8AC120.60-1

1 General information

The AC120 plug-in module has an EnDat 2.1 encoder interface but can also be used to evaluate simple incremental encoders with a sinusoidal output signal. [1)]

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 or shorted lines as well as encoder supply failures.

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

EnDat 2.1 encoder:

EnDat 2.1 is a standard developed by Johannes Heidenhain GmbH (www.heidenhain.de) that incorporates the advantages of absolute and incremental position measurement and also offers 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 delay times necessary for position measurement on drives with exceptional dynamic properties. With the sinusoidal incremental signal and the fine resolution in the EnDat 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 ACOPOS drive system is always automatically provided the correct motor parameters and limit values. This is referred to as the "embedded parameter chip".

Incremental encoder with sine formed output signal:

When using the AC120 plug-in module to evaluate simple incremental encoders with an sinusoidal output signal, only the incremental transfer channel is used. The "embedded parameter chip" it not available in this case because this encoder does not have parameter memory. The absolute position is also not available immediately after switching the device on. In this situation, a homing procedure normally has to be carried out. The module is equipped with a reference pulse input for this purpose.

1) Starting with revision F0.

2 Order data

Model number	Short description	Figure
	Plug-in modules	
8AC120.60-1	ACOPOS plug-in module, EnDat encoder and sine incremental encoder interface	
	Optional accessories	
	EnDat 2.1 cables	
8CE005.12-1	EnDat 2.1 cable, length 5 m, 10x 0.14 mm² + 2x 0.5 mm², Intercontec 17-pin female EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8CE007.12-1	EnDat 2.1 cable, length 7 m, 10x 0.14 mm² + 2x 0.5 mm², Intercontec 17-pin female EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8CE010.12-1	EnDat 2.1 cable, length 10 m, 10x 0.14 mm² + 2x 0.5 mm², Intercontec 17-pin female EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8CE015.12-1	EnDat 2.1 cable, length 15 m, 10x 0.14 mm² + 2x 0.5 mm², Intercontec 17-pin female EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8CE020.12-1	EnDat 2.1 cable, length 20 m, 10x 0.14 mm² + 2x 0.5 mm², Intercontec 17-pin female EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	
8CE025.12-1	EnDat 2.1 cable, length 25 m, 10x 0.14 mm² + 2x 0.5 mm², Intercontec 17-pin female EnDat connector, 15-pin male DSUB servo connector, can be used in cable drag chains, UL/CSA listed	

Table 1: 8AC120.60-1 - Order data

3 Technical data

Product ID	8AC120.60-1
General information	
Module type	ACOPOS plug-in module
B&R ID code	0x0FCC
Slot [1]	Slots 2, 3 and 4
Power consumption	
Depends on the encoder connected	Yes
E0 ... EnDat single-turn, 512 lines	Max. 2.3 W
E1 ... EnDat multi-turn, 512 lines	Max. 3.1 W
E2 ... EnDat single-turn, 32 lines (inductive)	Max. 3.1 W
E3 ... EnDat multi-turn, 32 lines (inductive)	Max. 3.1 W
E4 ... EnDat single-turn, 512 lines	Max. 2.4 W
E5 ... EnDat multi-turn, 512 lines	Max. 2.7 W
E8 ... EnDat single-turn, 16 lines (inductive)	Max. 2.9 W
E9 ... EnDat multi-turn, 16 lines (inductive)	Max. 3.1 W
EA ... EnDat single-turn, 32 lines (inductive)	Max. 2.7 W
EB ... EnDat multi-turn, 32 lines (inductive)	Max. 3.0 W
Certification	
CE	Yes
cULus	Yes
KC	Yes
Encoder inputs	
Quantity	1
Module-side connection	15-pin female DSUB connector
Status indicators	UP/DN LEDs
Electrical isolation	
Encoder - ACOPOS	No
Encoder monitoring	Yes
Max. encoder cable length	50 m [2]
Encoder supply	
Output voltage	Typ. 5 V
Load capability	250 mA [3]
Sense lines	2, compensation of max. 2x 0.7 V
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
Differential voltage	0.5 to 1.25 V_{ss}
Common-mode voltage	Max. ±7 V
Terminating resistor	120 Ω
Resolution [4]	16384 * number of encoder lines
Precision [5]	-

Table 2: 8AC120.60-1 - Technical data

Product ID	8AC120.60-1
Reference input	
Signal transmission	Differential signal, symmetrical
Differential voltage for low	≤ -0.2 V
Differential voltage for high	≥ +0.2 V
Common-mode voltage	Max. ±7 V
Terminating resistor	120 Ω
Serial interface	
Signal transmission	Synchronous
Protocol	RS485
Baud rate	625 kbaud
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: 8AC120.60-1 - Technical data

1) The AC120 is a single encoder module. It is also possible to insert multiple encoder modules. In this case, the encoder module in the slot with the lowest number is automatically used for motor feedback.
2) Requirements: The encoder is cabled using a shielded cable that has a wire cross section of at least 0.14 mm² for all signal lines and a wire cross section of at least 0.5 mm² for all encoder supply lines. The sense lines must be used.
3) This value only applies to the encoder. The actual load capacity of the encoder supply is approx. 300 mA. The difference of approx. 50 mA covers the consumption of the terminating resistors, which are always present. For longer encoder cables, it is important to note that the maximum voltage drop permitted on the supply wires (there and back) is 1.45 V. This can reduce the permissible load current.
4) Only a part of the resolution of the connected encoder can be used in practice. The usable resolution can be further reduced by signal interference from the connected encoder.
5) In practice, the precision is limited by the encoder.

4 Status indicators

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

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

The faster the encoder position changes, the brighter the respective LED is lit.

5 Firmware

The firmware is part of the operating system for the ACOPOS servo drives. Firmware is updated by updating the ACOPOS operating system.

6 Wiring

6.1 Pinout

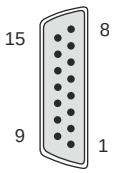
Figure	X11	Pin	Name	Function	
				EnDat mode	Incremental mode
		1	A	Channel A	
		2	COM (1, 3 - 9, 11, 13 - 15)	Encoder supply 0 V	
		3	B	Channel B	
		4	+5V out / 0.25A	Encoder supply +5 V	
		5	D	Data input	---
		6	---	---	
		7	R\	---	Reference pulse inverted
		8	T	Clock output	---
		9	A\	Channel A inverted	
		10	Sense COM	Sense input 0 V	
		11	B\	Channel B inverted	
		12	Sense +5V	Sense input +5 V	
		13	D\	Data inverted	---
		14	R	---	Reference pulse
		15	T\	Clock output inverted	---

Table 3: AC120 EnDat encoder interface - 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 in accordance with IEC 60364-4-41 or EN 61800-5-1.

6.2 Input/Output circuit diagram

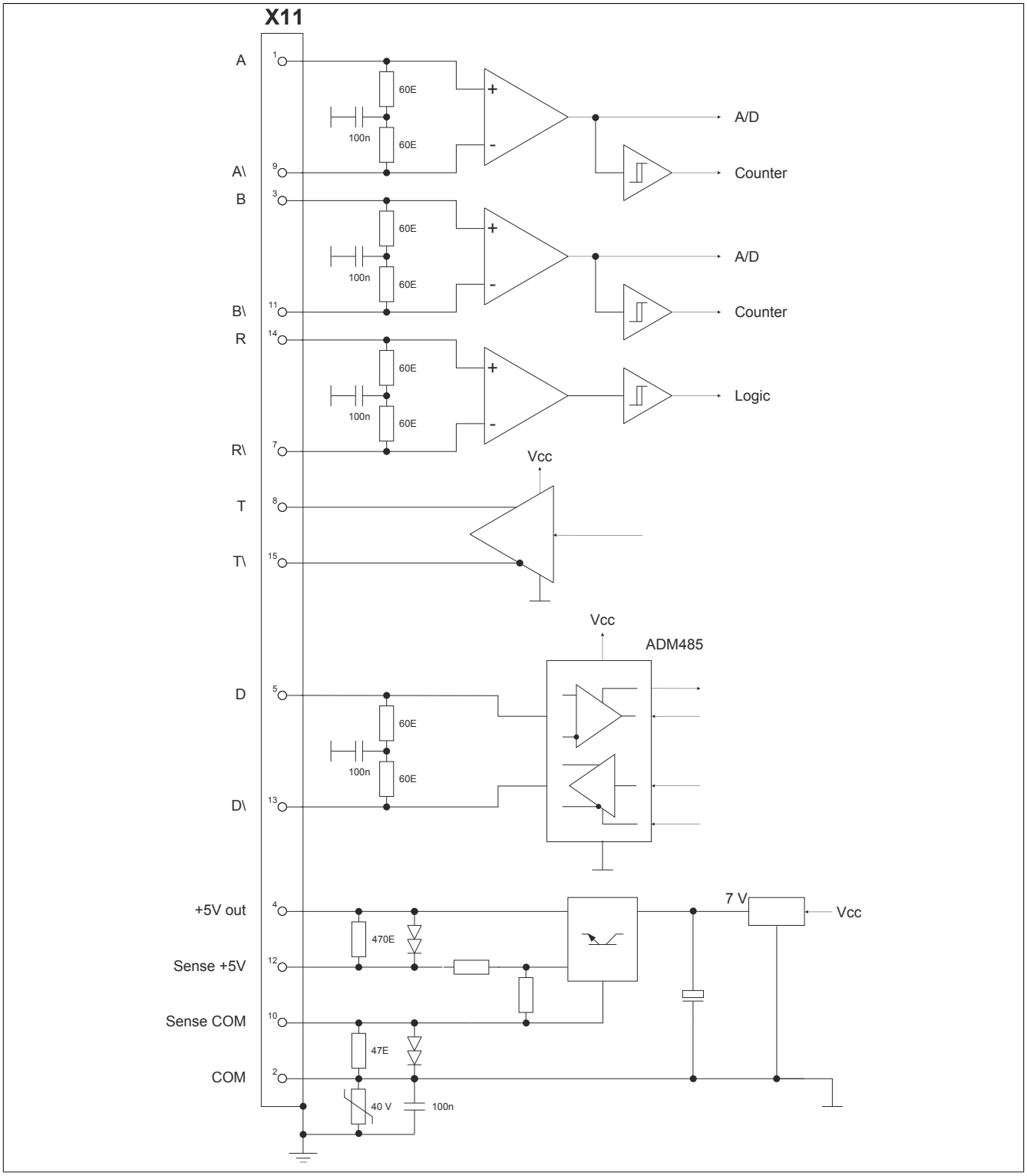


Figure 1: AC120 - Input/Output circuit diagram