2

Hardware description

Contents of this chapter

This chapter gives information about the hardware of the control units.

Hardware description

The BCU-02, BCU-12 and BCU-22 are control units used for controlling converters via fiber optic links. They contain integrated branching unit functionality for collecting and storing real-time data from the converter modules to help fault tracing and analysis. The data is stored on the SDHC memory card inserted into the SD CARD slot and can be analyzed by ABB service personnel.

The control unit types have a different number of fiber optic connections:

BCU type	No. of fiber optic connections	Can be replaced with
BCU-02	2	BCU-02, BCU-12, BCU-22
BCU-12	7	BCU-12, BCU-22
BCU-22	12	BCU-22

The control unit requires an external 24 V DC power source. It has three option slots for I/O extensions, encoders and fieldbus adapters, and a removable memory unit. For example, if you need to replace the control unit, you can keep the parameter settings by moving the memory unit from the defective control unit to the new one.

The drive-to-drive link (XD2D) is a daisy-chained RS-485 transmission line that allows basic master/follower communication with one master and multiple followers. The control unit also has one option slot for connecting a RDCO DDCS communication option board. For more information, see the *RDCO-0x DDCS communication option modules user's manual* (3AFE64492209 [English]).

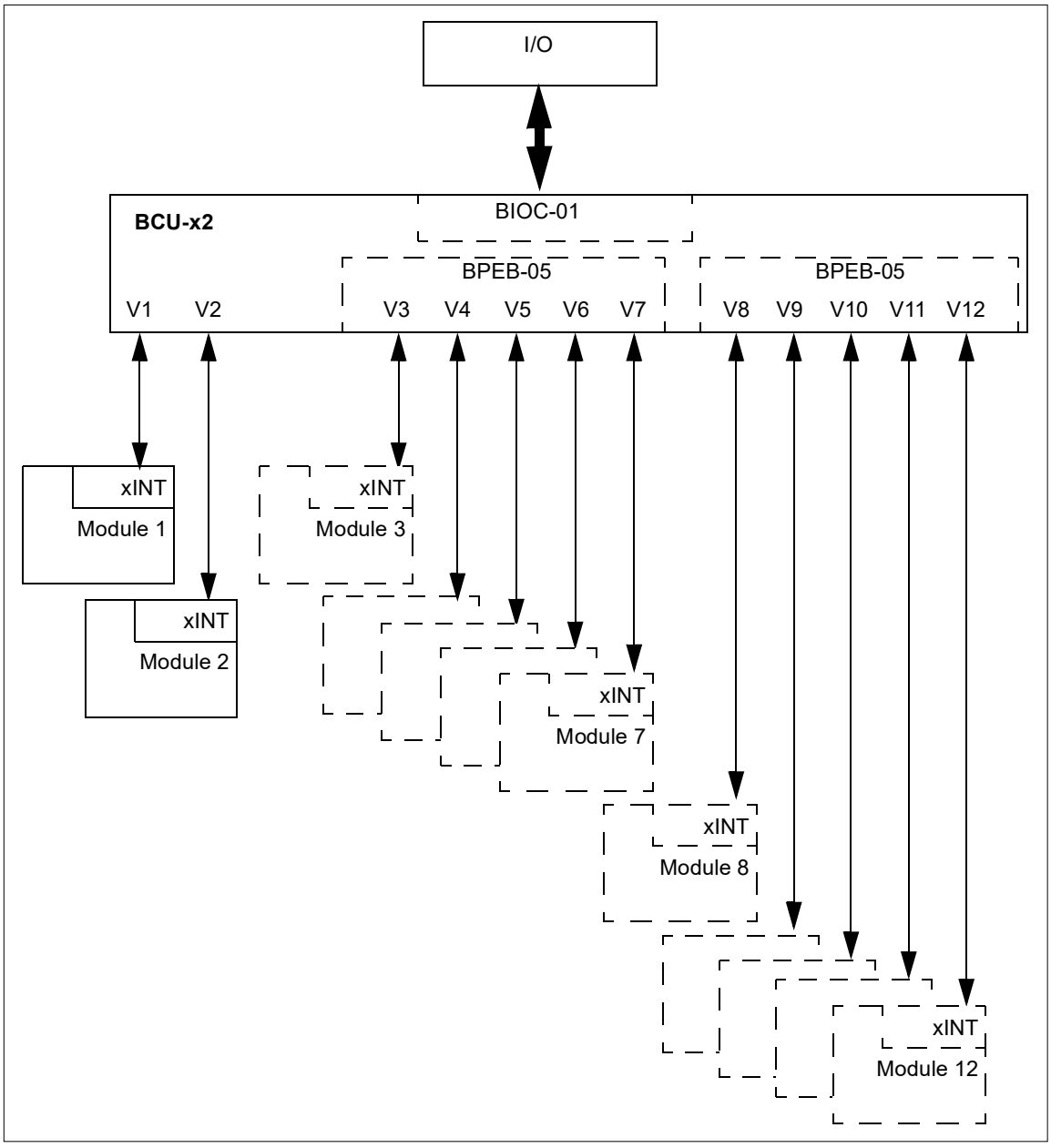
Fiber optic connections

The BCU-02 control unit has two fiber optic connections V1 and V2 for connecting to converter modules. The BCU-12 control unit has one BPEB-05 board, and the BCU-22 control unit has two BPEB-05 boards. Each BPEB-05 board adds five fiber optic connections. Thus, the BCU-12 has seven connections (V1…V7), and the BCU-22 has twelve connections (V1…V12).

The maximum lengths of the cables are:

- 1 mm plastic optical fiber cables, 35 m (115 ft)
- 200 µm hard-clad silica fiber cables, 100 m (328 ft).

Fiber optic pairs connected to one control unit must have the same length. With long distances, cables of different length cause different delays, which can have an unwanted effect on the operation.



For instructions on how to connect the control unit to the converter module(s), see the applicable converter hardware manual.

	Description
I/O connector	
XAI	Analog input
XAO	Analog output
XDI	Digital input and digital start interlock
XDIO	Digital input/output
XD2D	Drive-to-drive link
XD24	+24 V output for digital input
XPOW	External power input
XRO1	Relay output 1
XRO2	Relay output 2
XRO3	Relay output 3
XSTO	Safe torque off connection (input signal). **Note:** This input only acts as a true Safe torque off input in control units controlling a motor. In other applications (such as a supply or brake unit), de-energizing the IN1 and/or IN2 terminal will stop the unit but does not constitute a true safety function. For more information on Safe torque off, see the applicable converter hardware manual.
XSTO OUT	Safe torque off connection (output for powering XSTO input of inverter modules).
X485	Not in use
Switch	
AI1	Analog input 1 current/voltage selection
AI2	Analog input 2 current/voltage selection
D2D TERM	Drive-to-drive link termination
DICOM = DIOGND	Determines whether DICOM is separated from DIOGND (ie, common reference for digital inputs floats).
Fiber optic connector	
V1T…V12T, V1R…V12R	Fiber optic connector to converter module: T = Transmitter, R = Receiver
Connector for optional module	
SLOT 1	F-type adapter, interface and I/O extension modules If FDPI-02 diagnostics and panel interface is used, it has to be installed in slot 1 with two screws.
SLOT 2	F-type adapter, interface and I/O extension modules
SLOT 3	F-type adapter, interface and I/O extension modules, FSO-xx safety functions module
SLOT 4	RDCO-0x DDCS communication option modules
Safety option connector	
X12	Cable connector for the FSO-xx safety functions module. **Note:** The FSO-xx safety functions module can be used only with ACS880 inverters. For more information on the FSO-xx safety functions module, see the applicable FSO-xx safety functions module user's manual.
Control panel and Ethernet connector	
XETH	Ethernet port, not in use
X13	Control panel
Memory unit and card connector	
X205 MEMORY UNIT	Converter memory unit connector
SD CARD	Secure digital card holder (Data logger memory for the fiber optic links)

	Description
Miscellaneous	
+ Battery	Real-time clock battery

The 7-segment display

The following table gives the indications of the 7-segment display on the control unit. Multi-character indications are displayed as repeated sequences of characters.

	“U” is indicated shortly before “o”. The control program has been launched and is running.
	Flashing character. The firmware cannot be started: The memory unit is missing or corrupted.
	The firmware download from a PC to the control unit is in progress.
	At the converter power-up, the 7-segment display can show short indications of, for example, “1”, “2”, “b” or “U”. These are normal indications immediately after powering up the converter. If the 7-segment display ends up showing other values than described above after the power-up, it indicates a hardware failure.

LEDs

The following table gives the indications of the LEDs on the control unit.

LED	
BATT OK	When on, the battery voltage of the real time clock is sufficient (higher than 2.8 V). When off, • battery voltage is below 2.8 V, • battery is missing, or • control unit is not powered.
PWR OK	When on, internal voltage is sufficient.
FAULT	When on, the control program indicates that the equipment is faulty. See the applicable firmware manual.
WRITE	When on, writing to the SD card is in progress.

3

Installation

Contents of this chapter

This chapter gives information about the installation procedures and the contents of the delivery.

Examining the delivery

Make sure that these items are included:

- control unit with the I/O connectors
- memory unit
- SD/SDHC flash memory card (inserted in its slot)
- real-time clock battery.

Make sure that there are no signs of damage to any of the items.

Identifying different control unit types

Before you install the control unit, make sure that it has the correct control program for the converter hardware in question. The control program is shown on the label attached to the memory unit.

Make sure also that the control unit is correct for your equipment configuration.

Replacing the memory unit



WARNING! Do not remove or install the memory unit when the control unit is powered.

See **B** in figure *Replacement illustration (page 23)*.

1. Remove the screw.
2. Pull out the old memory unit.
3. Insert the new memory unit.
4. Install the screw.

Replacing the SD/SDHC memory card

Do not remove the SD card while the yellow *WRITE* LED is on. Writing to the SD card is in progress. For the replacement card type, see the technical data.

See **C** in figure *Replacement illustration (page 23)*.

1. Remove the screw and the clip covering the memory card.
2. Push the card to remove it.
3. Install the new card in reverse order.

Replacing the control unit

See section *Installing the control unit (page 17)*.

1. If the control unit is attached to the rail with screws or end brackets, remove them.
2. Remove the control unit from the rail.
3. Remove the latches from the back of the control unit.
4. Pull out the detachable terminal blocks that have control cables connected.
5. Install the new control unit in reverse order.

If there is a safety circuit connected to the STO terminals (XSTO) of the control unit, do the acceptance test of the safety function after replacing the control unit. See the drive or inverter module hardware manual, safety option user's manual, and/or the related FSO safety functions module user's manual.

5

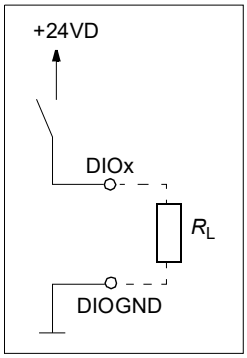
Technical data

Contents of this chapter

This chapter contains the technical data for the control units.

Connector data

Terminal	
Power supply (XPOW)	Connector pitch 5 mm, wire size 2.5 mm^2 24 V (±10%) DC, 2 A External power input. Two supplies can be connected for redundancy.
Relay outputs RO1…RO3 (XRO1…XRO3)	Connector pitch 5 mm, wire size 2.5 mm^2 250 V AC / 30 V DC, 2 A Protected by varistors
+24 V output (XD24:2 and XD24:4)	Connector pitch 5 mm, wire size 2.5 mm^2 Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.
Digital inputs DI1…DI6 (XDI:1…XDI:6)	Connector pitch 5 mm, wire size 2.5 mm^2 24 V logic levels: “0” < 5 V, “1” > 15 V R_{in}: 2.0 kohm Input type: NPN/PNP (DI1…DI5), NPN (DI6) Hardware filtering: 0.04 ms, digital filtering up to 8 ms DI6 (XDI:6) can alternatively be used as an input for a PTC thermistor. “0” > 4 kohm, “1” < 1.5 kohm I_{max}: 15 mA (DI1…DI5), 5 mA (DI6)

Start interlock input DIIL (XDI:7)	Connector pitch 5 mm, wire size 2.5 mm^2 24 V logic levels: “0” < 5 V, “1” > 15 V R_{in}: 2.0 kohm Input type: NPN/PNP Hardware filtering: 0.04 ms, digital filtering up to 8 ms
Digital inputs/outputs DIO1 and DIO2 (XDIO:1…XDIO:4) Input/output mode selection by parameters. DIO1 can be configured as a frequency input (0…16 kHz with hardware filtering of 4 microseconds) for 24 V level square wave signal (sinusoidal or other wave form cannot be used). DIO2 can be configured as a 24 V level square wave frequency output. See the firmware manual.	Connector pitch 5 mm, wire size 2.5 mm^2 As inputs: 24 V logic levels: “0” < 5 V, “1” > 15 V R_{in}: 2.0 kohm Filtering: 1 ms As outputs: Total output current from +24 VD is limited to 200 mA 
Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2)	Connector pitch 5 mm, wire size 2.5 mm^2 10 V ±1% and –10 V ±1%, R_{load} 1 … 10 kohm Maximum output current: 10 mA
Analog inputs AI1 and AI2 (XAI:4 … XAI:7). Current/voltage input mode selection by switches	Connector pitch 5 mm, wire size 2.5 mm^2 Current input: –20…20 mA, R_{in}: 100 ohm Voltage input: –10…10 V, R_{in} > 200 kohm Differential inputs, common mode range ±30 V Sampling interval per channel: 0.25 ms Hardware filtering: 0.25 ms, adjustable digital filtering up to 8 ms Resolution: 11 bit + sign bit Inaccuracy: 1% of full scale range Inaccuracy with Pt100 sensors: 10 °C (18 °F)
Analog outputs AO1 and AO2 (XAO)	Connector pitch 5 mm, wire size 2.5 mm^2 0…20 mA, R_{load} < 500 ohm Frequency range: 0 … 500 Hz Resolution: 11 bit + sign bit Inaccuracy: 2% of full scale range
Drive-to-drive link (XD2D)	Connector pitch 5 mm, wire size 2.5 mm^2 Physical layer: RS-485 Termination by switch
RS-485 connection (X485)	Connector pitch 5 mm, wire size 2.5 mm^2 Physical layer: RS-485
Safe torque off connection (XSTO)	Connector pitch 5 mm, wire size 2.5 mm^2 Input voltage range: -3…30 V DC Logic levels: “0” < 5 V, “1” > 17 V For the unit to start, both connections must be “1” Current consumption: 66 mA (continuous) per STO channel per inverter module EMC (immunity) according to IEC 61326-3-1

Safe torque off output (XSTO OUT)	Connector pitch 5 mm, wire size 2.5 mm^2 To STO connector of inverter module
Control panel connection (X13)	Connector: RJ-45 Cable length < 3 m (10 ft)
Ethernet connection (XETH)	Connector: RJ-45 This connection is not supported by the firmware.
SDHC memory card slot (SD CARD)	Memory card type: SDHC Maximum memory size: 8 GB

The terminals on the board fulfill the Protective Extra Low Voltage (PELV) requirements. The PELV requirements of a relay output are not fulfilled if a voltage higher than 48 V is connected to the relay output.