8BAC0120.000-1

1 General information

The EnDat 2.1 plug-in module 8BAC0120.000-1 can be used in an ACOPOSmulti slot. The module contains an EnDat 2.1 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 2.1 encoders:

EnDat 2.1 is a standard developed by Johannes Heidenhain GmbH (www.heidenhain.de) that combines the advantages of absolute and incremental position measurement and additionally provides a read/write parameter memory in the encoder. With absolute position measurement (the absolute position is sampled serially), a homing procedure for referencing is usually 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.

The incremental process allows the short deceleration periods necessary for position measurement when using drives with highly dynamic characteristics. With the sinusoidal incremental signal and the fine resolution in the EnDat 2.1 module, a very high positioning resolution is achieved in spite of the moderate signal frequencies used.

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.

2 Order data

Model number	Short description	Figure
	Plug-in modules	
8BAC0120.000-1	ACOPOSmulti plug-in module, EnDat 2.1 interface	
	Optional accessories	
	EnDat 2.1 cables	
8BCE0005.1111A-0	ACOPOSmulti EnDat 2.1 cable, length 5 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCE0007.1111A-0	ACOPOSmulti EnDat 2.1 cable, length 7 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCE0010.1111A-0	ACOPOSmulti EnDat 2.1 cable, length 10 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCE0015.1111A-0	ACOPOSmulti EnDat 2.1 cable, length 15 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCE0020.1111A-0	ACOPOSmulti EnDat 2.1 cable, length 20 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8BCE0025.1111A-0	ACOPOSmulti EnDat 2.1 cable, length 25 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	

Table 1: 8BAC0120.000-1 - Order data

3 Technical data

Model number	8BAC0120.000-1
General information	
Module type	ACOPOSmulti plug-in module
B&R ID code	0x22EF
Slot [1]	Slots 1 and 2
Power consumption	
Depends on connected encoder	Yes
E0 ... EnDat single-turn, 512 lines	Max. 4 W
E1 ... EnDat multi-turn, 512 lines	Max. 4 W
E2 ... EnDat single-turn, 32 lines (inductive)	Max. 4 W
E3 ... EnDat multi-turn, 32 lines (inductive)	Max. 4 W
E4 ... EnDat single-turn, 512 lines	Max. 4 W
E5 ... EnDat multi-turn, 512 lines	Max. 4 W
Certifications	
CE	Yes
KC	Yes
UL	cULus E225616 Power conversion equipment
Encoder inputs [2]	
Quantity	1
Module-side connection	15-pin male DSUB connector
Status indicators	UP/DN LEDs
Electrical isolation	
Encoder - ACOPOSmulti	No
Encoder monitoring	Yes
Max. encoder cable length	75 m
Sine/Cosine inputs	
Signal transmission	Differential signals, symmetrical
Signal frequency (-3 dB)	DC up to 300 kHz
Signal frequency (-5 dB)	DC up to 400 kHz
Common-mode voltage	Max. ±7 V
Terminating resistor	120 Ω
Resolution	12-bit
Encoder power supply	
Output voltage	5 V ±5%
Load capacity	250 mA [3]
Sense lines	2, compensation of max. 2x 0.7 V
Position	
Resolution @ 1 V_{SS} [4]	Number of encoder lines * 5700
Synchronous serial interface	
Signal transmission	RS485
Data transfer rate	781.25 kbit/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: 8BAC0120.000-1 - Technical data

1) The 8BAC0120.000-1 is an encoder module. Up to two encoder modules can 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) The EnDat encoder must be wired using a cable with a single shielding layer.
3) An additional reserve of 57 mA is available for terminating resistors.
4) This value does not correspond to the encoder resolution that must be configured in Automation Studio (16384 * number of encoder lines).

4 Wiring

4.1 Pinout

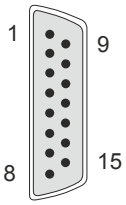
Figure	X11	Pin	Description	Function
		1	A	Channel A
		2	COM	Encoder power supply 0 V
		3	B	Channel B
		4	+5 V	Encoder power supply +5 V
		5	D	Data input
		6	---	---
		7	T+	Temperature sensor +
		8	T	Clock output
		9	A\	Channel A inverted
		10	Sense COM	Sense input 0 V
		11	B\	Channel B inverted
		12	Sense +5 V	Sense input +5 V
		13	D\	Data inverted
		14	T-	Temperature sensor -
		15	T\	Clock output inverted

Table 3: EnDat 2.1 interface 8BAC0120.000-1 - 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.

Warning!

Temperature sensors are only permitted to be connected to T+ and T- on an ACOPOSmulti plug-in module under the following conditions:

- **The ACOPOSmulti plug-in module is connected in SLOT1 of an ACOPOSmulti module and no temperature sensor is connected to connectors X4A/T+ and X4A/T- of this ACOPOSmulti module.**
- **Only for 8BVIxxxxHxD0.xxx-x inverter modules:**
  The ACOPOSmulti plug-in module is connected in SLOT2 of an ACOPOSmulti module and no temperature sensor is connected to connectors X4B/T+ and X4B/T- of this ACOPOSmulti module.

Otherwise, the temperature monitoring functions on the ACOPOSmulti module may become ineffective, which in extreme cases can cause the hardware (e.g. motors) connected to the ACOPOSmulti module to be destroyed!

4.2 Input/Output circuit diagram

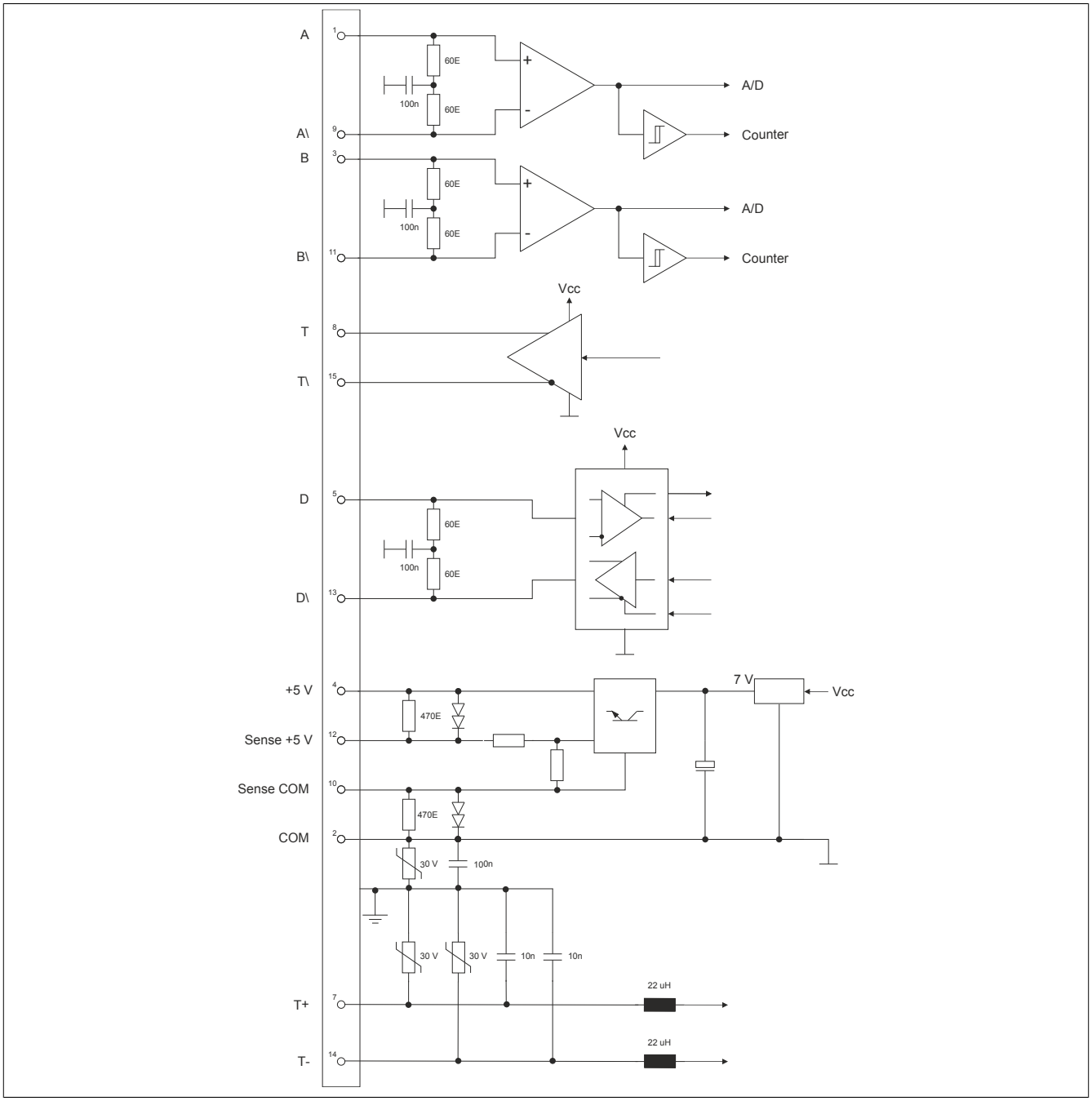


Figure 1: Input/output circuit diagram - EnDat 2.1 interface 8BAC0120.000-1

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. [1)]

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.

1) 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!