (FBA)*, *51 FBA A settings*, *52 FBA A data in* and *53 FBA A data out*. Check cable connections. Check if communication master is able to communicate.
A7C2	FBA B communication Programmable warning: *50.32 FBA B comm loss func*	Cyclical communication between drive and fieldbus adapter module B or between AC500 PLC and fieldbus adapter module B is lost.	Contact your local ABB representative. ⚠ **WARNING!** FBA B communication is reserved for drive internal communication and should not be changed by user.
A7EE	Panel loss Programmable warning: *49.05 Communication loss action*	Control panel or Drive composer PC tool selected as active control location for drive has ceased communicating.	Check Drive composer PC tool or control panel connection. Check control panel connector. Check BCON X13 connector pins. Disconnect and reconnect the control panel. Replace control panel in mounting platform.
A7F0	FSCA-01 firmware incompatible	FSCA-01 firmware version is incompatible with the drive software. Fieldbus communication will not be stable.	The warning is active if any of the FSCA-01 modules (used for FBA A and/or for FBA B communication) have incompatible FW version. Check parameter *54.33 FBA B appl SW ver* to determine if the FSCA-01 module used for internal communication is having an incompatible FW version. Refer to the release notes for the list of compatible FW versions. If second FSCA-01 module is used for FBA A communication, check parameter *51.33 appl SW ver*. Replace all FSCA-01 modules that have incompatible FW version with compatible ones.
A800	High frequency injection position search time-out	High frequency injection starting position searching is over the defined time limit. Drive will stop after warning displayed.	Check if PM motor is non-salient type. Check parameter settings in group 77.

Code (hex)	Warning	Cause	What to do
A801	High frequency injection polarity search time-out	High frequency injection starting polarity identification is over the defined time limit. Drive will stop after warning displayed.	Check if PM motor is non-salient type. Check parameter settings in group 77.
A880	Motor bearing Programmable warnings: *33.14 On-time 1 warn message* *33.24 On-time 2 warn message* *33.55 Value counter 1 warn message* *33.65 Value counter 2 warn message*	Warning generated by an on-time timer or a value counter	Check the event log for an auxiliary code. Check the source of the warning corresponding to the code: 0: *33.13 On-time 1 source* 1: *33.23 On-time 2 source* 4: *33.53 Value counter 1 source* 5: *33.63 Value counter 2 source*.
A881	Output relay	Warning generated by an edge counter Programmable warnings: *33.35 Edge counter 1 warn message* *33.45 Edge counter 2 warn message*	Check the event log for an auxiliary code. Check the source of the warning corresponding to the code: 2: *33.33 Edge counter 1 source* 3: *33.43 Edge counter 2 source*.
A882	Motor starts		
A883	Power ups		
A884	Main contactor		
A885	DC charge		
A886	On-time 1 (Editable message text) Programmable warning: *33.14 On-time 1 warn message*	Warning generated by on-time timer 1	Check the source of the warning (parameter *33.13 On-time 1 source*).
A887	On-time 2 (Editable message text) Programmable warning: *33.24 On-time 2 warn message*	Warning generated by on-time timer 2	Check the source of the warning (parameter *33.23 On-time 2 source*).
A888	Edge counter 1 (Editable message text) Programmable warning: *33.35 Edge counter 1 warn message*	Warning generated by edge counter 1	Check the source of the warning (parameter *33.33 Edge counter 1 source*).
A889	Edge counter 2 (Editable message text) Programmable warning: *33.45 Edge counter 2 warn message*	Warning generated by edge counter 2	Check the source of the warning (parameter *33.43 Edge counter 2 source*).
A88A	Value integrator 1 (Editable message text) Programmable warning: *33.55 Value counter 1 warn message*	Warning generated by value counter 1	Check the source of the warning (parameter *33.53 Value counter 1 source*).
A88B	Value integrator 2 (Editable message text) Programmable warning: *33.65 Value counter 2 warn message*	Warning generated by value counter 2	Check the source of the warning (parameter *33.63 Value counter 2 source*).

Code (hex)	Warning	Cause	What to do
A88C	Device clean	Warning generated by an on-time timer Programmable warnings: *33.14 On-time 1 warn message* *33.24 On-time 2 warn message*	Check the event log for an auxiliary code. Check the source of the warning corresponding to the code: 0: *33.13 On-time 1 source* 1: *33.23 On-time 2 source*
A88D	DC capacitor		
A88E	Cabinet fan		
A88F	Cooling fan		
A890	Additional cooling fan		
A8A0	AI supervision Programmable warning: *12.03 AI supervision function*	An analog signal is outside the limits specified for the analog input.	Check signal level at the analog input. Check the wiring connected to the input. Check the minimum and maximum limits of the input in parameter group *12 Standard AI*.
A8B0	Signal supervision 1 (Editable message text) Programmable warning: *32.06 Supervision 1 action*	Warning generated by the signal supervision 1 function	Check the source of the warning (parameter *32.07 Supervision 1 signal*).
A8B1	Signal supervision 2 (Editable message text) Programmable warning: *32.16 Supervision 2 action*	Warning generated by the signal supervision 2 function	Check the source of the warning (parameter *32.17 Supervision 2 signal*).
A8B2	Signal supervision 3 (Editable message text) Programmable warning: *32.26 Supervision 3 action*	Warning generated by the signal supervision 3 function	Check the source of the warning (parameter *32.27 Supervision 3 signal*).
A981	External warning 1 (Editable message text) Programmable warning: *31.01 External event 1 source* *31.02 External event 1 type*	Fault in external device 1	Check the external device. Check setting of parameter *31.01 External event 1 source*.
A982	External warning 2 (Editable message text) Programmable warning: *31.03 External event 2 source* *31.04 External event 2 type*	Fault in external device 2	Check the external device. Check setting of parameter *31.03 External event 2 source*.
A983	External warning 3 (Editable message text) Programmable warning: *31.05 External event 3 source* *31.06 External event 3 type*	Fault in external device 3	Check the external device. Check setting of parameter *31.05 External event 3 source*.
A984	External warning 4 (Editable message text) Programmable warning: *31.07 External event 4 source* *31.08 External event 4 type*	Fault in external device 4	Check the external device. Check setting of parameter *31.07 External event 4 source*.

Code (hex)	Warning	Cause	What to do
A985	External warning 5 (Editable message text) Programmable warning: *31.09 External event 5 source* *31.10 External event 5 type*	Fault in external device 5	Check the external device. Check setting of parameter *31.09 External event 5 source*.
A988	PM DC unbalance Waring	DC unbalance detected during capacitor reforming process. If sub capacitor voltage difference (compared to the average sub-capacitor voltage) is bigger than 80V, this warning will report.	Wait until capacitor reforming process is over. There will be several situations: 1 the warning is gone during/after capacitor reforming process. If so, nothing to do. 2 The warning is still existing even after capacitor reforming process, then the capacitor reforming process is failed. If so re-do capacitor reforming process? if failed again, replace the power module which still has problem.
AFAA	Autoreset	A fault is about to be autoreset.	Informative warning. See the settings in parameter group *31 Fault functions*.
AFE1	Emergency stop (off2)	Drive has received an emergency stop (mode selection off2) command.	Check that it is safe to continue operation. Then return emergency stop push button to normal position. Restart drive. If the emergency stop was unintentional, check the source selected by parameter *21.05 Emergency stop source*.
AFE2	Emergency stop (off1 or off3)	Drive has received an emergency stop (mode selection off1 or off3) command.	
AFEA	Enable operation signal missing (Editable message text)	Enable operation signal not received	Check the setting of (and source selected by) parameter *20.19 Enable operation signal*.
AFEB	Run enable missing	No run enable signal is received.	Check setting of parameter *20.12 Run enable 1 source*. Switch signal on (e.g. in the fieldbus Control Word) or check wiring of selected source.
AFF6	Identification run selected	Motor ID run is in progress.	Informative warning.
B5A2	Power up programmable event: *96.39 Power up event logging*	The drive has been powered up.	Informative event.
B5A5	SW LP Version	Pure event to indicate the loading package software version information. This event will be triggered once after BCON reboot.	Pure information event. The aux code is a packaged version information in hexadecimal format. Each sub version number are represented by two hexadecimal numbers. For example, Aux. code: 0x02490003. 02: 2 49: 73 00: 0 03: 3 It means software version: 2.73.0.3

Code (hex)	Warning	Cause	What to do
B670	Cap Reform Start	Capacitor reforming started.	Pure event – only appears in the event log for diagnostic purpose.
B671	Cap Reform Done	Capacitor reforming is done successfully.	Pure event – only appears in the event log for diagnostic purpose.
B672	Cap Reform Aborted	Capacitor reforming test was aborted	Pure event – only appears in the event log for diagnostic purpose.
B673	Factory data logger triggered	Pure event to show that factory data logger is triggered.	Check the event log for an auxiliary code. The code indicates the source which triggers the logger: 0 - periodically (defined by parameter 96.85, 96.86) 1 - manually by parameter 96.87 2 - MB close command of synchronized bypass function. 3 - RMS overtime of Synchronized Bypass function. 4 - Phase synchronization overtime of Synchronized Bypass function. 5 -Ride through becomes inactive. 6 -Low frequency current limitation becomes active. 7 -Triggered by some parameter when 96.88 is configured as “Other…”.
B675	Routine test complete	Finish routine test.	Pure event – only appears in the event log for diagnostic purpose.
B677	Site commission complete	Finish site commission.	Pure event – only appears in the event log for diagnostic purpose.
B678	MCB closed	MCB is closed.	Pure event – only appears in the event log for diagnostic purpose. Aux code: MCB switching time
B679	MCB open	MCB is open.	Pure event – only appears in the event log for diagnostic purpose. Aux code: MCB switching time
B686	Checksum mismatch Programmable event: *96.54 Checksum action*	The calculated parameter checksum does not match any enabled reference checksum.	See *A686 Checksum mismatch* (page *368*).
B690	Drive charged	This event is shown each time the drive is charged.	Pure event - only appears in the event log for diagnostic purposes.
B691	Drive starting	This event is shown each time the drive is starting.	Pure event - only appears in the event log for diagnostic purposes.
B692	Drive operating	This event is shown after the starting procedure is completed and the drive is able to follow the given reference.	Pure event - only appears in the event log for diagnostic purposes.
B693	Drive stopping	This event is shown each time the drive is stopping.	Pure event - only appears in the event log for diagnostic purposes.

Code (hex)	Warning	Cause	What to do
B694	Modulation stopped	This event is shown each time the modulation is stopped after a normal stop. Before modulation is stopped the drive shall ramp the motor speed to zero if parameter *21.03 Stop mode* is set to "Ramp". If parameter *21.03 Stop mode* is set to "Coast" the modulation is stopped as soon as the stop command is given.	Pure event - only appears in the event log for diagnostic purposes.
B695	Drive discharged	This event is shown each time the drive is discharged.	Pure event - only appears in the event log for diagnostic purposes.
B696	MCB on command	This event is shown each time the MCB close command given.	Pure event - only appears in the event log for diagnostic purposes.
B697	MCB off command	This event is shown each time the MCB open command given.	Pure event - only appears in the event log for diagnostic purposes.
B698	SBU MSS opened	This event is shown each time the MSS breaker is opened (state transition from RdyRun to RdyOn).	Pure event - only appears in the event log for diagnostic purposes.
B699	SBU MSS closed	This event is shown each time the MSS breaker is closed based on its feedback signal.	Pure event - only appears in the event log for diagnostic purposes. Aux code shows the time cost during MSS closed.
B700	MSS on command	This event is shown each time the MSS close command is sent by SW.	Pure event - only appears in the event log for diagnostic purposes.
B701	MSS off command	This event is shown each time the MSS open command is sent by SW.	Pure event - only appears in the event log for diagnostic purposes.
B702	SBU MB closed	This event is shown each time the MB breaker is closed based on its feedback signal.	Pure event - only appears in the event log for diagnostic purposes Aux code shows the time cost during MB closed.
B703	MB on command	This event is shown each time the MB close command is sent by SW.	Pure event - only appears in the event log for diagnostic purposes.
B704	Sync to mains command	This event is shown each time sync to mains command is received.	Pure event - only appears in the event log for diagnostic purposes.
B6B3	Par changed	Event shows a parameter has been changed	Aux code shows which parameter has been changed. The last two hex numbers indicate the index number, the middle two hex numbers indicate the group number.

Code (hex)	Warning	Cause	What to do
B6B4	Commissioning step complete	Commissioning steps finished.	Commissioning steps are finished. Pure event – only appears in the event log for diagnostic purpose. Commissioning steps Aux.code (Hex): 0001 - SW downloading complete 0002 - License key refreshed 0003 - Motor parameters filled 0004 - App para setting complete 0005 - Common para setting complete 0006 - Ctrl supply monitoring testing 0007 - Door interlock monitoring testing 0008 - MCB Testing 0009 - Overriding system communication testing 000A - Master Follower Setting 000B - Remote Connectivity Setting 000C - MV is connected 000D - Capacitor reforming 000E - Charging Test/PEBB FW loading 000F - Cooling/heating system testing 0010 - Vector ctrl setting (CT/MF) 0011 - No load testing 0012 - Flying start testing 0013 - Overriding system ctrl testing 0014 - Load testing 0015 - Stop mode testing 0016 - Vector ctrl testing (ST) 0017 - Master Follower Testing 0018 - SBU Testing

Code (hex)	Warning	Cause	What to do
B6B5	Motor overcurrent phase U2 while sync	The instantaneous motor current has exceeded the internal fault limit while sync.	Check the event log for auxiliary code. The code indicates which threshold has been exceeded. 1 - inverter overcurrent 2 - hardware overcurrent (95% of the maximum measureble current) 3 - motor overcurrent Check for motor cable phase to phase short circuit. Check for motor winding phase to phase short circuit. Check for delta/star connection of the motor. Check whether the motor parameters in *99 Motor data* are consistent with the motor rating plate. Ensure no power factor correction capacitors or surge absorbers are in the motor cable circuit. If a start of rotating motor is attempted, check whether "Automatic" is selected in parameter *21.19 Scalar start mode* or *21.01 Vector Start mode* according to the motor control mode. When motor is still magnetized,check whether restart has not been requested after a fault occurred (at least 2 rotor time constants should be allowed before another start attempt).

Code (hex)	Warning	Cause	What to do
B6B6	Motor overcurrent phase V2 while sync	The instantaneous motor current has exceeded internal fault limit while sync.	Check the event log for auxiliary code. The code indicates which threshold has been exceeded. 1 - inverter overcurrent 2 - hardware overcurrent (95% of the maximum measureble current) 3 - motor overcurrent Check for motor cable phase to phase short circuit. Check for motor winding phase to phase short circuit. Check for delta/star connection of the motor. Check whether the motor parameters in *99 Motor data* are consistent with the motor rating plate. Ensure no power factor correction capacitors or surge absorbers are in the motor cable circuit. If a start of rotating motor is attempted, check whether "Automatic" is selected in parameter *21.19 Scalar start mode* or *21.01 Vector Start mode* according to the motor control mode. When motor is still magnetized,check whether restart has not been requested after a fault occurred (at least 2 rotor time constants should be allowed before another start attempt).

Code (hex)	Warning	Cause	What to do
B6B7	Motor overcurrent phase W2 while sync	The instantaneous motor current has exceeded internal fault limit while sync.	Check the event log for auxiliary code. The code indicates which threshold has been exceeded. 1 - inverter overcurrent 2 - hardware overcurrent (95% of the maximum measureble current) 3 - motor overcurrent Check for motor cable phase to phase short circuit. Check for motor winding phase to phase short circuit. Check for delta/star connection of the motor. Check whether the motor parameters in *99 Motor data* are consistent with the motor rating plate. Ensure no power factor correction capacitors or surge absorbers are in the motor cable circuit. If a start of rotating motor is attempted, check whether "Automatic" is selected in parameter *21.19 Scalar start mode* or *21.01 Vector Start mode* according to the motor control mode. When motor is still magnetized,check whether restart has not been requested after a fault occurred (at least 2 rotor time constants should be allowed before another start attempt).
B6B8	PM DC link overvoltage while sync	The measured DC link voltage of a power module (PM) has exceeded the maximum level while sync. Special situations: 1. One specific PM has higher DC voltage than others while motor is ramping down. 2. Grid voltage loss (ridethrough) while motor is ramping down. 3. When SBU is applied, DC voltage increases after MB closed.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check the input primary voltage of the drive. If the fault occurred on the site matches any of the 3 special situations listed in the left, and the software version is V3.11.0.2 or below, upgrade to the latest released version. Check the deceleration time of rpm operation mode in parameter group *23 Speed reference ramp* or check the deceleration time of Hz operation mode in group *28 Frequency reference chain*. Use coast-to-stop function (if applicable). Replace the PM (if always the same PM gives the fault).
B6B9	PM HB1 short circuit turn off while sync	The desaturation detection of the IGBTs in HB1 (half bridge 1) of a power module (PM) has detected a short circuit while sync.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.

Code (hex)	Warning	Cause	What to do
B6BA	PM HB2 short circuit turn off while sync	The desaturation detection of the IGBTs in HB2 (half bridge 2) of a power module (PM) has detected a short circuit while sync.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
B6BB	PM HB1 or HB2 short circuit turn off while sync	The desaturation detection of the IGBTs in HB1 or HB2 of a power module (PM) has detected a short circuit while sync.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
B6BC	PM HB1 and HB2 short circuit turn off while sync	The desaturation detection of the IGBTs in HB1 and HB2 of a power module (PM) has detected a short circuit while sync.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
B932	PM heatsink temperature high	IGBT heatsink temperature measured of a power module (PM) is high.	Check the event log for the auxiliary code. The code indicates which PM is affected. Check the hestsink and remove the dust inside. Check the dust filter mat of the PM. Note: Each bit of the auxiliary code (binary) represents the warning status of a PM. Each phase has at most 9 PMs, the first nine bits of the auxiliary code,from right to left, represent the warning status of the 9 PMs of phase A. For example, auxiliary code (binary) 0100 00000 0010 00000 0001 means that PM1 of phase A, PM2 of phase B, PM3 of phase C have higher temperature.
C6A3	Notice	This notice is shown when changing language. This notice can be observed in SD card log.	This is an notification and does not affect the operation of the drive. No action is needed.
C6B3	Notice	This notice is shown when parameter refreshment occurs. This notice can be observed in SD card log.	This is an notification and does not affect the operation of the drive. No action is needed.
D204	Ambient temperatur e low	The lowest temperature of the inverter unit is less than 0 ˚ C.	Check the ambient temperature of the electrical roomand and increase it to above 0 ˚C.
D23A	MCB ON inhibited after Sync to mains	MCB closed inhibited on single motor mode after sync to mains.	Stop sync to mains or change to multi motors mode.
D240	Charging count	There are too many DC link charging attempts.?	Two attempts in P82.92 s is allowed to prevent DC capacitor overheating.

Code (hex)	Warning	Cause	What to do
E200	Control supply alarm	Control supply alarm has been detected based on monitoring of the digital signal. Alarm is activated according to selection in *81.10 Control supply monitoring*.	Check the control supply failure alarm signal. Check setting of the parameter *81.10 Control supply monitoring*.
E201	Trafo phase U1 temperature high	The winding temperature of the indicated transformer primary phase is approaching temperature limit.	Check cooling of the transformer (door air inlet filter pads, fan operation). Check overload settings for transformer (contact your local ABB representative).
E202	Trafo phase V1 temperature high	The winding temperature of the indicated transformer primary phase is approaching temperature limit.	Check cooling of the transformer (door air inlet filter pads, fan operation). Check overload settings for transformer (contact your local ABB representative).
E203	Trafo phase W1 temperature high	The winding temperature of the indicated transformer primary phase is approaching temperature limit.	Check cooling of the transformer (door air inlet filter pads, fan operation). Check overload settings for transformer (contact your local ABB representative).
E204	Ambient temperature high	The air inlet temperature of the inverter unit is approaching the maximum converter ambient temperature.	Check and improve the cooling of the electric room where converter is placed.
E205	INU air pressure high	The air pressure drop across the inverter unit is approaching the limit value.	Check PM heatsinks for dust pick up and clean if required. Check pressure drop sensor on control hub and replace control hub if required.
E206	Redundant fan running	Redundant fan group is active.	After fixing the root cause of the cooling fan failure, reset with parameter *83.15 Fan alarm reset*.
E207	AC500 communication error alarm	AC500 has detected communication errors between BCU and AC500 communication link. (Once ModMaster_Read and ModeMaster_Write module has errors in IO controller)	Check Modbus cable. Check FSCA-01 module.

Code (hex)	Warning	Cause	What to do
E208	AC500 communication alarm	The watchdog supervision of the communication link between BCU and AC500 has detected a communication failure. Alarm is activated according to selection in parameter *50.32 FBA B comm loss func*.	Check Modbus cable. Check FSCA-01 module. Check setting of parameter groups *54 FBA B settings*, *55 FBA B data in* and *56 FBA B data out* (changes allowed only by ABB authorized personnel). **Note:** Make sure that up to maximum of two fieldbus extension modules are used on the BCU.
E209	MCB not available	MCB available signal is missing.	Check MCB available signal. Check setting of parameters: *82.40 MCB available monitoring*, *82.42 MCB available Grp+Indx*, *82.43 MCB available BitNum*.
E20A	MCB external protection	MCB external protection active	Check MCB external protection signal. Check setting of parameters: *82.50 MCB external protection monitoring*, *82.52 MCB external protection Grp+Indx*, *82.53 MCB external protection BitNum*.
E20B	MCB ON inhibited	MCB ON inhibition active.	Check MCB ON inhibition signal. Check setting of parameters: *82.45 MCB ON inhibition monitoring*, *82.47 MCB ON inhibition Grp+Indx*, *82.48 MCB ON inhibition BitNum*.
E20C	Ambient temperature sensor failure	The air inlet temperature of the inverter unit has exceeded internal warning level.	Check air inlet temperature sensor wiring of the inverter unit.
E20D	TRU air filter dirty	Transformer unit air filter has been detected dirty.	Check air inlet filter pads on the transformer unit cabinet.
E20E	INU cooling fan 1 warning	Temperature relay integrated in INU cooling fan 1 has opened. A redundant fan group is activated.	Check wiring of fan 1 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E20F	INU cooling fan 2 warning	Temperature relay integrated in INU cooling fan 2 has opened. A redundant fan group is activated.	Check wiring of fan 2 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E210	INU cooling fan 3 warning	Temperature relay integrated in INU cooling fan 3 has opened. A redundant fan group is activated.	Check wiring of fan 3 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).

Code (hex)	Warning	Cause	What to do
E211	INU cooling fan 4 warning	Temperature relay integrated in INU cooling fan 4 has opened. A redundant fan group is activated.	Check wiring of fan 4 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E212	INU air pressure low	The air pressure drop across inverter unit is approaching lower limit value.	Check or replace inverter unit air inlet filter pads. Check pressure drop sensor and measuring tube on control hub and replace control hub or tube if required.
E214	TRU cooling fan 1 warning	Temperature relay integrated in TRU cooling fan 1 has opened. A redundant fan group is activated.	Check wiring of fan 1 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E215	TRU cooling fan 2 warning	Temperature relay integrated in TRU cooling fan 2 has opened. A redundant fan group is activated.	Check wiring of fan 2 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E216	TRU cooling fan 3 warning	Temperature relay integrated in TRU cooling fan 3 has opened. A redundant fan group is activated.	Check wiring of fan 3 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E217	DC link not discharged	DC link voltage is still high although the MCB open command was given 15 minutes ago. Or when BCON reboot, DC link voltage is high.	Check the MCB. It might happen that one or more MCB contacts are stuck in closed position.
E218	INU door not closed	During charging of the drive, the inverter unit door lock has reported that the door is not locked.	Lock the inverter unit door. Check internal wiring of the door lock signals (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).

Code (hex)	Warning	Cause	What to do
E219	IO Controller version incompatible	IO Controller SW version (shown in parameter *81.07 IO Controller version*) is lower than the expected value (shown in parameter *81.08 IO Controller version required*).	Upgrade IO Controller SW (Contact your local ABB representative).
E21B	TRU cooling fan 4 warning	Temperature relay integrated in TRU cooling fan 4 has opened. A redundant fan group is activated.	Check wiring of fan 4 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E21D	Cooling fan test run	Cooling fans are operated in the test mode independent of drive state.	The fan test mode is controlled by parameter *83.12 Fan control*. As soon as this parameter is set to "Auto run" the test run is ended and the alarm is removed.
E21E	Control backup supply alarm	Control backup supply alarm has been detected based on monitoring of the digital signal.	Check the control backup supply alarm signal. Check setting of the parameter *81.11 Control backup supply monitoring*.
E21F	Motor phase U1 temperature high	The winding temperature of the indicated motor phase is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.04 Motor winding phase U1 warning limit*.
E220	Motor phase V1 temperature high	The winding temperature of the indicated motor phase is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.07 Motor winding phase V1 warning limit*.
E221	Motor phase W1 temperature high	The winding temperature of the indicated motor phase is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.10 Motor winding phase W1 warning limit*.
E222	Motor phase U2 temperature high	The winding temperature of the indicated motor phase is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.13 Motor winding phase U2 warning limit*.
E223	Motor phase V2 temperature high	The winding temperature of the indicated motor phase is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.16 Motor winding phase V2 warning limit*.
E224	Motor phase W2 temperature high	The winding temperature of the indicated motor phase is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.19 Motor winding phase W2 warning limit*.

Code (hex)	Warning	Cause	What to do
E225	Motor DE bearing temperature high	The DE bearing temperature of the motor is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.22 Motor DE bearing temperature warning limit*.
E226	Motor NDE bearing temperature high	The NDE bearing temperature of the motor is approaching the temperature limit.	Check cooling of the motor. Check warning limit setting for the motor temperature *84.25 Motor NDE bearing temperature warning limit*.
E227	Converter space heater overload warning	Converter space heater has been detected based on monitoring of the digital signal.	Check if the space heater short circuit or overload. Check setting of the parameter *81.21 Converter space heater monitoring*.
E228	Motor space heater overload warning	Motor space heater has been detected based on monitoring of the digital signal.	Check if the space heater short circuit or overload. Check setting of the parameter *81.22 Motor space heater monitoring*.
E229	Inductor temperature high	Inductor temperature is approaching the temperature limit.	Check cooling of the inductor.
E230	Inductor temperature rising high	Inductor temperature rising relative to ambient temperature is approaching the temperature rising limit.	Check cooling of the inductor.
E231	Incorrect operation	Customer gives Sync to mains and Sync to VSD command together.	Correct operation command.
E232	Inductor bypassed	Synchronize command is inhibited by inductor bypassed.	Stop the drive and open the inductor bypass contactor.
E233	Sync to mains not finished	Cannot exit Sync to mains mode if it is not finished when drive is running.	Stop the drive or wait unitl synchronize to mains is finished then exit Sync to mains mode.
E234	MB not closed	Sync to VSD mode command is inhibited by MB open status.	MB has already opened and motor can be controlled on VSD mode directly.
E235	Sync to VSD not support	Sync to VSD functionality isn't supported currently.	Contact your local ABB represenative and pay attention to ABB latest released version.

Code (hex)	Warning	Cause	What to do
E237	Phase angle sync overtime	1 minute after synchronization is started (drive started modulation and sync to mains command is received), grid and motor voltage phase angle are still out of expected limit.	Check wiring of the RSYC-01 board meets the specification. Check the RSYC-01 board. Monitor signal 12.21 AI2 actual value using Drive composer. Par12.21 should try to approach 5V in normal synchronizing process. If it keeps at a constant voltage, the RSYC-01 board is probably broken. Another board broken situation is that the voltage (angle and frequency) adjusting works. Par12.21 AI2 actual value can stay at about 5V stably, but BCON DI6 (signal 10.01 bit5) is always low (0). Check acceleration time and deceleration time settings, these two values should not be set to very long. For CVMI2B solution (if setting P85.36 is Yes), check (monitor by Drive Composer) if motor speed, current, torque are oscillating, if yes, consider to change acceleration / deceleration time (for scalar control) or 25.02 speed proportional gain (for vector control) to stabilize motor speed. Contact ABB support if problem cannot be solved
E238	RMS sync overtime	1 minute after synchronization is started (drive started modulation and sync to mains command is received), grid and motor voltage RMS deviation is still out of expected limit.	Check actual voltage of grid and motor voltage via Par1.170 SBU Grid voltage and Par1.171 SBU motor voltage. If the voltage is abnormal, check PT, voltage RMS transducer board and wiring. Change parameter 85.8 to higher value.
5018	PM HB1 IGBT Desat	The desaturation detection of the IGBTs in HB1 (half bridge 1) of a power module (PM) has detected a short circuit.	Pure event - Check the event log for an auxiliary code. The code indicates which PM is affected.
5019	PM HB2 IGBT Desat	The desaturation detection of the IGBTs in HB2 (half bridge 2) of a power module (PM) has detected a short circuit.	Pure event - Check the event log for an auxiliary code. The code indicates which PM is affected.
501A	PM HB1 or HB2 IGBT Desat	The desaturation detection of the IGBTs in HB1 (half bridge 1) or HB2 (half bridge 2) of a power module (PM) has detected a short circuit.	Pure event - Check the event log for an auxiliary code. The code indicates which PM is affected.
501B	PM HB1 and HB2 IGBT Desat	The desaturation detection of the IGBTs in HB1 (half bridge 1) and HB2 (half bridge 2) of a power module (PM) has detected a short circuit.	Pure event - Check the event log for an auxiliary code. The code indicates which PM is affected.

Fault messages

Code (hex)	Fault	Cause	What to do
1010	Power module fault	A general PM fault has tripped the drive. A more detailed fault message with indication of which PM has a fault is followed to this message.	Check the more detailed fault message with the auxiliary code followed to this fault message. The code indicates which PM is affected.
1011	Control hub fault	Control hub detects a power fail or a pressure sensor error.	Check the control power supply. The fault may happen in case control power is lost. Check the FO connection between BCON and control hub. If no problem is identified with the power supply and connection to BCON replace the control hub. Auxiliary code bits meaning (more than one bit can be 1 at same time): Bit0 =1 (0x1): Multilink frame error (from Control hub to BCON) Bit8 =1 (0x100): Multilink watchdog error (from Control hub to BCON) Bit16 =1 (0x10000): Control hub power fail Bit17 =1 (0x20000): Multilink frame error or watchdog error (from BCON to Control hub)
1012	PM states mismatch	Control hub has detected a combination of PMs' states that is not valid.	Check POF wiring to PMs (or replace). Check control hub daughter boards (or replace). Check PM SW version and update if required. Contact your local ABB representative.
2110	Trafo overcurrent	The transformer primary current has exceeded internal fault limit.	Check the event log for an auxiliary code. The code indicates the threshold which has been exceeded: 1 - Hardware overcurrent (95% of maximum measurable current) 2 - Transformer overcurrent Check the primary cabling. Check the transformer. Contact your local ABB representative.
2113	Trafo no-load overcurrent	Transformer primary current has exceeded internal fault limit while converter is not modulating and the inrush current has declined after MCB has been closed.	There is a short circuit on the secondary side of the transformer => check transformer secondaries, wiring and PM input main power circuit. Transformer inrush current has not yet declined during the blanking time => fine tune the inrush current blanking time (Contact your local ABB representative).
2118	Unintended MCB closed	MCB close command is not given by drive	Check if MCB close command come from other sources, instead of drive.

Code (hex)	Fault	Cause	What to do
211B	Grid current asymmetry	The difference between measured transformer primary currents has exceeded internal fault limit.	Check the event log for an auxiliary code. The code indicates which value has exceed the threshold: 1 - Difference of phase A and B current RMS values 2 - Difference of phase B and C current RMS values 3 - Difference of phase C and A current RMS values Check for grid voltage asymmetry. Check the fault limit settings (Contact your local ABB representative). Check LEM connection.? Check?trafo?primary side terminals and cabling for weak contact or open circuit.?
211C	Grid phase loss	The instantaneous grid current is less than limit during charging.	Check LEM connection. Check trafo primary side terminals and cabling for weak contact or open circuit. Check the event log for an auxiliary code. The code indicates which phase has problem. 1 - Phase U1 2 - Phase V1 3 - Phase W1
211D	Grid power unavailable	Grid power is not avaliable when MCB is closed for charging.	Check the power grid supply.
211E	Grid voltage and motor voltage mismatch	There is a mismatch between grid voltage (RMS value) and grid nominal voltage.	Check the grid voltage is matching with the motor nominal voltage or not. Check if HVRB voltage measurement terminal (6kV/10kV) connection is correct.
2281	Calibration	Measured offset of output phase current measurement or difference between output phase U2 and W2 current measurement is too big (the values are updated during current calibration).	Try performing the current calibration again (Contact your local ABB representative).

Code (hex)	Fault	Cause	What to do
2310	Overcurrent	Output current has exceeded internal fault limit.	Check motor load. Check acceleration times in parameter group *23 Speed reference ramp* for rpm operation mode or in group *28 Frequency reference chain* for Hz operation mode. Check motor and motor cable (including phasing and delta/star connection). Check that the start-up data in parameter group *99 Motor data* corresponds to the motor rating plate. Check that there are no power factor correction capacitors or surge absorbers in motor cable.
2330	Earth leakage	Drive has detected load unbalance typically due to earth fault in motor or motor cable.	Check that there are no power factor correction capacitors or surge absorbers in motor cable. Check for an earth fault in motor or motor cables by measuring the insulation resistances of motor and motor cable. If no earth fault can be detected, contact your local ABB representative.
2340	Short circuit	Short-circuit in motor cable(s) or motor.	Check motor and motor cable. Check that there are no power factor correction capacitors or surge absorbers in motor cable.

Code (hex)	Fault	Cause	What to do
2350	Motor overcurrent phase U2	The instantaneous motor current has exceeded internal fault limit.	Check the event log for auxiliary code. The code indicates which threshold has been exceeded. 1 - inverter overcurrent 2 - hardware overcurrent (95% of the maximum measureble current) 3 - motor overcurrent Check for motor cable phase to phase short circuit. Check for motor winding phase to phase short circuit. Check for delta/star connection of the motor. Check whether the motor parameters in *99 Motor data* are consistent with the motor rating plate. Ensure no power factor correction capacitors or surge absorbers are in the motor cable circuit. If a start of rotating motor is attempted, check whether "Automatic" is selected in parameter *21.19 Scalar start mode* or *21.01 Vector Start mode* according to the motor control mode. When motor is still magnetized,check whether restart has not been requested after a fault occurred (at least 2 rotor time constants should be allowed before another start attempt).

Code (hex)	Fault	Cause	What to do
2351	Motor overcurrent phase V2	The instantaneous motor current has exceeded internal fault limit.	Check the event log for auxiliary code. The code indicates which threshold has been exceeded. 1 - inverter overcurrent 2 - hardware overcurrent (95% of the maximum measureble current) 3 - motor overcurrent Check for motor cable phase to phase short circuit. Check for motor winding phase to phase short circuit. Check for delta/star connection of the motor. Check whether the motor parameters in *99 Motor data* are consistent with the motor rating plate. Ensure no power factor correction capacitors or surge absorbers are in the motor cable circuit. If a start of rotating motor is attempted, check whether "Automatic" is selected in parameter *21.19 Scalar start mode* or *21.01 Vector Start mode* according to the motor control mode. When motor is still magnetized,check whether restart has not been requested after a fault occurred (at least 2 rotor time constants should be allowed before another start attempt).

Code (hex)	Fault	Cause	What to do
2352	Motor overcurrent phase W2	The instantaneous motor current has exceeded internal fault limit.	Check the event log for auxiliary code. The code indicates which threshold has been exceeded. 1 - inverter overcurrent 2 - hardware overcurrent (95% of the maximum measureble current) 3 - motor overcurrent Check for motor cable phase to phase short circuit. Check for motor winding phase to phase short circuit. Check for delta/star connection of the motor. Check whether the motor parameters in *99 Motor data* are consistent with the motor rating plate. Ensure no power factor correction capacitors or surge absorbers are in the motor cable circuit. If a start of rotating motor is attempted, check whether "Automatic" is selected in parameter *21.19 Scalar start mode* or *21.01 Vector Start mode* according to the motor control mode. When motor is still magnetized,check whether restart has not been requested after a fault occurred (at least 2 rotor time constants should be allowed before another start attempt).
2355	Motor phase U2 lost	The converter is operated at greater than 5% rated speed and one motor phase current undershoots the internal fault limit. MCB open during drive operating may trigger this fault.	Check motor terminals and cabling for weak contact or open circuit. Check if MCB is opened unexpectedly while drive is operating.
2356	Motor phase V2 lost	The converter is operated at greater than 5% rated speed and one motor phase current undershoots the internal fault limit. MCB open during drive operating may trigger this fault.	Check motor terminals and cabling for weak contact or open circuit. Check if MCB is opened unexpectedly while drive is operating.
2357	Motor phase W2 lost	The converter is operated at greater than 5% rated speed and one motor phase current undershoots the internal fault limit. MCB open during drive operating may trigger this fault.	Check motor terminals and cabling for weak contact or open circuit. Check if MCB is opened unexpectedly while drive is operating.

Code (hex)	Fault	Cause	What to do
323A	PM charging timeout fault	PM charging time was longer than 2 seconds	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
3230	PM DC link overvoltage	The measured DC link voltage of a PM has exceeded the maximum level. Special situations: a) One specific power module has higher DC voltage than others while motor is ramping down. b) Grid voltage loss (ridethrough) while motor is ramping down. c) When SBU is applied, DC voltage increases after MB closed.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter primary voltage. If the fault triggered on site mathces any of the situations listed in the left and the software version is V3.11.0.2 or below, upgrade to the latest released version. Check the deceleration times in parameter group *23 Speed reference ramp* for rpm operation mode or in group *28 Frequency reference chain* for Hz operation mode. Use coast-to-stop function (if applicable). Replace the PM (if always the same PM gives the fault).
3231	PM DC link undervoltage	The measured DC link voltage of a PM has undershot the minimum level.	Check the event log for an auxiliary code. The code indicates which PM is affected. Contact your local ABB representative.
3233	PM +5V power supply fault	The +5V power supply of a PM has failed.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
3234	PM +5V power supply regulation fault	The measured +5V power supply voltage of a PM is out of tolerance.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
3236	PM DC link capacitors not balanced	The series connected capacitors in the DC link of a PM are heavily unbalanced.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
3237	PM input voltage deviation	The input voltage measurement of a PM has a large deviation compared to the average input voltages of all PMs.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check PM input fuses. Replace the faulty PM. Check transformer secondary voltage.
3238	PM input overvoltage	The measured input voltage of a PM has exceeded the maximum level.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter primary voltage. Reduce transformer primary tapping one step. Replace the PM (if always the same PM gives the fault).

Code (hex)	Fault	Cause	What to do
3239	PM diode open circuit	PM rectifier's diode open circuit is detected.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
3280	Standby timeout	Drive start is requested but the DC link voltage is too low.	If parameters *20.02 Ext1 start trigger type* and/or *20.07 Ext2 start trigger type*. are set to “Level” this fault might come immediately after closing the MCB. Use “Edge” trigger type instead. If the drive is controlled over fieldbus check the corresponding settings for fieldbus control.
3330	Motor voltage sense fault phase U2	The measured motor phase to ground voltage has exceeded internal fault level.	Check voltage divider resistance value. Check CVMI2 board and wiring to it.
3331	Motor voltage sense fault phase V2	The measured motor phase to ground voltage has exceeded internal fault level.	Check voltage divider resistance value. Check CVMI2 board and wiring to it.
3332	Motor voltage sense fault phase W2	The measured motor phase to ground voltage has exceeded internal fault level.	Check voltage divider resistance value. Check CVMI2 board and wiring to it.
3333	Ground fault	The common mode motor voltage of the drive has exceeded internal fault limit.	Check for drive internal ground faults (secondary cabling, PMs, transformer, terminal unit). Check for drive external ground faults (motor cable, motor windings). Check the HVD board.
3381	Output phase loss	Motor circuit fault due to missing motor connection (all three phases are not connected).	Connect motor cable.
4100	Ambient temperature	Ambient temperature is too high.	Check proper cooling of the control unit cabinet.
4110	Control board temperature	Control board temperature is too high	Check proper cooling of the control unit cabinet.
4220	PM heatsink overtemperature	Measured IGBT heatsink temperature of a PM has exceeded the maximum level.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check heatsink fins for dust pick-up. Check PM to air channel gasket. Check the door air inlet filter pads.
4221	PM HCB overtemperature	Measured charging relay temperature on Heavy Copper Board (HCB) of a PM has exceeded the maximum level.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check heatsink fins for dust pick-up. Check PM to air channel gasket. Check the door air inlet filter pads.

Code (hex)	Fault	Cause	What to do
4981	External temperature 1 (Editable message text)	Measured temperature 1 has exceeded fault limit.	Check the value of parameter *35.02 Measured temperature 1*. Check the cooling of the motor (or other equipment whose temperature is being measured). Check the value of parameter *35.12 Temperature 1 fault limit*.
4982	External temperature 2 (Editable message text)	Measured temperature 2 has exceeded fault limit.	Check the value of parameter *35.03 Measured temperature 2*. Check the cooling of the motor (or other equipment whose temperature is being measured). Check the value of parameter *35.22 Temperature 2 fault limit*.
5001	Control board power fail	The power supply of the control board was below the internal fault limit.This fault is also shown, if the control board is intentionally powered off.	Check the control power supply.
5002	CVMI2 power fail	The power supply of the CVMI2 is below the power fail voltage level. CT type identification (only for SYS0) failed due to CVMI2 power supply failure, resulting in 95.37 CVMI2 power fail voltage being set to 40V. Fault can be reset only after CT type identification process is re-triggered.	Check if CVMI power supply is normal. (Only valid for SYS0) Refresh license key to trigger CT type identification process again: Select 'Refresh' in 96.75 License key refresh and press Enter, then the parameter should change into 'Done' automatically. Fault should be able to be reset now. Replace a new CVMI2 board.
5003	SBU CVMI power fail	The power supply of the SBU CVMI is below the power fail voltage level.	Check supply voltage of the SBU CVMI2B.
5010	PM HB1 short circuit turn off	The desaturation detection of the IGBTs in HB1 (half bridge 1) of a PM has detected a short circuit.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
5011	PM HB2 short circuit turn off	The desaturation detection of the IGBTs in HB2 (half bridge 2) of a PM has detected a short circuit.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
5012	PM HB1 or HB2 short circuit turn off	The desaturation detection of the IGBTs in HB1 (half bridge 1) or HB2 (half bridge 2) of a PM has detected a short circuit.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.

Code (hex)	Fault	Cause	What to do
5013	PM charging relay not closed	The voltage across the charging relay contact of a PM is larger than it would be expected if the contact was closed.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
5014	PM rating incompatibility	One or more power modules have different rating from the one specified by the drive license key. The converter can only operates if all power modules have the correct rating.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the PM.
5015	PM DC voltage sense fault	The DC link voltage measurement of a PM is out of range during self test.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
5016	PM heatsink temperature sense fault	The heatsink temperature measurement of a PM is out of range during self test.	Check the event log for an auxiliary code. The code indicates which PM is affected. Replace the faulty PM.
5017	PM HB1 and HB2 short circuit turn off	The desaturation detection of the IGBTs in HB1 (half bridge 1) and HB2 (half bridge 2) of a PM has detected a short circuit.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
501C	Repeated PM HB1 IGBT Desat	The desaturation detection of the IGBTs in HB1 (half bridge 1) of a power module (PM) has detected a repeated short circuit in cool down time.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
501D	Repeated PM HB2 IGBT Desat	The desaturation detection of the IGBTs in HB2 (half bridge 2) of a power module (PM) has detected a repeated short circuit in cool down time.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
501E	Repeated PM HB1 or HB2 IGBT Desat	The desaturation detection of the IGBTs in HB1 (half bridge 1) or HB2 (half bridge 2) of a power module (PM) has detected a repeated short circuit in cool down time.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.
501F	Repeated PM HB1 and HB2 IGBT Desat	The desaturation detection of the IGBTs in HB1 (half bridge 1) and HB2 (half bridge 2) of a power module (PM) has detected a repeated short circuit in cool down time.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check converter output terminals for a phase to phase short circuit. Replace the faulty PM.

Code (hex)	Fault	Cause	What to do
5029	PM Sub Capacitor Overvoltage1	Power module sub capacitor over voltage set by Par95.90 during capacitor reforming process happened.	Check the auxiliary code which indicates which power module reported this fault. Try to do the capacitor reforming test again or replace the problematic power modules.
5030	PM Sub Capacitor Overvoltage2	Power module sub capacitor over voltage set by Par95.91 and last over time period set by Par95.92 during capacitor reforming process happened.	Check the auxiliary code which indicates which power module reported this fault. Try to do the capacitor reforming test again or replace the problematic power modules.
5031	Cap Reform failed	Capacitor reforming test was done and failed because DC unbalance warning is still active after specified time period.	Check Par 95.93, 95.94 and 95.95 which indicates which power module(s) caused this fault. Try to do the capacitor reforming test again or replace the problematic power modules.
5032	PIL grid contactor control fault	PIL grid contactor control fault. The feedback is not correct 3s after command is given.	Check wiring of control and feedback between converter and grid contactor. Check grid contactor.
5094	Measurement circuit temperature	Problem with internal temperature measurement of the drive.	Contact your local ABB representative.
50A1	Emergency OFF button pressed	Emergency OFF button on the cabinet door has been pressed.	Check that it is safe to release the emergency OFF button on the front door and if it is, release the emergency OFF button. If the emergency OFF button is released but the warning is still active, check the wiring of the signals from the emergency OFF button. Check if the shield cover inside SBU cabinet is installed correctly.
5691	Measurement circuit ADC	Measurement circuit fault.	Contact your local ABB representative.
5693	Measurement circuit DFF	Measurement circuit fault.	Contact your local ABB representative.
6000	Internal SW error	Internal software error	Contact your local ABB representative. Quote the auxiliary code (check the event details in the event log).
607A	Trial mode expired	The entered license key of the drive is not valid and the trial mode time has expired.	Contact ABB support line to get a valid license key. Enter a valid license key in parameters *96.71 License key part 1*, *96.72 License key part 2*, *96.73 License key part 3*, *96.74 License key part 4* and then set the parameter *96.75 License key refresh* to "Refresh".

Code (hex)	Fault	Cause	What to do
607C	License key missing	License key for the drive has not been entered.	Contact ABB support line to get a valid license key. Enter a valid license key in parameters *96.71 License key part 1*, *96.72 License key part 2*, *96.73 License key part 3*, *96.74 License key part 4* and then set the parameter *96.75 License key refresh* to "Refresh".
607D	Control hub version incompatibility	Incompatible version of the control hub firmware has been detected.	Check the parameter *07.16 Control hub FW version*. If this version is older (smaller) than the *07.18 Control Hub FW version required* the control hub FW needs to be upgraded. Contact your local ABB representative.
607E	PM Software update in progress	An incorrect software version on the power modules was identified and a software update is in progress. This fault is active due to safety reasons to keep the MCB open until valid SW is downloaded to all Power modules. SW download to Power modules lasts 4 minutes.	The fault cannot be reset until the SW download is finished. When the SW download is finished a fault *607F PM Software update done* will be shown. Wait for the fault *607F PM Software update done* to show up. Then it is possible to reset the fault and to re-charge the drive.
607F	PM Software update done	An incorrect software version on the power modules was identified and a software update was done.	Reset the fault.
6080	PM Software Checksum wrong	An incorrect software checksum number on the power modules was identified and a PM software update is in progress. This fault is active due to safety reasons to keep the MCB open until valid SW is downloaded to all power modules. SW download to Power modules lasts 4 minutes.	The fault cannot be reset until the SW download is finished. When the SW download is finished a fault *607F PM Software update done* will be shown. Wait for the fault *607F PM Software update done* to show up. Then it is possible to reset the fault and to recharge the drive. Aux code meaning: Any bits=1 means corresponding power module's checksum number is wrong: Bit0=1: A1 … Bit8=1: A9 Bit9=1: B1 … Bit17=1: B9 Bit18=1:C1 … Bit26=1:C9
6110	PM configuration fail	An undefined fault code from a PM has been received.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check PM SW version and update if required. Replace the PM (if always the same PM gives the fault). Contact your local ABB representative.

Code (hex)	Fault	Cause	What to do
6111	PM undefined fault	An undefined fault code from a PM has been received.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check PM SW version and update if required. Replace the PM (if always the same PM gives the fault). Contact your local ABB representative.
6112	PM undefined state	Control hub has detected an undefined PM state.	Note: It is normal for this fault to appear after drive discharge. If the fault reappears after reset: Check POF wiring to the PMs (or replace). Check control hub daughter boards (or replace). Check PM SW version and update if required. Contact your local ABB representative.
6120	CVMI2 configuration fault	During initialization of the CVMI2 measurement board a fault was detected.	Replace the CVMI2 board.
6122	CVMI2 version incompatibility	Incompatible version of the CVMI2 firmware has been detected.	The Aux code is the minimum version for normal running. If the detected version ('07.17 CVMI2 FW version') is older (smaller) than required (07.119 CVMI2 FW version required), the CVMI2 FW needs to be upgraded. Please contact your local ABB representative.
6182	Unrecoverable SW Error	An unrecoverable error has occurred.	Check the event log for the fault code and auxiliary code and report those to your local ABB representative. Cycle the control power to reboot control boards.
6200	Checksum mismatch Programmable fault: *96.54 Checksum action*	The calculated parameter checksum does not match any enabled reference checksum.	See *A686 Checksum mismatch* (page *368*).
6306	FBA A mapping file	Fieldbus adapter A mapping file read error.	Contact your local ABB representative.
6307	FBA B mapping file	Fieldbus adapter B mapping file read error.	Contact your local ABB representative.
6481	Task overload	Internal fault	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative.
6487	Stack overflow	Internal fault	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative.

Code (hex)	Fault	Cause	What to do
64A1	Internal file load	File read error	Reboot the control unit (using parameter *96.08 Control board boot*) or by cycling power. If the problem persists, contact your local ABB representative.
64A2	Internal record load	Internal record load error	Contact your local ABB representative.
64A3	Application loading	Application file incompatible or corrupted	Note: This fault cannot be reset. Check the event log for the auxiliary code and contact your local ABB representative.
64B0	Memory unit detached	The memory unit was detached when the control unit was powered.	Contact your local ABB representative.
64B1	Internal SSW fault	Internal fault	Contact your local ABB representative.
64B2	User set fault	Loading of user parameter set failed because • requested set does not exist • set is not compatible with control program • drive was switched off during loading.	Contact your local ABB representative.
64E1	Kernel overload	Operating system error	Note: This fault cannot be reset. Contact your local ABB representative.
6581	Parameter system	Parameter load or save failed	Try forcing a save using parameter *96.07 Parameter save manually*. Retry.
6591	Backup/Restore Timeout	Backup or restore action takes too long.	Check panel / PC-tool connection to BCU. Abort current backup / restore and retry.
65A1	FBA A parameter conflict	The drive does not have a functionality requested by PLC (overriding system), or requested functionality has not been activated.	Check PLC programming. Check settings of parameter groups *50 Fieldbus adapter (FBA)* and *51 FBA A settings*.
65A2	FBA B parameter conflict	The drive does not have a functionality requested by PLC, or requested functionality has not been activated.	Contact your local ABB representative. ⚠ **WARNING!** FBA B communication is reserved for drive internal communication and should not be changed by user.
6881	Text data overflow	Internal fault	Reset the fault. If the fault persists contact your local ABB representative.
6882	Text 32-bit table overflow	Internal fault	Reset the fault. If the fault persists contact your local ABB representative.
6883	Text 64-bit table overflow	Internal fault	Reset the fault. If the fault persists contact your local ABB representative.

Code (hex)	Fault	Cause	What to do
6885	Text file overflow	Internal fault	Reset the fault. Contact your local ABB representative if the fault persists.
7081	Panel loss Programmable fault: *49.05 Communication loss action*	Control panel or Drive composer PC tool selected as active control location for drive has ceased communicating.	Check Drive composer PC tool or control panel connection. Check control panel connector. Check BCON X13 connector pins. Disconnect and reconnect the control panel. Replace control panel in mounting platform.
7082	Ext I/O comm loss Programmable fault: *31.55 Ext I/O comm loss event*	The I/O extension module types specified by parameters do not match the detected configuration.	See *A799 Ext I/O comm loss* (page *370*).
7083	Panel reference conflict	Use of saved control panel reference in multiple control modes attempted.	The control panel reference can only be saved for one reference type at a time. Consider the possibility of using a copied reference instead of saved reference (see the reference selection parameter).
7121	Motor stall Programmable fault: *31.24 Stall function*	Motor is operating in stall region because of e.g. excessive load or insufficient motor power.	Check motor load and drive ratings. Check fault function parameters *31.24*…*31.28*.
71B1	Motor fan Programmable fault: *35.106 DOL starter event type*	No feedback received from external fan.	Check external fan (or other equipment controlled) by the logic. Check settings of parameters *35.100*…*35.106*.
7310	Overspeed	Motor is turning faster than highest allowed speed due to incorrectly set minimum/maximum speed, insufficient braking torque or changes in load when using torque reference.	Check minimum/maximum speed settings, parameters *30.11 Minimum speed* and *30.12 Maximum speed* for rpm operation mode or *30.13 Minimum frequency* and *30.14 Maximum frequency* for Hz operation mode. Check adequacy of motor braking torque. Check applicability of torque control.
73B0	Emergency ramp failed	Emergency stop did not finish within expected time.	Check the settings of parameters *31.32 Emergency ramp supervision* and *31.33 Emergency ramp supervision delay*. Check the predefined ramp times (*23.11*…*23.19* for mode Off1, *23.23* for mode Off3).

Code (hex)	Fault	Cause	What to do
73F0	Overfrequency	Motor is turning faster than highest allowed speed due to incorrectly set minimum/maximum frequency, insufficient braking torque or changes in load when using torque reference.	Check minimum/maximum frequency setting in parameters *30.13 Minimum frequency* and *30.14 Maximum frequency*. Check adequacy of motor braking torque. Check applicability of torque control.
7510	FBA A communication Programmable fault: *50.02 comm loss func*	Cyclical communication between drive and fieldbus adapter module A or between PLC (overriding system) and fieldbus adapter module A is lost.	Check status of fieldbus communication. See user documentation of fieldbus interface. Check settings of parameter groups *50 Fieldbus adapter (FBA)*, *51 FBA A settings*, *52 FBA A data in* and *53 FBA A data out*. Check cable connections. Check if communication master is able to communicate.
7520	FBA B communication Programmable fault: *50.32 FBA B comm loss func*	Cyclical communication between drive and fieldbus adapter module B or between AC500 PLC and fieldbus adapter module B is lost.	Contact your local ABB representative. ⚠ **WARNING!** FBA B communication is reserved for drive internal communication and should not be changed by user.
7534	PM Rx link fault	A communication fault on the Rx communication channel of a PM has been detected.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check POF wiring to the PM (or replace). Check control hub daughter board (or replace). Replace the PM.
7538	Control hub missing PM	A PM in the converter does not send data to the control hub. This fault can be caused by a faulty Tx channel of a PM and /or by a bad fiber optic connection from the PM to the control hub.	Check the event log for an auxiliary code. The code indicates which PM is affected. Inspect corresponding power module (PEBBs). Check POF wiring to the PM (or replace). Check control hub daughter board (or replace). Replace the PM.
7539	Hub RX comm err	A communication error was detected in the control hub on the receiver from one power module (PM). This can be caused by a malfunction on the PM or the fiber optic connection from the PM to the hub.	Check the event log for an auxiliary code. The code indicates which PM is affected. Check POF wiring to the PM (or replace). Check control hub daughter board (or replace). Replace the PM.
D102	INU air pressure low	The air pressure drop across inverter unit is below fault limit value.	Check inverter cooling fan and inverter unit filter.

Code (hex)	Fault	Cause	What to do
D103	INU air pressure sensor failure	The air pressure drop across the inverter unit has exceeded internal fault level.	Check pressure drop sensor and measuring tube on control hub and replace control hub or tube if needed.
7540	CVMI2 communication lost	There is communication error between BCON and CVMI2 board.	Check communication wiring from BCU to CVMI2 board. Check power supply wiring of CVMI2 board. Replace the CVMI2 board. Typical auxiliary code: **F010**: BCON is rebooted while CVMI2 board is still power-on. The fault is resettable. **802D**: CVMI is rebooted while BCON is power-on. The fault is resettable. **0029**: The communication between BCON and CVMI2 board is not established. Check communication wiring and power supply of CVMI2 board. Aux code bits meaning (more than one bit can be 1 at the same time): From CVMI to BCON: bit0 =1 (0x1):?No communication latched bit1 =1 (0x2): Link error (3 continuous data check errors) bit2 =1 (0x4): Communication error (data check error) bit4-3: Data Transmission Protocol state machine • 00 = NO CONNECTION (Not initialized) • ?01 = ESTABLISHING CONNECTION • 10 = CONNECTION ESTABLISHED From BCON to CVMI: bit12 =1 (0x1000):?Communication error (data check error) bit13 =1 (0x2000): Link error (3 continuous data check errors) bit14 =1 (0x4000): No communication latched bit15 =1 (0x8000): Data type is recognized and correct.
7541	SBU CVMI communication lost	There is communication error between BCON and SBU CVMI2 board.	Check communication wiring from BCU to SBU CVMI board. Check power supply of SBU CVMI2 board. Replace the SBU CVMI board.
7582	MF comm loss Programmable fault: *60.09 M/F comm loss function*	Master/follower communication is lost.	See *A7CB MF comm loss* (page *371*).

Code (hex)	Fault	Cause	What to do
FF7E	Follower	A follower drive has tripped.	Check the auxiliary code. Add 2 to the code to find out the node address of the faulted drive. Correct the fault in the follower drive.
80A0	AI supervision Programmable fault: *12.03 AI supervision function*	An analog signal is outside the limits specified for the analog input.	Check signal level at the analog input. Check the wiring connected to the input. Check the minimum and maximum limits of the input in parameter group *12 Standard AI*.
80B0	Signal supervision (Editable message text) Programmable fault: *32.06 Supervision 1 action*	Fault generated by the signal supervision 1 function.	Check the source of the fault (parameter *32.07 Supervision 1 signal*).
80B1	Signal supervision 2 (Editable message text) Programmable fault: *32.16 Supervision 2 action*	Fault generated by the signal supervision 2 function.	Check the source of the fault (parameter *32.17 Supervision 2 signal*).
80B2	Signal supervision 3 (Editable message text) Programmable fault: *32.26 Supervision 3 action*	Fault generated by the signal supervision 3 function.	Check the source of the fault (parameter *32.27 Supervision 3 signal*).
9081	External fault 1 (Editable message text) Programmable fault: *31.01 External event 1 source* *31.02 External event 1 type*	Fault in external device 1.	Check the external device. Check setting of parameter *31.01 External event 1 source*.
9082	External fault 2 (Editable message text) Programmable fault: *31.03 External event 2 source* *31.04 External event 2 type*	Fault in external device 2.	Check the external device. Check setting of parameter *31.03 External event 2 source*.
9083	External fault 3 (Editable message text) Programmable fault: *31.05 External event 3 source* *31.06 External event 3 type*	Fault in external device 3.	Check the external device. Check setting of parameter *31.05 External event 3 source*.
9084	External fault 4 (Editable message text) Programmable fault: *31.07 External event 4 source* *31.08 External event 4 type*	Fault in external device 4.	Check the external device. Check setting of parameter *31.07 External event 4 source*.
9085	External fault 5 (Editable message text) Programmable fault: *31.09 External event 5 source* *31.10 External event 5 type*	Fault in external device 5.	Check the external device. Check setting of parameter *31.09 External event 5 source*.

Code (hex)	Fault	Cause	What to do
D101	Charging count	There are too many DC link charging attempts.?	Two attempts in Par 82.92 s? is allowed to prevent DC capacitor overheating.
E100	Trafo phase U1 overtemperature	The winding temperature of the indicated transformer primary phase has exceeded the temperature limit.	Check cooling of the transformer (door air inlet filter pads, fan operation). Check overload settings for the transformer (contact your local ABB representative).
E101	Trafo phase V1 overtemperature	The winding temperature of the indicated transformer primary phase has exceeded the temperature limit.	Check cooling of the transformer (door air inlet filter pads, fan operation). Check overload settings for the transformer (contact your local ABB representative).
E102	Trafo phase W1 overtemperature	The winding temperature of the indicated transformer primary phase has exceeded the temperature limit.	Check cooling of the transformer (door air inlet filter pads, fan operation). Check overload settings for the transformer (contact your local ABB representative).
E103	Ambient overtemperature	The air inlet temperature of the inverter unit has exceeded the maximum converter ambient temperature.	Check and improve the cooling of the electric room where converter is placed.
E104	IO Controller hardware configuration error	IO controller module doesn't match with the program hardware configuration.	Check actual hardware IO modules. Refresh *81.09 IO Controller configuration refresh* to configure correct modules.
E105	AC500 communication lost	AC500 has detected communication errors between BCU and AC500 communication link.	Check Modbus cable. Check FSCA-01 module.
E106	Converter space heater overload fault	Converter space heater has been detected based on monitoring of the digital signal.	Check if the space heater short circuit or overload. Check setting of the parameter *81.21 Converter space heater monitoring*.
E107	Motor space heater overload fault	Motor space heater has been detected based on monitoring of the digital signal.	Check if the space heater short circuit or overload. Check setting of the parameter *81.22 Motor space heater monitoring*.
E108	AC500 communication timeout	The watchdog supervision of the communication link between BCU and AC500 has detected a communication failure.	Check Modbus cable. Check FSCA-01 module. Check setting of parameter groups *54 FBA B settings*, *55 FBA B data in* and *56 FBA B data out* (changes allowed only by ABB authorized personnel). **Note:** Make sure that up to maximum of two fieldbus extension modules are used on the BCU.

Code (hex)	Fault	Cause	What to do
E109	MCB not available	MCB available signal is missing.	Check MCB available signal. Check setting of parameters: *82.40 MCB available monitoring*, *82.42 MCB available Grp+Indx*, *82.43 MCB available BitNum*.
E10A	MCB external protection	MCB external protection is active.	Check MCB external protection signal. Check setting of parameters: *82.50 MCB external protection monitoring*, *82.52 MCB external protection Grp+Indx*, *82.53 MCB external protection BitNum*.
E10C	TRU cooling fan 1 fault	Temperature relay integrated in TRU cooling fan 1 has opened.	Check wiring of fan 1 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E10D	TRU cooling fan 2 fault	Temperature relay integrated in TRU cooling fan 2 has opened.	Check wiring of fan 2 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E10E	TRU cooling fan 3 fault	Temperature relay integrated in TRU cooling fan 3 has opened.	Check wiring of fan 3 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E10F	Control supply failure	Control supply failure has been detected based on monitoring of the digital signal.	Check the control supply failure signal. Check setting of the parameter *81.10 Control supply monitoring*.
E111	TRU cooling fan 4 fault	Temperature relay integrated in TRU cooling fan 4 has opened.	Check wiring of fan 4 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E113	INU cooling fan 1 fault	Temperature relay integrated in INU cooling fan 1 has opened.	Check wiring of fan 1 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E114	MCB control fault	MCB close command and MCB close feedback do not match.	Check if MCB has tripped on its own, by means of short circuit protection relay or overload protection relay and adapt MCB protection relay settings if required. Check MCB control wiring between ACS580MV and MCB.

Code (hex)	Fault	Cause	What to do
E115	INU cooling fan 2 fault	Temperature relay integrated in INU cooling fan 2 has opened.	Check wiring of fan 2 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E116	INU cooling fan 3 fault	Temperature relay integrated in INU cooling fan 3 has opened.	Check wiring of fan 3 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E118	INU door not closed	During charging or operation of the drive, the inverter unit door lock sensor has reported that the door is not closed.	Close the inverter unit door. Check internal wiring of the door lock signals (open circuits, loose terminals).
E119	MCB discrepancy	MCB open feedback signal and MCB close feedback signal are active at the same time.	Check MCB control feedback signals wiring (open circuit, loose terminals).
E11A	INU cooling fan 4 fault	Temperature relay integrated in INU cooling fan 4 has opened.	Check wiring of fan 4 temperature contacts (open circuit, loose terminals). Check if fan is mechanically blocked or makes excessive noise (bearing problem).
E11C	INU door not locked	During charging or operation of the drive, the inverter unit door lock has reported that the door is not locked.	Lock the inverter unit door. Check internal wiring of the door lock signals (open circuits, loose terminals).
E11D	Transformer temperature sensor failure	The winding temperature of the indicated transformer primary phase has exceeded internal fault level.	Check the auxiliary code. The code specifies the affected transformer primary phase as follows: 01: U1 02: V1 03: W1 04: U1 and V1 05: V1 and W1 06: U1 and W1 07: U1, V1 and W1. Check winding temperature sensor wiring for the indicated transformer primary phase.
E123	Motor phase U1 overtemperature	The winding temperature of the indicated motor phase has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.03 Motor winding phase U1 fault limit*.

Code (hex)	Fault	Cause	What to do
E124	Motor phase V1 overtemperature	The winding temperature of the indicated motor phase has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.06 Motor winding phase V1 fault limit*.
E125	Motor phase W1 overtemperature	The winding temperature of the indicated motor phase has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.09 Motor winding phase W1 fault limit*.
E126	Motor phase U2 overtemperature	The winding temperature of the indicated motor phase has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.12 Motor winding phase U2 fault limit*.
E127	Motor phase V2 overtemperature	The winding temperature of the indicated motor phase has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.15 Motor winding phase V2 fault limit*.
E128	Motor phase W2 overtemperature	The winding temperature of the indicated motor phase has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.18 Motor winding phase W2 fault limit*.
E129	Motor DE bearing overtemperature	The DE bearing temperature of the motor has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.21 Motor DE bearing temperature fault limit*.
E12A	Motor NDE bearing overtemperature	The NDE bearing temperature of the motor has exceeded the temperature limit.	Check cooling of the motor. Check fault limit setting for the motor temperature *84.24 Motor NDE bearing temperature fault limit*.
E130	Motor phase U1 temperature sensor failure	The winding temperature of the indicated motor phase has exceeded internal fault level.	Check winding temperature sensor wiring of the indicated motor phase.
E131	Motor phase V1 temperature sensor failure	The winding temperature of the indicated motor phase has exceeded internal fault level.	Check winding temperature sensor wiring of the indicated motor phase.
E132	Motor phase W1 temperature sensor failure	The winding temperature of the indicated motor phase has exceeded internal fault level.	Check winding temperature sensor wiring of the indicated motor phase.
E133	Motor phase U2 temperature sensor failure	The winding temperature of the indicated motor phase has exceeded internal fault level.	Check winding temperature sensor wiring of the indicated motor phase.

Code (hex)	Fault	Cause	What to do
E134	Motor phase V2 temperature sensor failure	The winding temperature of the indicated motor phase has exceeded internal fault level.	Check winding temperature sensor wiring of the indicated motor phase.
E135	Motor phase W2 temperature sensor failure	The winding temperature of the indicated motor phase has exceeded internal fault level.	Check winding temperature sensor wiring of the indicated motor phase.
E136	Motor DE bearing temperature sensor failure	The DE bearing temperature has exceeded internal fault level.	Check temperature sensor wiring of the DE bearing.
E137	Motor NDE bearing temperature sensor failure	The NDE bearing temperature has exceeded internal fault level.	Check temperature sensor wiring of the NDE bearing.
E140	MSS control fault	MSS command and MSS feedback do not match.	Check if MSS has tripped on its own, by means of short circuit protection relay or overload protection relay and adapt MSS protection relay settings if required. Check MB control wiring between ACS580MV and MSS.
E141	MB control fault	MB command and MB feedback do not match.	Check if MB has tripped on its own, by means of short circuit protection relay or overload protection relay and adapt MB protection relay settings if required. Check MB control wiring between ACS580MV and MB.
E143	Bypass contactor control fault	Command and feedback of contactor do not match.	Check if contactor has tripped on its own, by means of short circuit protection relay or overload protection relay and adapt contactor protection relay settings if required. Check contactor control wiring between ACS580MV and contactor.
E144	Inductor overtemperature	The inductor temperature has exceeded the temperature limit.	Check cooling of the inductor.
E145	Inductor temperatuer rising overhigh	Inductor temperature rising relative to ambient temperature has exceeded the temperature rising limit.	Check cooling of the inductor.
E146	Voltage transducer sensor failure	The measured RMS voltage of the grid or drive output for SBU has exceeded internal fault level.	Check the auxiliary code, the code specifies affected measuring sensor as follows: 01: Grid voltage 02: Drive output voltage 04: Grid and drive output voltages Check the voltage sensor wiring for the indicated place. Check MCR-VAC-UI-0-DC board.

Code (hex)	Fault	Cause	What to do
E147	Inductor temperature sensor failure	The temperature of the inductor has exceeded interal fault level.	Check the wiring of the inductor temperature sensor.
FA90	STO diagnostics failure	This fault is triggered by internal diagnostic. Look at auxiliary code of this fault: Axu code = 1: The check sum verification in specified memory failed. Aux code = 2: The watchdog are triggered. Some timer function which should be reset in 2ms time level are not executed as expected. Possible causes: • CPU load is too high. Some tasks are not executed in specified time. • BCON board is broken.	Check signal of 7.11 Cpu usage. If it is very high, Contact your local ABB representative. Replace BCON board if the control board is broken.
FB11	Memory unit missing	No memory unit is attached to the control unit.	Power down the control unit. Check that the memory unit is properly inserted into the control unit.
		The memory unit attached to the control unit is empty.	Power down the control unit. Attach a memory unit (with the appropriate firmware) to the control unit.
FB12	Memory unit incompatible	The memory unit attached to the control unit is incompatible.	Power down the control unit. Attach a compatible memory unit.
FB13	Memory unit FW incompatible	The firmware on the attached memory unit is incompatible with the drive.	Power down the control unit. Attach a memory unit with compatible firmware.
FB14	Memory unit FW load failed	The firmware on the attached memory unit could not be loaded to the drive.	Power down the control unit. Check that the memory unit is properly inserted into the control unit. If the problem persists, replace the memory unit.
FF81	FB A force trip	A fault trip command has been received through fieldbus adapter A.	Check the fault information provided by the PLC (overriding system).

4

Service Level Parameters

What this chapter contains

The chapter describes all parameters that require Service access level. The parameters at End user access level are not listed in this manual, although some of them are referenced. For more details on the End user level parameters refer to *ACS580MV primary control program firmware manual*. Parameters can be viewed and edited using operator panel ACS-AP-S or Drive composer PC tool. To access parameters described in this chapter the service level password must be entered in the parameter *96.02 Pass code*. When service access level is active the parameter *96.3 Access level active* will have value 0b0011.

Safety

WARNING! Most of service level parameters are safety relevant, such as Protection settings (Group *34 Protections*). Wrong setting of such parameters might cause damage to the drive!

Terms and abbreviations

Term	Definition
Actual signal	Type of parameter that is the result of a measurement or calculation by the drive, or contains status information. Most actual signals are read-only, but some (especially counter-type actual signals) can be reset.
Def	(In the following table, shown on the same row as the parameter name) The default value of a parameter for the Factory macro. For information on macro-specific parameter values, see chapter Application macros in *ACS580MV primary control program firmware manual*.
FbEq16	(In the following table, shown on the same row as the parameter range, or for each selection) 16-bit fieldbus equivalent: The scaling between the value shown on the panel and the integer used in fieldbus communication when a 16-bit value is selected in parameter group *52 FBA A data in* or *53 FBA A data out*. A dash (-) indicates that the parameter is not accessible in 16-bit format.
Other [bit]	The value is taken from a specific bit in another parameter. The source is selected from a parameter list.
Parameter	Either an user-adjustable operating instruction for the drive, or an actual signal.
p.u.	Per unit

Summary of groups containing service level parameters

Group	Contents	Page
01 Actual value	Basic signals for monitoring the drive.	*80*
05 Diagnostics	Various run-time-type counters and measurements related to drive maintenance.	*80*
07 System info	Drive hardware and firmware information.	*81*
10 System info	Configuration of digital inputs and relay outputs.	*81*
17 Control Hub IO	Monitoring of control hub input/output signals.	*81*
21 Start/stop mode	Start and stop modes; emergency stop mode and signal source selection; DC magnetization settings; flystart settings.	*80*
30 Limits	Drive operation limits.	*87*
31 Fault functions	Configuration of external events; selection of behavior of the drive upon fault situations.	*87*
34 Protections	Drive protection functions.	*89*
60 DDCS communication	DDCS communication configuration.	*94*
79 TC Vector control	PI-Control, filter and configuration settings for vector control mode. **Note:** Vector control mode is released from SW version MHDRE 2.70.0.1 (2018-B), some parameters from this group are also used by scalar control mode.	*95*
81 System control and monitoring	Application software parameters used for system control and monitoring.	*99*
82 Charging, MCB control	MCB control (drive charging control).	*100*
83 Cooling system	Control of the converter cooling system.	*101*
87 AC500 I/O interface	Configuration of IO controller (AC500eco) digital inputs, relay / transistor outputs and analog inputs.	*104*
95 HW configuration	Various hardware-related settings.	*107*

96 System	Language selection; parameter save and restore; user parameter sets; control unit reboot.	*111*
97 Motor control	Voltage reserve; flux braking; IR compensation.	*115*
99 Motor data	Motor configuration settings.	*116*

Parameter listing

No.	Name/Value	Description	Def/FbEq16
01 Actual value		Basic signals for monitoring the drive. All parameters in this group are read-only unless otherwise noted.	
1.165	Voltage RMS deviation % of grid	Voltage RMS deviation between grid and motor.	0
	-10.00...10.00		1 = 1%
1.166	Angle deviation	Angle deviation between grid and motor.	0
	-180.00...180.00		1 = 1 degree
05 Diagnostics		Various run-time-type counters and measurements related to drive maintenance. All parameters in this group are read-only unless otherwise noted.	
05.10	Control board temperature	Measured BCON control board temperature.	-
	-50 … 150 °C		1 = 1 °C
05.48	Control board temperature warning	Control board temperature warning threshold. If the control board temperature exceeds this value the alarm *A4A0 Control board temperature* will be activated.	0 (=disabled)
	-		1 = 1 °C
05.49	Control board temperature fault	Control board temperature fault threshold. f the control board temperature exceeds this value the drive trips on fault *4110 Control board temperature*.	0 (=disabled)
	-		1 = 1 °C
05.140	Communication counter link selector	Selects the communication link of message counter or error counter displayed in parameters *05.141* and *05.142*. Note: This parameter is visible only for AINF2, AINFB and AINF6 targets.	FigBus
	FigBus	Shows the message counter and error counter for UART-communication between fieldbus module and control unit.	0
	DDCS	Shows the message counter and error counter for DDCS link layer.	1
	Drive-to-Drive (D2D)	Shows the message counter and error counter for Drive-to-Drive communication link.	2
	Safety option (FSO)	Shows the message counter and error counter for UART link messages between safety option and control unit.	3
	Power unit communication (PSL2)	Shows the message counter and error counter for PSL2 communication link. All the channels are combined into one common counter.	4
	Panel communication	Shows the message counter and error counter for panel communication link.	5

No.	Name/Value	Description	Def/FbEq16
05.141	Communication message counter	Displays the value of message counter based on the communication link selected with parameter *05.140*. The counter resets, if you reboot the control board or after the value reaches the maximum limit. Note: This parameter is visible only for AINF2, AINFB and AINF6 targets.	-
	0…4294967295	Number of messages since the last control board reboot.	1 = 1
05.142	Communication error counter	Displays the value of error counter based on the communication link selected with parameter *05.140*. The counter resets, if you reboot the control board or after the value reaches the maximum limit. Note: This parameter is visible only for AINF2, AINFB and AINF6 targets.	-
	0…4294967295	Number of errors since the last control board reboot.	1 = 1
07 System info		Service-level parameters for drive hardware and firmware information. Note: All parameters in this group are read only.	-
07.09	Preboot version	Shows the version number of preboot program in the control unit.	-
07.16	Drive nominal current	Shows the nominal current of the drive.	-
	0 … 15000 A	Nominal current.	1 = 1 A
10 System info		Service-level parameters for drive hardware and firmware information. Note: All parameters in this group are read only.	-
10.101	RO1 toggle counter	Counts number of times relay output RO1 changed states. To reset the counter, in control panel depress the Reset key for at least three seconds.	-
	0…4294967295	Number of times RO1 changed states.	1 = 1
10.102	RO2 toggle counter	Counts number of times relay output RO2 changed states. To reset the counter, in control panel depress the Reset key for at least three seconds.	-
	0…4294967295	Number of times RO2 changed states.	1 = 1
10.103	RO3 toggle counter	Counts number of times relay output RO3 changed states. To reset the counter, in control panel depress the Reset key for at least three seconds.	-
	0…4294967295	Number of times RO3 changed states.	1 = 1
17 Control Hub IO		Monitoring of control hub input/output signals.	

No.	Name/Value	Description	Def/FbEq16
17.03	Control hub DO force selection	Selects the control hub digital outputs whose electrical values are replaced by forced values from parameter 17.04.	0b0000
		Bit / Name / Information	
		0: DO1	
		1: DO2	
		2: DO3	
		3: DO4	
		4 … 15: Reserved	
17.04	Control hub DO force data	Forces control hub digital outputs to the set value if selected in parameter 17.03. Bit 0 is the forced value for control hub DO1.	0b0000
		Bit / Name / Information	
		0: DO1	
		1: DO2	
		2: DO3	
		3: DO4	
		4 … 15: Reserved	
17.06	Control hub DI force selection	Selects the control hub digital inputs whose electrical values are replaced by forced values from parameter 17.07.	0b00000
		Bit / Name / Information	
		0: DI1	
		1: DI2	
		2: DI3	
		3: DI4	
		4 … 15: Reserved	
17.07	Control hub DI force data	Contains the values of digital inputs that are used instead of the electrical statuses if selected in parameter 17.06. Bit 0 is the forced value for control hub DI1.	0b00000
		Bit / Name / Information	
		0: DI1	
		1: DI2	
		2: DI3	
		3: DI4	
		4 … 15: Reserved	
17.08	INU air pressure drop	Inverter unit cabinet pressure drop (raw value).	-
	-		-
21 Start/stop mode		Start and stop modes; emergency stop mode and signal source selection; DC magnetization settings; flystart settings.	

No.	Name/Value	Description	Def/FbEq16
21.23	DC magn. ctrl P-gain	Proportional gain of the PI controller used for DC magnetization. **Note:** This parameter should be modified only by expert personnel.	10 %
	0 … 1000 %		0.01 = 1 %
21.24	DC magn. ctrl time constant	Integral time constant of the PI controller used for DC magnetization. **Note:** This parameter should be modified only by expert personnel.	10 ms
	0 … 10000 ms		0.001 = 1 ms
21.25	DC magn. ctrl max limit	Limit value for the PI controller used for DC magnetization. **Note:** This parameter should be modified only by expert personnel.	1000 %
	0 … 1000 %		0.01 = 1 %
21.30	Flystart current level	Defines the initial current level to be used during speed scan process. The p.u. refers to the motor current base (motor nominal current defined in parameter 99.6).	0.4 p.u.
	0 … 1 p.u.		1 = 1 p.u.
21.31	Flystart flux ramp time	Defines the flux ramp up time (from 0 to 1 p.u.) during flystart.	10 s
	1 … 50 s		1 = 1 s
21.32	Flystart frequency min	Minimum frequency/speed used during speed scan in flystart. If the motor speed is still not found when the frequency reference gets smaller than this parameter, the flystart continues the speed scan with negative sign or ends the speed scan depending on the option selected in parameter 21.34: *21.34 Flystart reverse enable* = 1: (Motor can rotate in both directions) If the motor speed is still not found when the frequency reference gets smaller than this parameter, the flystart continues the speed scan with negative sign. If the negative motor speed is still not found when the speed reference (its absolute value) gets smaller than this parameter, it is concluded that the motor speed equals 0 and DC magnetization is performed. ***21.34 Flystart reverse enable* = 0:** (Motor can rotate only in one direction) If the motor speed is still not found when the frequency reference gets smaller than this parameter it is concluded that the motor speed equals 0 and DC magnetization is performed.	0.1 p.u.
	0 … 1 p.u.		1 = 1 p.u.
21.33	Flystart frequency ramp time	Defines the time to ramp the scan frequency from nominal to zero.	10 s
	0 … 50 s		1 = 1 s

No.	Name/Value	Description	Def/FbEq16
21.34	Flystart reverse enable	If this parameter is set to 1 the flystart algorithm performs the speed scan over positive and negative speeds. If this parameter is set to 0 the flystart algorithm performs the speed scan only over positive speeds. See parameter 21.32 for more details.	1 NoUnit
	0 … 1 NoUnit		1 = 1 NoUnit
21.35	Flystart speed detect curr level	When the motor current in d axis falls below this value the motor speed is considered found. After that the flux is ramped up to the rated value. **Important:** The current level for finding the motor speed is defined by multiplying this parameter by the parameter *21.30 Flystart current level*. In other words, the p.u. for this parameter does not refer to the motor current base (motor nominal current) but to the initial current level used in flystart algorithm (parameter *21.30 Flystart current level*).	0.35 p.u.
	0 … 1 p.u.		1 = 1 p.u.
21.36	Flystart speed detect quali time	Defines the qualification time for 21.35. After this qualification, the speed shall be defined as detected.	20ms
	0…100 ms		1 = 1 ms
21.37	Flystart Iq ctrl filt time	Filter time constant in ms for the Iq current to be fed to the Iq current controller.	20 ms
	0.25 … 100 ms		1 = 1 ms
21.38	Flystart Iq ctrl Kp	Proportional gain of the PI controller used to control Iq current during flystart.	0.075 NoUnit
	0 … 10 NoUnit		1 = 1 NoUnit
21.39	Flystart Iq ctrl Ki	Integral gain of the PI controller used to control Iq current during flystart.	0.05 NoUnit
	0 … 1 NoUnit		1 = 1 NoUnit
21.204	Starting freeze time	Starting inhibit from last stop or fault to make motor fully demagnetized.	5000ms
	0…10000 ms		1 = 1ms
23 Speed reference ramp		Service level parameters for speed reference ramp	-
23.43	Shape time acc 3	Defines the acceleration ramp time at the start of acceleration. See parameter 23.16. Note: This parameter affects only ramp 2, if parameter *23.47 Shape time pair selection* = 1.	0.000 s
	0.000 … 1800.000 s	Acceleration start ramp time.	10 = 1 s
23.44	Shape time acc 4	Defines the acceleration ramp time at the end of acceleration. See parameter 23.17. Note: This parameter affects only ramp 2, if parameter *23.47 Shape time pair selection* = 2.	0.000 s
	0.000 … 1800.000 s	Acceleration end ramp time.	10 = 1 s

No.	Name/Value	Description	Def/FbEq16
23.45	Shape time dec 3	Defines the deceleration ramp time at the start of deceleration. See parameter 23.18. Note: This parameter affects only ramp 2, if parameter *23.47 Shape time pair selection* = 2.	0.000 s
	0.000 … 1800.000 s	Deceleration start ramp time.	10 = 1 s
23.46	Shape time dec 3	Defines the deceleration ramp time at the end of deceleration. See parameter 23.19. Note: This parameter affects only ramp 2, if parameter *23.47 Shape time pair selection* = 2.	0.000 s
	0.000 … 1800.000 s	Deceleration end ramp time.	10 = 1 s
23.47	Shape time pair selection	Selects how ramp shape time applies to ramps 1 and 2.	0
	Only shape times 1 and 2.	Ramp shape times 1 and 2 define the shape of both ramps, 1 and 2.	0
	All shape times	Ramp shape times 1 and 2 define the shape of ramp 1. Ramp shape times 3 and 4 define the shape of ramp 2.	1
26 Torque reference chain		Service-level parameters for torque reference chain. Parameters 26.90 …26.101 configure the acceleration damping function. See also, Acceleration damping function and Reference selection for torque controller chain diagram in the Firmware manual.	
26.90	Motor acceleration	Displays the filtered acceleration (i.e. rate of actual speed change). The filtering is defined by parameters 26.92…26.97. Negative values indicate deceleration. This parameter is read-only.	-
	-2147483.648 … 2147483.647 rpm/s	Filtered acceleration.	100 = 1 rpm/s
26.91	Motor acceleration multiplication	Defines a multiplier for the acceleration value, applied before filtering. Default value zero disables calculation and saves CPU time.	0
	0.00 … 256.00	Multiplier for acceleration.	100 = 1
26.92	Acceleration filtering time	Defines the base filtering time for acceleration of all three filters. This filtering time is normally used above the speed defined in par. 26.95 Acceleration filter increase speed high.	5.0 ms
	0.5 … 3276.7 ms	Acceleration filtering time.	10 = 1 ms
26.93	Acceleration filter increase	Defines a multiplier for the base filtering time (par. 26.92 Acceleration filtering time). The product of parameters 26.93 and 26.92 is used as the filtering time below the speed defined by parameter 26.94 Acceleration filter increase speed low. The filtering time decreases linearly between the speeds in parameters 26.94 and 26.95.	1.0
	1.0 … 3276.7	Filtering time multiplier for low speeds.	1 = 1
26.94	Acceleration filter increase speed low	Defines a speed breakpoint below which the increased filtering time (product of parameters 26.92 and 26.93) is used.	30.00 rpm

No.	Name/Value	Description	Def/FbEq16
	0.00 … 30000.00 rpm	Breakpoint for increased filtering time.	1 = 1 rpm
26.95	Acceleration filter increase speed high	Defines a speed breakpoint above which the base filtering time (par. 26.92) is used.	60.00 rpm
	0.00 … 30000.00 rpm	Breakpoint for base filtering time.	1 = 1 rpm
26.96	Acceleration filter bypass limit	Defines a limit for rate of speed change (because when actual speed changes quickly, the overall filtering time must be decreased). Above this limit, the first filter is bypassed, and the filtering time of the second and third filters are divided by parameter 26.97 Acceleration filter reduction.	100.000 rpm/s
	0.000 … 32767.000 rpm/s	Filtered rate of actual speed change.	1 = 1 rpm/s
26.97	Acceleration filter reduction	Defines the acceleration filter reduction value. When actual speed changes faster than the bypass limit (par. 26.96), the first filter is bypassed and the filtering time of the second and third filters are divided by this value.	2.0
	1.0 … 24.0	Filtering time reduction.	1 = 1
26.98	Acceleration damping gain	Defines the multiplier for filtered acceleration, applied before limitation. Default value zero disables calculation and saves CPU time. When damping is used, also the acceleration calculation needs to be activated by parameter 26.91 Motor acceleration multiplication.	0.0 %s²/rad
	-3000.0 … 3000.0 % s²/rad	Multiplier for filtered acceleration.	10 = 1% s²/rad
26.99	Abs acceleration damping maximum	Defines the maximum limit for torque correction term (output of the acceleration damping function). Note: The same limit applies for both acceleration and deceleration.	10.0%
	0.0 … 300.0%	Maximum limit for acceleration damping.	1 = 1%
26.100	Acceleration damping output enabled	Determines (or selects a source to determine) whether the output of the acceleration damping function is applied to the torque reference.	Not selected
	Not selected	0.	0
	Selected	Applies acceleration damping output to torque reference	1
	DI1	Digital input DI1 (10.02 DI delayed status, bit 0).	2
	DI2	Digital input DI2 (10.02 DI delayed status, bit 1).	3
	DI3	Digital input DI3 (10.02 DI delayed status, bit 2).	4
	DI4	Digital input DI4 (10.02 DI delayed status, bit 3).	5
	DI5	Digital input DI5 (10.02 DI delayed status, bit 4).	6
	DI6	Digital input DI6 (10.02 DI delayed status, bit 5).	7
	DIO1	Digital input/output DIO1 (11.02 DIO delayed status, bit 0).	10
	DIO2	Digital input/output DIO2 (11.02 DIO delayed status, bit 1).	11
	Other [bit]	Source selection	-

No.	Name/Value	Description	Def/FbEq16
26.101	Acceleration damping output	Displays the output of the oscillation damping function. This value is added to the torque reference (as allowed by par. 26.100). This parameter is read-only.	-
	-1600.0 … 1600.0%	Output of the acceleration damping function.	1 = 1%
30 Limits		Drive operation limits.	
30.54	Overvoltage Limit	Maximum value of DC link voltage for control. DC link voltage is limited to this value during braking.	1140 V
	0 … 1200 V		1 = 1 V
30.56	Ridethrough secondary voltage limit	Ridethrough DC Link control level [V]. During the ridethrough the DC Link is controlled to this level.	600 V
	0 … 1200 V		1 = 1 V
30.57	Ridethrough DC link control level	Ridethrough DC Link control level [V]. During the ridethrough the DC Link is controlled to this level.	900 V
	0 … 1200 V		1 = 1 V
31 Fault functions		Configuration of external events; selection of behavior of the drive upon fault situations.	
31.100	Trafo no-load overcurrent	Select how the drive reacts when a Trafo no-load overcurrent is detected.	No action
	No action	Throw nothing	
	Fault	Throw a fault	
31.32	*Emergency ramp supervision*	Parameters *31.32 Emergency ramp supervision* and *31.33 Emergency ramp supervision delay*, together with *01.29 Speed change rate*, provide a supervision function for emergency stop modes Off1 and Off3. The supervision is based on either • observing the time within which the motor stops, or • comparing the actual and expected deceleration rates. If this parameter is set to 0%, the maximum stop time is directly set in parameter *31.33*. Otherwise, *31.32* defines the maximum allowed deviation from the expected deceleration rate, which is calculated from parameters *23.11*…*23.19* (Off1) or *23.23 Emergency stop time* (Off3). If the actual deceleration rate (*01.29*) deviates too much from the expected rate, the drive trips on *73B0 Emergency ramp failed*, sets bit 8 of *06.17 Drive status word 2*, and coasts to a stop. If *31.32* is set to 0% and *31.33* is set to 0 s, the emergency stop ramp supervision is disabled. See also parameter *21.04 Emergency stop mode*. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector).	0%
	0…300%	Maximum deviation from expected deceleration rate.	1 = 1%

No.	Name/Value	Description	Def/FbEq16
31.33	*Emergency ramp supervision delay*	If parameter *31.32 Emergency ramp supervision* is set to 0%, this parameter defines the maximum time an emergency stop (mode Off1 or Off3) is allowed to take. If the motor has not stopped when the time elapses, the drive trips on *73B0 Emergency ramp failed*, sets bit 8 of *06.17 Drive status word 2*, and coasts to a stop. If *31.32* is set to a value other than 0%, this parameter defines a delay between the receipt of the emergency stop command and the activation of the supervision. It is recommended to specify a short delay to allow the speed change rate to stabilize. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector).	0 s
	0…32767 s	Maximum ramp-down time, or supervision activation delay.	1 = 1 s
31.37	*Ramp stop supervision*	Parameters *31.37 Ramp stop supervision* and *31.38 Ramp stop supervision delay*, together with *01.29 Speed change rate*, provide a supervision function for normal (ie. non-emergency) ramp stopping. The supervision is based on either • observing the time within which the motor stops, or • comparing the actual and expected deceleration rates. If this parameter is set to 0%, the maximum stop time is directly set in parameter *31.38*. Otherwise, *31.37* defines the maximum allowed deviation from the expected deceleration rate, which is calculated from parameters *23.11*…*23.19*. If the actual deceleration rate (*01.29*) deviates too much from the expected rate, the drive trips on *73B1 Stop failed*, sets bit 14 of *06.17 Drive status word 2*, and coasts to a stop. If *31.37* is set to 0% and *31.38* is set to 0 s, the ramp stop supervision is disabled. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector).	0%
	0…300%	Maximum deviation from expected deceleration rate.	1 = 1%
31.38	*Ramp stop supervision delay*	If parameter *31.37 Ramp stop supervision* is set to 0%, this parameter defines the maximum time a ramp stop is allowed to take. If the motor has not stopped when the time elapses, the drive trips on *73B1 Stop failed*, sets bit 14 of *06.17 Drive status word 2*, and coasts to a stop. If *31.37* is set to a value other than 0%, this parameter defines a delay between the receipt of the stop command and the activation of the supervision. It is recommended to specify a short delay to allow the speed change rate to stabilize. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector).	0 s
	0…32767 s	Maximum ramp-down time, or supervision activation delay.	1 = 1 s

No.	Name/Value	Description	Def/FbEq16
34 Protections		Drive protection functions. Note: For motor related quantities specified in p.u., if no special note is given, the base value is Motor nominal current defined in parameter 99.6. For grid related quantities specified in p.u., if no special note is given, the base value is Rated input current defined by license key (can be seen in parameter 30.41). Any deviation from the above described standard base system is explicitly mentioned in the parameter description. **Note:** All protection functions use qualifier times that are internally set in software and cannot be changed by Service level parameters. The below described parameters that can be set with Service access level specify the threshold value for faults (except Par 34.01 and 34.23). A fault is activated when the particular drive value exceeds its threshold for longer than qualifier time. Parameters *31.32 Emergency ramp supervision* and *31.33 Emergency ramp supervision delay*, together with *01.29 Speed change rate*, provide a supervision function for emergency stop modes Off1 and Off3. The supervision is based on either • observing the time within which the motor stops, or • comparing the actual and expected deceleration rates. If this parameter is set to 0%, the maximum stop time is directly set in parameter *31.33*. Otherwise, *31.32* defines the maximum allowed deviation from the expected deceleration rate, which is calculated from parameters *23.11*…*23.19* (Off1) or *23.23 Emergency stop time* (Off3). If the actual deceleration rate (*01.29*) deviates too much from the expected rate, the drive trips on *73B0 Emergency ramp failed*, sets bit 8 of *06.17 Drive status word 2*, and coasts to a stop. If *31.32* is set to 0% and *31.33* is set to 0 s, the emergency stop ramp supervision is disabled. See also parameter *21.04 Emergency stop mode*. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector). If parameter *31.32 Emergency ramp supervision* is set to 0%, this parameter defines the maximum time an emergency stop (mode Off1 or Off3) is allowed to take. If the motor has not stopped when the time elapses, the drive trips on *73B0 Emergency ramp failed*, sets bit 8 of *06.17 Drive status word 2*, and coasts to a stop. If *31.32* is set to a value other than 0%, this parameter defines a delay between the receipt of the emergency stop command and the activation of the supervision. It is recommended to specify a short delay to allow the speed change rate to stabilize. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector).	

No.	Name/Value	Description	Def/FbEq16
		Parameters *31.37 Ramp stop supervision* and *31.38 Ramp stop supervision delay*, together with *01.29 Speed change rate*, provide a supervision function for normal (ie.nonemergency) ramp stopping. The supervision is based on either • observing the time within which the motor stops, or • comparing the actual and expected deceleration rates. If this parameter is set to 0%, the maximum stop time is directly set in parameter *31.38*. Otherwise, *31.37* defines the maximum allowed deviation from the expected deceleration rate, which is calculated from parameters *23.11*…*23.19*. If the actual deceleration rate (*01.29*) deviates too much from the expected rate, the drive trips on *73B1 Stop failed*, sets bit 14 of *06.17 Drive status word 2*, and coasts to a stop. If *31.32* is set to 0% and *31.33* is set to 0 s, the ramp stop supervision is disabled. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector). If parameter *31.37 Ramp stop supervision* is set to 0%, this parameter defines the maximum time a ramp stop is allowed to take. If the motor has not stopped when the time elapses,the drive trips on *73B1 Stop failed*, sets bit 14 of *06.17 Drive status word 2*, and coasts to a stop. If *31.37* is set to a value other than 0%, this parameter defines a delay between the receipt of the stop command and the activation of the supervision. It is recommended to specify a short delay to allow the speed change rate to stabilize. **Note:** This parameter is only applied to vector mode (99.04 Motor control mode = Vector).	
34.03	Grid overcurrent trip level	Grid overcurrent protection trip level. The parameter is defined in [p.u.] with base value defined in parameter *30.41 Rated input current*. Grid overcurrent protection reacts on the instantaneous values of the measured transformer primary current. Therefore the absolute value of the grid overcurrent trip threshold is calculated as: Par 34.03 x Par 30.41 * sqrt(2). If the instantaneous transformer primary current exceeds the calculated limit in any condition, the drive trips on fault *2110 Trafo overcurrent*. **Note:** If the calculated grid overcurrent trip threshold exceeds 95% of the maximum measurable transformer current (defined by the license key) the grid overcurrent trip threshold is set to 95% of the maximum measurable transformer current regardless of the setting in this parameter. **Note:** If the Trafo overcurrent happens during charging on a de-rated R4 drive then this parameter can be increased above the default value. Contact the ABB support line for the exact settings. This is only valid for de-rated R4 drives!	1.5 p.u.
	0 … 5 p.u.		1 = 1 p.u.

No.	Name/Value	Description	Def/FbEq16
34.05	Trafo over curr no load trip level	If the transformer primary current exceeds this limit during charging the drive trips on fault *2113 Trafo no-load overcurrent*. This condition is only checked after MCB has been closed until all power modules are ON (before the time defined in parameter 34.01 is elapsed).	0.5 p.u.
	0 … 1 p.u.		1 = 1 p.u.
34.07	Trafo current sensor offset	Maximum expected (allowed) measurement offset of the transformer current sensor. From this value the maximum expected (allowed) current measurement error is calculated in the software. If a measured transformer phase current exceed this maximum allowed measurement error when the MCB is open, the drive trips on fault *2116 Trafo current sense fault phase U1* or *2117 Trafo current sense fault phase V1* depending on the phase that is affected. This occurrence indicates a potential problem with transformer current measurement chain. **Note:** When MCB is open and the drive is fault free, the current calibration is active. The current calibration algorithm removes any current measurement offset from the measurement. Therefore with MCB open and drive fault free, the displayed transformer measured currents are always equal 0 (parameters 1.49 - 1.51). However, the above described current measurement check is done internally. In other words, if the removed offset becomes bigger than the calculated maximum allowed current measurement error, the drive trips on the current sense fault.	0.4 mA
	0.0 … 100.0 mA		1 = 1 mA
34.09	Current sensor offset	This parameter works together with parameter 34.7 and 34.24. Maximum allowed measurement offset of the transformer current sensor is maximum of this value and value calculated from 34.07. Maximum allowed measurement offset of the motor current sensor is maximum of this value and value calculated from 34.24. When current sensor fault happens (2116, 2117, 2353, 2354), offset will be set to 0.	0.05 p.u.
	0 … 0.2 p.u.		
34.12	Grid current asymmetry trip level	If at least one of the differences between any 2 transformer phase currents (U1-V1, U1-W1, V1-W1) exceeds this limit the drive trips on fault *211B Grid current asymmetry*.	0.4 p.u.
	0 … 1 p.u.		1 = 1 p.u.
34.15	Grid phase loss trip level	If the absolute value of any trafo phase currents is smaller than this limit during charging, the drive shall trip due to grid phase loss.	
	0.000 … 1.000		1 =1

No.	Name/Value	Description	Def/FbEq16
34.17	Motor overcurrent trip level	The parameter is defined in [p.u.] with base value defined by: - Motor nominal current (Par99.6) Motor overcurrent protection reacts on the instantaneous values of the measured motor phase currents. Therefore the absolute value of the motor overcurrent trip threshold is calculated as: min (Par 99.6 ×Par34.17, Par30.40× Par34.19)×2 √ This is done to prevent a damage to a weaker component in case converter and motor ratings are different. If the instantaneous value of a measured motor phase current exceeds the calculated threshold, the drive trips on fault *2350 Motor overcurrent phase U2*, *2351 Motor overcurrent phase V2* or *2352 Motor overcurrent phase W2* depending on the phase that is affected. **Note:**If the calculated motor overcurrent trip threshold exceeds 95% of the maximum measurable motor current (defined by the license key) the motor overcurrent trip threshold is limited to 95% of the maximum measurable motor current regardless of the settings in this parameter.	1.3 p.u.
	0 … 3 p.u.		1 = 1 p.u.
34.19	Inverter over curr trip level	The parameter is defined in [p.u.] with base value defined by Par30.40 Converter rated output current. Refer to Par34.17 for more details.	
	0 … 3 p.u.		1 = 1 p.u
34.20	Grid power unavailable trip grid current level	If the absolute values of all the grid currents are smaller than this limit when charging, the drive shall trip due to 211D Grid power unavailable.	0.1
	0….1 p.u.		1 = 1 p.u.
34.21	Grid power unavailable trip secondary voltage level	If the values of all the average secondary voltage are smaller than this limit when charging, the drive shall trip due to 211D Grid power unavailable.	400
	0….1500 V		
34.22	Grid power unavailable trip quali time	If the grid power is missing longer than the time after MCB feedback, the drive shall trip due to 211D Grid power unavailable.	1500
	0….5000 ms		1 = 1 ms
34.23	Motor curr sense fault ena delay	Time delay after modulation stop before motor current measurement supervision is enabled. During this time after modulation stop the Motor current sense fault is not checked (see Par 34.24 for more details on Motor current sense fault).	5 s
	0 … 30 s		1 = 1 s

No.	Name/Value	Description	Def/FbEq16
34.24	Mot current sensor offset	Maximum expected (allowed) measurement offset of the motor current sensor. From this value the maximum expected (allowed) current measurement error is calculated in the software. If a measured motor phase current exceed this limit when the drive is not modulating the drive trips on fault *2353 Motor current sense fault phase U2* or *2354 Motor current sense fault phase V2*, depending on the phase that is affected. This occurrence indicates a potential problem with motor current measurement chain. For more details see also parameter 34.7.	0.4 mA
	0.0 … 100.0 mA		1 = 1 mA
34.25	SBU faults masking while sync	If Enabled is selected, below faults will be masked as pure events while sync. - Faults: 2350 Motor overcurrent phase U2 2351 Motor overcurrent phase V2 2352 Motor overcurrent phase W2 3230 PM DC link overvoltage 5010 PM HB1 short circuit turn off 5011 PM HB2 short circuit turn off 5012 PM HB1 or HB2 short circuit turn off 5017 PM HB1 and HB2 short circuit turn off - Pure events: B6B5 Motor overcurrent phase U2 while sync B6B6 Motor overcurrent phase V2 while sync B6B7 Motor overcurrent phase W2 while sync B6B8 PM DC link overvoltage while sync B6B9 PM HB1 short circuit turn off while sync B6BA PM HB2 short circuit turn off while sync B6BB PM HB1 or HB2 short circuit turn off while sync B6BC PM HB1 and HB2 short circuit turn off while sync	Disable
	Disable		0
	Enable		1
34.26	Motor phase loss trip level	If the absolute value of any of motor phase currents is smaller than this limit and the motor speed is higher than 5% motor nominal speed the drive trips on fault *2355 Motor phase U2 lost*, *2356 Motor phase V2 lost* or *2357 Motor phase W2 lost*, depending on the phase that is affected.	0.1 p.u.
	0 … 1 p.u.		1 = 1 p.u.
34.34	Motor volt sense fault trip level	If the measured motor phase-to-ground voltage exceeds this limit the drive trips on fault *3330 Motor voltage sense fault phase U2*, *3331 Motor voltage sense fault phase V2* or *3332 Motor voltage sense fault phase W2*, depending on the phase that is affected. This occurrence indicates a potential problem with motor voltage measurement chain.	1.9 p.u.
	0 … 2 p.u.		1 = 1 p.u.

No.	Name/Value	Description	Def/FbEq16
34.36	Ground fault trip level	Maximum allowed amplitude of the motor common mode voltage fundamental component. If the amplitude of the fundamental component in the motor common mode voltage exceeds this limit the drive trips on fault *3333 Ground fault*.	500 V
	0 … 3000 V		1 = 1 V
34.37	Incorrect grid voltage fault limit	If the grid voltage exceeds the limit during Sync, drive will trip on fault *211E Grid voltage Deviated*.	20
	0…100%		1 = 1%
34.38	Incorrect grid voltage fault quali time	If the grid voltage exceeds the limit during Sync, drive will trip on fault *211E Grid voltage Deviated*.	3
	1…10 s		1 = 1s
34.58	Low frequency current limit delay time	Delay time for low frequency current limit function.	10s
	10s…15s		1 = 1s
34.61	Overload warning quali time	Qualification time for overload warning.	2
	0…10s		1 = 1s
60 DDCS communication		DDCS communication configuration. The DDCS protocol is used to connect to BCON with the R&D PC tool “Drive Tool” (DT) that is used for some special tests. **Note: DT is not a service tool and shall not be used for commissioning of the drive.**	
60.04	MF response delay	Defines the delay time at which the follower responds to the master. If the follower does not respond within this defined time the count for communication loss timeout starts (parameter *60.08 M/F comm loss timeout*). Time = 60.04 MF response delay * 250 microseconds Note: Modify this parameter if the follower does not respond to the delay time of 250 microseconds. For example, the follower is older or slower.	1
	1…20	Time delay factor	1 = 1
60.06	MF baud rate	Sets the master/follower communication speed of DDCS channel selected with parameter *60.01 M/F communication port* when parameter *60.03 M/F mode* is one of *DDCS* selections.	4 mbps
	1 mbps	1 Megabit per second	1
	2 mbps	2 Megabits per second	2
	4 mbps	4 Megabits per second	4
	8 mbps	8 Megabits per second	8

No.	Name/Value	Description	Def/FbEq16
60.85	IEC D2D baud rate	Defines the drive-to-drive (D2D) communication speed of DDCS channel selected with parameter *60.01 M/F communication port* when parameter *60.03 M/F mode* is one of *D2D* selections.	8 mbps
	1 mbps	1 Megabit per second	1
	2 mbps	2 Megabits per second	2
	4 mbps	4 Megabits per second	4
	8 mbps	8 Megabits per second	8
60.100	DT node address	Target BCON address for connection to DT. **Note:** When using a table emulator this parameter must be set to 2.	1
	1 … 254		-
60.101	DT baud rate	Baud rate for communication with DT.	1 mbps
	-		-
60.102	DT HW connection	Connection configuration between BCON and the PC running DT.	Star
	Star	PC is connected directly to only one BCON. This setting shall be used when connecting to the BCON on a drive.	
	Ring	PC is connected to more BCONs connected in a communication ring. This setting shall be used when connecting to the BCON on table emulator.	
60.103	DT link control	Link control between PC and BCON.	10
	1 … 15		-
60.104	DT com port	Selects the slot on BCON where FDCO-02 extension module (for connection to DT) is installed.	No connect
	No connect; Slot 1A … Slot 3B		-
79 TC Vector control		PI-Control, filter and configuration settings for vector control mode. **Note:** Vector control mode is released from SW version 2.70.0.1 (2018-B), some parameters from this group are also used by scalar control mode.	
79.01	Flux ctrl p-gain	Stator flux PI control proportional gain	3 p.u.
	0…25 p.u.		1 = 1 p.u.
79.02	Flux ctrl integrator time const	Stator flux PI control time constant	1000ms
	0…1000 ms		1 = 1 ms
79.03	Flux ctrl max limit	Stator flux PI control max limit	10 p.u.
	0…10 p.u.		1 = 1 p.u.
79.04	Flux ctrl min limit	Stator flux PI control min limit	10 p.u.
	1…10 p.u.		1 = 1 p.u.
79.05	Flux filter cutoff freq	Flux filter cutoff frequency	200 Hz
	0…1000 Hz		1 = 1 Hz

No.	Name/Value	Description	Def/FbEq16
79.06	Flux ctrl min p-gain	Minimum value of proportional gain of flux controller. The gain is linearly decreased from "Flux ctrl p-gain" to this value as function of frequency. At frequency equal and greater than "Flux ctrl freq. min p-gain" the gain equals to "Flux ctrl min p-gain".	1 p.u.
	0…25 p.u.		1 = 1 p.u.
79.07	Freq. of flux ctrl min p-gain	Frequency at witch proportional gain of flux controller equals to minimum. The gain is linearly decreased from "Flux ctrl p-gain" to "Flux ctrl min p-gain" as function of frequency. At frequency equal and greater than "Flux ctrl freq. min p-gain" the gain equals to "Flux ctrl min p-gain".	100%
	0…200%		0.1 p.u.
79.10	Torque ctrl p-gain	Torque PI control proportional gain	1 = 1 p.u.
	0…10 p.u.		1 = 1 p.u.
79.11	Torque ctrl time constant	Torque PI control time constant	10 ms
	0…10000 ms		1 = 1 ms
79.12	Torque ctrl max limit	Torque PI control max limit	10 p.u.
	0…10 p.u.		1 = 1 p.u.
79.13	Torque ctrl min limit	Torque PI control min limit	-10 p.u.
	-10…0 p.u.		1 = 1 p.u.
79.14	Torque filter cutoff freq	Torque filter cutoff frequency	200 Hz
	0…1000 Hz		1 = 1 Hz
79.19	PLL ctrl p-gain	Frequency PLL PI control proportional gain	2.4 p.u.
	0…10 p.u.		1 = 1 p.u.
79.20	PLL ctrl time constant	Frequency PLL PI control time constant	3 ms
	0…1000 ms		1 = 1 ms
79.23	PLL filter cutoff freq	Frequency PLL filter cutoff frequency	300 Hz
	0…1000 Hz		1 = 1 Hz
79.24	Flux speed filter cutoff freq	Flux estimated speed filter cutoff frequency	10 Hz
	0…150 Hz		1 = 1 Hz
79.25	Est. speed filter cutoff freq	Estimated speed filter cutoff frequency	10 Hz
	0…150 Hz		1 = 1 Hz
79.26	Compensation of PWM phase delay	Compensates phase delay of generated stator voltage due to PWM	-0.5 p.u.
	-5…5 p.u.		1 = 1 p.u.
79.27	Compensation of Is meas. phase delay	Compensates phase delay of stator current due to measurement delay	-3.2 p.u.
	-10…10 p.u.		1 = 1 p.u.

No.	Name/Value	Description	Def/FbEq16
79.28	Premodulation	Flat top premodulation adapts the reference voltages to the dc-link voltage oscillation, in order to extend the range of output voltage	Flat top
	No premodulation	Reference voltages are not changed	0
	Symmetrising	Reference voltages are symmetrised assuming const dc-link voltages	1
	Flat top	A reference voltage stickes to dc-link voltage level (made flat top) when exceeding dc-link voltage. Other references are shifted by the same value	2
79.29	Voltage in motor model	Switch between measured and reference voltage in motor model	Reference
	Measured	Measured stator voltage is used in motor model	0
	Reference	Reference stator voltage is used in motor model	1
79.30	Vector control approach	Switch between RFOC and SFOC	RFOC
	SFOC	Stator flux oriented control	0
	RFOC	Rotor flux oriented control	1
79.31	Current ctrl filter cutoff freq	Cut-off frequency of low-pass filter of current controller	150 Hz
	0…318 Hz		1 = 1 Hz
79.32	Current ctrl p-gain	Proportional gain of stator current controller	0.24 p.u.
	0…3 p.u.		1 = 1 p.u.
79.33	Current ctrl integrator time const	Time constant of integrator of stator current controller	49 ms
	0…10000 ms		1 = 1 ms
79.35	Voltage ctrl p-gain	Proportional gain of stator voltage controller	0.5 p.u.
	0…10 p.u.		1 = 1 p.u.
79.36	Voltage ctrl integrator time const	Time constant of integrator of stator voltage controller	50 ms
	0…1000ms		1 = 1 ms
79.37	Max forcing of mag current	Maximum value of dynamic component of magnetizing current reference in % of motor nominal current	25%
	0…1000%		1 = 1%
79.38	Raise time of rotor flux reference	Raise time of rotor flux reference from 0% to 100%	5 s
	0.0002…25 s		1 = 1 s
79.39	Fall time of rotor flux reference	Fall time of rotor flux reference from 100% to 0%	1 s
	0.00025…25 s		1 = 1 s
79.40	Rotor flux ref filter cutoff freq	Cut-off frequency of low-pass filter of rotor flux reference	3 Hz
	0…25 Hz		1 = 1 Hz
79.41	Dynamic margin of modulation index	Modulation index margin where torque is limited to zero	15%

No.	Name/Value	Description	Def/FbEq16
	0…15%		1 = 1%
79.42	Modulation index limiter gain	Modulation index limiter gain	50 p.u.
	0…1000 p.u.		1 = 1 p.u.
79.43	Adaptive voltage reserve	Enables adaptive voltage reserve	Inactive
	Inactive		0
	Active		1
79.50	Stabilizer control	Current stabilizer is enable/disable for Scalar control	Enable
	Disable		0
	Enable		1
79.51	Scalar current limiter control	Current limiter is enable/disable for scalar control	Enable
	Disable		0
	Enable		1
79.52	Fast stabilizer gain	Fast current stabilizer gain for scalar control	0.0001 p.u.
	0…1 p.u.		1 = 1 p.u.
79.53	Slow stabilizer gain	Slow current stabilizer gain for scalar control	0.001 p.u.
	0…1 p.u.		1 = 1 p.u.
79.54	Compensation gain	Compensation gain used to calculate fast/slow stabilizer gain for scalar control	0.093 p.u.
	0…1 p.u.		1 = 1 p.u.
79.55	Current filter gain	iq filter gain used in slow current stabilizer	0.0067 p.u.
	0…1 p.u.		1 = 1 p.u.
79.56	Current limiter dynamic gain	Delta iq limit gain used in fast current limiter for scalar control	0.001 p.u.
	0…1 p.u.		1 = 1 p.u.
79.57	Current limiter proportional gain	Proportional gain of slow current limiter for scalar control	0.002 p.u.
	0…1 p.u.		1 = 1 p.u.
79.58	Current limiter integral gain	Integral gain of slow current limiter for scalar control	0.0001 p.u.
	0…1 p.u.		1 = 1 p.u.
79.59	Scalar limiter fast preset	Enable/Disable preset speed chain to actual speed for scalar control	Disable
	Disable		0
	Enable		1
79.60	Current id filter gain	id filter gain used in iq limit calculation of current limiter for scalar control	0.0067 p.u.
	0…1 p.u.		1 = 1 p.u.

No.	Name/Value	Description	Def/FbEq16
79.61	Energy balancing gain	Energy balancing algorithm helps to keep the converter three phases balanced even in case of existing unbalance in transformer. Setting 0 to this parameter disables energy balancing. Warning: The energy balancing can be disabled only for testing. Operating a drive with energy balancing disabled can lead to trips.	10 p.u.
	0…1000 p.u.		1 = 1 p.u.
79.63	Energy balancing common mode limit	Common mode voltage limitation for Energy balancing output, setting to zero to this parameter disables energy balancing. Warning: The energy balancing can be disabled only for testing. Operating a drive with energy balancing disabled can lead to trips.	0.05 p.u.
	0…1 p.u.		1 = 1 p.u.
79.66	Dead-time compensation	Enables compensation of switching dead-time	Enable
	Disable		0
	Enable		1
79.70	Est. Flux Correction K1	The correction coefficient is linearly change Est. Flux Correction K1 at frequency Est. Flux Correction Freq.1 to Est. Flux Correction K2 at Est. Flux Correction Freq.2	0.15 p.u.
	0…1 p.u.		1 = 1 p.u.
79.71	Est. Flux Correction Freq.1	The correction coefficient is linearly change Est. Flux Correction K1 at frequency Est. Flux Correction Freq.1 to Est. Flux Correction K2 at Est. Flux Correction Freq.2	10%
	0…500%		1 = 1%
79.72	Est. Flux Correction K2	The correction coefficient is linearly change Est. Flux Correction K1 at frequency Est. Flux Correction Freq.1 to Est. Flux Correction K2 at Est. Flux Correction Freq.2	0.05 p.u.
	0…1 p.u.		1 = 1 p.u.
79.73	Est. Flux Correction Freq.2	The correction coefficient is linearly change Est. Flux Correction K1 at frequency Est. Flux Correction Freq.1 to Est. Flux Correction K2 at Est. Flux Correction Freq.2	60%
	0…500%		1 = 1%
81 System control and monitoring		Application software parameters used for system control and monitoring.	

No.	Name/Value	Description	Def/FbEq16
81.60	FBA communication error counter	Internal Modbus communication between BCON and IO controller is monitored. All lost communication messages are counted and total count is stored in this parameter. The communication error counter is stored on the SD card and can be viewed using ACS580MV data analyzer tool. Some lost messages can be expected in any communication chain and do not indicate any problem. If more consecutive messages are lost, the drive will trip on fault *E105 AC500 communication error*. However, a constantly increasing error count can point to a potential problem in the Modbus communication that is not yet causing drive to trip but might result in bigger communication errors (trips) in the future. If constant increase in this parameter value is observed, conduct the actions described in the fault *E105 AC500 communication error*. Note: In case of control power loss (BCON shut down), the last value of the error counter might not get properly stored on the SD card. Therefore the values on the SD card might have sudden drops. However, the overall trend of the parameter value will be either constant or increasing. This small drops in the value can be ignored and overall trend should be examined. Note: The counter will wrap around - if the maximum value of the parameter is reached, the counting will reset to 0 and continue counting up from 0.	0 NoUnit
	0 … 4294967295 NoUnit		1 = 1 NoUnit
81.61	FBA PLC module error counter	Internal warnings and low priority errors on the IO controller (AC500 PLC) are counted and sent to BCON over internal Modbus communication. The total count is stored in this parameter. The PLC error counter is stored on the SD card and can be viewed using ACS580MV data analyzer tool. Internal PLC warnings and errors do not indicate any serious problem with PLC and are reset automatically. However. a constantly increasing error count can point to a problem in the PLC. In that case examine the PLC and its extension modules. Connect to the PLC and read out the fault data loggers. Report your findings to ABB support line. **Note:** In case of control power loss (BCON shut down), the last value of the error counter might not get properly stored on the SD card. Therefore the values on the SD card might have sudden drops. However, the overall trend of the parameter value will be either constant or increasing. This small drops in the value can be ignored and overall trend should be examined. **Note:** The counter will wrap around - if the maximum value of the parameter is reached, the counting will reset to 0 and continue counting up from 0.	0 NoUnit
	0 … 4294967295 NoUnit		1 = 1 NoUnit
82 Charging, MCB control		MCB control (drive charging control).	

No.	Name/Value	Description	Def/FbEq16
82.32	Unlock door after discharged	Force to unlock the inverter cabinet door immediately after converter is discharged. Function is activated only once. It will change back to Disabled automatically. **Note:** Without forcing, the inverter cabinet door will be locked for 15 minutes after MCB opens. During this 15minutes, Supply OFF Led on control cabinet front door blinks once per second if DC link is higher than the discharged level, and blinks once every two seconds if DC link is lower than the discharged level. **WARNING!** Make sure that all safety measures are in place when opening inverter cabinet door! Refer to *ACS580MV hardware manual* for instructions on safe handling.	Disabled
	Disabled		0
	Enabled		1
82.80	Ride through test	This parameter enables the ride-through test. After setting this parameter to *Enabled*, the MCB open command will be sent. When ride-through time (defined in parameter 82.81) elapses, MCB close command will be sent, and this parameter will be set to *Disabled*. During the time defined in Par 82.81 plus the time defined in parameter *82.28 MCB closing time limit*, the *MCB open* status feedback is internally forced to FALSE, and the *MCB closed* status feedback is internally forced to TRUE. In this way the protection system will not react during the test time allowing for tests with drive disconnected from the grid. Ride-through test can only be performed when MCB is closed, both in Local and Remote mode.	Disabled
	Disabled		0
	Enabled		1
82.81	Ride through test time	This parameter defines ride-through test time. After this time elapses, the MCB close command will be sent and the parameter *82.80 Ride through test* will be set to *Disabled* automatically.	5.00 s
	1 … 60 s		1 = 1 s
82.92	Charging overload timer	The parameter defines a time period. No more than two attempts of DC link charging in this time period is allowed to prevent DC capacitor overheating.	300s
	1s ~ 1200s		1 = 1 s
83 Cooling system		Control of the converter cooling system.	
83.10	Standard fan amount	Selects the number of cooling fans for inverter (INU) and transformer (TRU) unit. Note: To reduce the starting current, selected fan groups are switched on one after another every 2 seconds.	1 INU fan and 1 TRU fan

No.	Name/Value	Description	Def/FbEq16
	1 INU fan and 1 TRU fan		0
	1 INU fan and 2 TRU fans		1
	2 INU fans and 2 TRU fans		2
	2 INU fans and 3 TRU fans		3
	3 INU fans and 2 TRU fans		4
	3 INU fans and 3 TRU fans		5
	1 INU fan		6
83.11	Redundant fan control	Selects redundancy of cooling fans. If redundant fan is selected the continuous operation of the drive is guaranteed even in case when one fan group has fan failure. Switching on the redundant fan group takes place automatically. Fan failure in one group will result in an alarm message and redundant cooling fan group will be started. If two fan groups have failure, including redundant fan group, a fault will be generated. Note: If redundant fan control is enabled, fan group 1 is assigned to redundant fan. Redundant fans will be started in case of following events (warnings): *E201 Trafo phase U1 temperature high* …*E203 Trafo phase W1 temperature high*, *E204 Ambient temperature high*, *E212 INU air pressure low*, *E20E INU cooling fan 1 warning* …*E211 INU cooling fan 4 warning*, *E214 TRU cooling fan 1 warning* …*E21B TRU cooling fan 4 overload*.	Disabled
	Disabled		0
	Enabled		1
83.16	Fan power supply selection	Cooling fan power supply can be selected from internal TRU integrated transformer or external custom interface	Internal
	Internal	Cooling fans are supplied form the integrated transformer **Note:** in this configuration the cooling fans are only active when the MCB is closed.	0
	External	Cooling fans are supplied form external AC power supply. In this configuration fans can run even if the MCB is open.	1
83.30	INU air pressure monitoring		
	Disabled		0
	Enabled		1

No.	Name/Value	Description	Def/FbEq16
83.31	INU air pressure monitoring delay time	Time delay for monitoring of the air pressure (drop) inside inverter unit cabinet. Different actions will apply in case of low and high pressure and depending on the availability of the redundant fans: 1. If INU cabinet air pressure after cooling starts (from MCB closed begin timing) is lower than the value set in parameter 83.32 for longer than time set in this parameter, the alarm message *E212 INU air pressure low* is shown. If redundant fan(s) are selected in parameter 83.11, redundant fan group is activated. 2. If INU cabinet air pressure after cooling starts (from MCB closed begin timing) is higher than the value set in parameter 83.34 for longer than time set in this parameter, the alarm message *E205 INU air pressure high* is shown.	40 s
	0 … 300 s		1 = 1 s
83.32	INU air pressure low limit	Inverter unit air pressure lower limit. For use explanation see parameter 83.31. **Note**: This parameter is set in DriveStartup to a value 80 Pa lower than the air pressure measured during commissioning. This setting is enabled only if the air pressure measured during commissioning does not deviate from the air pressure that has been measured during routine testing by more than +/- 50 Pa. If the deviation between INU air pressure measured during commissioning and the same pressure measured during routine testing is bigger than 50 Pa do the following: • check the fan operation • check the filter pads on the INU cabinet door • check the pressure sensor • check the air duct (if present)	125 Pa
	-1000 … 1000 Pa		1 = 1 Pa
83.34	INU air pressure high limit	Inverter unit air pressure high limit. For use explanation see parameter 83.31. **Note**: This parameter is set in DriveStartup to a value 80 Pa higher than the air pressure measured during commissioning. This setting is enabled only if the air pressure measured during commissioning does not deviate from the air pressure that has been measured during routine testing by more than +/- 50 Pa. If the deviation between INU air pressure measured during commissioning and the same pressure measured during routine testing is bigger than 50 Pa do the following: • check the fan operation • check the filter pads on the INU cabinet door • check the pressure sensor • check the air duct (if present)	800 Pa
	-1000 … 1000 Pa		1 = 1 Pa
83.35	INU air pressure low fault limit	Limit for INU air pressure low fault.	35 Pa
	-1000 … 1000 Pa		1 = 1 Pa

No.	Name/Value	Description	Def/FbEq16
83.50	EC fan reference	Speed reference for the inverter unit cooling fans given in percentage of the maximum fan speed. **Note:** This parameter is effective only if the drive is equipped with EC cooling fans.	100%
	0 … 100 %		1 = 1%
85 SBU control and monitoring		Control and monitoring of SBU.	
85.17	SBU Sync Permission quali time	Set a time period to get a stable sync permission signal.	7s
	0….10s		1 = 1s
85.31	Inductor temperature fault limit	A fault will be generated, if actual temperature of inductor rises above this limit	45°C
	0 … 500°C		10 = 1°C
85.32	Inductor temperature warning limit	An alarm will be generated, if scaled actual temperature rises above this limit.	55°C
	0 … 500°C		10 = 1°C
85.33	Inductor temp rising fault limit	A fault will be generated, if the difference of actual temperature of inductor and ambient temperature rises above this limit	20°C
	0 … 500°C		10 = 1°C
85.34	Inductor temp rising warning limit	A alarm will be generated, if the difference of actual temperature of inductor and ambient temperature rises above this limit	15°C
	0 … 500°C		10 = 1°C
85.38	SBU maximum sync time	Sync to mains will fail if the time limit is exceeded. E237 or E238 will be reported.	60
	10…600		1 = 1 s
87 AC500 I/O interface		Configuration of AC500 digital inputs, relay / transistor outputs and analog inputs.	

No.	Name/Value	Description	Def/FbEq16
87.11	AC500 CPU DI force selection	Electrical status of digital inputs can be overridden, for example during testing. A bit in parameter 87.12 is provided for each digital input, and its value is applied whenever the corresponding bit in this parameter is set to 1. Example: 0000000000001001b = The electrical status of digital inputs DI3 and DI0 will be overridden with values supplied in bits 3 and 0 of parameter 87.12. The electrical status of all other digital inputs on AC500 CPU remains unchanged.	0b00000000
		Bit / Name / Information	
		0: CPU-DI0 External ON request	
		1: CPU-DI1 External OFF request	
		2: CPU-DI2 Local OFF command (push button)	
		3: CPU-DI3 Local ON command (push button)	
		4: CPU-DI4 MCB feedback status OPEN	
		5: CPU-DI5 Converter space heater tripped	
		6: CPU-DI6 Motor space heater tripped	
		7: CPU-DI7 INU door locked	
		8 … 15: Reserved	
87.12	AC500 CPU DI force data	Values for overridden digital inputs (0 or 1; bitwise). It is only possible to override the electrical status of digital inputs that have been selected in parameter 87.11. Bit 0 is the overriding value for DI0.	0b00000000
	0000h…FFFFh		-
87.14	AC500 CPU DO force selection	Electrical status of digital outputs can be forced, for example during testing. A bit in parameter 87.15 is provided for each digital output. A digital output is forced to this value whenever the corresponding bit in this parameter is set to 1. Example: 0000000000001001b = Digital outputs DO3 and DO0 will be forced to the values supplied in bits 3 and 0 of parameter 87.15.	0b000000
		Bit / Name / Information	
		0: CPU-DO0 MCB CLOSE command	
		1: CPU-DO1 /MCB OPEN command	
		2: CPU-DO2 LED activation (Main supply ON indication)	
		3: CPU-DO3 LED activation (Main supply OFF indication)	
		4: CPU-DO4 System alarm	
		5: CPU-DO5	
		6 … 15: Reserved	
87.15	AC500 CPU DO force data	Values for forced digital outputs (0 or 1; bitwise). It is only possible to force digital outputs that have been selected in parameter 87.14. Bit 0 is the forced value for DO0.	0b000000
	0000h…FFFFh		-

No.	Name/Value	Description	Def/FbEq16
87.41	AC500 E P2 DI force selection	Electrical status of digital inputs can be overridden, for example during testing. A bit in parameter 87.42 is provided for each digital input, and its value is applied whenever the corresponding bit in this parameter is set to 1. Example: 0000000000001001b = The electrical status of digital inputs DI3 and DI0 will be overridden with values supplied in bits 3 and 0 of parameter 87.42. The electrical status of all other digital inputs on AC500 P2 extension module remains unchanged.	0b0000000
		Bit / Name / Information	
		0: E_P2-DI0 Control supply failure	
		1: E_P2-DI1 Control backup supply failure	
		2: E_P2-DI2 TRU fan1 status OK	
		3: E_P2-DI3 TRU fan2 status OK	
		4: E_P2-DI4 TRU fan3 status OK	
		5: E_P2-DI5 TRU fan4 status OK	
		6: E_P2-DI6	
		7: E_P2-DI7 INU door closed	
		8 … 15: Reserved	
87.42	AC500 E P2 DI force data	Values for overridden digital inputs (0 or 1; bitwise). It is only possible to override electrical status of digital inputs that have been selected in parameter 87.41. Bit 0 is the overriding value for DI0.	0b0000000
	0000h…FFFFh		-
87.44	AC500 E P2 DO force selection	Electrical status of digital outputs can be forced, for example during testing. A bit in parameter 87.45 is provided for each digital output. A digital output is forced to this value whenever the corresponding bit in this parameter is set to 1. Example: 0000000000001001b = Digital outputs DO3 and DO0 will be forced to the values supplied in bits 3 and 0 of parameter 87.45.	0b0000000
		Bit / Name / Information	
		0: E_P2-DO0 fan group 1 ON	
		1: E_P2-DO1 fan group 2 ON	
		2: E_P2-DO2 fan group 3 ON	
		3: E_P2-DO3 fan group 4 ON	
		4: E_P2-DO4 fan group 5 ON	
		5: E_P2-DO5 space heater OFF	
		6: E_P2-DO6 INU door unlock	
		7: E_P2-DO7 alarm fault LED	
		8 … 15: Reserved	
87.45	AC500 E P2 DO force data	Values for forced digital outputs (0 or 1; bitwise). It is only possible to force digital outputs that have been selected in parameter 87.44. Bit 0 is the forced value for DO0.	0b0000000
	0000h…FFFFh		-

No.	Name/Value	Description	Def/FbEq16
95 HW configuration		Various hardware-related settings	
95.36	BCON RX from CVMI2 comm err count	Total (cumulative) number of communication errors from CVMI to BCON. This counter will be reset to zero after BCON reboot. It can be manually reset to zero by input from drive composer or from the control panel by keeping Reset depressed for over 3 seconds. The counter will be saturated after it reaches maximum value (4095).	-
95.55	Control hub half optical power	If this parameter is set to *Enable*, the power of the optical transmitters in control hub will be reduced by half. Used to diagnose communication problems from control hub to power modules as described in *POF Link Test* on page *133*.	Disable
	Disable	Optical transmitter full power.	
	Enable	Optical transmitter half power.	
95.70	PM half optical power	If this parameter is set to *Enable*, the power of the optical transmitter in power modules will be reduced by half. Used to diagnose communication problems from power modules to control hub as described in *POF Link Test* on page *133*.	Disable
	Disable	Optical transmitter full power.	
	Enable	Optical transmitter half power.	
95.82	PM diode open circuit threshold	When the minimum value of inverse-voltage on each diode in Power module is less than Par95.82 for Par95.83 time, the drive will trip with 'PM diode open circuit' fault.	-100v
	-200v~0v		1=1v
95.83	PM diode open circuit qualifier	When the minimum value of inverse-voltage on each diode in Power module is less than Par95.82 for Par95.83 time, the drive will trip with 'PM diode open circuit' fault.	2ms
	0ms~20ms		1=1ms
95.85	Grid frequency sel	Selection of grid frequency.	50 Hz
	50 Hz	Grid frequency is 50Hz.	
	60 Hz	Grid frequency is 60Hz.	
95.88	Capacitor reforming test	Enable/disable capacitor reforming test	Disabled
	Disabled	Disable capacitor reforming test.	
	Enabled	Enable capacitor reforming test.	
95.89	Capacitor Reforming time period	The parameter defines how long the capacitor reforming test will last.	60 minute
	15Min ~ 60Min		1 = 1minute
95.90	PM Sub-capacitor overvoltage 1	When the sub-capacitor of ACS580MV power module is bigger than this value, the drive will trip will 'PM Sub Capacitor Overvoltage1' fault. Note: This fault detection only active during capacitor reforming period.	480V
	0V ~ 500V		1 = 1Volt

No.	Name/Value	Description	Def/FbEq16
95.91	PM Sub-capacitor overvoltage 2	When the sub-capacitor of ACS580MV power module is bigger than this value and last for Par 95.92 seconds, the drive will trip with 'PM Sub Capacitor Overvoltage2' fault. Note: This fault detection only active during capacitor reforming period.	450V
	0V ~ 500V		1 = 1Volt
95.92	PM Sub-capacitor OV quali time	When the sub-capacitor of ACS580MV power module is bigger than Par95.91 and last for Par 95.92 seconds, the drive will trip with 'PM Sub Capacitor Overvoltage2' fault. Note: This fault detection only active during capacitor reforming period.	30s
	1~ 60s		1 = 1s
95.93	DC unbalance status word 1	During capacitor reforming process, if 'PM DC unbalance Warning' is active, this status word indicates which power module in phase A report this warning.	0x0000

Bit	Name	Description
0	A1	1 = Power module A1 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
1	A2	1 = Power module A2 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
2	A3	1 = Power module A3 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
3	A4	1 = Power module A4 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
4	A5	1 = Power module A5 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
5	A6	1 = Power module A6 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
6	A7	1 = Power module A7 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
7	A8	1 = Power module A8 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
8	A9	1 = Power module A9 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
9	A10	1 = Power module A10 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
10	A11	1 = Power module A11 report the '**PM DC unbalance Warning**' during capacitor reforming time period.
11...15		Reserved

No.	Name/Value	Description	Def/FbEq16
95.94	DC unbalance status word 2	During capacitor reforming process, if 'PM DC unbalance Warning' is active, this status word indicates which power module in phase B report this warning, if have.	0x0000

Bit	Name	Description
0	B1	1 = Power module B1 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
1	B2	1 = Power module B2 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
2	B3	1 = Power module B3 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
3	B4	1 = Power module B4 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
4	B5	1 = Power module B5 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
5	B6	1 = Power module B6 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
6	B7	1 = Power module B7 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
7	B8	1 = Power module B8 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
8	B9	1 = Power module B9 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
9	B10	1 = Power module B10 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
10	B11	1 = Power module B11 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
11...15		Reserved

No.	Name/Value	Description	Def/FbEq16
95.95	DC unbalance status word 3	During capacitor reforming process, if 'PM DC unbalance Warning' is active, this status word indicates which power module in phase C report this warning, if have.	0x0000

Bit	Name	Description
0	C1	1 = Power module C1 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
1	C2	1 = Power module C2 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
2	C3	1 = Power module C3 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
3	C4	1 = Power module C4 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
4	C5	1 = Power module C5 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
5	C6	1 = Power module C6 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
6	C7	1 = Power module C7 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
7	C8	1 = Power module C8 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
8	C9	1 = Power module C9 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
9	C10	1 = Power module C10 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
10	C11	1 = Power module C11 report the '**PM DC unbalance Waring**' during capacitor reforming time period.
11...15		Reserved

95.96	Cap Reform status word	This status word indicates the capacitor reforming status.	0x0000

Bit	Name	Description
0	Not Used	1 = Capacitor reforming test is disabled.
1	Rdy ON	1 = Capacitor reforming function is enabled and waiting for MCB close.
2	Reforming ongoing	1 = MCB is closed and Capacitor reforming process is ongoing.
3	Capacitor reforming aborted	1 = Capacitor reforming test was aborted.
4	Done Failed	1 = Capacitor reforming function was done but there are still DC unbalance warning active.
5	Done successfully	1 = Capacitor reforming test was done successfully.
6…15		Reserved

95.100	Trafo Prim current filter cutoff freq	Transformer primary current filter cut-off frequency.	1 Hz
	1... 20 Hz		1 = 1 Hz
95.101	PM SW DL force	Enable/disable Power Module software force download.	Disabled
	Disable	Disable Power module software force download.	

<table>
<tr><th>No.</th><th>Name/Value</th><th>Description</th><th>Def/FbEq16</th></tr>
<tr><td></td><td>Enable</td><td>Enable Power module software force download.</td><td></td></tr>
<tr><td>95.102</td><td>Min DC Volt Req Force DL</td><td>Minimum DC link voltage required to start Power Module software force download. It is only possible to start PM software force download process when the minimum cell dc link voltage is bigger than this value.</td><td>900V</td></tr>
<tr><td></td><td>850V~ 1030V</td><td></td><td>1 = 1V</td></tr>
<tr><td>95.103</td><td>PM SW Force DL status word</td><td>This status word indicates the PM software force download status.</td><td>0x0001</td></tr>
<tr><td></td><td colspan="3"><table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Disabled</td><td>1 = PM software force download is disabled</td></tr>
<tr><td>1</td><td>Condition not fulfilled</td><td>1 = PM software force download is enabled but condition is not fulfilled to start this process. Condition includes:
-The minimum cell dc link voltage is lower than Par95.102.</td></tr>
<tr><td>2</td><td>Condition ok to do PM SW DL</td><td>1 = PM software force download function is enabled and conditions are fulfilled. The download process will start soon or is ongoing now.</td></tr>
</table></td></tr>
<tr><td>95.121</td><td>PEBB SW checksum</td><td></td><td>1</td></tr>
<tr><td></td><td>0-65535</td><td></td><td></td></tr>
<tr><td>95.130</td><td>PM IGBT desat DC voltage threshold</td><td>If DC voltage is less than P95.130 during P95.131 time, after IGBT desat is detected, drive will trip with ‘PM HB short circuit turn off’. Otherwise, drive will restart after P95.131 time.</td><td>700v</td></tr>
<tr><td>95.131</td><td>PM IGBT desat DC voltage quali time</td><td>If DC voltage is less than P95.130 during P95.131 time, after IGBT desat is detected, drive will trip with ‘PM HB short circuit turn off’.</td><td>200ms</td></tr>
<tr><td>95.132</td><td>PM IGBT desat cool down time</td><td>If IGBT desat is detected again within P95.132 time since desat was detected and restarted before.</td><td>3600s</td></tr>
<tr><td colspan="2">96 System</td><td>Language selection; access levels; macro selection; parameter save and restore; control unit reboot; user parameter sets; unit selection.</td><td></td></tr>
<tr><td rowspan="6">96.21</td><td>Time sync secondary source</td><td>Defines the first priority source for drive’s date and time synchronization from an external source.</td><td rowspan="5">Panel link
0
3
8
9</td></tr>
<tr><td>Internal</td><td></td></tr>
<tr><td>Fieldbus A</td><td></td></tr>
<tr><td>Panel link</td><td></td></tr>
<tr><td>Ethernet tool link</td><td></td></tr>
<tr><td rowspan="3">96.40</td><td>Internal SW error supervision</td><td>Enables internal SW error supervision.</td><td>Enable</td></tr>
<tr><td>Disable</td><td></td><td>0</td></tr>
<tr><td>Enable</td><td></td><td>1</td></tr>
</table>

No.	Name/Value	Description	Def/FbEq16
96.60	Power fail Udc level	If DC voltage decreases below the power fail limit then power fail situation is triggered, meaning that some crucial data is saved immediately before power goes completely down. Normally power fail limit is determined automatically according to drive type and supply voltage range. The non-zero value of this parameter overrides the internal limit. This allows tuning of the power fail limit when necessary. **Warning:** Too high limit may decrease lifetime of the flash memory if power fail savings are done too often! This parameter should be modified only by expert personnel.	0 V
	0 … 2000 V		10 = 1 V
96.68	SD card fault quali value	Set SD card maximum failure value with any non-zero value.	10
	0 … 32767	Non-zero value.	1 = 1
96.83	Site commission complete	Indicate site commission complete or not	No
	No	Start site commission	
	Yes	Site commission complete.	

No.	Name/Value	Description	Def/FbEq16
96.84	Commissioning step complete	Finish commission steps. Pure event – only appears in the event log for diagnostic purpose. Commission steps Aux.code(Hex): 0001 - SW downloading complete 0002 - License key refreshed 0003 - Motor parameters filled 0004 - App para setting complete 0005 - Common para setting complete 0006 - Ctrl supply monitoring testing 0007 - Door interlock monitoring testing 0008 - MCB Testing 0009 - Overriding system communication testing 000A - Master Follower Setting 000B - Remote Connectivity Setting 000C - MV is connected 000D - Capacitor reforming 000E - Charging Test/PEBB FW loading 000F - Cooling/heating system testing 0010 - Vector ctrl setting (CT/MF) 0011 - No load testing 0012 - Flying start testing 0013 - Overriding system ctrl testing 0014 - Load testing 0015 - Stop mode testing 0016 - Vector ctrl testing (ST) 0017 - Master Follower Testing 0018 - SBU Testing 0019 - SBU parameter setting 001A - MAU parameter setting 001B - SBU MB setting 001C - SBU MSS setting 001D - SBU ctrl interface checking 001E - MAU ctrl interface checking 001F - Sync bypass test (without load) 0020 - Sync bypass test (with load)	

No.	Name/Value	Description	Def/FbEq16
	NO		0
	SW downloading complete		1
	License key refreshed		2
	Motor parameters filled		3
	App para setting complete		4
	Common para setting complete		5
	Ctrl supply monitoring testing		6
	Door interlock monitoring testing		7
	MCB Testing		8
	Overriding system communication testing		9
	Master Follower Setting		A
	Remote Connectivity Setting		B
	MV is connected		C
	Capacitor reforming		D
	Charging Test/PEBB FW loading		E
	Cooling/heating system testing		F
	Vector ctrl setting (CT/MF)		10
	No load testing		11
	Flying start testing		12
	Overriding system ctrl testing		13
	Load testing		14
	Stop mode testing		15
	Vector ctrl testing (ST)		16
	Master Follower Testing		17
	SBU Testing		18
	SBU parameter setting		19

<table>
<tr><th>No.</th><th>Name/Value</th><th>Description</th><th>Def/FbEq16</th></tr>
<tr><td></td><td>MAU parameter setting</td><td></td><td>1A</td></tr>
<tr><td></td><td>SBU MB setting</td><td></td><td>1B</td></tr>
<tr><td></td><td>SBU MSS setting</td><td></td><td>1C</td></tr>
<tr><td></td><td>SBU ctrl interface checking</td><td></td><td>1D</td></tr>
<tr><td></td><td>MAU ctrl interface checking</td><td></td><td>1E</td></tr>
<tr><td></td><td>Sync bypass test (without load)</td><td></td><td>1F</td></tr>
<tr><td></td><td>Sync bypass test (with load)</td><td></td><td>20</td></tr>
<tr><td>96.205</td><td>Disable parameter flash saving while running</td><td>Disables parameter flash saving when drive is running. Typically, flash saving occurs before every start command. When saving is disabled, the drive start command is delayed until the saving completed. Maximum typical saving time is around 15 ms.</td><td>No</td></tr>
<tr><td></td><td>No</td><td>Flash saving is enabled while drive is running.</td><td>0</td></tr>
<tr><td></td><td>Yes</td><td>Flash saving is disabled while drive is running.</td><td>1</td></tr>
<tr><td colspan="2">97 Motor control</td><td>Voltage reserve; flux braking; IR compensation.</td><td></td></tr>
<tr><td>97.14</td><td>Internal ramp time</td><td>Defines minimum ramp time for the scalar control, that will be used only internally to prevent stepwise reference changes to torque control.</td><td>0.2 s</td></tr>
<tr><td></td><td>0 … 100 s</td><td></td><td>1 = 1 s</td></tr>
<tr><td>97.40</td><td>Output choke inductance</td><td>Define the inductance of the output choke.Below is the typical values. Pilot projects may have different value, please check at site.<table><tr><th>Frame size</th><th>Inductance (mH)</th></tr><tr><td>R3</td><td>11</td></tr><tr><td>R4</td><td>7.4</td></tr><tr><td>R5</td><td>5.6</td></tr><tr><td>R6</td><td>3.7</td></tr><tr><td>R7</td><td>2.8</td></tr><tr><td>R8</td><td>2.0</td></tr><tr><td>R9</td><td>1.4</td></tr></table></td><td>1.48mH</td></tr>
<tr><td></td><td>0 … 100mH</td><td></td><td>100 = 1mH</td></tr>
<tr><td>97.41</td><td>SBU max adjust voltage</td><td>Maximum allowed voltage adjusting during synchronizing bypass process.</td><td>0.15 p.u.</td></tr>
<tr><td></td><td>0 … 0.3 p.u.</td><td></td><td>1 = 1 p.u.</td></tr>
<tr><td>97.42</td><td>SBU min adjust voltage</td><td>Minimum allowed negative voltage adjusting during synchronizing bypass process.</td><td>-0.15 p.u.</td></tr>
<tr><td></td><td>-0.3 … 0 p.u.</td><td></td><td>1 = 1 p.u.</td></tr>
<tr><td>97.43</td><td>SBU stop modulation current</td><td>During synchronizing bypass process, if output current is higher than this value, converter stops modulation.</td><td>2 p.u.</td></tr>
<tr><td></td><td>0 … 10 p.u.</td><td></td><td>1 = 1 p.u.</td></tr>
</table>

No.	Name/Value	Description	Def/FbEq16
97.44	SBU motor overcurrent trip level	During synchronizing bypass process, SBU motor overcurrent trip level will replace motor overcurrent trip level.	2.5 p.u.
	0 … 10 p.u.		1 = 1 p.u.
97.45	SBU motor phase loss trip level	During synchronizing bypass process, SBU motor phase loss trip level will replace motor phase loss trip level.	0.05 p.u.
	0 … 10 p.u.		1 = 1 p.u.
97.46	SBU current control gain	Gain of SBU current controller.	0.3 p.u.
	-1000 … 1000 p.u.		100 = 1 p.u.
97.49	SBU phase ctrl Ki	Integral gain of the PI controller used to control angle of motor voltage during sync to mains.	0.0005
	-5.0000…5.0000		1 = 1
97.50	SBU phase ctrl Kp	Proportional gain of the PI controller used to control angle of motor voltage during sync to mains.	0.008
	-5.000…5.000		1 = 1
99 Motor data		Motor configuration settings.	
99.04	Motor ctrl mode	Selects the motor control mode.	Scalar
	Vector	**Warning:** Vector control mode is only officially released from SW version 2.70.0.1 (2018-B). SBU can't work with Vector control mode.	0
	Scalar	Scalar control - the switching of the output semiconductors is controlled to achieve the constant ratio between motor voltage and frequency (V/f) thus achieving constant flux. With scalar control the motor can be controlled in frequency (Hz) or speed (rpm) mode. The reference value for the motor frequency (or speed) can be set by various sources and the voltage is adjusted accordingly.	1

Parameter listing default values.

5

Using ACS580MV Data Analyzer

What this chapter contains

This chapter contains short guideline for using the ACS580MV data analyzer PC tool. This tool can be used to analyze diagnostic data that are continuously stored on SD card in BCU.

ACS580MV data analyzer

ACS580MV data analyzer allows the user to view event logger, fault data logger and continuous monitoring logger files stored in SD card. The SD card installed in BCU allows for storing of big amount of data, so the records of drive operation over its entire lifetime can be collected.

ACS580MV data analyzer allows the following functionalities:

- View the Event logger (long term chronological list of all events that happened on the drive).
- Display of information (helptext) for an event when it is selected in the event logger view.
- Export the event logger in .txt or .csv format.
- Plot the fault data logger if it is attached to a fault. A fault data logger is always attached to the tripping fault - the first fault that is activated after the drive has been error free.
- View time plot information by placing the cursor on the time plot.
- Customize the time plots using settings option.
- Export the fault data logger in .txt or .csv format.
- Align the parameter information displayed in the time plots using Settings -> Parameters Alignment drop-down.
- Zoom the time plot by selecting the required area.
- Synchronize zooming and cursor position.
- Plot the continuous monitoring logger. Continuous monitoring logger contains the slowly sampled drive parameters that are collected continuously.
- Export of continuous monitoring logger in .txt and ,csv format.

In the remainder of the chapter a description of different tools options is given.

Menu bar

The Menu bar includes the following main menus:

- File
- View
- Help

File menu

File menu allows to open a data folder and to exit the ACS580MV data analyzer session. File menu consists of the following commands:

- **Select Data Folder:** Allows the user to open a top folder containing all logged data.
- **Exit:** Ends ACS580MV data analyzer session.

View menu

View menu allows to change the font size of the user interface. View menu consists of the following commands:

- **Normal:** Changes the text font size of the user interface to normal text.
- **Large:** Changes the text font size of the user interface to large text.
- **The largest:** Changes the text font of the user interface to the largest text.

Help menu

Help menu allows to view the product information and the manual. The Help menu consists of the following commands:

- About product: Displays the version number and copyright information.
- Manual: Displays ACS580MV data analyzer user manual as a PDF.

Event logger

To open data folder, proceed as follows:

1. In the ACS580MV data analyzer main menu, click **File** and then click **Select Data Folder**.

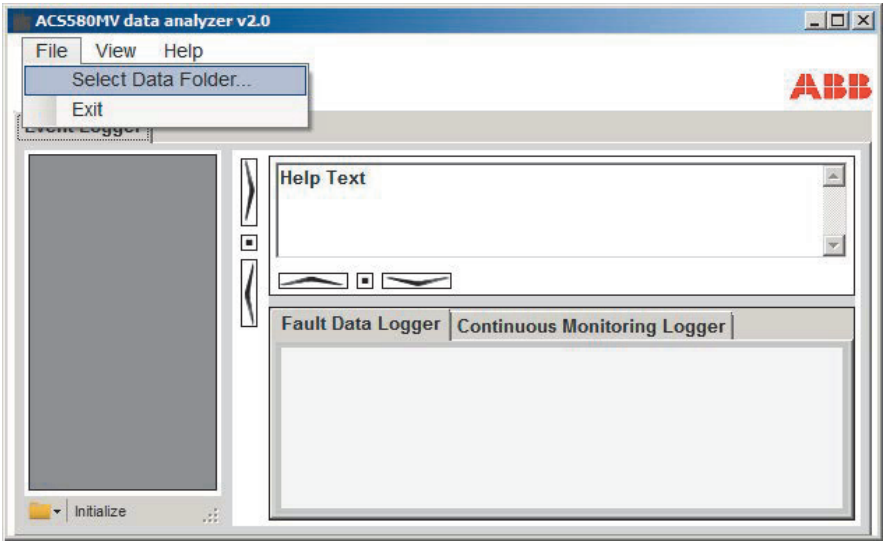


Figure: ACS580MV data analyzer

2. Select the data folder in the file system and click **Open**.

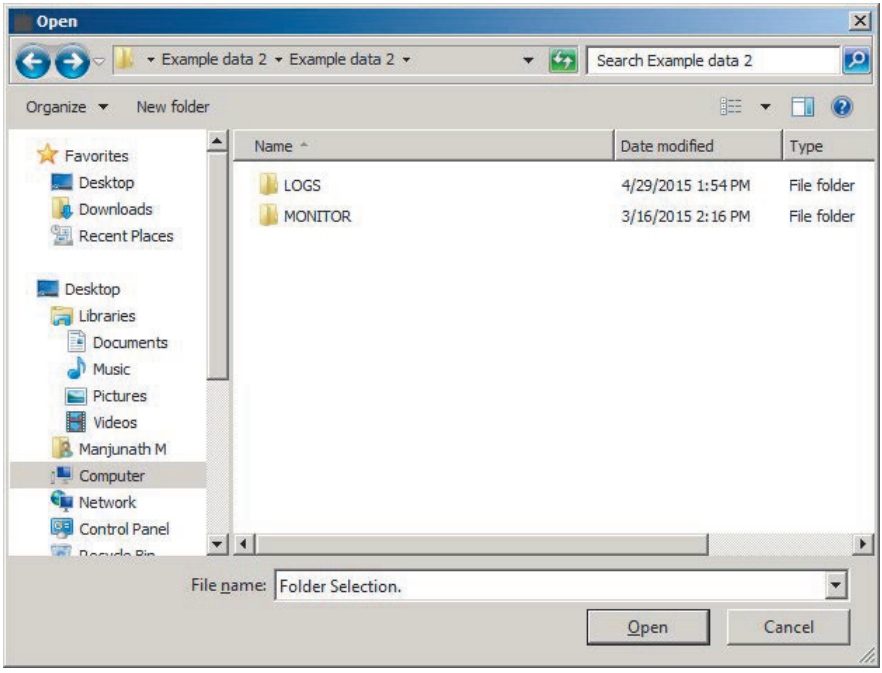


Figure: Folder selection

Note: The user must select the top folder that contains LOGS and MONITOR folders with event logs, fault data logger and continuous monitor logger files. The ACS580MV data analyzer processes all the files in the selected folder and its sub-folders and extract all the information.

ACS580MV data analyzer displays all the events in a form of chronological list containing the icon, time stamp, event code, event name and event aux code. Additionally, for each tripping fault (i.e. the first fault that activated after a drive was error free), the following data is available:

- Initial values: values of certain important drive parameters at the instant of fault activation.
- Fault data logger that can be plotted as a time plot.

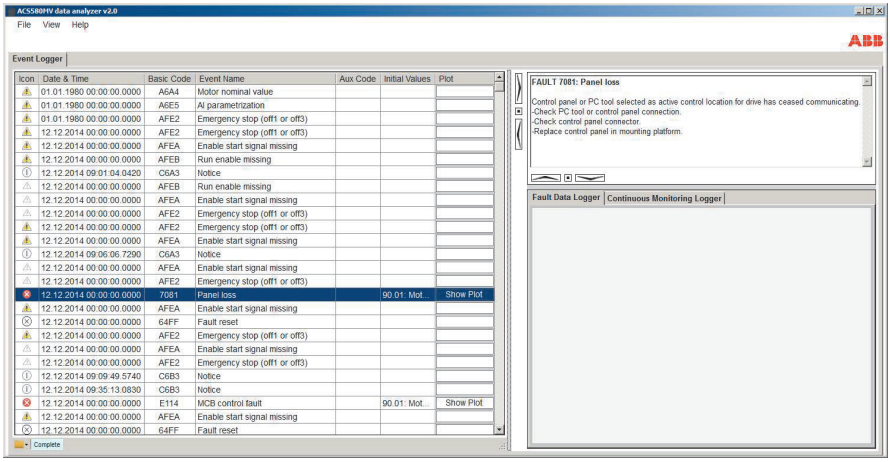


Figure: ACS580MV data analyzer

When the user selects an event in a list, the event type (fault or alarm), code and name with related help text are displayed in the top right pane.

3. In the status strip, click **Export All** in the drop-down list to export the event logger to the file system in *.txt* or *.csv* format.

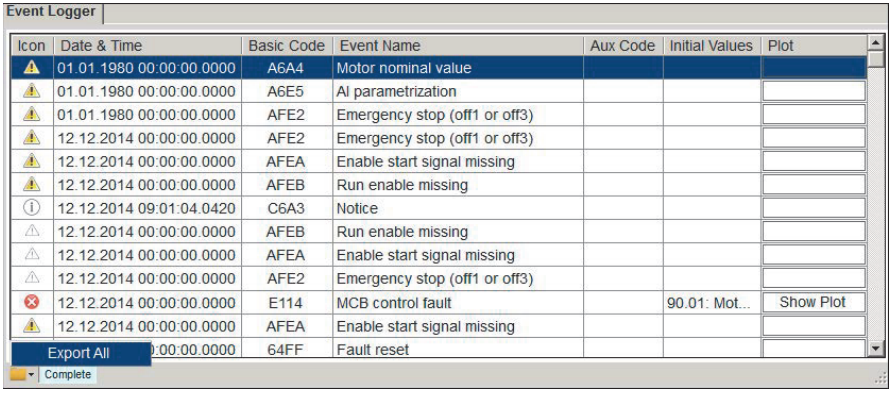


Figure: Export event logger

Fault data logger

Fault data logger displays the time plots of corresponding fault data logger. The user can select parameters to be displayed on graphs by checking and unchecking the check box next to parameter.

- Click **Show Plot** in the Event logger to view the time plot of the fault data logger on the right pane.

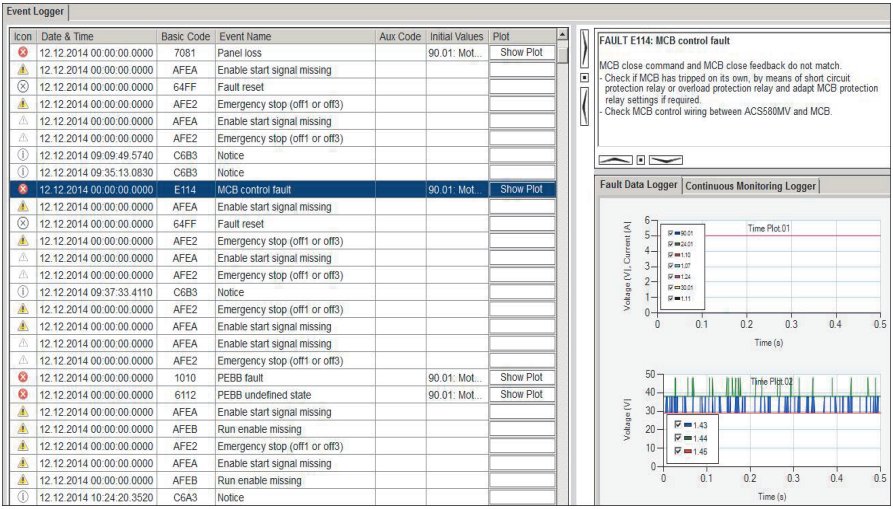


Figure: Time plot

Note: Time plots are applicable for fault events only.

Fault data logger contains Settings, Alignment, Sync plots and Export options in the status strip drop-down list.

Settings

1. In the status strip, click **Settings** in the drop-down list to change the settings of the time plot.

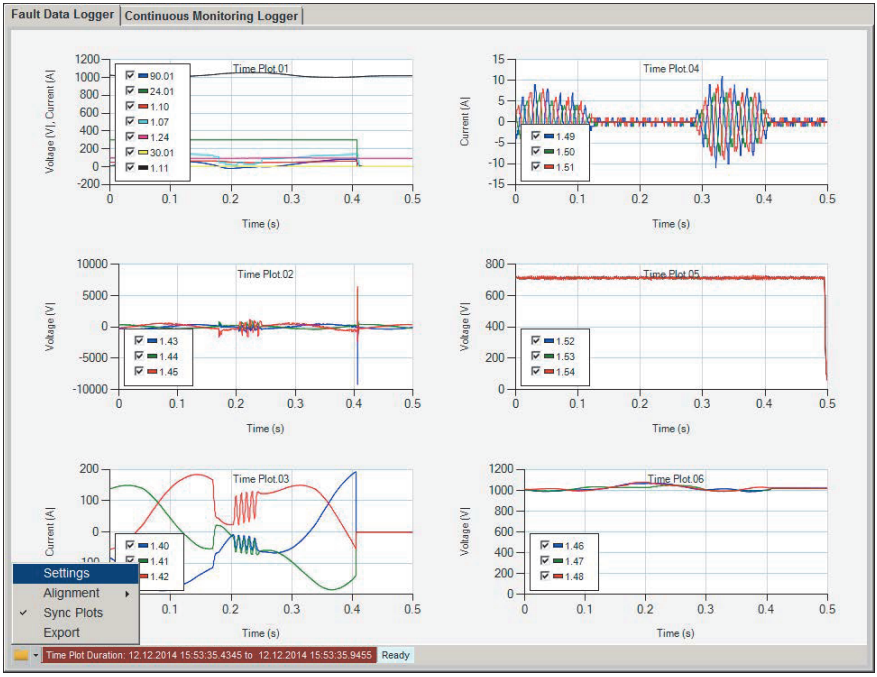


Figure: Time plot settings

2. In the Settings window, select the required time plots by selecting the check box.

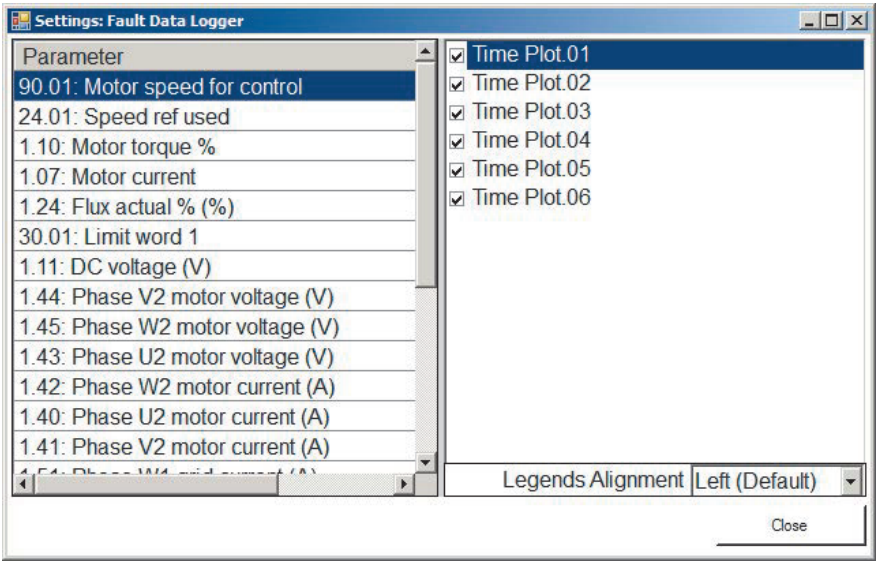


Figure: Settings

3. Select the desired option in **Legends Alignment** drop-down list to align the time plot parameter signals.

Alignment

Alignment allows the user to align the parameter signal list in the time plot data logger. The user can select the desired option in the Alignment option.

Sync plots

Sync plots allows the user to sync the time plot zoom and cursor position across all time plots.

Export

Export allows the user to export the time plot data logger to the file system in *.txt* or *.csv* format.

Continuous monitoring logger

Continuous monitoring logger collects the predefined drive data with slow sample time (10s to 500s, depending on particular drive parameter). Data collected in the Continuous monitoring logger are intended for analysis of the drive operation over longer periods of time. The user can select start and end

date to view the time plot. All monitored drive parameters are grouped in several groups (called CML plots) that can be selected by right clicking on the graph area. To display or hide some of the parameters in the graph, check boxes next to parameter numbers can be used. Hovering with the mouse pointer over the parameter signal in the graph displays parameter name, sample time, sample value, average, minimum and maximum value.

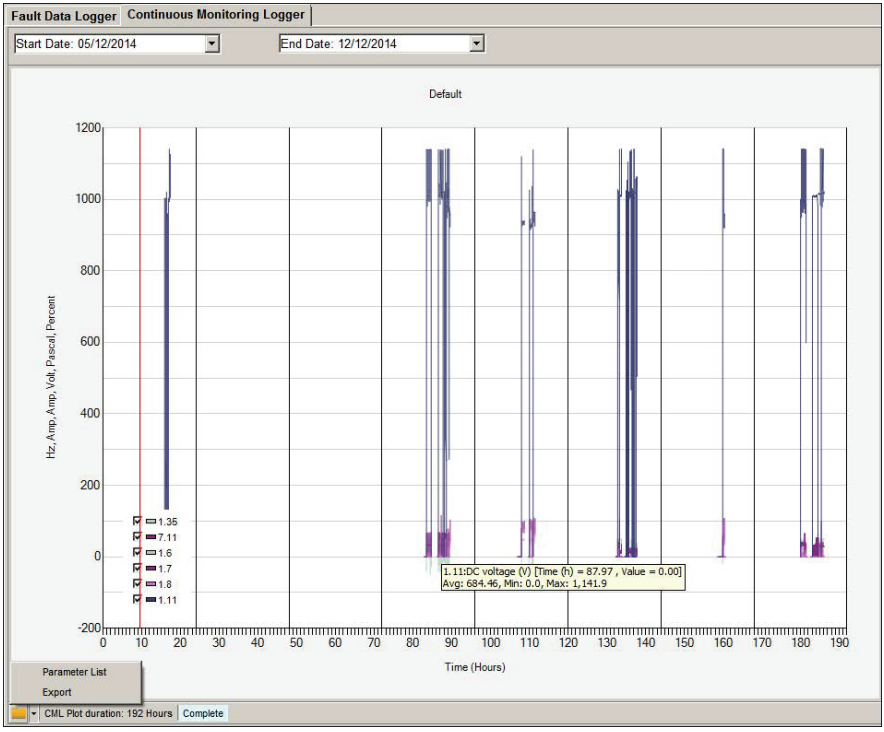


Figure: Continuous monitoring logger

Continuous monitoring logger allows to align the legends, parameter signal lists and to select the parameter groups (CML plots) by right-clicking on the graph area.

Continuous monitoring logger contains **Parameter list** and **Export** options in the status strip drop-down list.

Parameter list

Parameter list shows which drive parameters are contained in each of the CML plots. Following CML plots are available:

- Default
- Transformer temperatures
- IGBT temperatures (3 temperatures are measured)
- Charging relay temperatures
- Power module communication error counters
- Control hub communication error counters
- Power modules operating hours and total run time of the drive

Export

Export allows the user to export the time plot data logger to the file system in *.txt* and *.csv* format.

6

Drive Composer Support Package

Contents of this chapter

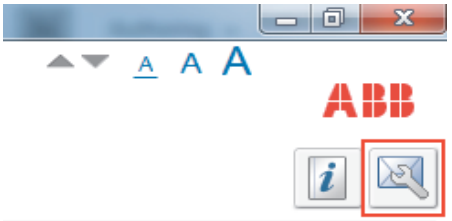
This chapter describes how to quickly collect data from a drive using the Support package functionality of Drive composer PC tool and how to analyse the data.

Support package

Support package collects the data stored in the event logger on BCU's memory unit. The event logger on the BCU's memory unit has very limited capacity and gets cyclically overwritten as new events happen. It can store information about the last 5 faults that tripped the drive, and the last 20 secondary events that occurred. Therefore, it cannot provide long term monitoring functionality that is described in chapter *Using ACS580MV Data Analyzer*. Nevertheless, if collected immediately after an event that needs troubleshooting, the support package can collect valuable data from the drive. The support package can be created by the user of the drive and emailed to ABB Support line for investigation.

Support package is created in Drive composer PC tool by clicking on the icon in the top right corner of the tool window. By clicking on the icon shown in the

figure below, a file SupportFiles.dcsupport is created and attached to the default email program installed in the PC. The file can also be saved manually.



The support package contains following information from the drive:

- Parameter backup
- Event logger (including fault data loggers for tripping faults)
- System info.

The support package file can be opened in Drive composer PC tool (ver. 1.10 or newer):

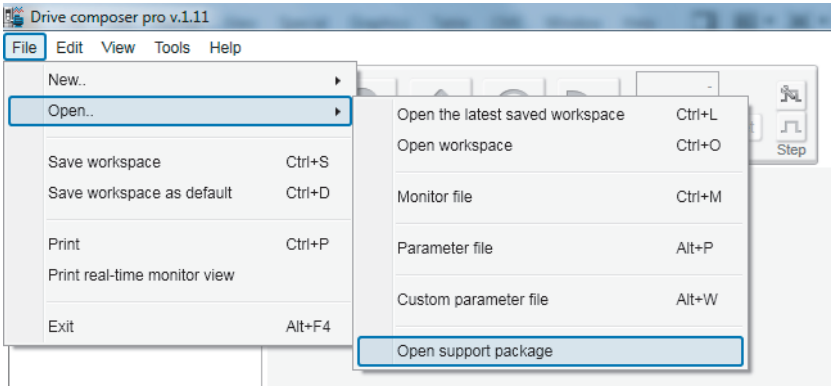


Figure: Opening the support package file in Drive composer

In Drive composer the data from support package are available in the “File drives” section:

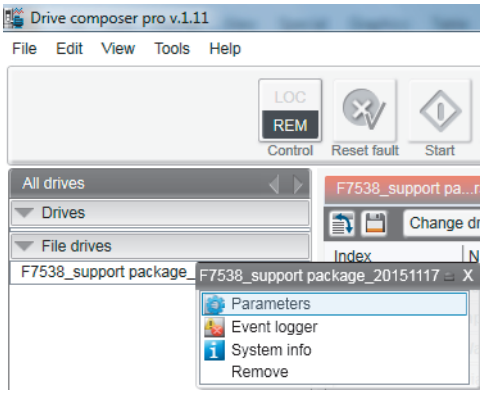


Figure: Drive data available in support package

Tripping faults in the event logger have a fault data logger attached (see chapter *Fault Tracing* for more details on the event logger and fault data logger). Fault data loggers can be seen in Online Monitor section of Drive composer. Just click on the plot icon next to a tripping fault in the event logger. This will open the data in graphical form in the Online Monitor section of Drive composer (lower part of Drive composer window). Opening the fault data logger will change the title of Online Monitor to “Data logger”:

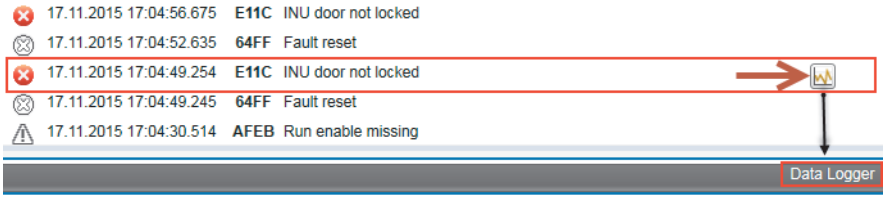


Figure: Plotting the fault data logger

For further analysis the fault data logger data can be exported in textual format that can be further processed in e.g. Matlab. The fault data logger data can be exported from Online Monitor / Data Logger section of Drive composer by selecting option “Export graph” and setting signals and samples to “All”:

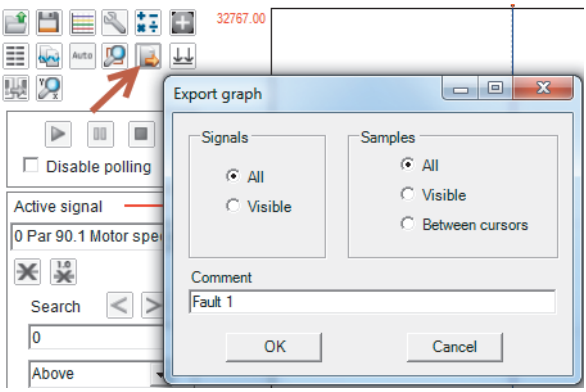


Figure: Exporting the fault data logger

The data from the fault data logger are exported in .dcexp format. If Matlab is available, the data can be imported using ABB in-house script in the following way: log_data = read_dcexp('FileName.dcexp'). The script will plot the data in predefined format, like in the following figure. If Matlab is not available, the .dcexp file can be imported and analyzed in Excel.

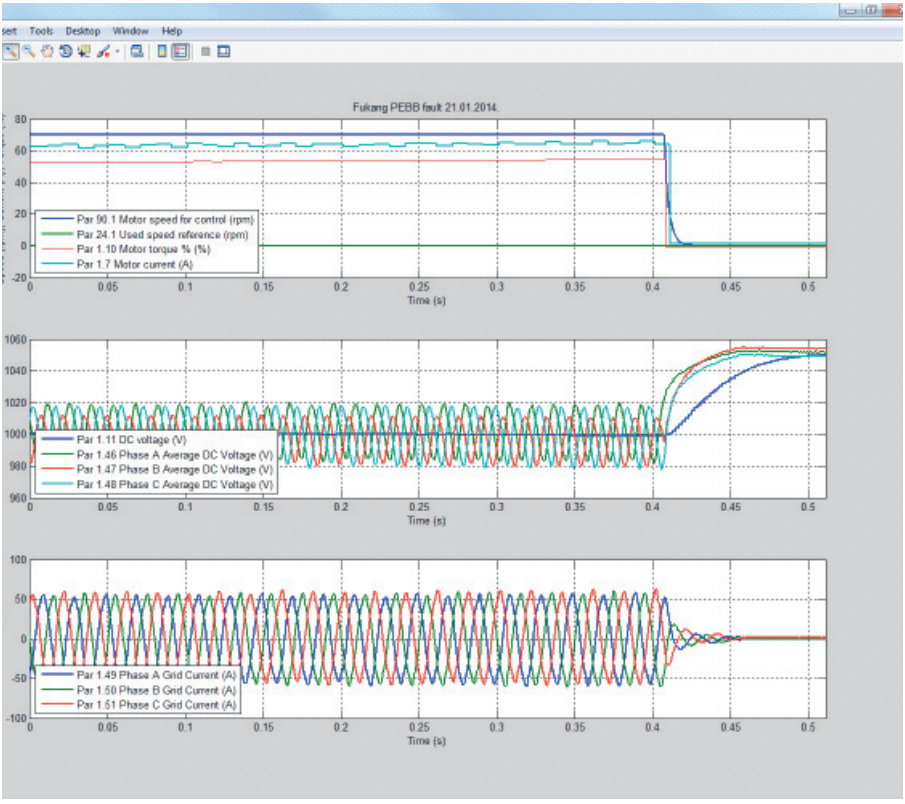


Figure: Example of fault data logger data plotted using Matlab script

7

POF Link Test

Contents of this chapter

This chapter describes how to use the parameters that control the POF link power between Control Hub and Power Modules, in order to early detect communication problems. The service pass-code is required to have access to these parameters in parameter group *95 HW configuration*.

It is important to mention that, by enabling the half optical power, a degradation of **–3dBm** is introduced in the optical link. According to previous tests performed on one drive, the transmitter optical power is **-15.7dBm**, at full power, 25°C and 10m cable, resulting in **-18.7dBm** at half power. However, the communication problems experienced on one drive were correlated to POF cables with an optical power of **-30dBm**. That means that results of the test described in this chapter might not be conclusive.

Communication problems are observed through the parameters:

- 70.12/32/52…, Hub RX comm err count A1/A2/A3 …
- 71.12/32/52…, Hub RX comm err count B1/B2/B3 …
- 72.12/32/52…, Hub RX comm err count C1/C2/C3 …

and

- 70.5/25/45…, PM RX comm err count A1/A2/A3 …
- 71.5/25/45…, PM RX comm err count B1/B2/B3 …
- 72.5/25/45…, PM RX comm err count C1/C2/C3 …

Note the normal behaviour of these counters is to jump to an initial value that is different from 0, after the drive is charged. The parameter “Hub RX comm err count XX” can have an initial value in the range of 5 to 10 and the parameter “PM RX comm err count XX” can have an initial value in the range of 50 to 100. So for

the tests described in this chapter the counters should be observed only after completing the charging sequence of the drive.

Link from power modules (TX) to control hub (RX)

The POF transmitter power on the Power Module is controlled with the parameter *95.70 PM half optical power*.

Test POF-1: PM TX Full Power

Test steps

Charge the drive.

Set parameter *95.55 Control hub half optical power* to **Disable** to have the full power on the Control Hub TX POF link.

Set parameter *95.70 PM half optical power* to **Disable** to have the full power on the PM TX POF link.

Observe the following parameters:

- 70.12/32/52…, Hub RX comm err count A1/A2/A3 …
- 71.12/32/52…, Hub RX comm err count B1/B2/B3 …
- 72.12/32/52…, Hub RX comm err count C1/C2/C3 …

Test results

PASS: the observed Hub RX comm err counters can have an initial value different from 0, but **DO NOT** have variation for more than 10 minutes. ➔In this case, execute the test *Test POF-2: PM Tx Half Power*.

FAIL: the observed Hub RX comm err counters have **ANY** variation during 10 minutes. This indicates that the PM transmitter is not delivering the data as expected ➔ In this case, skip the test *Test POF-2: PM Tx Half Power* and follow the instructions given in section *What to do in case tests POF-1 or POF-2 fail*.

Test POF-2: PM Tx Half Power

Test steps

Charge the drive.

Set parameter *95.55 Control hub half optical power* to **Disable** to have the full power on the Control Hub TX POF link.

Set parameter *95.70 PM half optical power* to **Enable** to have the half power on the PM TX POF link.

Observe the following parameters:

- 70.12/32/52…, Hub RX comm err count A1/A2/A3
- 71.12/32/52…, Hub RX comm err count B1/B2/B3 …
- 72.12/32/52…, Hub RX comm err count C1/C2/C3 …

Test results

PASS: the observed Hub RX comm err counters can have an initial value different from 0, but **DO NOT** have variation for more than 10 minutes ➔ In this case, execute the test *Test POF-3: Hub TX Full Power*.

FAIL: the observed Hub RX comm err counters have **ANY** variation during 10 minutes. This indicates that the PM transmitter is not delivering the data as expected ➔ In this case, skip the test *Test POF-3: Hub TX Full Power* and follow the instructions given in section *What to do in case tests POF-1 or POF-2 fail*.

What to do in case tests POF-1 or POF-2 fail

In case tests *Test POF-1: PM TX Full Power* or *Test POF-2: PM Tx Half Power* fail, the following steps can be executed:

1. Check/exchange the POF link cable between the Control Hub receiver and the PM transmitter of the failed Hub RX comm err counter. Repeat the failed tests.
2. In case point 1 does not solve the problem, exchange the PM connected to the failed Hub RX comm err counter. Repeat the failed tests.

Link from control hub (TX) to power modules (RX)

The POF transmitter power on the Control Hub is controlled with the parameter *95.55 Control hub half optical power*.

Test POF-3: Hub TX Full Power

Test steps

Charge the drive.

Set parameter *95.55 Control hub half optical power* to **Disable** to have the full power on the Control Hub TX POF link.

Set parameter *95.70 PM half optical power* to **Disable** to have the full power on the PM TX POF link.

Observe the following parameters:

- 70.5/25/45..., PM RX comm err count A1/A2/A3 ...
- 71.5/25/45..., PM RX comm err count B1/B2/B3 ...
- 72.5/25/45..., PM RX comm err count C1/C2/C3 ...

Test results

PASS: the observed PM RX comm err counters can have an initial value different from 0, but **DO NOT** have variation for more than 10 minutes ➔ In this case, execute the test *Test POF-4: Hub Tx Half Power*.

FAIL: the observed PM RX comm err counters have **ANY** variation during 10 minutes. This indicates that the Control Hub transmitter, placed on the daughter board, is not delivering the data as expected ➔ In this case, skip the test *Test POF-4: Hub Tx Half Power* and follow the instructions given in section *What to do in case tests POF-3 or POF-4 fail*.

Test POF-4: Hub Tx Half Power

Test steps

Charge the drive.

Set parameter *95.55 Control hub half optical power* to **Enable** to have the half power on the Control Hub TX POF link.

Set parameter *95.70 PM half optical power* to **Disable** to have the full power on the PM TX POF link.

Observe the following parameters:

- 70.5/25/45..., PM RX comm err count A1/A2/A3 ...
- 71.5/25/45..., PM RX comm err count B1/B2/B3 ...
- 72.5/25/45..., PM RX comm err count C1/C2/C3 ...

Test results

PASS: the observed PM RX comm err counters can have an initial value different from 0, but **DO NOT** have variation for more than 10 minutes ➔ In this case, the test is finished.

FAIL: the observed PM RX comm err counters have **ANY** variation during 10 minutes. This indicates that the Control Hub transmitter, placed on the daughter board, is not delivering the data as expected ➔ In this case, follow the instructions given in section *What to do in case tests POF-3 or POF-4 fail*.

Second FAIL criteria: By using the Hub TX half power, it can happen that the drive trips with the message “Control hub missing PM” indicating already the POF link that has a problem ➔ In this case, the respective communication error counter does not need to be observed, and the

instructions given in section *What to do in case tests POF-3 or POF-4 fail* can be directly applied.

What to do in case tests POF-3 or POF-4 fail

In case the test fail the following steps can be executed:

1. Check/exchange the POF link cable between the Control Hub transmitter and the PM Receiver of the failed PM RX comm err counter. Repeat the failed test.
2. In case point 1 does not solve the problem, exchange the Control Hub daughter board connected to the failed PM RX comm err counter. Repeat the failed test.

8

Inspecting Power Modules

Contents of this chapter

In order to detect a malfunction or a failed component in a power module, the tests described in this chapter shall be carried out. If tests identify a failure in the power module, perform investigation steps to solve the problems as recommended.

ABB will also do further analysis and repair.

Safety

DANGER

High voltage!

Obey the instructions given in chapter 1 ***Safety instruction*** and chapter 12 ***Maintenance*** of the *ACS580MV hardware manual*. If you ignore them, injury or death, or damage to the equipment can occur.

Before starting to work on the drive, make sure:

- that the main and auxiliary power supply to the drive is switched off, locked out, and tagged out
- that the drive is dead
- that safety ground connections are in place
- that personal protective equipment is provided and used when required
- that everyone involved is informed.

Before energizing the drive, make sure:

- that all foreign objects are removed from the drive
- that all internal and external covers are securely fastened and all doors are closed, locked and / or bolted
- that the release dials of safety switches are in the locked position.

Process

To detect a faulty power module, proceed with

- Visual inspection
- Measure the resistance of fuses
- Measure if DC link is short circuited
- Measure the diodes of rectifier and IGBT

Additional Notes:

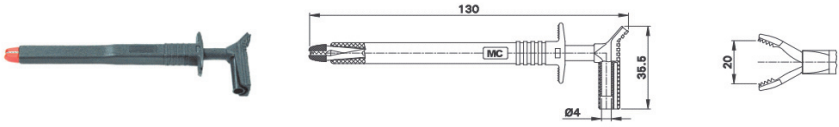
- Tests are intended to verify malfunction.
- Upload measurements to MoR after all tests specified in section *Measurement steps* are performed.
- Refer to *Warranty directive* when sending failed power modules back.
- If failure can still not be identified, do analysis according *Known Problems*.

Required tools and equipment

Besides the tools required in chapter 12 in *ACS580MV hardware manual*, below equipment is required for measuring.

1. Multi–meter, for example, Fluke 87, which can measure diode turn-on voltage and resistance.

2. Test clip, MINIGRIP-XCI from Multi-Contact is recommended which can be used on R1-R9 power modules.



Measurement steps

Disconnect 3 phase inputs (U/V/W) and 2 outputs (VAC1/VAC2) cables from the power module. To make it easier to connect test clip for DC+, slide the power module out properly.

To do this, follow the instructions of *ACS580MV hardware manual* chapter 12: Maintenance - replacing the power modules.

Visual inspection

Take pictures if there is any finding during visual inspection.

1. Check visually if there is any serious mechanical deformation.
2. Check visually if the heatsink is dirty.
3. Check visually if there is any arcing mark between input busbars and housing. If there is an arcing mark, this power module is faulty and there was short circuit. In this case replace it with a new power module and send the failed power module back to ABB for further analysis.
4. Check visually if the fuses (phase V and W if power module is R1-R6, Phase U and V if power module is R7-R9) on front side of power module are open. If the fuse is open, please continue with measurement as described in sections *Measure the resistance of fuses* (page *142*), *Measure if DC link is short circuited*

(page 142) and Measuring the diodes of rectifier and IGBT (page 142). For location of different measuring points refer to pictures given in section Measuring points.

Measure the resistance of fuses

Measure the resistance of the fuses using the multi-meter in resistor test mode.

Fuses resistance measurements - Healthy Power Module			
Test item	Plus probe	Minus probe	Allowed values
1	Fuse1_1	Fuse1_2	<0.5 Ohm
2	Fuse2_1	Fuse2_2	<0.5 Ohm

Table 1 Fuse resistance measurements - Healthy Power Module

If the measured values differ from the allowed values in Table 1, continue with the measurements as described in section Measure if DC link is short circuited and Measuring the diodes of rectifier and IGBT. If the power module passed all tests in section Measure if DC link is short circuited and Measuring the diodes of rectifier and IGBT replace the fuse with a new one (refer to ACS580MV hardware manual chapter 12: Maintenance - replacing the power module fuse) and start the drive again.

Measure if DC link is short circuited

Measure the resistance of DC link using the multi-meter in resistor test mode.

DC link short circuit measurement - Healthy Power Module			
Test item	Plus probe	Minus probe	Allowed values
3	DC +	DC -	>0.5 Ohm

Table 2 DC link resistance measurements - Healthy Power Module

If the measured values differ from the allowed values in Table 2, replace with a new power module and send failed power module back to ABB for further analysis.

Measuring the diodes of rectifier and IGBT

Measure the diode turn-on voltage across the measuring points shown in section Measuring points using the multi-meter in diode test mode.

Diodes measurements - Healthy Power Module			
Test item	Plus probe	Minus probe	Allowed values
4	DC -	U	0.2V~0.8V
5	DC -	V	0.2V~0.8V
6	DC -	W	0.2V~0.8V
7	U	DC+	0.2V~0.8V
8	V	DC+	0.2V~0.8V
9	W	DC+	0.2V~0.8V
10	DC -	VAC1	0.2V~0.8V
11	DC -	VAC2	0.2V~0.8V
12	VAC1	DC+	0.2V~0.8V
13	VAC2	DC+	0.2V~0.8V

Table 3 Diodes measurements - Healthy Power Module

If the measured values differ from the allowed values in Table 3, replace with a new power module and send failed power module back to ABB for further analysis.

Measuring points

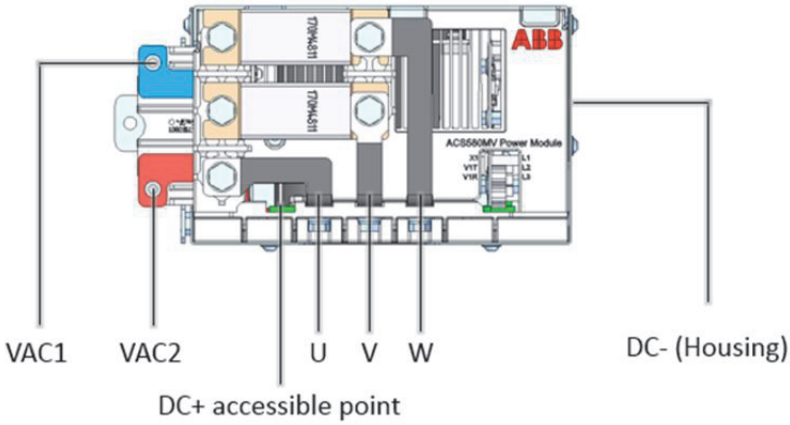


Figure 1: R1-R3 power module – Measuring points

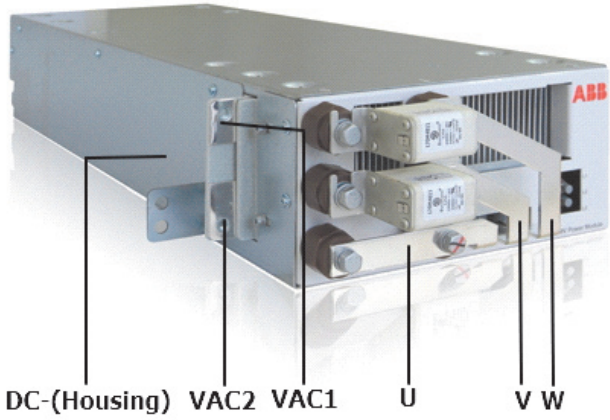


Figure 2: R4-R6 power modules – Measuring points 1

Figure 3: R4-R6 power modules – Measuring points 2

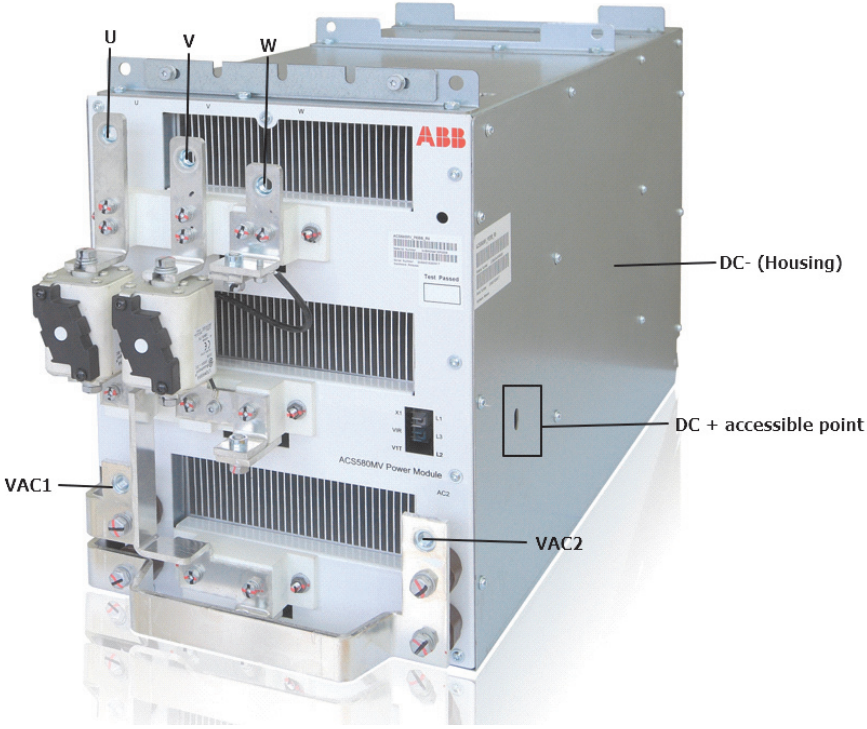


Figure 4: R7-R9 power modules – Measuring points

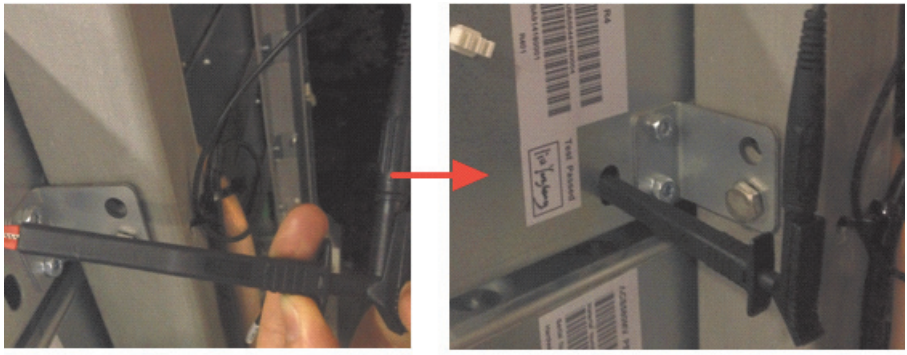


Figure 5: How to use the clip to access DC+ point (R1-R9)

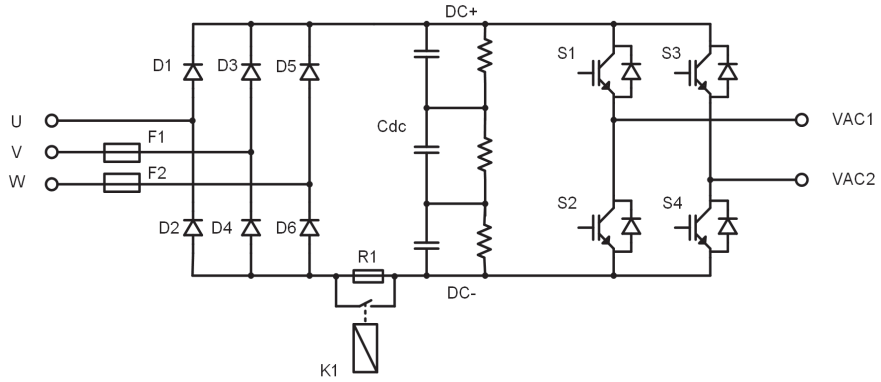


Figure 6: R1-R6 power modules main circuit diagram

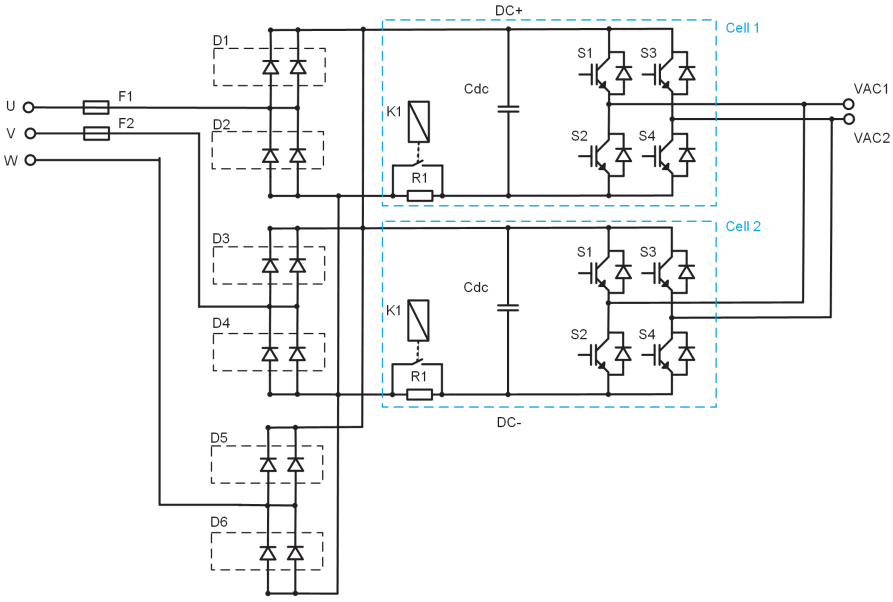


Figure 7: R7 power module main circuit diagram

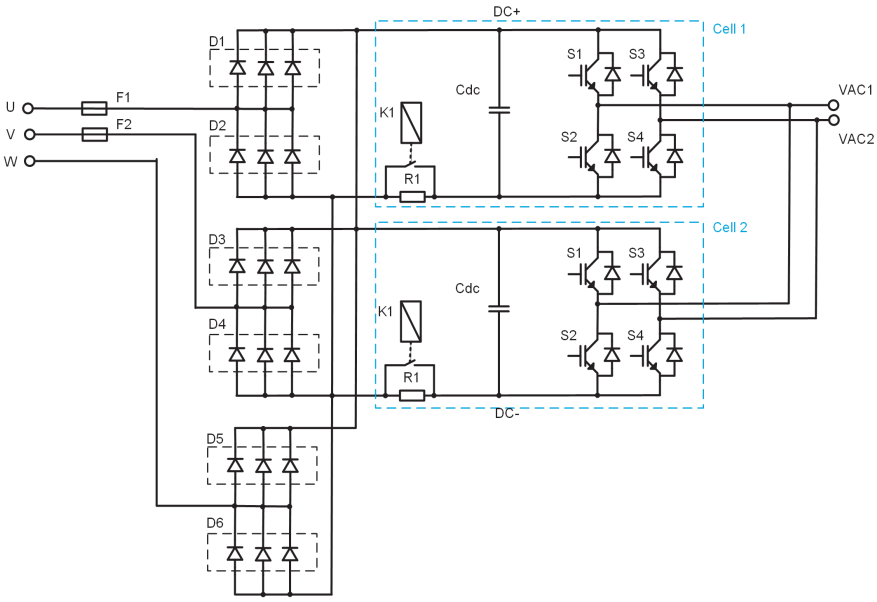


Figure 8: R8 power module main circuit diagram

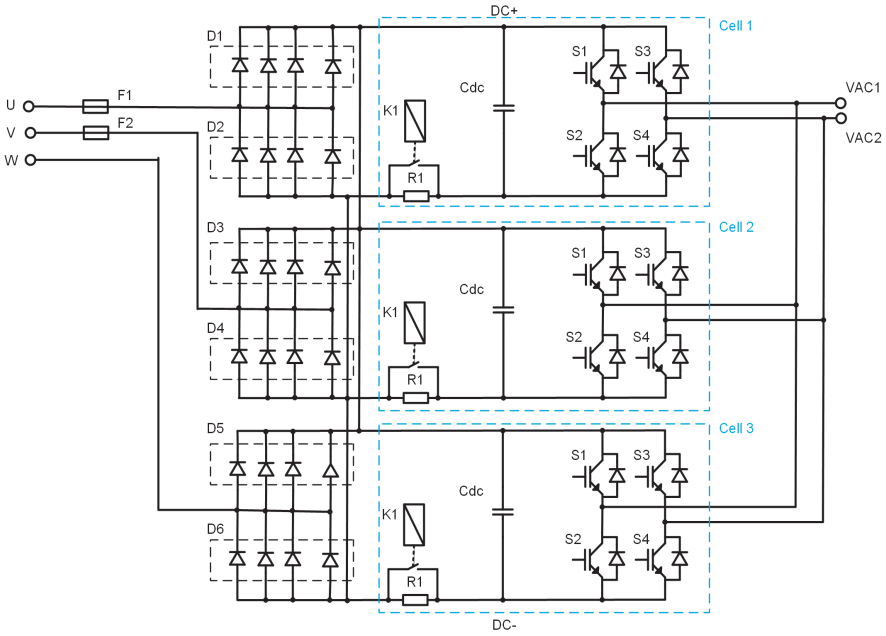


Figure 9: R9 power module main circuit diagram

Record Table

Measurements - Healthy Power Module				
Converter serial number:				
Power module serial number:				
Power module material number:				
Power module HW release:				
Power module position:				
Visual Inspection			YES	NO
1 Warranty sticker is complete.				
2 Serious mechanical deformation is observed.				
3 Heatsink is dirty.				
4 Arcing mark is observed.				
5 Fuse indicator is open.				
Test item	Plus probe	Minus probe	Allowed values	Measured values
1	Fuse1_1	Fuse1_2	<0.5 Ohm	
2	Fuse2_1	Fuse2_2	<0.5 Ohm	
3	DC+	DC-	>0.5 Ohm	
4	DC -	U	0.2V~0.8V	
5	DC -	V	0.2V~0.8V	
6	DC -	W	0.2V~0.8V	
7	U	DC+	0.2V~0.8V	
8	V	DC+	0.2V~0.8V	
9	W	DC+	0.2V~0.8V	
10	DC -	VAC1	0.2V~0.8V	
11	DC -	VAC2	0.2V~0.8V	
12	VAC1	DC+	0.2V~0.8V	
13	VAC2	DC+	0.2V~0.8V	

How to open the power module (PEBB)

Preparation

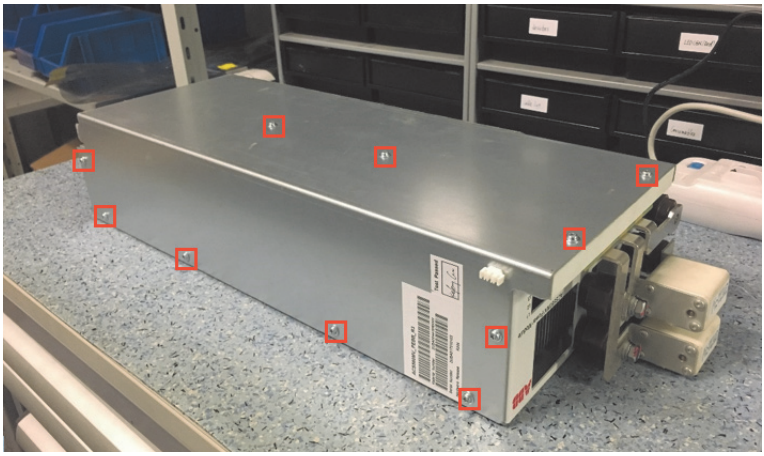
Before starting any work on the PEBB, please make sure safety rules have been applied, see as chapter *Safety*.

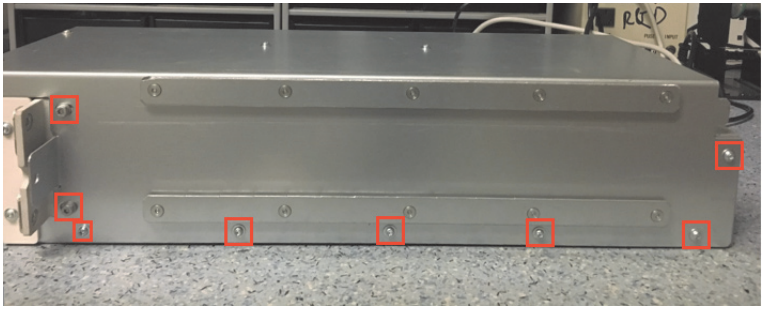
Necessary tools:

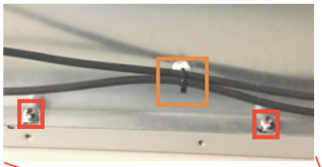
Index	Tool Type
1	Cable cutter
2	Sharp-nose plier
3	Combination screwdriver
4	T25 torx bit
5	Protective gloves
6	Auto screwdriver

Open the Power Module

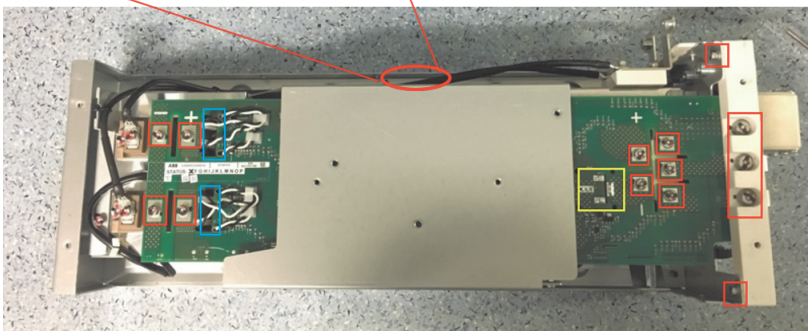
Step 1: remove red marked screws and open the PEBB.

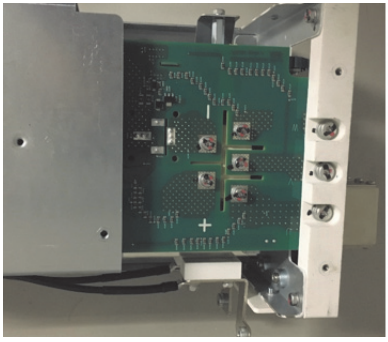


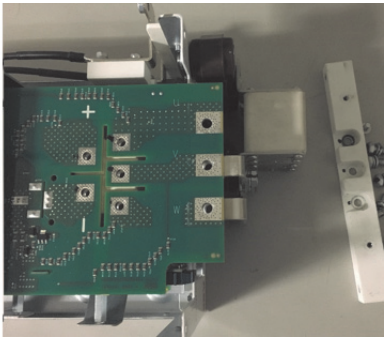


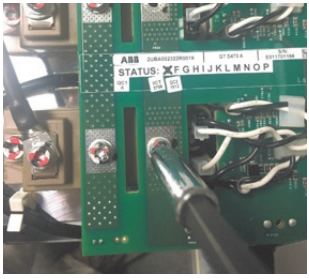


Side plate of the PEBB;
Remove red marked srews;
Open orange marked cable strap



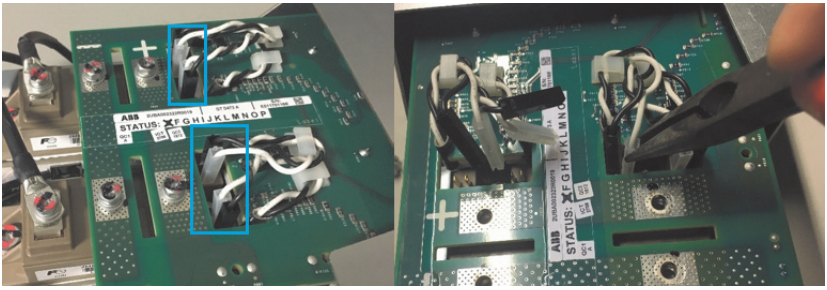






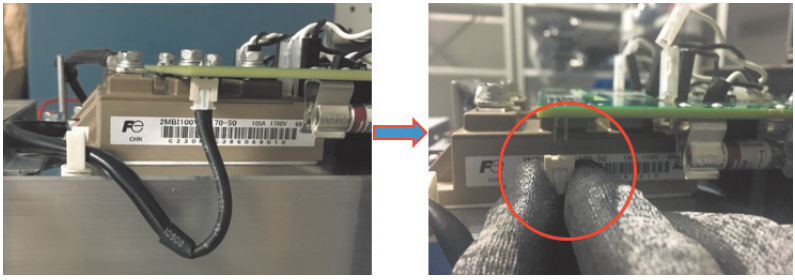
Unscrew all red marked screws.

Step 2. Unplug the gate emitter connection.



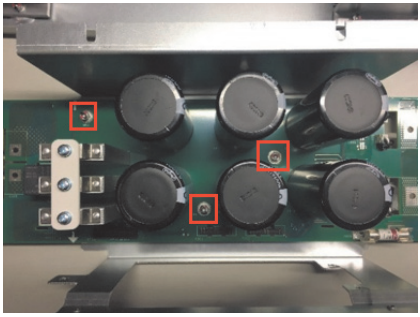
Step 3. Release output voltage cable from cable clamp.

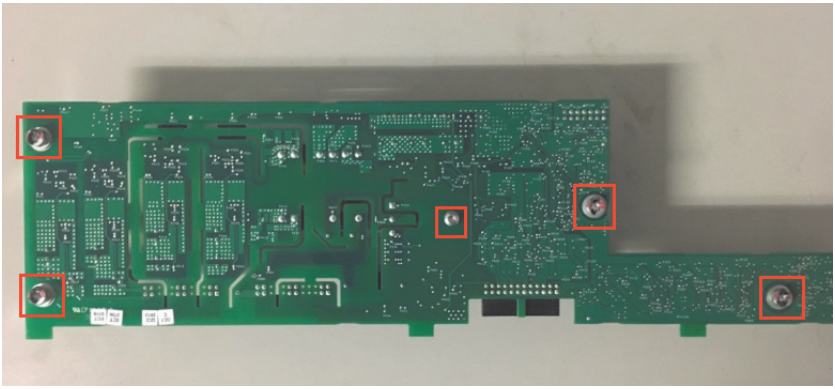
Step 4. Remove cable.

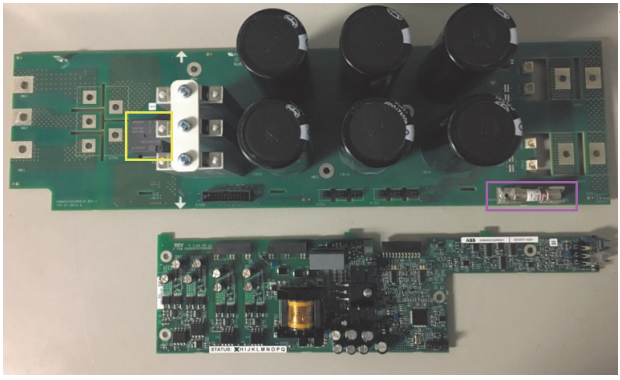


Step 5. Separate HCB board and CB board from holder.

Remove screws marked in red







Yellow: charging relay

Pink internal fuse: shall be always checked with multimiter for resistance; If fuse is open, needs to be reported to support line.

Known Problems

Should help field service engineer to diagnose some ACS580MV top known problems on site so that ABB can provide customers with faster resolutions and better experiences.

KP1252 Arc inside charging relay causes power module fault

Description of the problem

At the very beginning of charging, full voltage (about more than 1000V DC) applied on charging resistor R1 (also between one main contact and coil of K1), somehow the insulation breaks down inside K1 (the arc we found inside charging relay). High voltage goes to relay control circuit and causes some visible damage on Heavy Copper Board (HCB) or on Control Board (CB).

The reason why there is an arc inside relay is that liquid goes onto the sealed relay during manufacturing. New produced boards are free of the problem.

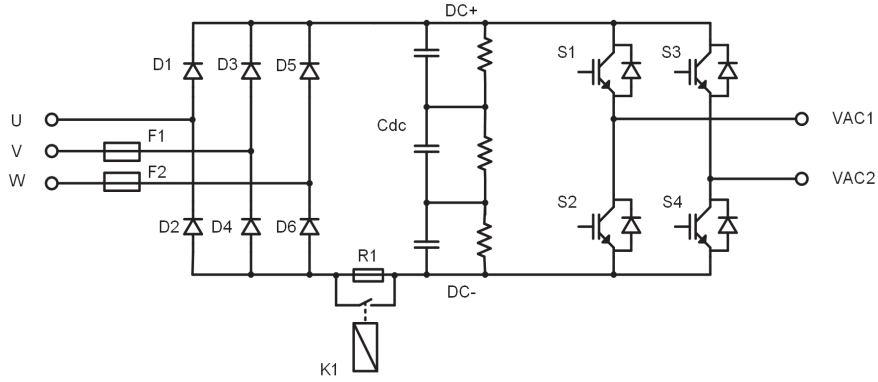


Figure 10: Main Circuit of Power Module

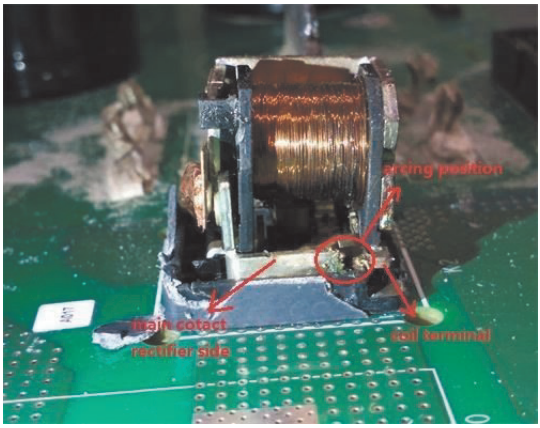


Figure 11: Arc inside relay

How to identify the problem on site

Fault Messages

This failure happens at the very beginning of charging, but you may not detect the failure during charging phase sometimes. Because there is no feedback from relay, it really depends on how severe the arcing is. You may get this fault when running the motor (at the beginning), large voltage dropping on charging resistor (relay is open) causes “diode fault” or “input voltage deviation”.
Possible fault message:

3234 PM +5V power supply regulation fault (usually on R4 - R6)

3237 PM input voltage deviation (usually on R1 - R3)

3239 PM diode open circuit (usually on R1 – R3)

Hardware Failure

If you observe one of below phenomenon, charging relay failure probably is the root cause.

1. Q802 on HCB board is exploded, which is close to relay area and could be observed after removing the cover of power module. (usually on R1 – R3, fuse on front face may open)

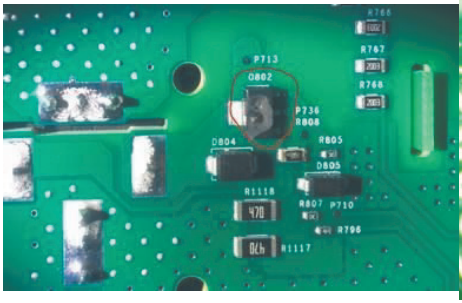


Figure 12: Q802 position

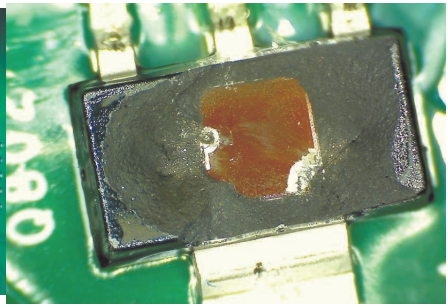


Figure 13: Q802 exploded

2. U605 or Q603 on control board burned, which is close to material label areas and could be observed after removing the cover of power module. (usually on R4 – R6)

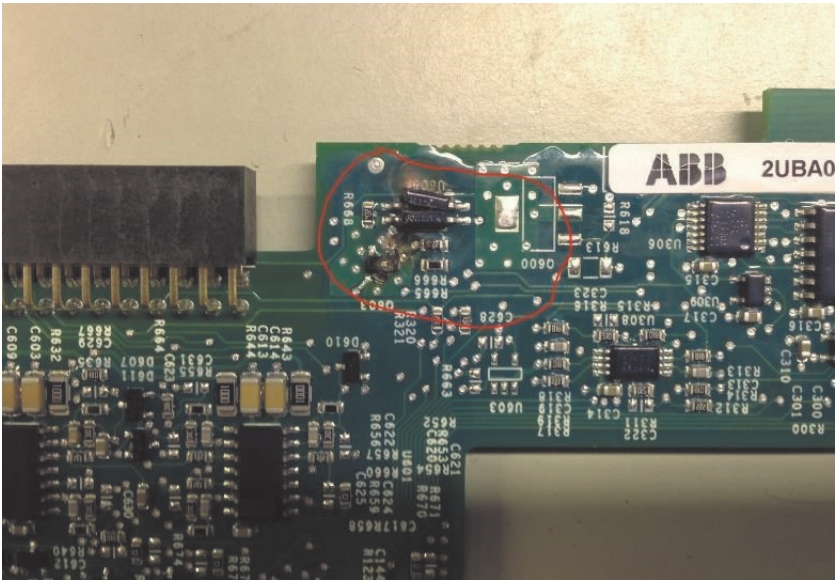


Figure 14: U605 burnt on control board

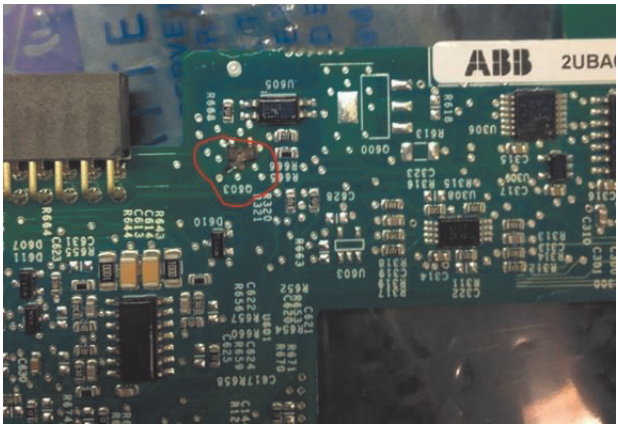


Figure 15: Q603 burnt on control board

How to solve the problem on site

After identifying the problem, we suggest that:

1. Send all available failure information (plus serial number of failed PCBA and power module) to support line for further double check. ABB can recheck if this power module is within the affected batch.
2. No repair is required and wait for instructions from support line.

KP1299 De-lamination of fiber optic cause communication failure

Description of the problem

Fiber optic is MSD (Moisture Sensitive Device), it can absorb moisture in high humidity environment and lead to delamination at period of mounting.

Delamination is a failure mechanism which affects the interfacial bond between two different material systems. Delamination occurs when an external force was put on two different materials with diverse coefficient of thermal expansion. For plastic packages, delamination usually happen when fiber optic is exposed to high humidity environment. When fiber optic's moisture sensitive part is soldering, high temperature vaporizes moisture rapidly which causes

enormous pressure between the interface of two materials, and lead to delamination of fiber optic.

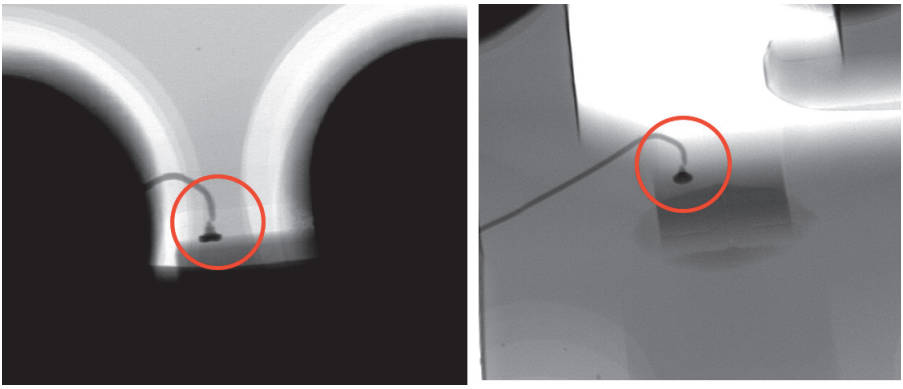


Figure 16: Delamination of fiber optic under X-ray

How to identify the problem on site

Fault Message

Delamination of fiber failure always happens with communication failure, below message can indicate that problem:

1. Control hub missing PM

2. Program download failed

How to analyze Failure

Quick verification with a cable, SAP number tbd can be done on field if FOR still ok or not.

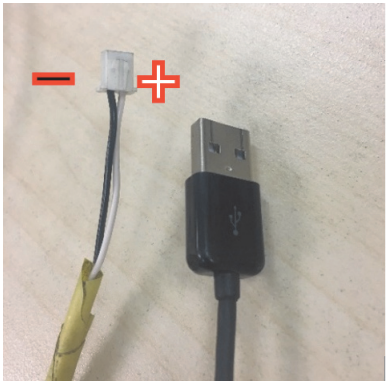
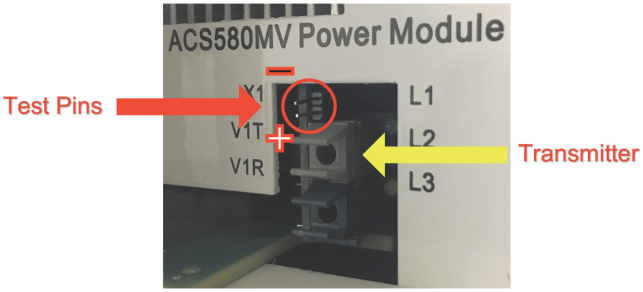


Figure 17: USB-5V power cable

Figure 18 shows, the interface of test pins which can be accessed from outside the PEBB to connect the USB cable for verification.



If there is no red light after connecting the pins correctly to the USB cable, the fiber optic sender is damaged.

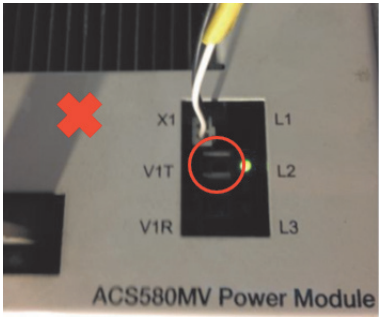


Figure 19: Fiber optic is damaged

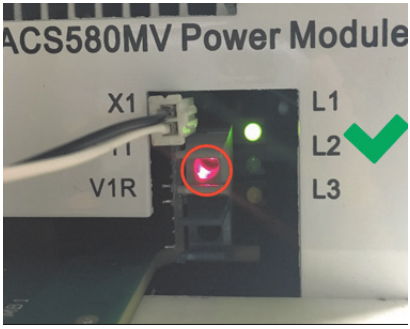


Figure 20: Fiber optic is ok

How to solve the problem on site

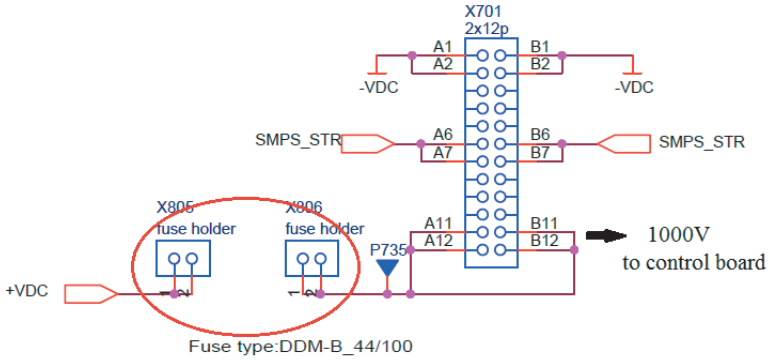
After identifying the problem, we suggest that:

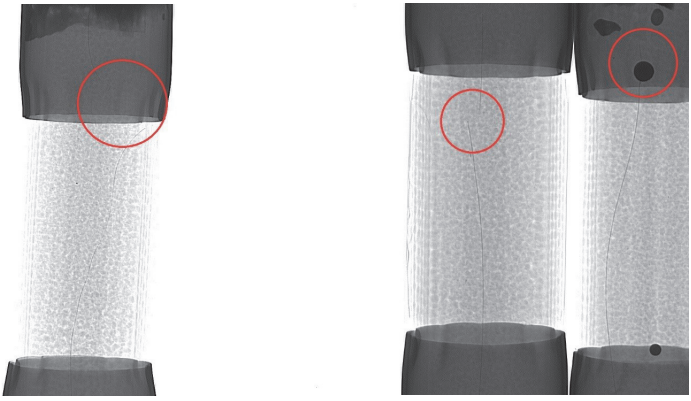
Send all available failure information (plus serial number of failed PCBA and power module) to support line.

KP1249 Fuse of PM control power loop failure causes control hub missing power module fault

Description of the problem

Fuse on HCB of power module open and cause control board cannot work.





How to identify the problem on site

Fault Messages

Fuse on HCB was broken usually invite Control Hub Missing PM on site. Because of control board doesn't work, so power module cannot communicate with control hub.

To identify this fault we can use USB-5V cable, if control hub missing happened and fiber optic is work well, fuse on HCB should be checked.

How to analyze Failure

Please refer section *Open the Power Module* to open the PEBB first. And you can find fuse link following photos.

Left photos are PEBB0 frame, right photos are PEBB1 frames.

Use multimeter plus and minus probes test two holders of fuse, the value should lower than 1 ohm.

How to solve the problem on site

If the fuse on HCB broken was the root cause, we suggest replace broken fuse and send all available failure information (plus serial number of failed PCBA and power module) to support line.

KP1692 MOSFET failure causes control board power failed

MOSFET on CB of power module short circuit caused “7538 Control hub missing PM”.

MOSFET short circuit usually happened between its gate and source. Short condition can cause the current in the loop increase and destroy multiple electronic components including the fuse on HCB.

When fuse open is found on site, it should be verified if the MOSFET shorted, before replacing new fuse, otherwise the new fuse will be damaged again.

How to identify the problem on side

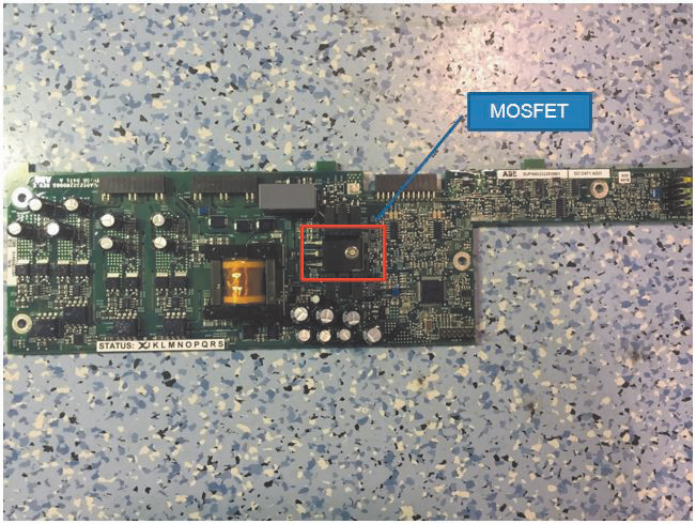
Fault Messages

MOSFET short circuit usually invite 7538 Control hub missing PM on site. Because of control board doesn't work, so power module cannot communicate with control hub.

Usually PM +5V power supply fault is reported before that.

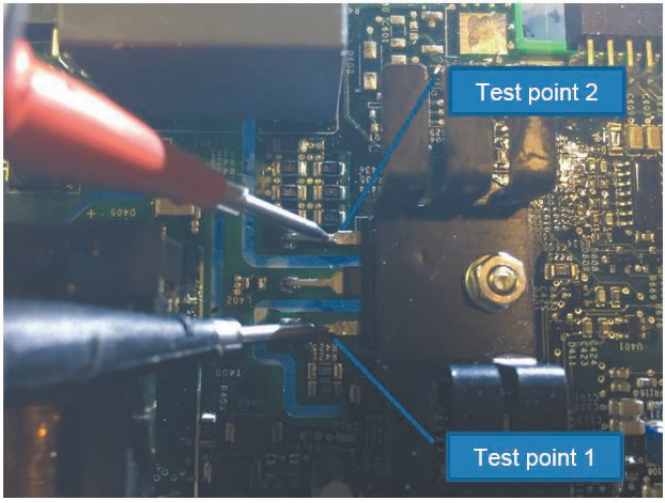
How to analyze Failure

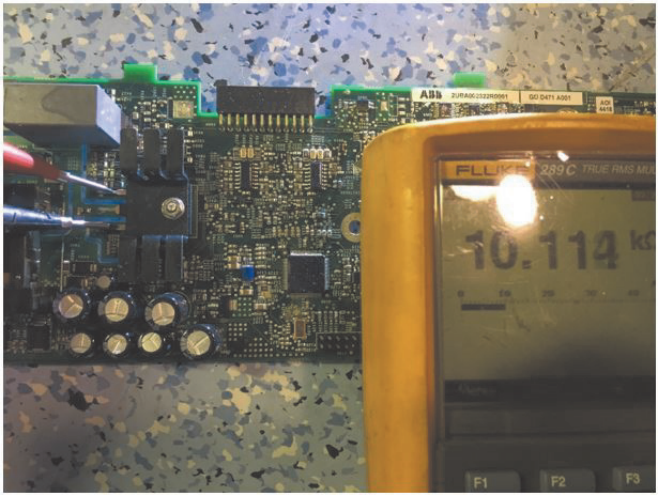
Please refer chapter 2.2 to open the PEBB first. And you can find MOSFET on CB like following photos.



Use multimeter plus measure the resistance between source (test point 1 showed in under photo) and gate (test point 2 showed in under photo) of MOSFET, the resistance should be around 10Kohm.

MOSFET failure happens when the resistance is almost 0ohm.





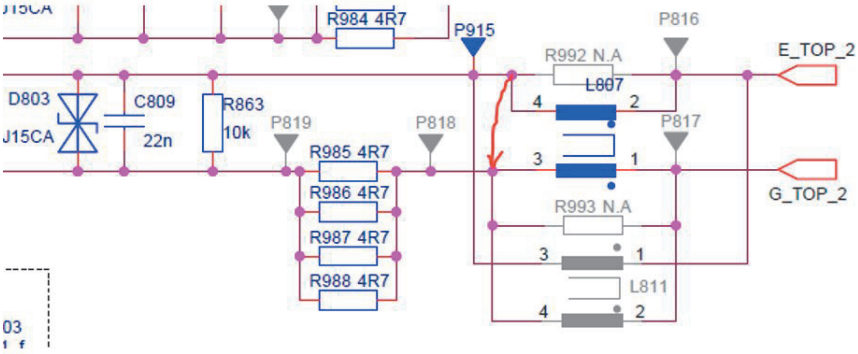
How to solve the problem on side

After identifying the problem, we suggest that:

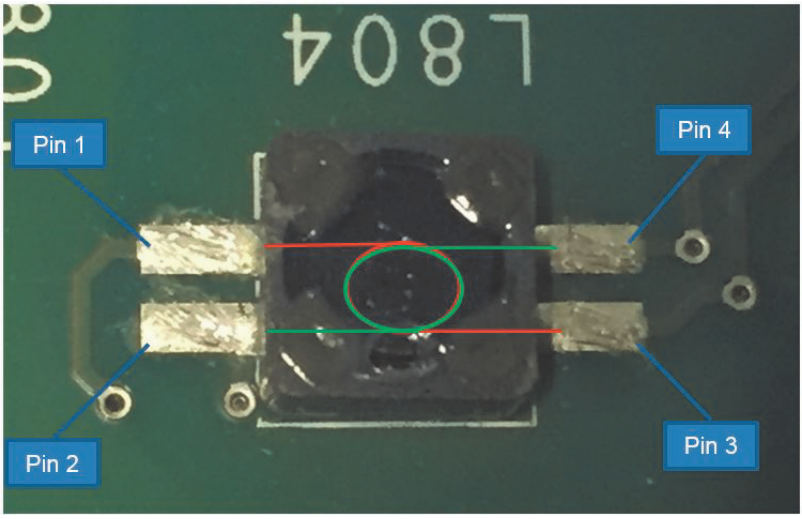
1. Send all available failure information (plus serial number of failed PCBA and power module) to support line for further double check.
2. No repair is required and wait for instructions from support line.

KP1632 Failed common mode choke on HCB is leading to malfunction of PEBB

Common mode choke short or open circuit on HCB usually occurs in the coil inside choke.



There are two group of coils inside of choke, one group connect with pin1 and pin3, another group connect with pin2 and pin4. Normally, pin1&pin2, pin3&pin4 should be open. Pin1&pin3, pin2&pin4 should be conductive.



How to identify the problem on side

Fault Messages

Once the short or open happened, the device will trap the fault message of “PM HBX short circuit turn off”.

How to analyze Failure

We can verify the choke's function by measuring resistance using the multi-meter.

Usually we can measure IGBT gate cables, black and white cable on IGBT gate terminal, to make sure the choke is ok or not. The resistance in there should be around 10Kohm.

If the choke short inside, the measurement value will far less than 10Kohm. The following table showed the test point and allowed values:

Choke resistance measurements - Healthy Power Module			
Test item	Plus probe	Minus probe	Allowed values
1	Pin1	Pin2	≈10K ohm
2	Pin3	Pin4	≈10K ohm
1	Pin1	Pin3	<2 ohm
2	Pin2	Pin4	<2 ohm

How to solve the problem on side

If the measured values differ from the allowed values in table, replace with a new power module and send failed power module back to factory for further analysis.

3

Flystart troubleshooting

Flystart troubleshooting

Most of the problems during flystart will have a motor current as a consequence. To find out the root cause for a problem it is necessary to observe the time the overcurrent is occurring and previous conditions of the drive. More precisely, the following features should be identified:

- What is the drive configuration (type of load, approximation of friction and losses, potential other sources influencing the driven load)
  - To get more information about the drive a test to determine the freewheeling characteristics should be performed – at rated speed set reference speed to 0 with speed/acceleration time = 0 and observe actual deceleration of the drive.
- Motor rated parameters
- Motor limits (current, speed, one direction of rotation or bi-directional…)
- When is the problem occurring:
  - speed scan (beginning/end)
  - reversal of the speed scan
  - flux ramp-up
  - transition to the normal operation
  - after transition to the normal operation
- Make sure to observe following variables:
  - 1.7 “Motor current”
  - 90.1 Motor speed for control
  - 23.2 “Speed ref ramp output” (for rpm operation mode) or “Frequency ref ramp output”(for Hz operation mode)

- (If DT tool is used additionally observe currents in d and q axis:)
  - g_tMeas_125us.Idq[0]
  - g_tMeas_125us.Idq[1]

The following table summarizes potential problems and describes troubleshooting measures. Note that for some problems several troubleshooting measures are proposed (sometime having opposite approach). Depending on the particular configuration of the system, one or more of those measures could solve the problem.

Issue	Possible solution
Initial flux ramp-up	
Motor overcurrent on the beginning of the speed scan (during initial flux ramp-up)	Flystart initiated too early. At least time equal to 1-2 rotor time constants have to pass between stop and restart to assure the flux has decayed.
	Reduce initial flux reference: 21.30 “Flystart current level”.
Motor speed is found but the drive always slows down to 0 before it starts again (with DC magnetization).	The drive is decelerating faster than the speed scan. Conditions to stop the speed scan are not met. Increase the value of 21.36 “Flystart speed detect quali time”.
Motor overload during initial flux ramp-up	High initial flux, reduce the parameter 21.30 “Flystart current level” (0.05 – 0.15 gives mostly satisfactory results).
Speed scan	
Motor overcurrent near the end of the speed scan	Check if the motor current is rising to high values as the reference speed approaches motor speed. If so, reduce initial flux 21.30 “Flystart current level”.
	Reduce 21.36 “Flystart speed detect quali time” to reduce the speed of speed scan.
Motor overcurrent at the speed scan reversal	Reduce initial flux 21.30 “Flystart current level”.
Final flux ramp-up:	
Motor overcurrent during final flux ramp-up (after the speed has been found).	Set controller proportional gain (21.38 “Flystart Scan Iq Ctrl Kp”) to 0.
Initial motor speed is found but during flux ramp-up motor decelerates to 0. Overcurrent occurs as the motor speed is approaching 0.	Reduce flux ramp-up time by reducing parameter 21.31 “Flystart Flux Ramp Time” in order to get motor started before it decelerates to 0.
	Increase flux ramp-up time by increasing parameter 21.31 “Flystart Flux Ramp Time” in order to get smaller flux at the time the motor decelerates to 0.
	Reduce initial flux 21.30 “Flystart current level” to prevent motor from accelerating during speed scan.
	Increase 21.36 “Flystart speed detect quali time”– speed scan will be faster and motor might not accelerate too much.
Transient to scalar control	
Motor overcurrent when transferring from flystart to scalar control	Set IR current reference 97.13 “IR compensation (see. description in 2.2.). Value of 0.25% is a good starting point. Should be increased in the case of higher stator resistive loses.

Issue	Possible solution
	Reduce the time during which reference speed is kept constant. The transient time equals one rotor time constant and cannot be directly set by parameter. In order to change it set parameters 98.4 “Lm user” and 98.3 “Rr user” to achieve different values of rotor time constants. Set rotor time constant to approx. 0.5s to prevent the current becoming too high during this transition. To achieve steady flux ramp-up with such a small rotor time constant the parameter 21.31 “Flystart Flux Ramp Time” should be put to higher value (recommended value = 10).
Fly start taking very long (>10 rotor time constants).	Motor starts rotating during speed scan but then decelerates to 0 speed during flux rampup.

10

Software capacitor reforming

What this chapter contains

This chapter contains short guideline for using ‘Capacitor reforming’ functionality. The service pass-code is required to have access to these parameters in parameter group 95 HW configuration.

Capacitor reforming test

The software capacitor reforming function can be used when below 2 conditions both fulfilled:

1. the drive runs into PM DC link capacitors not balanced (fault code 3236) during charging,

2. the drive was stored less than 2 years without charging (Maximum allowed time that the drive can charge/reformed without manual capacitor reforming according to reforming instruction 2UBB017371)

This function can be enabled manually by setting parameter 95.88.

When this function is enabled, PM DC link capacitors not balanced (fault code 3236) trip value is increased, so that the capacitor can be reformed by forcing the drive into a special mode to get the capacitor reformed, during which period the drive will stay at hot-standby mode, and no modulation is allowed. The drive will automatically discharged and back to normal operation mode when the defined reforming time is achieved.

Note: This SW reforming function cannot replace normal reforming process, if storage time is longer than 1 year, please follow reforming instruction 2UBB017371.

Capacitor reforming test steps

1. Preparation the drive. The drive should have no active faults and fulfill the condition to close MCB.
2. Set Par 95.88 Capacitor reforming test = Enable. (If possible, use Drive composer to monitor signal Par 95.93, Par 95.94, Par 95.95 and Par 95.96.).
3. Close MCB.
4. There are 3 different situations here:
   - After time period specified by Par 95.89, MCB is opened and there is no fault. This means capacitor reforming was done successfully.

   Action: Wait until Par95.96 cap reform status word = 0x0001. And then you can operate the drive following your normal commissioning process.
   - After time period specified by Par 95.89, MCB is opened and the drive tripped with fault 'Cap Reform failed'. This mean capacitor reforming process was done but 'PM DC unbalance Waring' was still active after capacitor reforming test.

   Action: Wait until Par 95.96 cap reform status word = 0x0001. And then you can redo the capacitor reforming test again or replace the problematic power modules which are indicated by Par 95.93, Par 95.94 and Par 95.95.
   - MCB is opened and the drive tripped with 'PM Sub Capacitor Overvoltagex' fault. This means capacitor reforming was interrupted or aborted because of protection.

   Action: Try to redo the capacitor reforming test again. If failed too, replace the problematic power modules which are indicated by Par 95.93, Par 95.94 and Par 95.95.
   - MCB is opened and the drive tripped with other faults. This means capacitor reforming was interrupted or aborted because of other protection.

   Action: First try to solve the fault which interrupted the reforming process. Then redo the capacitor reforming test again. If failed too, replace the problematic power modules which are indicated by Par 95.93, Par 95.94 and Par 95.95.

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 abb.com/searchchannels.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

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Your comments on our manuals are welcome. Navigate to new.abb.com/drives/manuals-feedback-form.

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