PCD1.A2000-A20

E-Line S-Serie RIO 6Rel 16A

The S-Serie E-Line RIO modules are controlled via the RS-485 serial communication protocols S-Bus and Modbus for decentralised automation using industrial quality components. The data point mix is specifically designed for building automation applications.
The compact design according to DIN EN 60715 TH35 enables the use in electrical distribution boxes even in the most confined spaces. Installation and maintenance are facilitated by the local manual override for each output. Remote maintenance is also possible using the access to the manual override by the web interface in the Saia PCD® controller. Programming is very efficient and fast using a complete FBox library with web templates for S-Bus. Individual programs may directly access the data points via Registers and Flags, a complete documentation is available from this data sheet.

Features

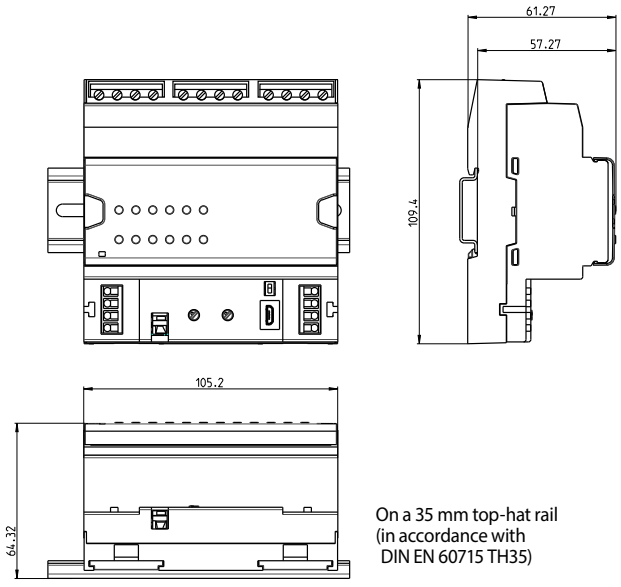
- S-Bus protocol optimized for fast data exchange
- Modbus protocol for integration in multi-vendor installations*
- Local override operating level via web panel or buttons on the module
- Easy programming using the FBox library and web templates
- Industrial hardware in accordance with IEC EN 61131-2
- Pluggable terminal blocks
- Bridge connectors for power supply and communication
- Bus termination on board
- Configurable Bi-Color LEDs and labelling for I/Os

* By default the module is working in S-Bus Data Mode with Autobaud detection.
To configure Modbus the Windows based Application "E-LineApp" is required.

General technical data

Power supply	
Supply voltage	24 VDC, –15/+20% max. incl. 5% ripple (in accordance with EN/IEC 61131-2)
Power consumption	1.2 … 3 W
Power supply bridge	24 VDC, 5 A max., up to 40 modules
Interfaces	
Communications interface	RS-485 Baud rate: 9,600, 19,200, 38,400, 57,600, 115,200 bps (Autobauding) Micro USB, Type B
Address switch	Two rotary switches 0 … 9 Address range 0 … 98
Bus termination	Integrated switch to activate and inactivate resistor termination
General data	
Ambient temperature	Operation: 0 … +55 °C Storage: –40 … +70 °C
Protection class	IP 20
Package	Single carton package with 1 Module incl. terminal blocks, 1 bridge connector

Dimensions and installation

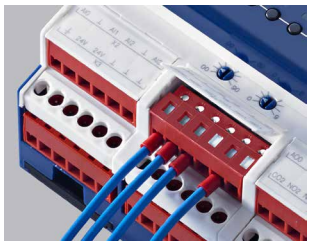


On a 35 mm top-hat rail
(in accordance with
DIN EN 60715 TH35)

Housing width 6 HP (105 mm)
Compatible with electrical control cabinet
(in accordance with DIN 43880, size 2 × 55 mm)

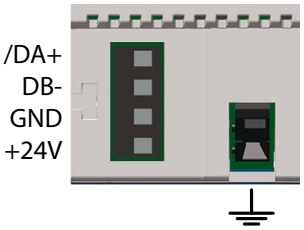
Terminal technology

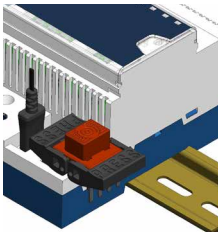
Push-in spring terminals enable wiring with rigid or flexible wires with a diameter up to 1.5 mm^2. A max. of 1 mm^2 is permitted with cable end sleeves.



Connection concept

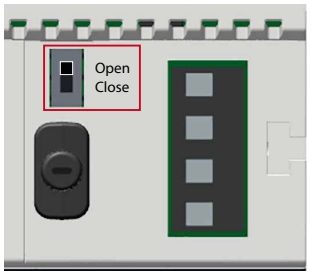
For easy installation the power supply and communication bus is available together at one connector. The push-in spring terminals enable wiring as well support the connector bridge.





Bus termination

The module provides an active bus termination. It is switched off by factory default. To enable the termination, the switch need to be in the “Close” position.

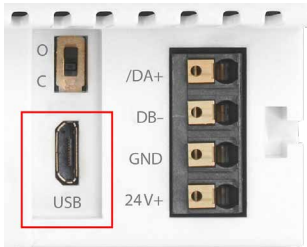


Status LED

OFF	No Power
Green	Communication OK
Green blink	Auto bauding in progress
Orange	No communication
Red	Error
Red/Green alternate	Booter mode (e.g. during Firmware download)
Red bink	Internal fatal error

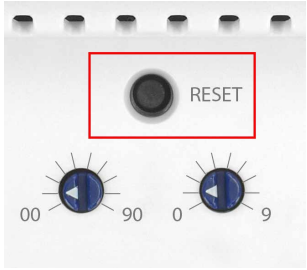
Service interface

The USB interface provides access to the Modbus configuration. Firmware updates can also be downloaded via Saia®PG5 Firmware Download tool.



Reset button

Pushed at power up: Module stays in Boot mode.
Pushed over 5 seconds: Reset to factory default.

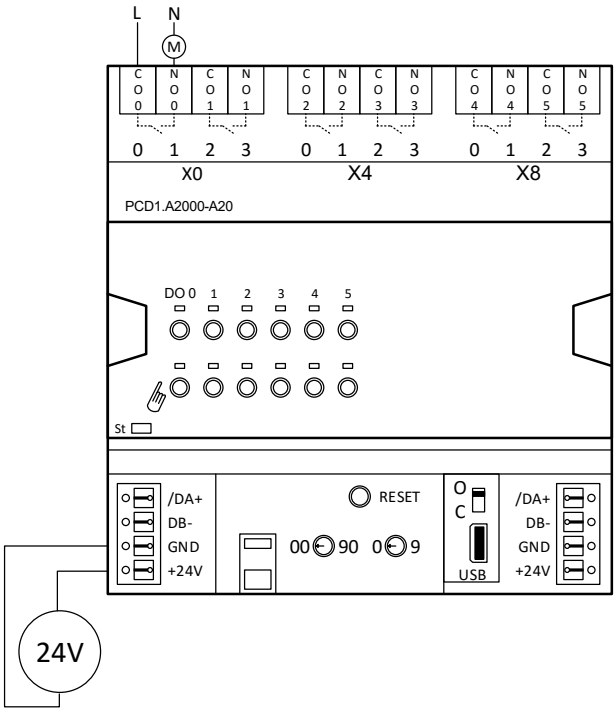


Output configuration

Relays

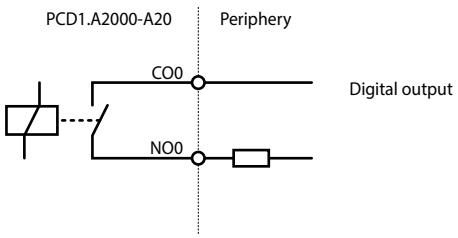
Number	6, normally open			
Relay type make	RTS3T024, SCHRACK			
Max. switching voltage	250 VAC / 30 VDC			
Max. switching current	16 A 250 VAC (AC1, DC1)			
Inrush current	165 A / 20 ms inrush peak current			
Contact lifetime	Contac t ratings			
	Type	Contact	Load	Cycles
	IEC 61810			
	RTS3T	A (NO)	16 A, 250 VAC, resistive, 85 °C	5×10^3
	UL 508			
	RTS3T	A (NO)	2 A, 480 VAC, magentic ballast, 80 °C	10×10^3
	RTS3T	A (NO)	2 A, 480 VAC, magentic ballast, 80 °C	10×10^3 *
	RTS3T	A (NO)	3 A, 250 VAC, magentic ballast, 80 °C	15×10^3
	RTS3T	A (NO)	4 A, 250 VAC, magentic ballast, 80 °C	15×10^3
	* Special test conditions avaiable on request			
Switching delay	Timing response: 10 ms under 24 VDC			
Relay coil supply	Internally provided (Power Supply of the module)			
Module power supply	The power supply to be able to switch correctly the relays up to 85°C is recommended between 21.6 V … 32 V. 20 °C : 17,0 … 32 VDC 30 °C : 18,0 … 32 VDC 40 °C : 18,6 … 32 VDC 50 °C : 19,2 … 32 VDC			
Manual operation	Local override operation by buttons			
Limitation	The isolation between two adjacent relays will not be big enough to switch two different phases of 230 VAC. It will be possible to switch 230 V & 24 V on the same module but it must have one relay free between 230 V & 24 V.			

Assignment overview

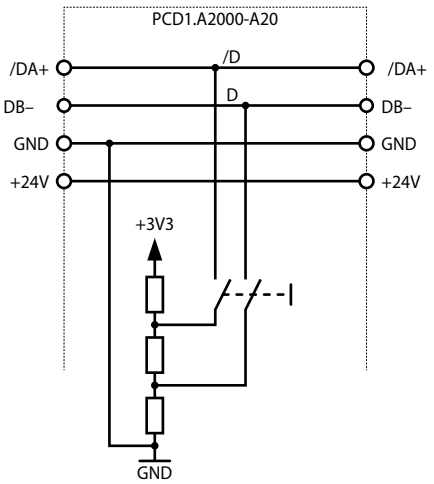


Connection diagrams

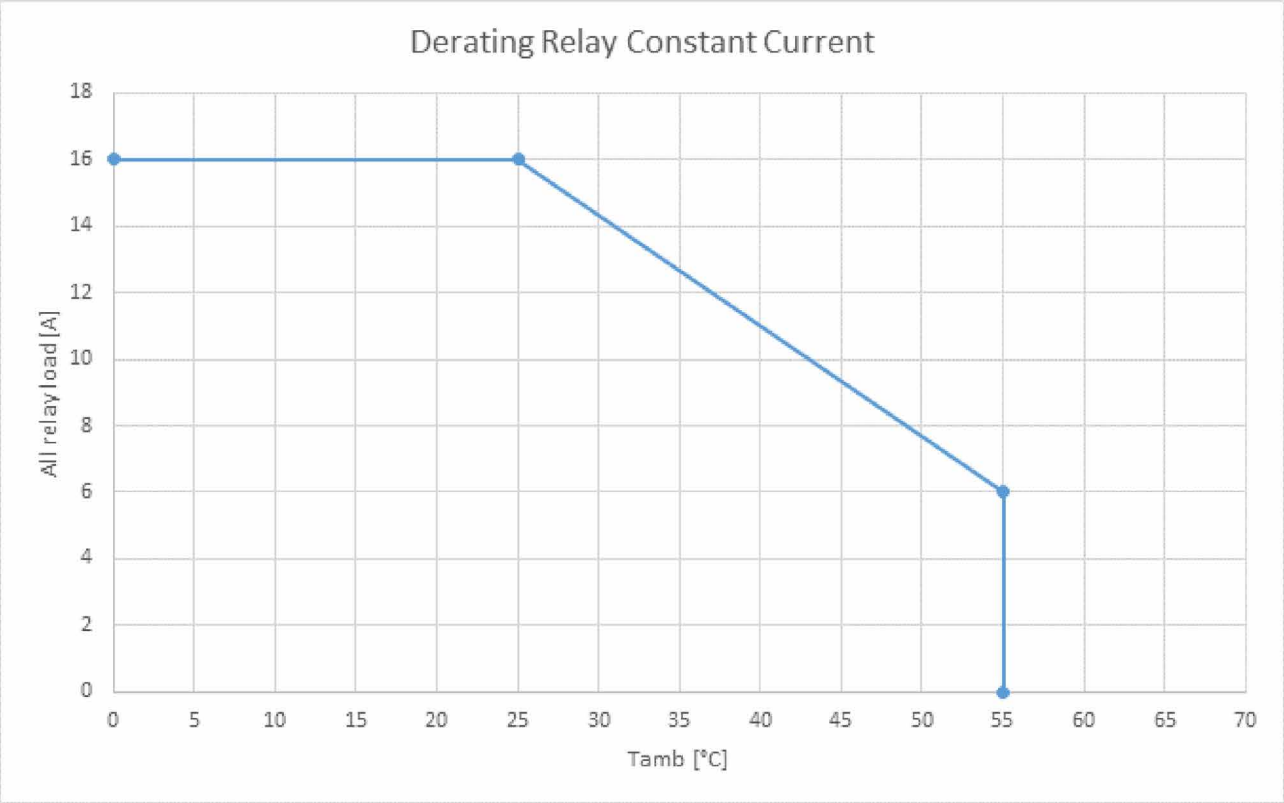
Relay output



Power supply and bus termination



Derating Rely Constant Current



LED Signalisation

Status LED

OFF	No Power
Green	Communication OK
Green blink	Auto bauding in progress
Orange	No communication
Red	Error
Red/Green alternate	Booter mode (e.g. during Firmware download)
Red bink	Internal fatal error

Digital output

The Output indication LED can be configured in colour and blink code separately for output state Low and High.

LED colour

- Off
- Red
- Green*
- Orange (red + green)

LED blink code

- No blink*
- Slow blinking (0.5 flashes per second)
- Fast blinking (2 flashes per second)

*Factory default

Remarks: In case of error on analogue I/O (overflow), the LED will blink at 1 Hz.

Manual mode

The Manual override LED is Off in automatic mode and orange in case of manual override is active.

LED colour

- Off (automatic)
- Orange manual mode active

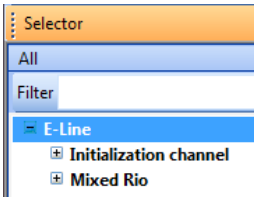
LED blink code

- No blink (local manual override)
- Blinking 1 flash per second (remote manual override)

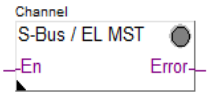
Programming

The modules are addressed and programmed with Saia PG5® Fupla FBoxes. Web templates are available for the operation and visualisation of the manual override function.

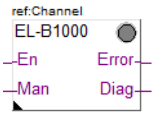
Fupla



E-Line library



FBox S-Bus initialisation



FBox for devices

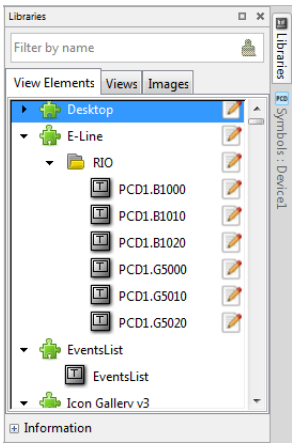
Communication FBox

- Data exchange for I/O via optimised S-Bus
- Configurable save state for bus interruption or timeout
- Direct generation of the symbols
- Reading and writing of the status of the manual override status
- Direct compatibility with web macros

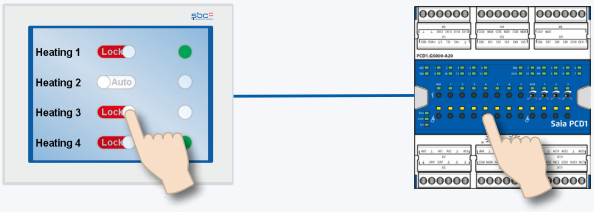
Further information, including which FBoxes are supported, Getting Started, etc., can be found on our support page www.saia-support.com

Web templates

Web templates are available for the operation and visualisation of the manual override function.



Manual operation



By using the local override function, commissioning can take place independently of the master station.
In addition, the manual operation can also be controlled remotely using a touch panel. If the bus line is cut off, the module keeps the manually set values. Traditional manual operation in the control cabinet door via potentiometers and switches can therefore be completely replaced by this solution.

Five operating modes can be selected for the manual operating funtion:

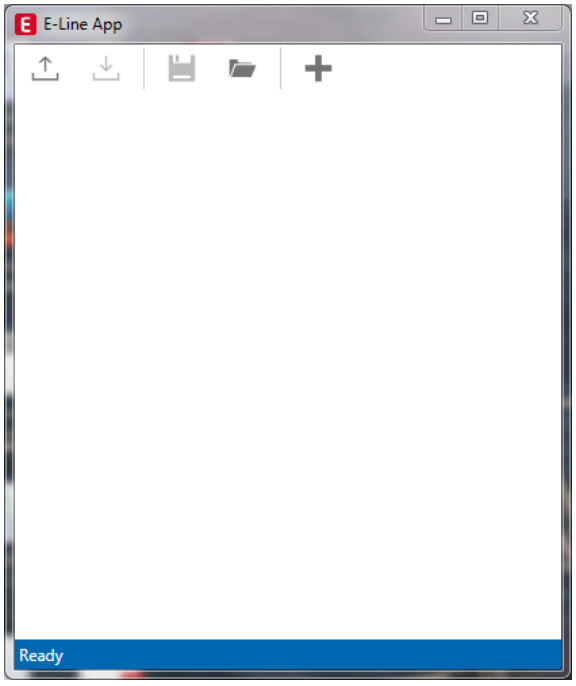
Operating modes	Description	Operation	
		at the module	via remote (S-Bus)
1	Manual operation deactivated	✗	✗
2	Operation permitted from the module only	✓	✗
3	Operation permitted from the module and limited operation from the panel. If manual operation is activated at the module, it cannot be reset from the panel.	✓	(cond-itional)
4	Unlimited operation from the panel and module	✓	✓
5	Panel operation (remote)	✗	✓

Depending on the application, reset of manually set values is allowed from a panel. To address this requirement, it is possible to deactivate or limit manual operation function.

The inputs / outputs of the E-Line RIO modules can be addressed via the standard S-Bus. However the FBox from the E-Line library is used for the configuration of these modules.
It is therefore recommended to use the optimised S-Bus protocol and the corresponding FBoxes from the E-Line library. Mixed mode operation is not recommended.

E-line App device setup

E-Line RIOs support the device setup by a windows application program connected via USB. The installer is available for download from the SBC support page: www.sbc-support.com ➔ E-Line RIO IO Modules.



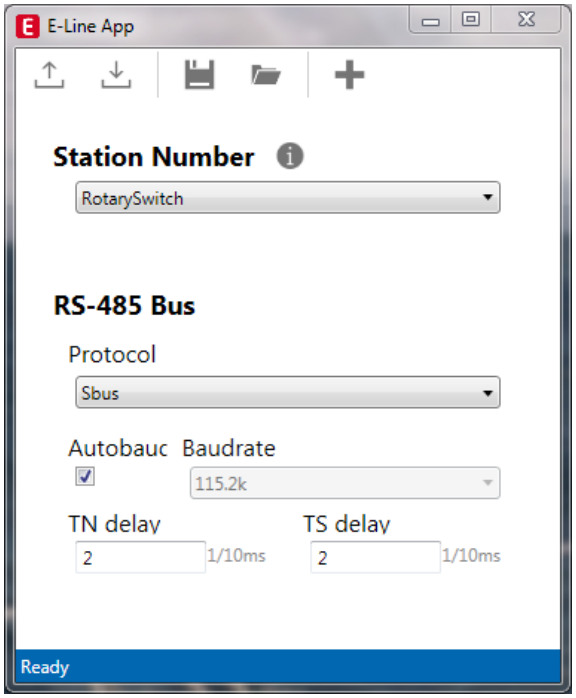
Create a new device configuration

Open an existing device configuration

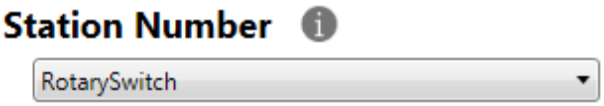
Save the current settings as device configuration

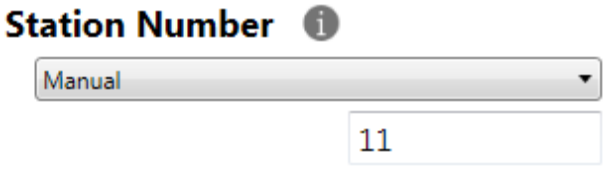
Upload configuration from the device

Download settings to the device

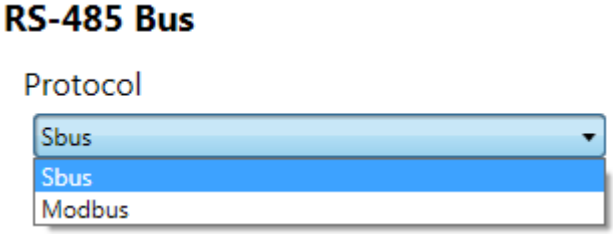


The station number can be set by the rotary switches at the device in the range of 0 … 98. If the rotary switches are set to position 99 the station number can be defined by the device configuration in a range of 0 … 253.

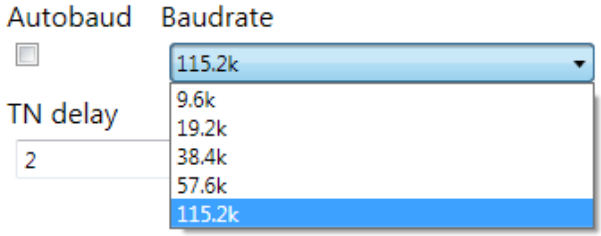




The serial communication protocol can be defined either as SBus or Modbus. By default the modules are delivered from factory with SBus.

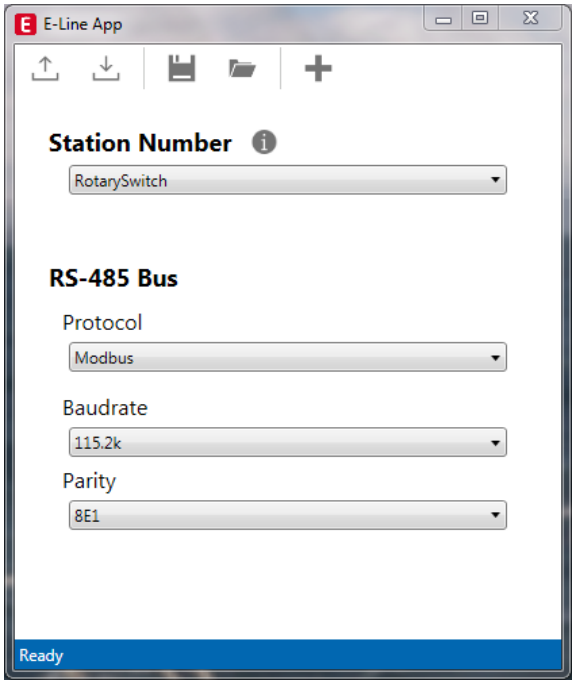


SBus settings

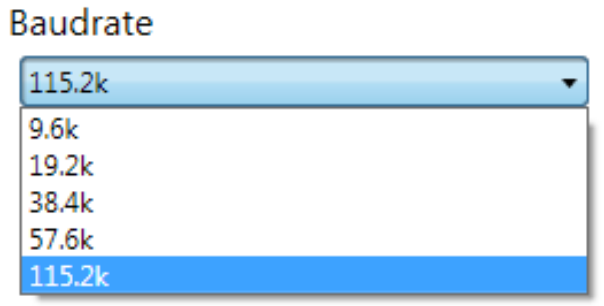


The Baudrate can be defined as automatic detection (default) or set to a specific value. The drop down choice will be available when the check box “Automatic” is unchecked. TN delay and TS delay shall be left at their default values of 2.

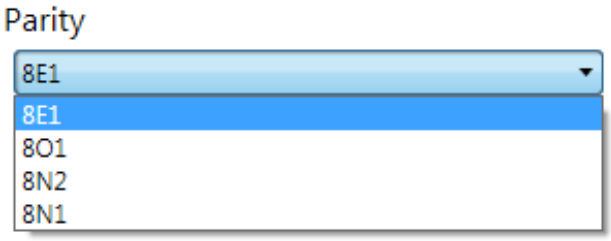
Modbus settings



The Baudrate is set by default to 115k. It can be defined as choice of the list.



For best interoperability the Parity Mode and number of Stop Bits can also be set.



S-Bus communication

SBus communication is based on Saia PCD® SBus Data Mode. Only the set-up of a unique S-Bus address within the communication line is required to establish a communication between Saia PCD® controllers and E-Line RIO modules. The address can be set by the rotary switches at the front of module. The baud rate will be learned from the network by factory default. In addition a Windows based application is available for manual parameter setup. Configuration parameters as well as manual override state and value are saved non-volatile. A delay of about one second between a manual state change and none volatile saving has to be taken into consideration.

Device address

- 0 … 98 Address is taken from the rotary switches
- 99 Address is taken from the device configuration. The address is settable with the E-Line configuration software.

Start-up procedure

- Reboot: All outputs are cleared (Off state)
- <1 sec. Output in manual operation are set according to the state before power down.
- Outputs in automatic mode

  Is no telegram received after reboot within the “safe state power-on timeout” the module enters as will into the safe state mode and sets the outputs according to their configured values.

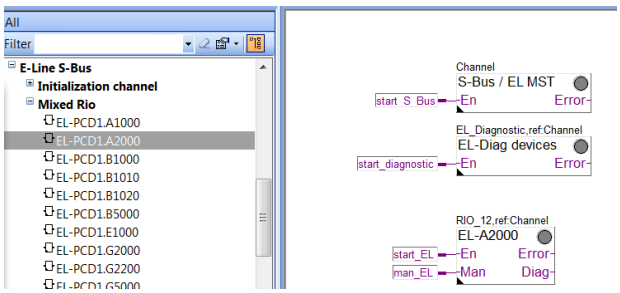
  On reception of a valid command telegram the outputs are controlled by the communication. When no communication update followed within the “safe state com. timeout” the module enters into safe state and sets the outputs according to their configured values.

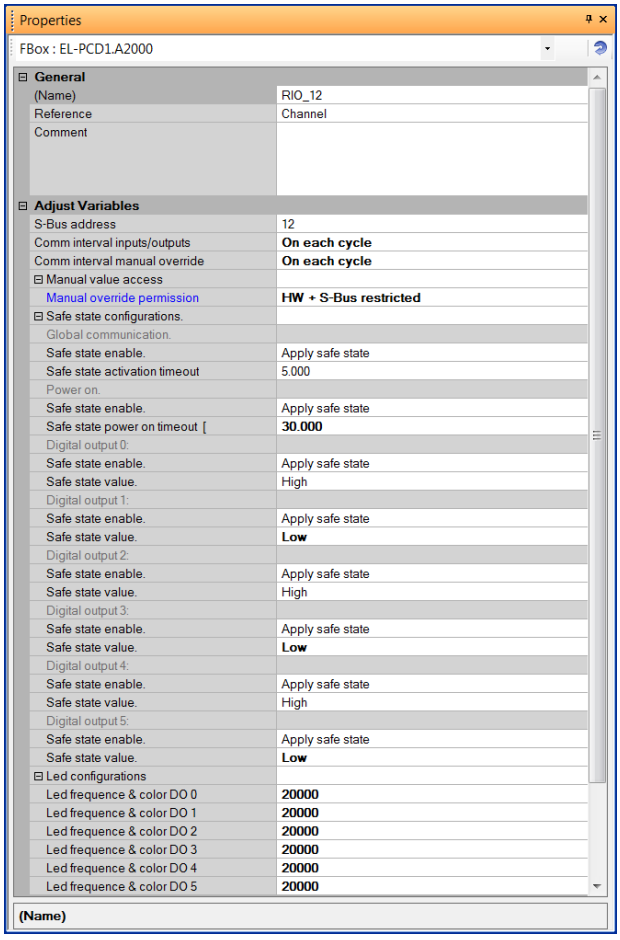
Usage of the E-Line module specific FBoxes

The usage of the E-Line module specific FBoxes from the E-Line S-Bus Fupla library allows an easy and efficient commissioning of the E-Line RIO.

The FBox allow to define and configure all possible functionalities of the E-Line RIO like manual override permission, usage of safe state mode, behaviour and colour of the LED’s and so on.

In the background, the FBox does use the fast ‘E-Line S-Bus’ protocol for a high speed communication between the master and the RIO.





S-Bus communication

Direct access to the RIO medias with standard S-Bus send and receive telegrams

The following chapter describes the media and parameter mapping to Registers and Flags for individual programming. For efficient PCD programming the E-Line RIO FBox family and templates are suitable for most applications. Only individual programming (e.g. Instruction List) require standard SBus communication.

Relay outputs

Output	Output Value	Read/Write	Manual override Communication	Read/Write*	Manual override Local	Read/Write**
Relay output 0	Flag 30	RW	Register 90	RW	Register 96	R
Relay output 1	Flag 31	RW	Register 91	RW	Register 97	R
Relay output 2	Flag 32	RW	Register 92	RW	Register 98	R
Relay output 3	Flag 33	RW	Register 93	RW	Register 99	R
Relay output 4	Flag 34	RW	Register 94	RW	Register 100	R
Relay output 5	Flag 35	RW	Register 95	RW	Register 101	R

* Writable only if SBus permission is set in the configuration, otherwise write has no effect
** Writing to these registers has no effect. Used only if hardware permission is set in the configuration

Normal operation: The outputs are set according the flag set by the communication.
Manual operation: The output are set according to the manual command, the communication flags are ignored.
Safe State: In case of a broken communication, a safe state value can be applied, see table Safe State Configuration.

Register format for manual override via SBus (Reg. 90 … 95):

Bit 0 Current output value
Bit 30 1: output is driven in manual override by SBus
Bit 31 1: output is driven in manual override by local push buttons

Register format for local manual override (Reg. 96 … 101):

Bit 0 Current output value
Bit 31 1: output is driven in manual override by local push buttons

LED Configuration

LED Relay output 0	Flag 300	RW
LED Relay output 1	Flag 301	RW
LED Relay output 2	Flag 302	RW
LED Relay output 3	Flag 303	RW
LED Relay output 4	Flag 304	RW
LED Relay output 5	Flag 305	RW

Register format:

Bit 0 … 7	I/O state Low	LED color
Bit 8 … 15	I/O state Low	LED blink code
Bit 16 … 23	I/O state High	LED color
Bit 24 … 32	I/O state High	LED blink code

LED color
0: Off
1: Red
2: Green
3: Orange (red + green)

LED blink code
0: No blink
1: Slow blinking (0.5 flashes per second)
2: Fast blinking (2 flashes per second)

Factory default: Low: off, High: LED colour 2 (green), no blink
Remarks: In case of error on analogue I/O (overflow), the led will blink at 1 Hz

The LEDs can be configured individually depending on the I/O state in colour and blink code.

Configuration for safe state and manual override

Output	Safe State Enable	Read/Write	Safe State Value	Read/Write
Relay output 0	Flag 320	RW	Register 350	RW
Relay output 1	Flag 321	RW	Register 351	RW
Relay output 2	Flag 322	RW	Register 352	RW
Relay output 3	Flag 323	RW	Register 353	RW
Relay output 4	Flag 324	RW	Register 354	RW
Relay output 5	Flag 325	RW	Register 355	RW
Communication safe state enable default 0 (disabled)			Flag 400	RW
Power-On safe state enable default 0 (disabled)			Flag 401	RW
Power-On safe state timeout [ms], Valid values 1000 … 100.000.000, default 30.000			Register 590	RW
Communication safe state timeout [ms] Valid values 1000 … 100.000.000, default 15.000			Register 591	RW
Manual operation mode Bit 0: Disabled Bit 1: Remote control limited*, default 1 Bit 2: Local operation enabled, default 1 Bit 3: Remote control unlimited*, default 0 Bits can be combined to enable remote and local operation			Register 592	RW
* If manual operation is locally activated at the module, the output value and manual state cannot be set/reset remotely				

Manual operation mode:

- Disabled (0)
- Local operation only (4, Bit 2 set)
- Local operation enabled, remote limited (6, Bit 1 and 2 set), default
- Local and remote operation enabled (12, Bit 2 and 3 set)
- Remote operation only, local operation disabled (8, Bit 3 set)

The safe state enable flag and the safe state value are combined in the following way:
Setting the enable flag to 0 keep the output value unchanged in case of safe state occurrence.
Setting the enable flag to 1 writes the safe state value in case of safe state occurrence.

Device Information

Firmware version (Decimal xyyzz, 10802 ➔ 1.08.02)	Register 600	R
Number of supported registers	Register 601	R
Number of supported flags	Register 602	R
Product type (ASCII String)***	Register 605 … 608	R
Hardware version (Hex)	Register 609	R
Serial number (Hex)	Register 611 … 612	R
Communication protocol (1:SBus Slave, 3:Modbus)	Register 620	R
Communication baud rate	Register 621	R
Communication auto baud enable (0:disabled, 1:enabled)	Register 622	R
Communication TN delay *	Register 623	R
Communication TS delay **	Register 624	R
Communication module address	Register 626	R

* Time in 0.1 ms (e.g. 2 means 200 us) before setting activation of RS-485 line driver send mode (only used for SBus slave protocol)
** Time in 0.1 ms (e.g. 2 means 200 us) before sending the first character after line driver activation (only used for SBus slave protocol)
*** The four registers contain the ASCII characters of the product type.
E.g. for PCD1.A2000-A20:
0605: 50434431H 0606: 2E413230H 0607: 30302D41H 0608: 32300000H

Modbus communication

Modbus fulfils the requirements for standard communication protocols. It is based on Modbus RTU. The Windows based configuration software is required to enable and set up the Modbus communication parameters. The device address can be set up with the rotary switches at the front of the modules. Configuration parameters as well as manual override state and value are saved non-volatile. A delay of about one second between a manual state change and non-volatile saving has to be taken into consideration.

Device address

- 0 … 98 Address is taken from the rotary switches
- 99 Address is taken from the device configuration. The address is settable with the E-Line configuration software.

Start-up procedure

- Reboot: All outputs are cleared (Off state)
- <1 sec. Output in manual operation are set according to the state before power down.
- Outputs in automatic mode

  Is no telegram received after reboot within the "safe state power-on timeout" the module enters as will into the safe state mode and sets the outputs according to their configured values.

  On reception of a valid command telegram the outputs are controlled by the communication. When no communication update followed within the "safe state com. timeout" the module enters into safe state and sets the outputs according to their configured values.

The following chapter describes the media and parameter mapping to Registers and Flags (=Coils).

Supported Modbus services:

- Function code 1 (read coils)
- Function code 3 (read registers)
- Function code 15 (write multiple coils)
- Function code 16 (write multiple registers)

Read coils

Request

Address	Function	Start Address		Number of Coils to read		CRC	
0 … 254	1	High-Byte	Low-Byte	High-Byte	Low-Byte	High-Byte	Low-Byte

Reply

Address	Function				CRC	
0 … 254	1	No. of Byte	Coil 0 … 7	Coil 8 … 15	High-Byte	Low-Byte

Write coils

Request

Address	Function	Start Address		Number of Coils to write		Coil		CRC	
0 … 254	15	High-Byte	Low-Byte	High-Byte	Low-Byte	0 … 7	Coil 0 … 7	High-Byte	Low-Byte

Reply

Address	Function	Start Address		Number of Coils to written		CRC	
0 … 254	15	High-Byte	Low-Byte	High-Byte	Low-Byte	High-Byte	Low-Byte

Read register

Request

Address	Function	Start Address		Number of Register to read		CRC	
0 … 254	3	High-Byte	Low-Byte	High-Byte	Low-Byte	High-Byte	Low-Byte

Reply

Address	Function	No. of Byte	Register Start Addr + 0		CRC	
0 … 254	3	0 … 256	High-Byte	Low-Byte	High-Byte	Low-Byte

Write register

Request

Address	Function	Start Address		No. of Bytes	Data Words		CRC	
0 … 254	3	High-Byte	Low-Byte	0 … 256	Low-Byte	High-Byte	High-Byte	Low-Byte

Reply

Address	Function	Start Address		No of Registers written		CRC	
0 … 254	3	High-Byte	Low-Byte	High-Byte	Low-Byte	High-Byte	Low-Byte

The CRC has to be calculated over all telegram bytes starting with address field up to the last data byte. The CRC has to be attached to the data. Please find an example at the appendix of this document. For more details, please refer the publicly available Modbus documentation www.modbus.org.

Relay outputs Digital outputs

Output	Output Value	Read/Write	Manual override Communication	Read/Write*	Manual override Local	Read/Write**
Relay output 0	Flag 30	RW	Value Reg. 180 Enable Reg. 181	RW	Value Reg. 192 Enable Reg. 193	R
Relay output 1	Flag 31	RW	Value Reg. 182 Enable Reg. 183	RW	Value Reg. 194 Enable Reg. 195	R
Relay output 2	Flag 32	RW	Value Reg. 184 Enable Reg. 185	RW	Value Reg. 196 Enable Reg. 197	R
Relay output 3	Flag 33	RW	Value Reg. 186 Enable Reg. 187	RW	Value Reg. 198 Enable Reg. 199	R
Relay output 4	Flag 34	RW	Value Reg. 188 Enable Reg. 189	RW	Value Reg. 200 Enable Reg. 201	R
Relay output 5	Flag 35	RW	Value Reg. 190 Enable Reg. 191	RW	Value Reg. 202 Enable Reg. 203	R

* Writable only if Modbus permission is set in the configuration, otherwise write has no effect
**Writing to these registers has no effect. Used only if hardware permission is set in the configuration

Normal operation: The outputs are set according the flag set by the communication.
Manual operation: The output are set according to the manual command, the communication flags are ignored.
Safe State: In case of a broken communication, a safe state value can be applied, see table Safe State Configuration.

Register format for manual override via Modbus (Reg. 180 … 191):

Bit 0 Current output value
Enable Reg. Bit 14 1: output is driven in manual override by Modbus
Enable Reg. Bit 15 1: output is driven in manual override by local push buttons

Register format for local manual override (Reg. 192 … 203):

Value Reg. Bit 0 Current output value
Enable Reg. Bit 15 1: output is driven in manual override by local push buttons

LED Configuration

Digital Output 0	Output L, Reg. 600 Output H, Reg. 601	RW
Digital Output 1	Output L, Reg. 602 Output H, Reg. 603	RW
Digital Output 2	Output L, Reg. 604 Output H, Reg. 605	RW
Digital Output 3	Output L, Reg. 606 Output H, Reg. 607	RW
Digital Output 4	Output L, Reg. 608 Output H, Reg. 609	RW
Digital Output 5	Output L, Reg. 610 Output H, Reg. 611	RW

Register format:

Output L, Bit 0 … 7	I/O state Low	LED color
Output L, Bit 8 … 15	I/O state Low	LED blink code
Output H, Bit 16 … 23	I/O state High	LED color
Output H, Bit 24 … 32	I/O state High	LED blink code

LED color
0: Off
1: Red
2: Green
3: Orange (red + green)

LED blink code
0: No blink
1: Slow blinking (0.5 flashes per second)
2: Fast blinking (2 flashes per second)

Factory default: Low: off, High: LED colour 2 (green), no blink
Remarks: In case of error on analogue I/O (overflow), the led will blink at 1 Hz

The LEDs can be configured individually depending on the I/O state in colour and blink code.

Configuration for safe state and manual override

Output	Safe State Enable	Read/Write	Safe State Value	Read/Write
Digital Output 0	Flag 320	RW	Register 350	RW
Digital Output 1	Flag 321	RW	Register 351	RW
Digital Output 2	Flag 322	RW	Register 352	RW
Digital Output 3	Flag 323	RW	Register 353	RW
Digital Output 4	Flag 324	RW	Register 354	RW
Digital Output 5	Flag 325	RW	Register 355	RW
Communication safe state enable default 0 (disabled)			Flag 400	RW
Power-On safe state enable default 0 (disabled)			Flag 401	RW
Power-On safe state timeout [ms], Valid values 1000 … 100.000.000, default 30.000			Reg. 1180, 1181	RW
Communication safe state timeout [ms] Valid values 1000 … 100.000.000, default 15.000			Reg. 1182, 1183	RW
Manual operation mode Bit 0: Disabled Bit 1: Remote control limited*, default 1 Bit 2: Local operation enabled, default 1 Bit 3: Remote control unlimited*, default 0 Bits can be combined to enable remote and local operation			Register 1184	RW
*If manual operation is locally activated at the module, the output value and manual state cannot be set/reset remotely				

Manual operation mode:

- Disabled (0)
- Local operation only (4, Bit 2 set)
- Local operation enabled, remote limited (6, Bit 1 and 2 set), default
- Local and remote operation enabled (12, Bit 2 and 3 set)
- Remote operation only, local operation disabled (8, Bit 3 set)

The safe state enable flag and the safe state value are combined in the following way:
Setting the enable flag to 0 keep the output value unchanged in case of safe state occurrence.
Setting the enable flag to 1 writes the safe state value in case of safe state occurrence.

Device Information

Firmware version (Decimal xyyzz, 10802 ➔ 1.08.02)	Register 1200	R
Number of supported registers	Register 1202	R
Number of supported flags	Register 1204	R
Product type (ASCII String)*	Register 1210 … 1217	R
Hardware version (Hex)	Register 1218	R
Serial number (Hex)	Register 1222 … 1224	R
Communication protocol (1: SBus Slave, 3: Modbus)	Register 1240	R
Communication baud rate	Register 1242	R
Communication auto baud enable (0:disabled, 1:enabled)	Register 1244	R
Communication Mode 0: 8,E,1; 1: 8,O,1; 2: 8,N,2; 3: 8,N,1	Register 1250	R
Communication module address	Register 1252	R
* The eight registers contain the ASCII characters of the product type. E.g. for PCD1.A2000-A20: 1210…1217: 5043H | 4431H | 2E41H | 3230H | 3030H | 2D41H | 3230H | 0000H		

CRC Generation Example

(Source: http://modbus.org/docs/PI_MBUS_300.pdf, the following content of this page is copied from the referenced document. In case of any questions, please check out the original source)

The function takes two arguments: unsigned char *puchMsg; A pointer to the message buffer containing binary data to be used for generating the CRC unsigned short usDataLen; The quantity of bytes in the message buffer. The function returns the CRC as a type unsigned short.

CRC Generation Function

```
unsigned short CRC16(puchMsg, usDataLen) ;
unsigned char *puchMsg ;                        /* message to calculate CRC upon */
unsigned short usDataLen ;                      /* quantity of bytes in message */
{
        unsigned char uchCRCHi = 0xFF ;         /* high byte of CRC initialized */
        unsigned char uchCRCLo = 0xFF ;         /* low byte of CRC initialized */
        unsigned uIndex ;                       /* will index into CRC lookup table */
        while (usDataLen--)                     /* pass through message buffer */
        {
                uIndex = uchCRCHi ^ *puchMsgg++;    /* calculate the CRC */
                uchCRCHi = uchCRCLo ^ auchCRCHi[uIndex];
                uchCRCLo = auchCRCLo[uIndex];
        }
        return (uchCRCHi << 8 | uchCRCLo);
}
```

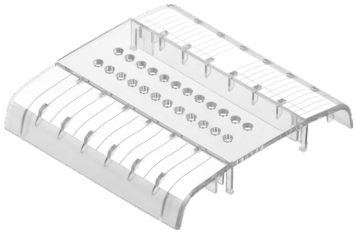
High-Order Byte Table

```
/* Table of CRC values for high-order byte */
static unsigned char auchCRCHi[] = {
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40 };
```

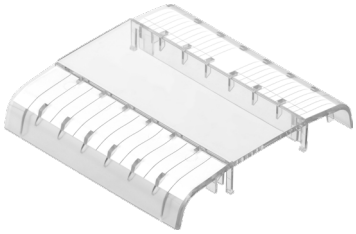
Low-Order Byte Table

```
/* Table of CRC values for low-order byte */
static char auchCRCLo[] = {
0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7, 0x05, 0xC5, 0xC4, 0x04,
0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09, 0x08, 0xC8,
0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C, 0xDC,
0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3, 0x11, 0xD1, 0xD0, 0x10,
0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35, 0x34, 0xF4,
0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A, 0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38,
0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF, 0x2D, 0xED, 0xEC, 0x2C,
0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26, 0x22, 0xE2, 0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0,
0xA0, 0x60, 0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5, 0x65, 0x64, 0xA4,
0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F, 0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68,
0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE, 0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C,
0xB4, 0x74, 0x75, 0xB5, 0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0,
0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54,
0x9C, 0x5C, 0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98,
0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B, 0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D, 0x4D, 0x4C, 0x8C,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42, 0x43, 0x83, 0x41, 0x81, 0x80, 0x40 };
```

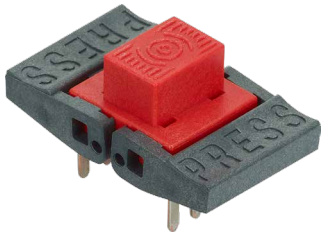
PCD1.A2000-A20



PCD1.K2026-005



PCD1.K2026-025



Connector bridge

Order details

Type	Short description	Description	Weight
PCD1.A2000-A20	E-Line S-Serie RIO 6Rel 16A	E-Line S-Serie digital output module manual override operating level for all outputs status LED for outputs supply 24 VDC 6 relay normally open 230 VAC / 30 VDC, 16 A (resistive load) 1 interface RS-485 (S-Bus and Modbus) 1 USB Service interface	290 g
PCD1.K2026-005	E-Line labelling set 5 × 6 HP	E-Line cover and labelling set consisting of 5 × covers (6 HP = 105 mm) and labelling sheet for mounting in the automation control cabinet	50 g
PCD1.K2026-025	E-Line labelling set 5 × 6 HP w. h.	E-Line cover and labelling set with holes consisting of 5 × covers (6 HP = 105 mm) with holes for manual override operating level and labelling sheet for mounting in the automation control cabinet	50 g
In preparation	Connector bridge	Set of 10 connector bridges for interconnection of power supply and communication bus.	100 g

Saia-Burgess Controls AG
Bahnhofstrasse 18 | 3280 Murten, Switzerland
T +41 26 580 30 00 | F +41 26 580 34 99
www.saia-pcd.com

support@saia-pcd.com | www.sbc-support.com