8BAC0120.001-2

1 General information

The EnDat 2.2 plug-in module can be used in an ACOPOSmulti slot. The module contains an EnDat 2.2 interface.

This module can be used to evaluate encoders installed in B&R servo motors as well as encoders for external axes (encoders that scan any machine movement). The input signals are monitored. This makes it possible to detect open circuits, conductor faults and failures in the encoder power supply.

EnDat 2.2 encoders:

EnDat 2.2 is a standard developed by Johannes Heidenhain GmbH (www.heidenhain.de). It is an advancement of EnDat 2.1, which incorporates the advantages of a true digital, bi-directional interface and also offers a read/write parameter memory in the encoder. With absolute position measurement, the homing procedure is generally not required. Where necessary, a multi-turn encoder (4096 revolutions) should be installed. To reduce costs, a single-turn encoder and a reference switch can also be used. In this case, a homing procedure must be carried out.

Because it relies on serial data transfer, only 4 signal lines are needed. The data is transferred synchronous to the clock signal defined by the subsequent electronics.

The parameter memory in the EnDat encoder is used by B&R to store motor data (among other things). In this way, the ACOPOSmulti drive system is always automatically provided the correct motor parameters and limit values. This function is referred to as the "embedded parameter chip".

During startup, the plug-in module is automatically identified, configured and its parameters set by the ACOPOSmulti drive system's operating system.

EnDat 2.2 encoders with battery-backed multi-turn functionality:

With optional accessory set 8BXB000.0000-0, the module also supports encoders with battery-backed multi-turn functionality. These multi-turn encoders do not keep track of position information in the event of power failure. Battery voltage monitoring is handled by the encoder itself and enabled automatically. [1)]

The battery compartment is located behind the black cover on the front of ACOPOSmulti 8BVP power supply modules and ACOPOSmulti 8BVI inverter modules.

Information:

The 8BAC0120.001-2 EnDat 2.2 plug-in module is only permitted to be used in combination with B&R 8BCF EnDat 2.2 cables or B&R 8BCH hybrid motor cables!

1) B&R motors with EnDat 2.2 encoders with battery-backed multi-turn functionality are available under model numbers 8xxxxx.B1....

2 Order data

Model number	Short description	Figure
	Plug-in modules	
8BAC0120.001-2	ACOPOSmulti plug-in module, EnDat 2.2 interface	
	Required accessories	
	EnDat 2.2 cables	
8BCF0005.1221B-0	EnDat 2.2 cable, length 5 m, 4x 0.14 mm² + 4x 0.35 mm², 12-pin female springtec EnDat connector, 9-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCF0007.1221B-0	EnDat 2.2 cable, length 7 m, 4x 0.14 mm² + 4x 0.35 mm², 12-pin female springtec EnDat connector, 9-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCF0010.1221B-0	EnDat 2.2 cable, length 10 m, 4x 0.14 mm² + 4x 0.35 mm², 12-pin female springtec EnDat connector, 9-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCF0015.1221B-0	EnDat 2.2 cable, length 15 m, 4x 0.14 mm² + 4x 0.35 mm², 12-pin female springtec EnDat connector, 9-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCF0020.1221B-0	EnDat 2.2 cable, length 20 m, 4x 0.14 mm² + 4x 0.35 mm², 12-pin female springtec EnDat connector, 9-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCF0025.1221B-0	EnDat 2.2 cable, length 25 m, 4x 0.14 mm² + 4x 0.35 mm², 12-pin female springtec EnDat connector, 9-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	

Table 1: 8BAC0120.001-2 - Order data

3 Technical data

Model number	8BAC0120.001-2
General information	
Module type	ACOPOSmulti plug-in module
B&R ID code	0xB0BF
Slot [1]	Slots 1 and 2
Max. power consumption	P_{Module} [mW] = 500 mW + 19 V * $I_{Encoder}$ [mA] [2]
Certifications	
CE	Yes
KC	Yes
UL	cULus E225616 Power conversion equipment
Encoder connection [3]	
Module-side connection	9-pin male DSUB connector
Status indicators	UP/DN LEDs
Electrical isolation	
Encoder - ACOPOSmulti	No
Encoder monitoring	Yes
Max. encoder cable length	100 m Depends on the cross section of the power supply wires in the encoder cable [4]
Encoder power supply	
Output voltage	Typ. 12.5 V
Load capacity	350 mA
Protective measures	
Overload protection	Yes
Short circuit protection	Yes
Synchronous serial interface	
Signal transmission	RS485
Baud rate	6.25 Mbit/s
Environmental conditions	
Temperature	
Operation	
Nominal	5 to 40°C
Maximum	55°C
Storage	-25 to 55°C
Transport	-25 to 70°C
Relative humidity	
Operation	5 to 85%
Storage	5 to 95%
Transport	Max. 95% at 40°C

Table 2: 8BAC0120.001-2 - Technical data

1) The 8BAC0120.001-2 is an encoder module. Two encoder modules can also be connected. In this case, the encoder module in the first slot automatically serves as motor feedback for the first axis; the encoder module in the second slot serves as motor feedback for the second axis. In 1-axis mode, the second slot can be used for other purposes.
2) $I_{Encoder}$ ... Current consumption of the EnDat 2.2 encoder. The current consumption of the terminating resistors is already taken into account in the formula.
3) Only B&R 8BCF EnDat 2.2 cables are permitted to be used for wiring the module.

4) The maximum encoder cable length l_{max} can be calculated as follows (the maximum permissible encoder cable length of 100 m is not permitted to be exceeded):

$l_{max} = 7.9/I_G * A * 1/(2*\rho)$

I_G ... Max. current consumption of the encoder [A]
A ... Cross section of the power supply wires [mm²]
ρ ... Specific resistance [Ωmm²/m] (e.g. for copper: ρ = 0.0178)

4 Wiring

4.1 Pinout

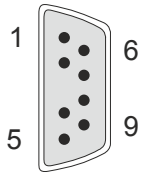
Figure	X11	Pin	Description	Function
		1	U+	Encoder power supply +12.5 V
		2	VBATT	Battery supply
		3	---	Keying
		4	D	Data input
		5	T	Clock output
		6	COM (1)	Encoder power supply 0 V
		7	COM (2)	Battery supply 0 V
		8	D\	Data input inverted
		9	T\	Clock output inverted

Table 3: EnDat 2.2 interface 8BAC0120.001-2 - Pinout

Danger!

The connections for the encoders are isolated circuits. These connections are therefore only permitted to be connected to devices or components that have sufficient isolation per IEC 60364-4-41 or EN 61800-5-1.

4.2 Input/Output circuit diagram

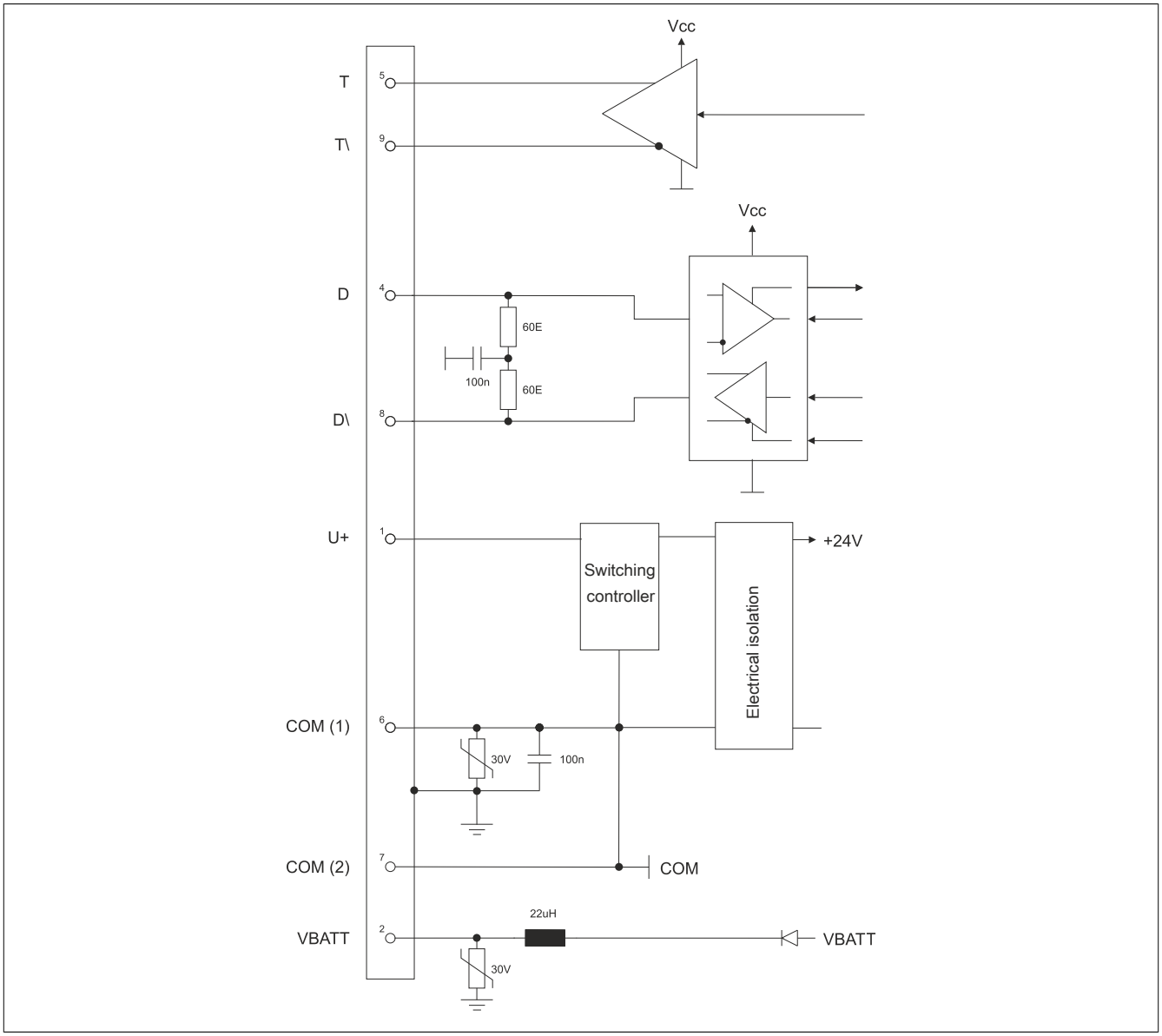


Figure 1: Input/output circuit diagram - EnDat 2.2 interface 8BAC0120.001-2

5 Status indicators

The indicators (LEDs UP/DN) are located on the front of the ACOPOSmulti drive or power supply module where the plug-in module is installed.

The UP/DN LEDs are lit depending on the rotational direction and the speed of the connected encoder. [2)]

UP LED ... indicates when the encoder position changes in the positive direction.
DN LED ... indicates when the encoder position changes in the negative direction.

6 Firmware

The firmware is part of the operating system for the ACOPOSmulti drive system. Firmware is updated by updating the ACOPOSmulti operating system.

2) The count direction of the encoder can be configured in Automation Studio. Changing the counting direction in Automation Studio does not change the actual counting direction of the encoder, however, and therefore has no effect on the UP/DN LEDs!