

B-RS, B-RS/A

RS485/RS232 Communication Separator B-RS, B-RS/A



B-RS, B-RS/A

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1 Device Description

1.1 Product Identification

Business name: B-RS, B-RS/A
Name of product: RS485/RS232 Communication Separator
Product drawing number: KP 115 (KP 115 Mod. A)

1.2 Device Functions

B-RS (B-RS / A) communication separator is a safety separation barrier for RS485 / RS232 communication line of the following devices:

- Corus Evo+



Attention!

From the point of view of use in potentially explosive atmospheres, the communication separator is designed as an associated apparatus, which must be placed outside the hazardous area during operation.

The purpose of the communication separator is to create an interface between intrinsically safe circuits (equipment placed in a potentially explosive atmosphere) and other circuits that are placed outside the hazardous area. The device performs function of an intrinsically safe separator for the communication circuits of the corrector. Its use makes it possible to easily connect common devices for reading / writing data via RS485 or RS232 communication (PC, PCL, external modem etc.) to intrinsically safe corrector.

The B-RS (B-RS/A) communication separator is powered by 12 V DC.

The communication separator is placed in a plastic box and is designed for mounting on a distribution board on a 35 mm DIN rail. Terminals for conductors with a maximum cross-section size of 2.5 mm² are used for connecting the conductors.

The communication separator is manufactured in two versions: in B-RS basic version and B-RS/A for powering the separator from accumulator only.

1.3 Description of Operation and the Equipment Design

The separator contains interference protection elements and protection against polarity reversal of the power supply.

For connection to intrinsically safe communication terminals of the corrector, the communication separator is equipped with an intrinsically safe RS485 / RS232 interface. Only one of them, either RS485 or RS232, can be used to connect to the corrector. These interfaces also include terminals to which the power voltage of the internal IS power voltage is connected (terminals U + and GND for RS485, and terminals CTS and GND for RS232). This IS supply voltage is used to power the conversion circuits of the corrector, which are galvanically isolated from the other circuits of the corrector. If the separator is used to connect an external modem, it is preferable to use the RS232 IS interface to connect the corrector.

**Recommendations:**

1. To connect the B-RS module (B-RS/A) to the EVC, we recommend using the RS485 communication interface over the RS232 interface for better current consumption and the possibility of using a longer connection cable.
2. If an external communication modem is connected to the EVC, an RS232 communication interface is required to connect the device with the B-RS (B-RS/A) barrier to ensure full duplex communication.

For connecting a communication device (PC, PCL, modem, etc.) to the communication separator, the separator is also equipped with an RS485 / RS232 interface. Again, only one of them can be used, i.e. either RS485 (terminals D +, D-, GND) or RS232 (terminals GND, TxD, RxD, RTS). The separator allows the following conversion between the IS interfaces and the standard interfaces RS485 and RS232:

Intrinsically safe communication interface	Standard communication interface	
	RS485	RS232
RS485	yes	yes
RS232	no	yes

Tab. 4 The options of conversion between the communication interfaces of B-RS separator

The communication separator is a signal-transparent device, i.e. the communication signals passing through this separator do not change their properties (the communication protocol used, and the communication speed used are retained). The range of available communication speeds and other parameters are provided in Section. 4.

The B-RS (B-RS/A) separation module contains no adjustment elements.



Fig. 17 B-RS, B-RS/A designs

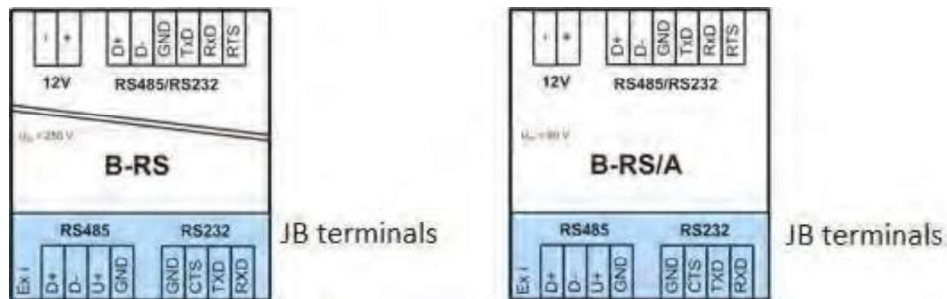


Fig. 18 Schematic symbols

1.3.1 B-RS Design

The basic version of the separator is intended for systems whose power is derived from the mains voltage ($U_m = 250V$). The B-RS can be powered, for example, from a non-backed-up power supply or from an accumulator backed-up power supply, a rechargeable mains charger, etc.

The communication separator B-RS in the basic version contains galvanic separation between the input and intrinsically safe output circuit.

1.3.2 B-RS/A Design

The B-RS/A separator design has reduced internal current consumption compared to the basic version. It is suitable for accumulator-only powered systems which can be recharged via solar panels ($U_m = 60 V$).

This power supply design has no galvanic separation between the input and intrinsically safe output circuits (negative input and output terminals are interconnected).

**Attention!**

The B-RS/A communication separator must not be powered from 230V mains voltage. Also, it must not be powered by an accumulator charged by a mains charger.

1.3.3 Activity Indication

On the front panel of the communication separator, four indication LEDs are placed.

LED Designation	Color	State	Meaning
PWR	Green	Lit	The module is powered
		Not lit	The module is not powered
TxD RxD RTS ↓ ↑ ↓ RxD TxD CTS	Yellow (3 pcs)	Flashes	Indicates the direction of the signal transmission TxD and the arrival of RTS signal from PC

2 Safety

2.1 General

From the safety point of view, the communication separator has been designed according to ČSN EN 60079-0 ed.4: III. 2013 and ČSN EN 60079-11 ed.2: VI. 2012 as an associated apparatus.

It is manufactured and supplied in accordance with the following European Parliament directives:

- 2014/34/EU(ATEX) Equipment and protective systems intended for use in potentially explosive atmospheres (NV 116/2016 Coll.)
- 2014/30/EU Electromagnetic Compatibility (NV 117/2016 Coll.)

The device is placed on the market and in use according to the above-mentioned directives with the CE mark affixed.

The device meets the requirements for radio interference emissions for industrial environments.

An EC Type Examination Certificate (ATEX) has been issued for use as an associated apparatus placed outside the potentially explosive atmospheres. Compliance with this Directive is included in the CE conformity marking.

FTZÚ 19 ATEX 0046	EU type-examination certificate (ATEX) for use in potentially explosive atmospheres.
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ATTENTION!

The device has been designed and approved as an associated apparatus. This means that only approved intrinsically safe equipment complying with intrinsic safety parameters specified in the EC-Type Examination Certificate may be connected to the instrument's intrinsically safe terminals.

During operation, the associated apparatus must be placed outside the potentially explosive atmospheres.



DANGER!

The device must be installed and used in accordance with this documentation and the conditions stated in the ATEX certificate.

When connecting the device, the relevant safety standards must be observed.

2.2 Using the Device in Potentially Explosive Atmospheres

Explosion Safety Level	Device
II (1)G [Ex ia Ga] IIB	<ul style="list-style-type: none"> - B-RS Design, Um = 250V - B-RS/A Design, Um = 60 V

When connecting the device, the electrical characteristics of the connecting cables must be considered and the requirements of the relevant safety standards met. Additionally, the Special conditions for Use must be observed, if listed in these Certificates. The explosion safety parameters of the device are specified in Section 5.

2.3 Specific Conditions of Use



CAUTION!

1. The B-RS/A module has no galvanic separation between intrinsically safe and conventional circuits. This must be taken into account during installation.
2. The B-RS/A module must not be powered from sources whose voltage is derived from 230 V mains voltage. It must also not be powered by an accumulator that is also charged by the mains charger.

3 Installing the Device

The device must be installed out of potentially explosive atmospheres. The device is intended for installation on a distribution board on a 35 mm DIN rail.

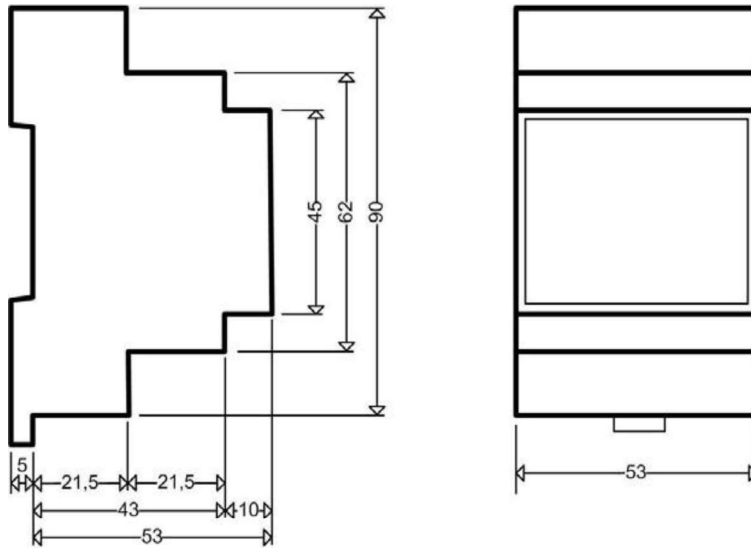


Fig. 19 Dimensions of the device (mm)

The communication separator must be powered from 12V DC power supply. If the DC power supply is supplied from the mains, it is necessary to install the 3rd stage overvoltage protection with a HF filter before the supply.

3.1 RS232/RS485 Communication Connection

Corus Evo+ - must be equipped with communication module S1-COM1. The module must be fitted in SLOT 1 and/or SLOT 2. The module offers RS232 or RS485 communication interface. Two S1-COM1 communication modules can be installed in the device. In that case, communication on two completely independent communication lines is possible, and the B-RS must be used for each line separately. The cable extended from the communication separator is connected to SLOT 1 or SLOT 2 terminal.

SLOT 1, SLOT 2	RS232	RS485
Terminal	Signal	Signal
1	---	D1+
2	---	D1-
3	GND	GND
4	CTS	U1+
5	RxD	---
6	TxD	---

Tab. 5 Assignment of terminal blocks SLOT 1 and SLOT 2 when fitted with S1-COM1 module

Note:

If the S4-COM0 internal module, which has an RS232 interface, is installed in the corrector for communication, the cable from the separator is connected directly to the terminals placed on this module.

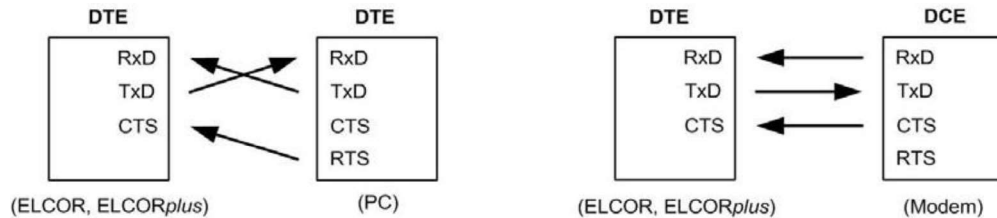
3.1.1 Note on connecting communication devices via RS232 interface

In terms of data transmission, two types of devices can be distinguished: DTE - Data terminal Equipment and DCE - Data Communication Equipment.

Corus Evo+ is a DTE devices.

Depending on whether a device of the same type (i.e. DTE) or a DCE-type device is used, either a cross or a direct connection is used. For example, a PC is a DTE device, a modem is a DCE device.

Generally (RS232 interface):



Corus Evo+ is connected via external module B-RS, B-RS/A. This communication module includes an internal signal crossing. Therefore, connecting to a PC and modem will be as follows:

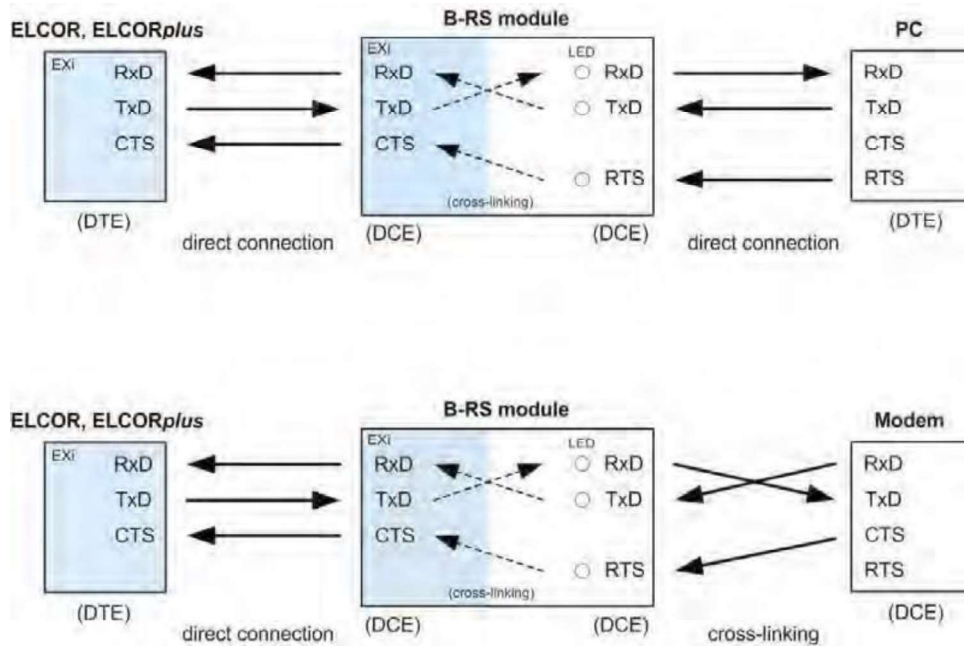


Fig. 20 Principle of connection with PC and external modem via B-RS module

3.2 Cabling

The cable between the corrector and the communication separator transmits the IS signal and must be shielded. The cable shield is connected on the corrector side, the shield remains unconnected on the B-RS (B-RS/A) communication separator side.

The recommended type of jumper cable between the corrector and the communication separator and its maximum length is shown in the following table.

Communication interface	Cable designation	Type	Inductance	Capacity	Conductor resistance	Manufacturer	Max. length
RS232	Unitronic LiYCY 4 x 0.34 mm ²	4-wire shielded	0.65 mH/k m	160 nF/km	59 Ω/km	Lappkabel Stuttgart	/
RS485	Unitronic LiYCY 4 x 0.34 mm ²	4-wire shielded	0.65 mH/k m	160 nF/km	59 Ω/km	Lappkabel Stuttgart	100 m


Tab. 6 Cable recommended for RS232 and RS485 between the corrector and the separator.

4 Technical Parameters

4.1 Operation Conditions and the Environment

Operating ambient temperature	-40 to +70°C
Working environment	Normal environment (ČSN 33 2000-5-51 ed. 3)
IP rating	IP 20 (ČSN EN 60 529)
The device design in terms of protection against electric shock	Class III protection equipment (ČSN EN 61140 ed. 3)
Relative humidity of the environment	0% to 95% relative, non-condensing
Air pressure	86 kPa to 106 kPa
External dimensions	53 x 90 x 58 mm
Device weight	130 g (B-RS) / 121 g (B-RS/A)
Mount	On 35mm DIN rail

4.2 Explosion-proof Design

Designation	 II (1)G [Ex ia Ga] IIB
Certificate no.	FTZÚ 19 ATEX 0046
Max. voltage value Um	250 V (B-RS design) 60 V (B-RS/A design)
Environment classification	Out of potentially explosive atmospheres

4.3 Power Supply (12V terminals)

Supply voltage range	10.5 to 15 V
Current consumption (idle) ¹	Type 14 mA at 14 V (B-RS) Type 8 mA at 12 V (B-RS/A)
Max. current consumption ²	34 mA (B-RS) 29 mA (B-RS/A)
Max. cable length	30m

4.4 Port RS485

Interface type	RS-485
Baud rate	2.4 kBd to 115.2 kBd

¹ Except for the power supply, no external circuits are connected to the separator terminals.

² RS232 device is connected to RS485 / RS232 terminals, RTS signal is active, terminals U + and GND of intrinsically safe RS485 port are shorted.

Accessories for Corus Evo+

B-RS, B-RS/A 6 Product Data Plate

Max. cable length	1,200m (at 38.4 kBd) (for cable lengths over 100m, a 120 Ω resistor is required at both ends of the cable)
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4.5 Port RS232

Interface type	RS-232
Baud rate	2.4 kBd to 115.2 kBd
Max. cable length	30m

4.6 Port RS485 (Intrinsically Safe)

Interface type	RS-485
Baud rate	2.4 kBd to 115.2 kBd
U + terminal voltage against GND	Type 5.0 V
U+ terminal short circuit current	Type 19.9 mA
Max. cable length	100 m ³
Galvanic separation	1,500 V (B-RS design only)

4.7 Port RS232 (Intrinsically Safe)

Interface type	RS-232
Baud rate	2.4 kBd to 115.2 kBd
Max. cable length	30m ³
Galvanic separation	1,500 V (B-RS design only)

³ The inductance and cable capacity (depending on the length and type of the cable used) must comply with the explosion-proof parameters of the system.

5 Explosion Safety Parameters

Intrinsically safe parameters are based on parameters of IS power supply, which is of trapezoidal characteristics.

5.1 Parameters for RS485 IS Terminals

Maximum output voltage	U _o :	7.2 V
Maximum voltage before limiting resistor	U _o :	11.12 V
Maximum output current	I _o :	109 mA
Maximum output power	P _o :	303 mW
Maximum external capacity	C _o :	18 µF (for gas group IIB)
Maximum external inductance	L _o :	1.2 mH (for gas group IIB)
Maximum internal capacity	C _i :	6 µF
Maximum internal inductance	L _i :	0 µH

5.2 Parameters for RS232 IS Terminals

Maximum output voltage	U _o :	20 V
Maximum voltage before limiting resistor	U _o :	11.12 V
Maximum output current	I _o :	109 mA
Maximum output power	P _o :	303 mW
Maximum external capacity	C _o :	1.18 µF (for gas group IIB)
Maximum external inductance	L _o :	120 mH (for gas group IIB)
Maximum internal capacity	C _i :	220 nF/km
Maximum internal inductance	L _i :	0 µH

6 Product Data Plate

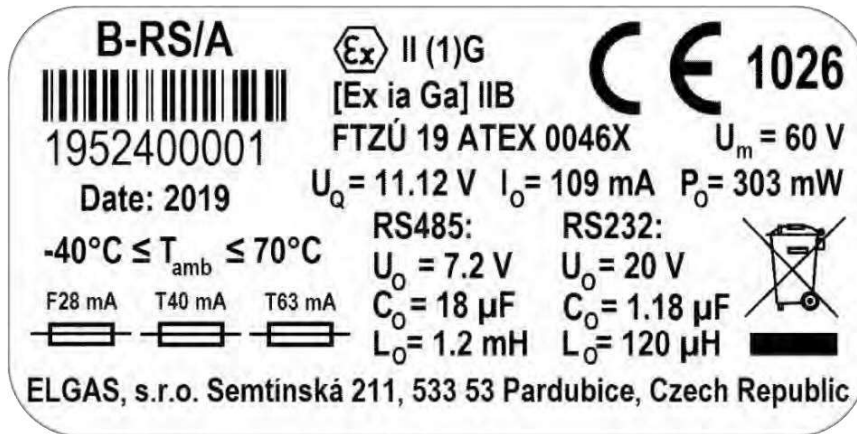
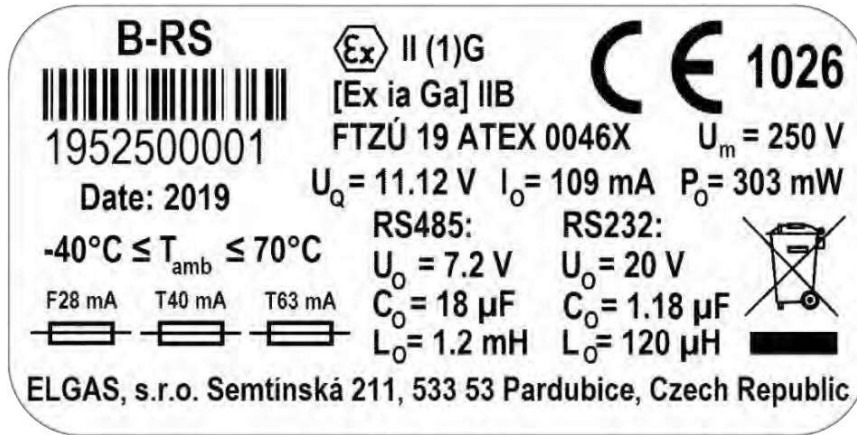


Fig. 21 Data Plates

7 Device Wiring Diagrams

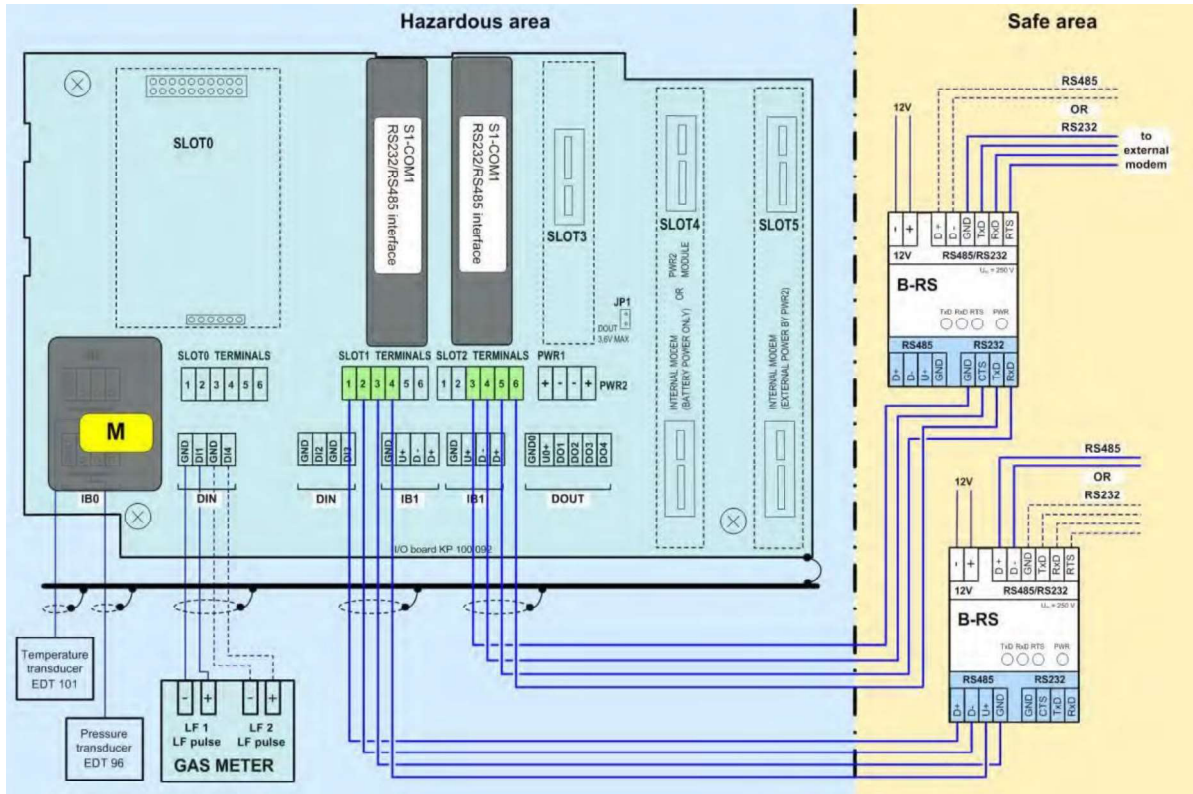


Fig. 24 Corus Evo+, communication via two independent interfaces RS232/RS485

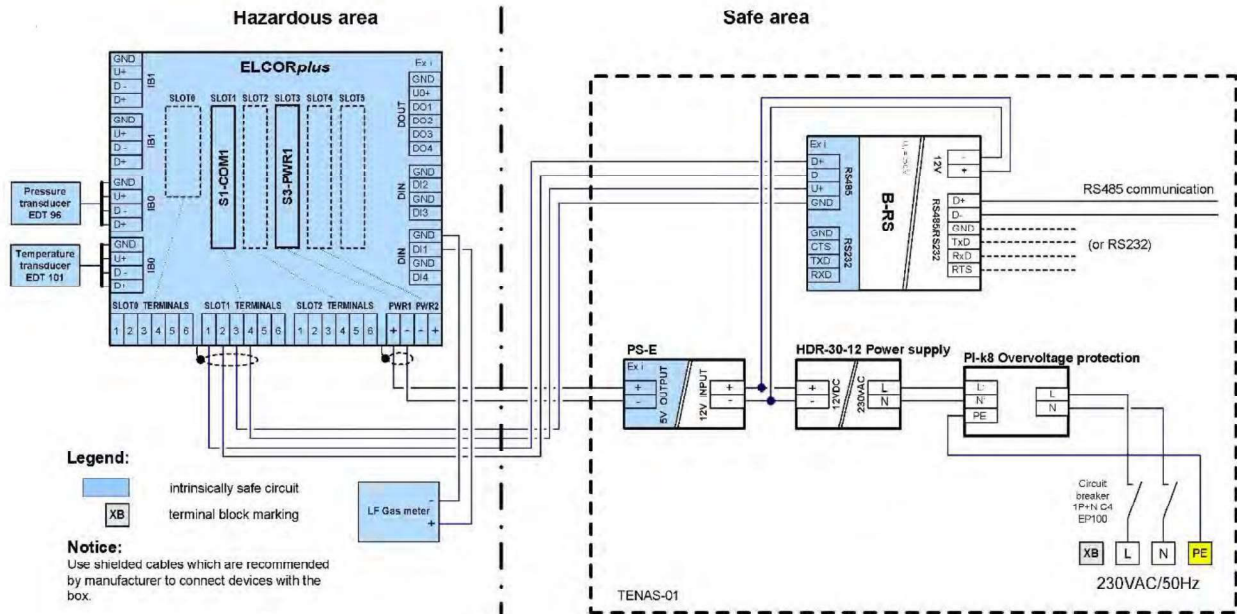


Fig. 25 Connection of Corus Evo+ with B-RS via RS485

Accessories for Corus Evo+

B-RS, B-RS/A 7 Device Wiring Diagrams

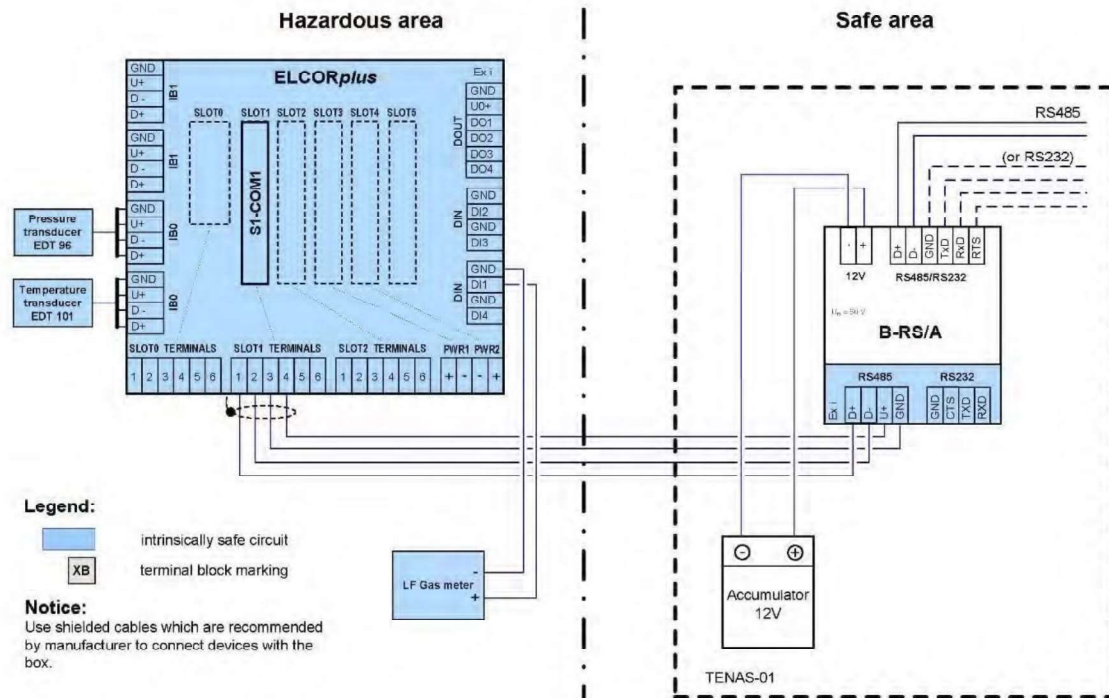


Fig. 26 Example connection with B-RS/A

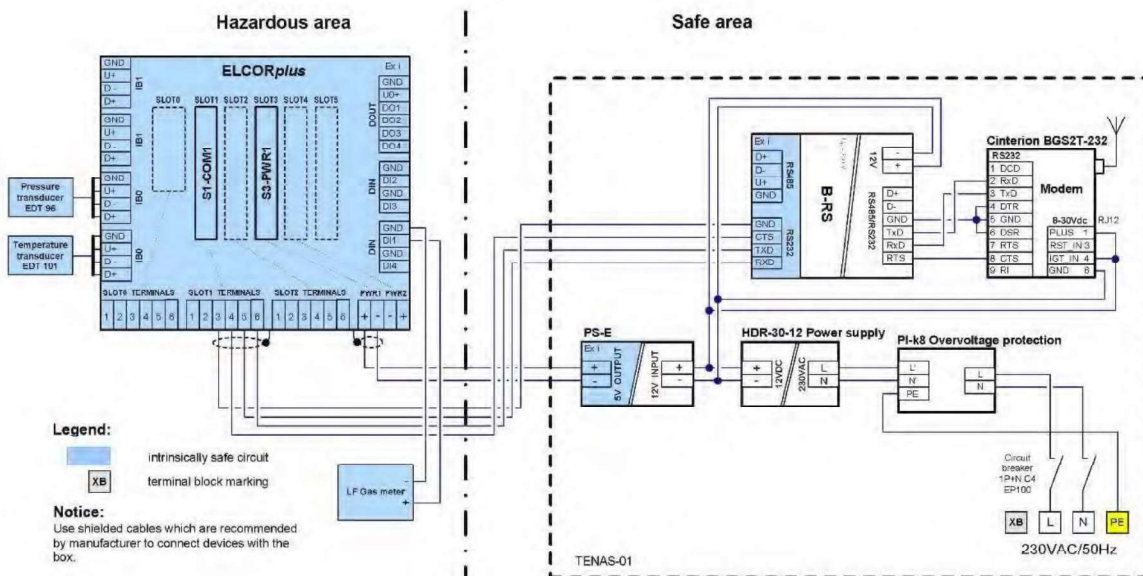


Fig. 27 Example connection of Corus Evo+ via RS232 to external modem