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INTERBUS
I/O Unit
RECO12.2

Configuration

SYSTEM200

DOK-CONTRL-RECO12.2***-PR02-EN-P

Rexroth
Indramat

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Title

INTERBUS I/O Unit RECO12.2

Type of document

Configuration

Document code

DOK-CONTRL-RECO12.2***-PR02-EN-P

Internal file reference

- DOK-MTC200-TECHN*UNTERL-04M1-EN-P
- DOK-MTC200-TEC*DOC*4V3-04M1-EN-P
- Drawing number: 120-0400-B306-02

Purpose of the document

This document is used

- for describing the hardware functions at the RECO12.2 unit
- connecting and installing the RECO12.2 unit
- providing the Specifications of the RECO12.2 unit

Configuration control

Documentation identification of previous releases	Release date	Comment
DOK-CONTRL-RECO12.2***-PR02-EN-P	02.99	First issue

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Published by

INDRAMAT GmbH • Bgm.-Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main

Phone 09352/40-0 • Tx 689421 • Fax 09352/40-4885

Dept. ECS (RW)

Note

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1 Brief Description and Installation of the RECO12.2 Unit

1.1 Brief Description

RECO12.2 is a remote I/O station with an INTERBUS field bus interface.

A unit consists of one/several RMB12.2-04 (4 slots) or RMB12.2-02 (2 slots) base racks , a bus coupler module RMK12.2-IBS-BKL, and up to 15 I/O modules. An expansion to 16 module locations is possible by installing four RMB12.2-04 base racks side by side. Local bus communication between the individual I/O modules and the bus coupler module takes place via the bus board in the racks.

The RMK12.2-IBS-BKL bus coupling module with an INTERBUS interface is available for the communication with the controller.

These bus coupling modules are INTERBUS remote bus devices. The associated I/O modules are INTERBUS I/O bus devices. This architecture ensures that each module is addressed as a separate device in the INTERBUS system (transparency).

The INTERBUS permits wide distances within the system to be covered. An INTERBUS ring can be as long as 12.8 km (from the interface module up to the last connected remote bus device). The wide distance of 12.8 km is achieved by subdividing the remote bus into bus segments of up to 400 m each.

Using the RMB12.2-02 or RMB12.2-04 base racks, the bus coupling module in IP20 rating and the I/O modules can indirectly be attached to a 35-mm DIN rail.

1.2 Overview RECO12.2

Designation	Type	Explanation	Material no.
Base rack, 2 slots	RMB12.2-02	accommodates up to 2 modules	278 843
Base rack, 4 slots	RMB12.2-04	accommodates up to 4 modules	278 844
Communication module	RMK12.2-IBS-BKL	INTERBUS interface (bus coupling module)	280 941
Input module	RME12.2-16-DC024	2 x 8 inputs, 24 VDC	280 943
Input module	RME12.2-32-DC024	4 x 8 inputs, 24 VDC	280 939
Input module	RME12.2-16-AC115	2 x 8 inputs, 115 VAC	280 942
Output module	RMA12.2-16-DC024-200	2 x 8 outputs, 24 VDC, 2 A	280 934
Output module	RMA12.2-32-DC024-050	4 x 8 outputs, 24 VDC, 500 mA	280 935
Output module	RMA12.2-16-AC230-200	2 x 8 outputs, 230 VAC, 2A	280 933
Output module	RMA12.2-16-RE230-200	2 x 8 relay outputs, 230 V, 2 A	280 932
Analog module	RMC12.2-2E-1A	Analog module 2 x input, 1 x output	280 944

Figure 1-1: Brief overview of RECO12.2

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1.3 Installation Instructions

Chiefly, the RMB12.2-04 or RMB12.2-02 racks are latched onto a TS 35x27x15 DIN rail, and secured with a screw (see RECO 12.2 mounting dimensions).

If necessary, the racks can be mounted directly on the mounting plate in the switchgear cabinet, using the holes provided in the racks (see base rack dimensions).

Installing the modules

Beginning with the bus coupling unit and in slot 1 (left-hand side), the modules are plugged into the base rack. Each module is secured with two retaining screws. The I/O modules are installed side by side to the right of the bus coupling unit in the slots 2 through 16. There must be no gaps between the modules.

Caution: Prior to commissioning you must tighten the retaining screws of the base racks and modules. (Figure 1-5: RMB12.2-04 base rack)

Never insert or disconnect a connector or module while power is applied to the unit.

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Mounting dimensions of the RECO12.2 unit

- Installing on DIN rail and fixing
- Mounting dimensions **without** mating connector

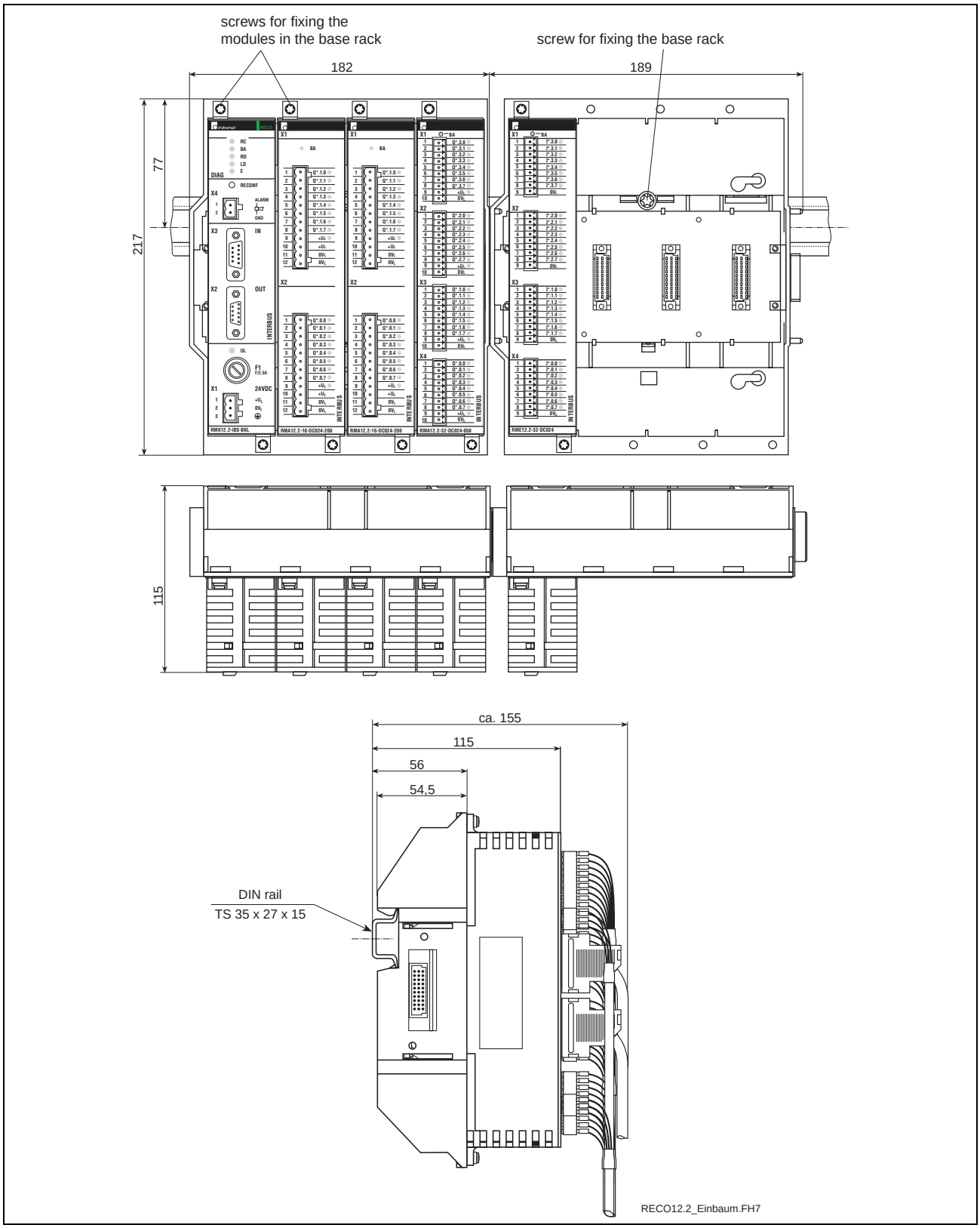


Figure 1-2: Mounting dimensions of the RECO12.2 unit

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Dimensions of RMB12.2-02 and RMB12.2-04 base racks

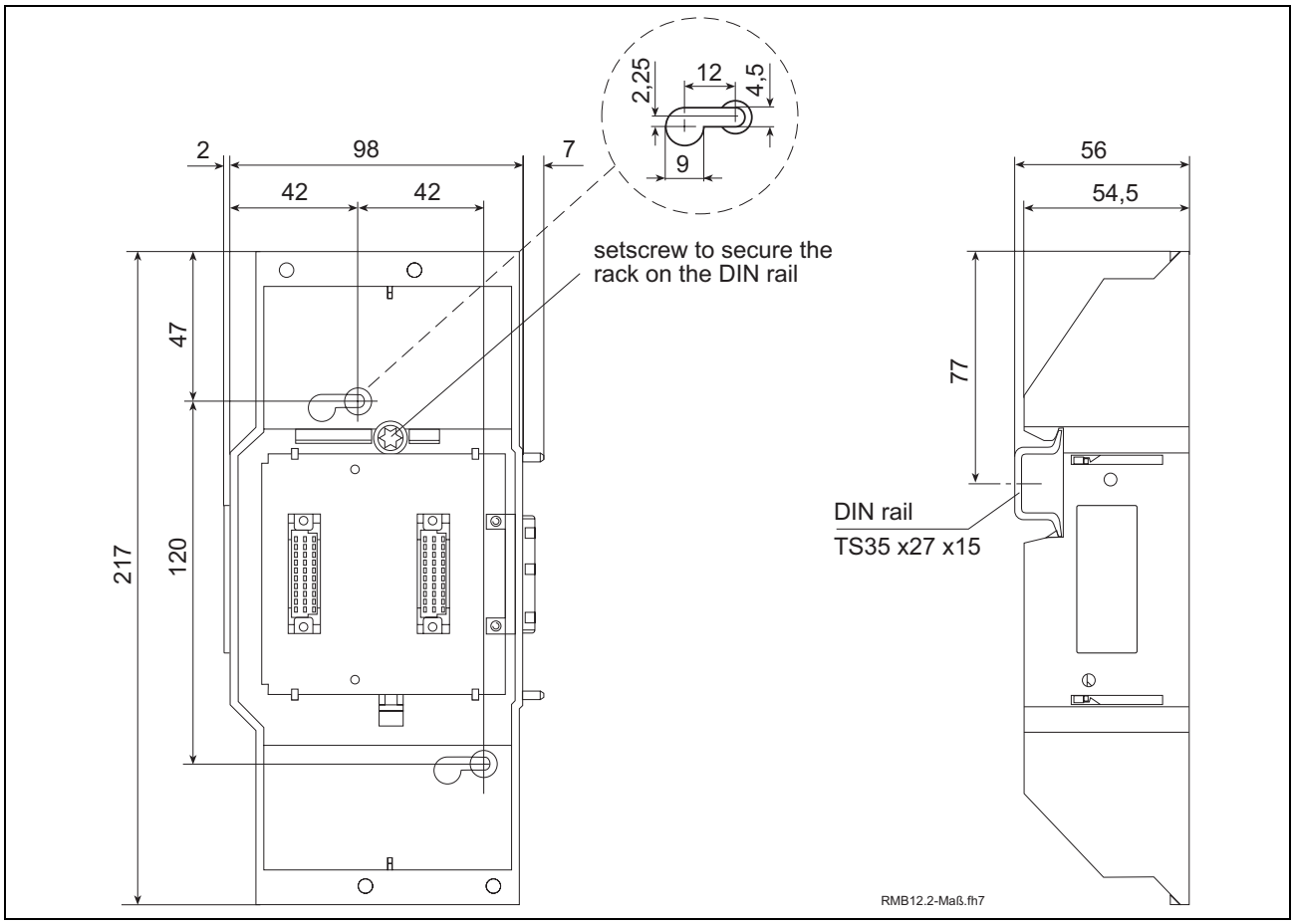


Figure 1-3: RMB12.2-02 base rack

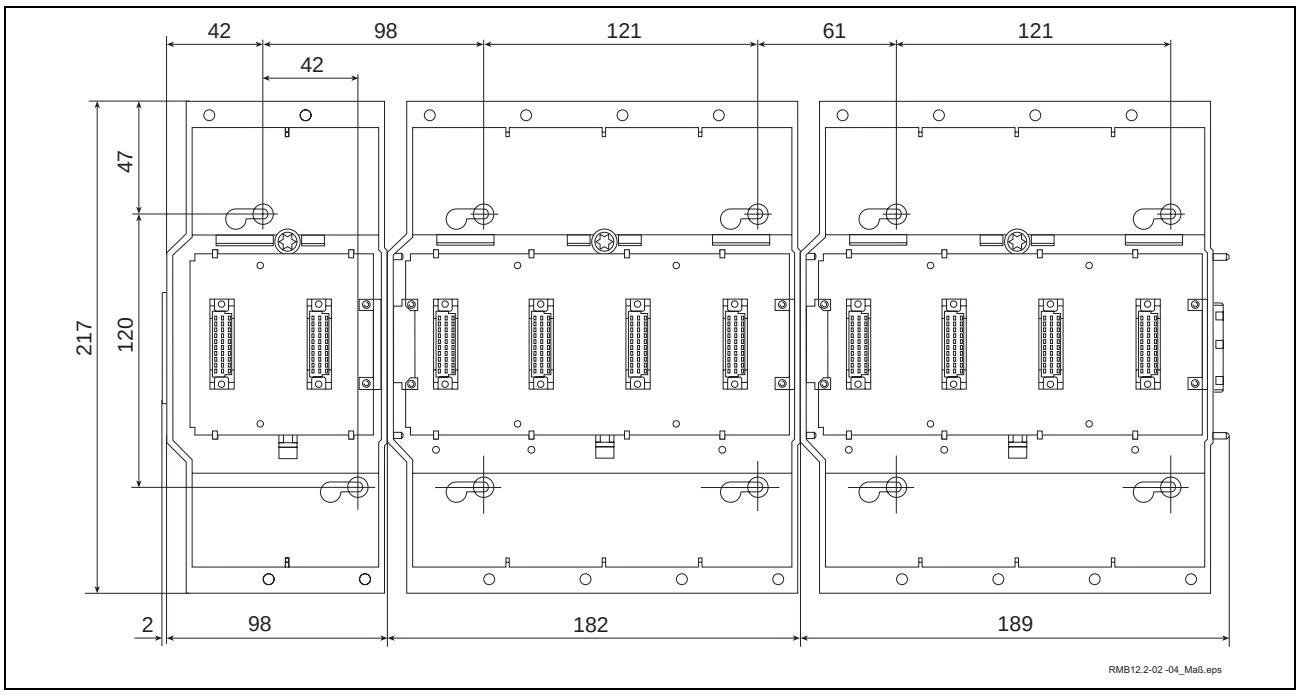


Figure 1-4: RMB12.2-02 base rack in connection with RMB12.2-04

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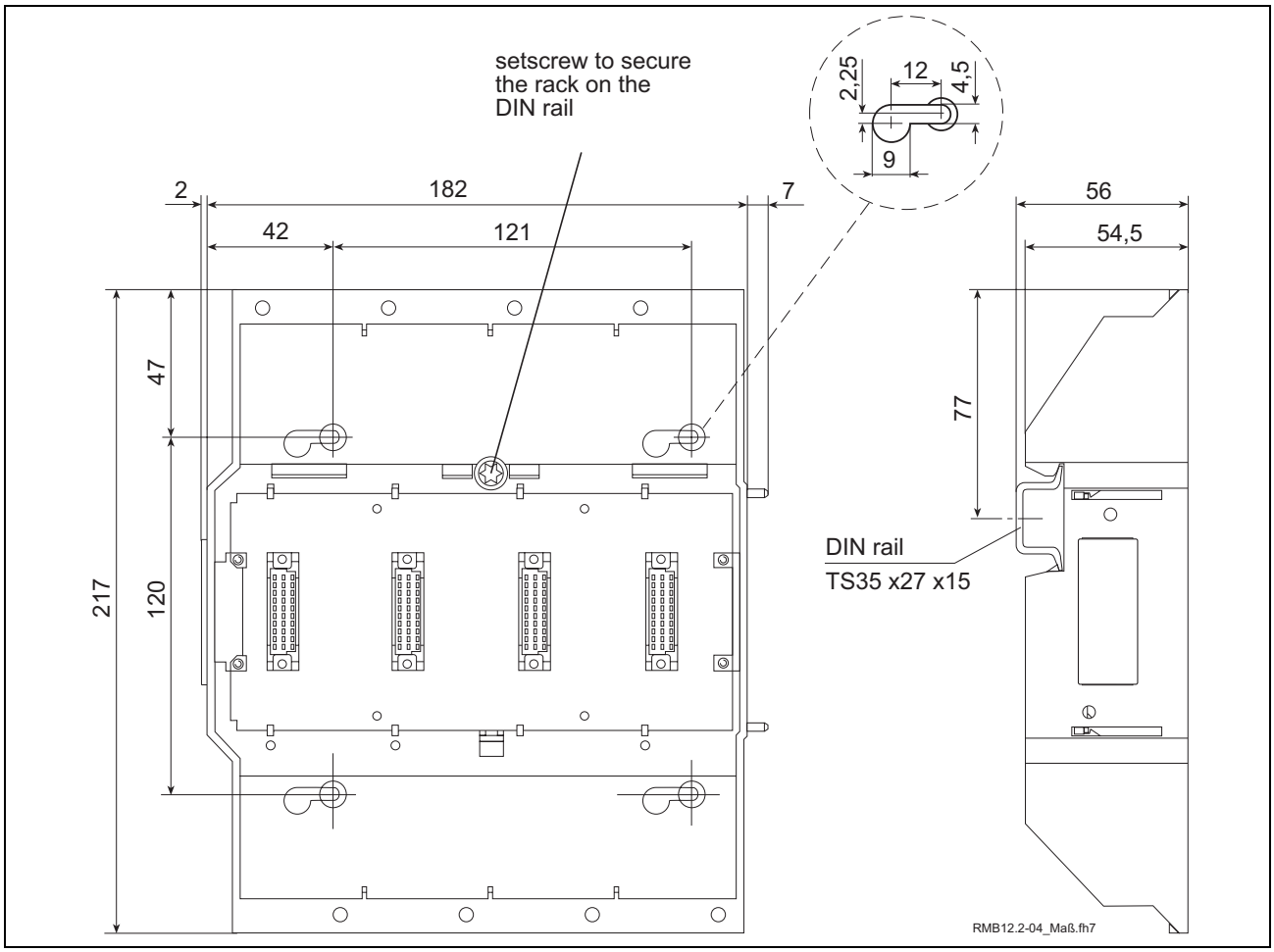


Figure 1-5: RMB12.2-04 base rack

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2 Specifications

2.1 General

Permissible cable cross-section for the supply voltage:	Up to 2.5 mm^2
Mounting in the switchgear cabinet:	Using RMB12.2 racks on TS 35 x 27 x 15 DIN rail
Protection rating:	IP 20, DIN VDE 0470, EN 60529
Humidity (storage/transport):	75%, no condensation 85%, no condensation (occasional) DIN 40 040 Class F
Atmospheric pressure:	860 ... 1080 hPa, 1500m (operation) 660 ... 1080 hPa, 3500m (storage)
Operating temperature:	0°C ... 50°C, DIN 40 040 Class KV
Storage temperature:	-30°C ... +85°C

Supply voltage

Nominal value:	24 VDC
Permissible ripples:	4,0 Vss within the permissible voltage range
Permissible voltage range:	19.5 ... 31 VDC, including ripples
Current consumption:	max. 0.8 A (depends on installed configuration)
Short-circuit current:	2.5 A (fuse)

EMC

Noise emission to EN 55022:	Class an industry environment)
Noise immunity to IEC 1000-4-2 (ESD):	Judgement criterion B
Noise immunity to IEC 1000-4-4 (Burst):	Judgement criterion B
Noise immunity to IEC 1000-5-5 (Surge):	Judgement criterion B

2.2 Addressing

General information about addressing

In order to be able to address the devices in the INTERBUS system directly, each device has an unambiguous address assigned. In addition, each INTERBUS module possesses an identification code (ID code) that shows the connected configuration unambiguously.

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Module addressing of the INDRAMAT SPS

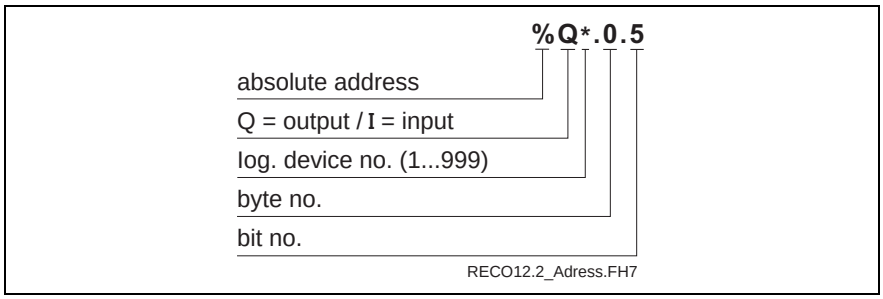


Figure 2-6: Typical address selection for an output module

Address selection for input modules

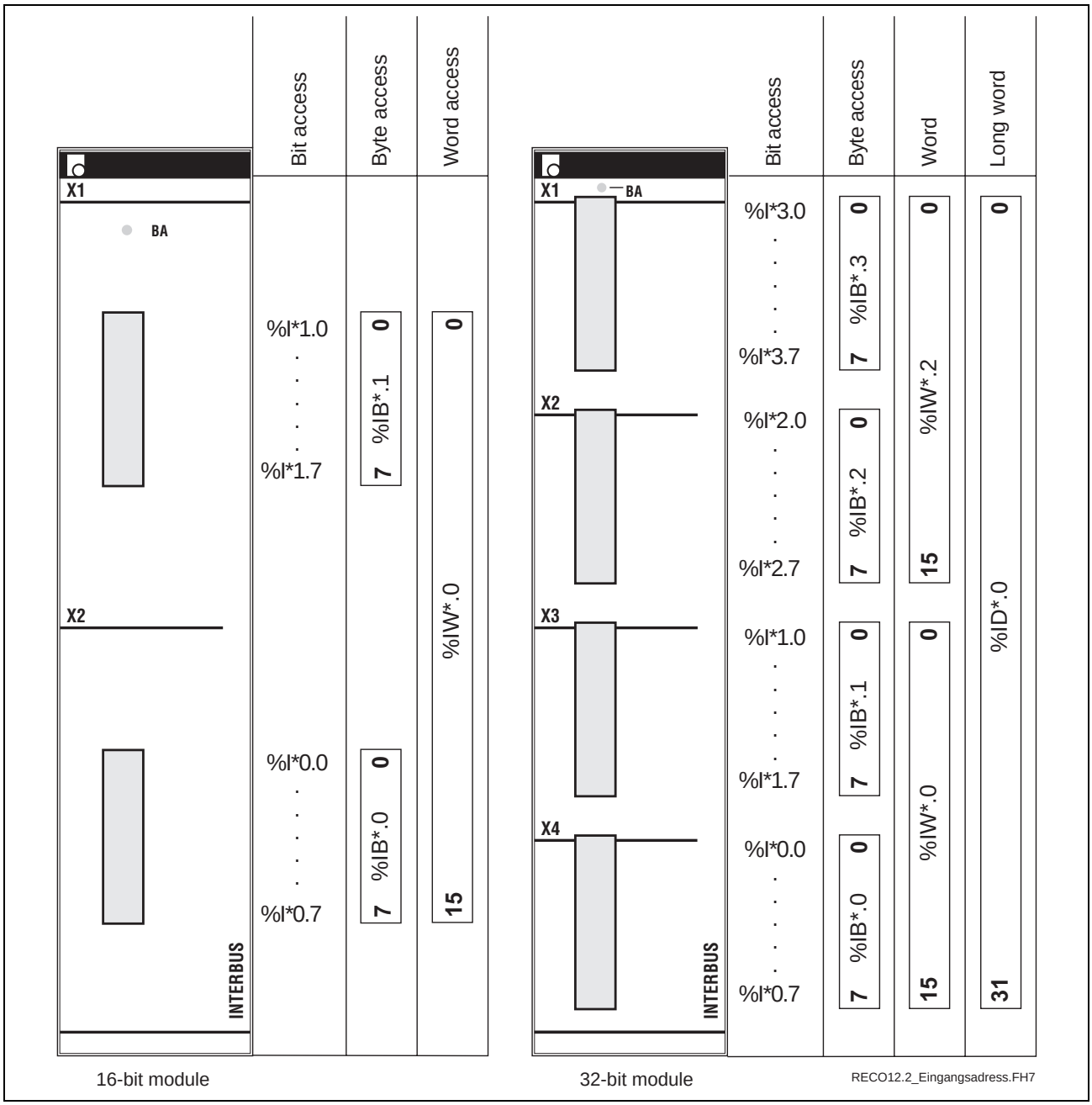


Figure 2-7: Bit, byte, word, and long word addresses for input modules

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Address selection for output modules

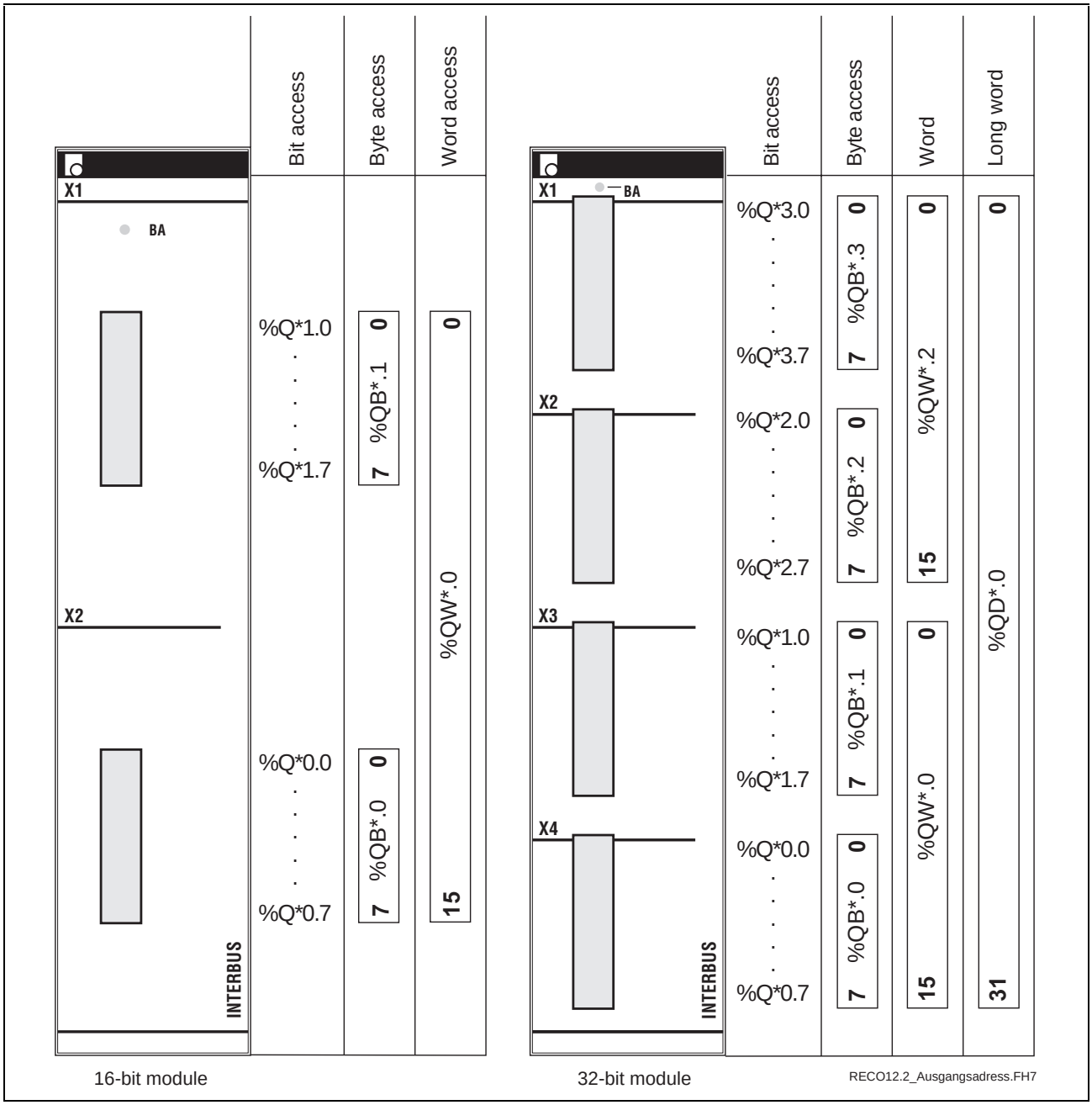


Figure 2-8: Bit, byte, word, and long word addresses for output modules

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3 RMK12.2-IBS-BKL INTERBUS Bus Terminal

3.1 Brief Description

The INTERBUS bus terminal RMK12.2-IBS-BKL connects the I/O modules of a RECO station with the INTERBUS network. The interface is a slave according to the INTERBUS standard. The incoming and outgoing interface is available through 9-way male/female connectors. The RMK12.2-IBS-BKL bus terminal permits a maximum of 15 I/O modules to be used via the outgoing INTERBUS I/O bus. The actual number of modules mainly depends on the inbuilt power supply unit that provides for the isolated power supply of the connected I/O modules (see RECO12.2 Configuration Limits)

3.2 Dimensions

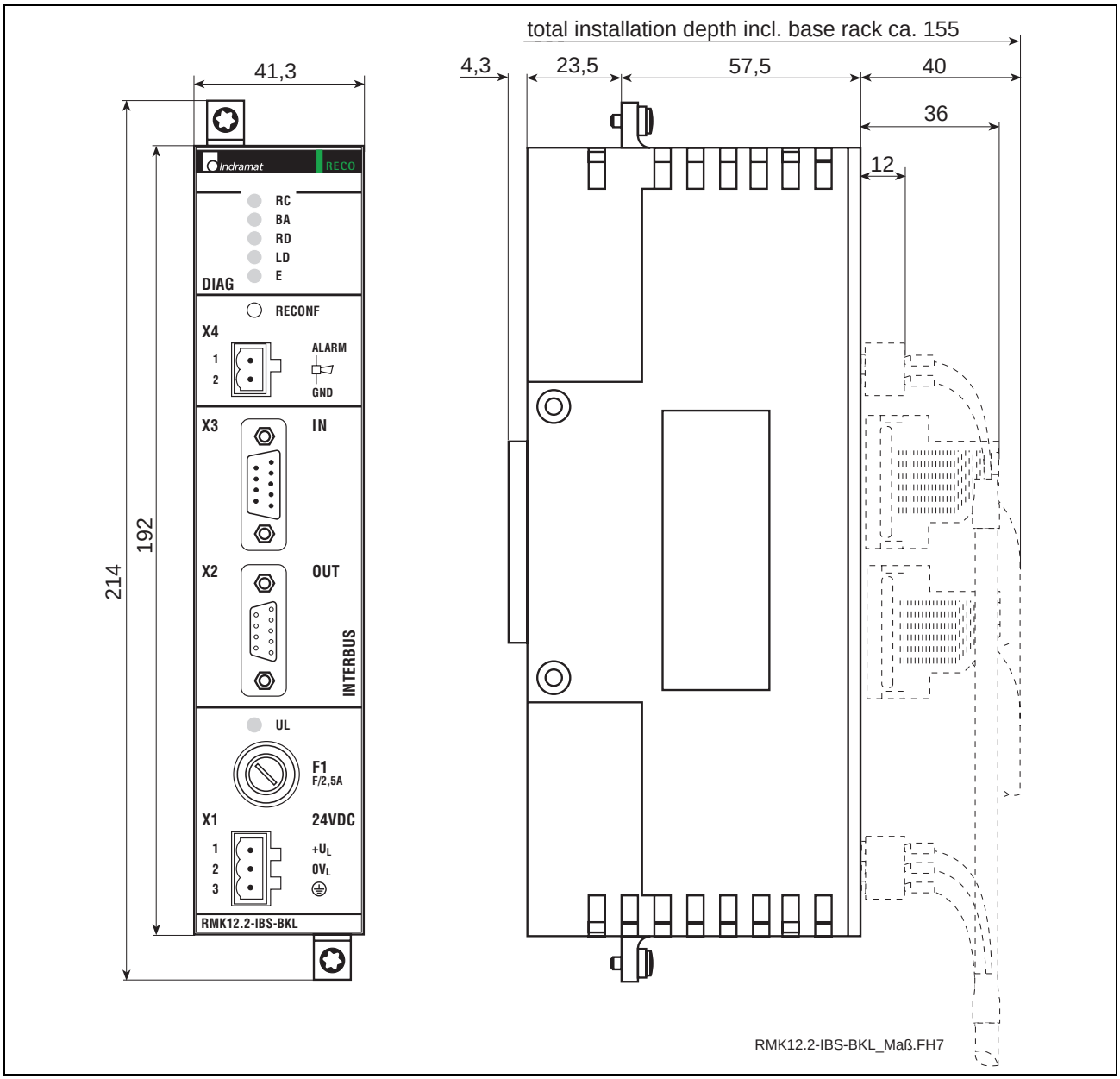


Figure 3-9: Mounting dimensions of RMK12.2-IBS-BKL

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3.3 ID Code:

$08_{(HEX)} = 8_{(DEC)}$

3.4 Pin Assignments

Mains connection and alarm

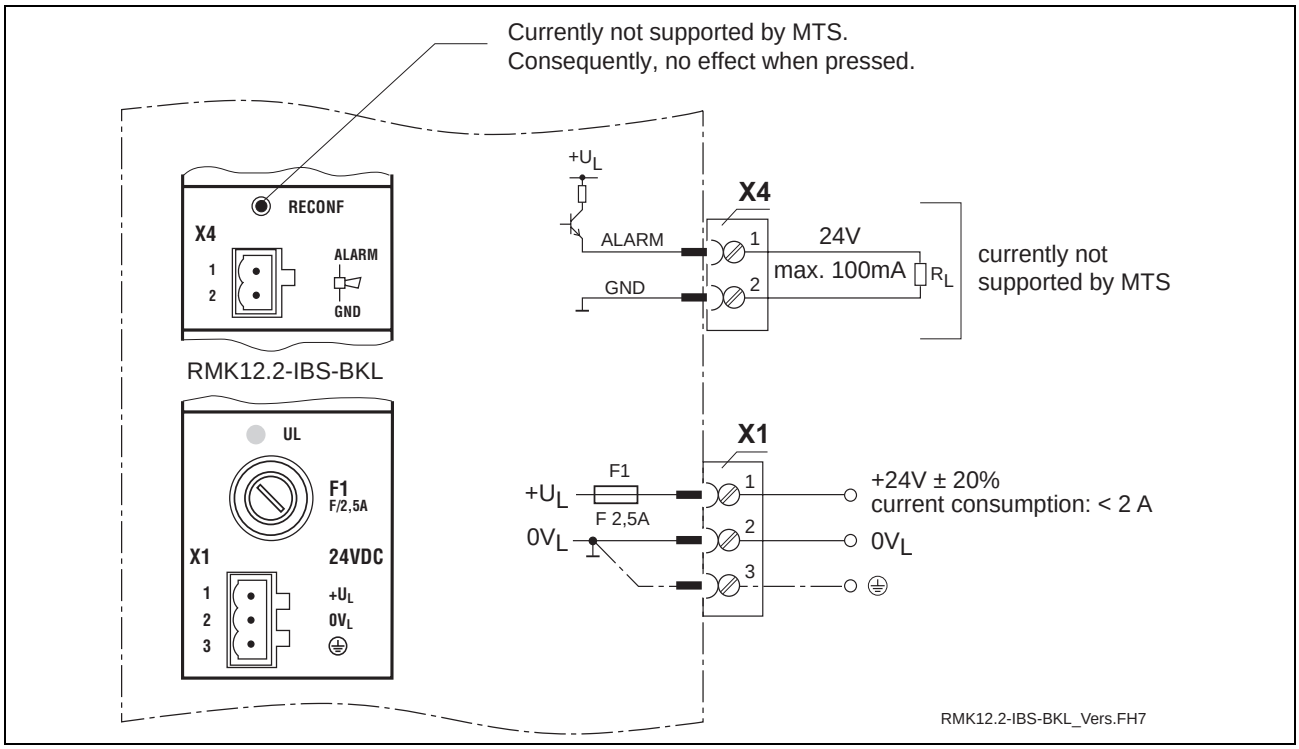


Figure 3-10: Pin assignments of mains connection and alarm

INTERBUS

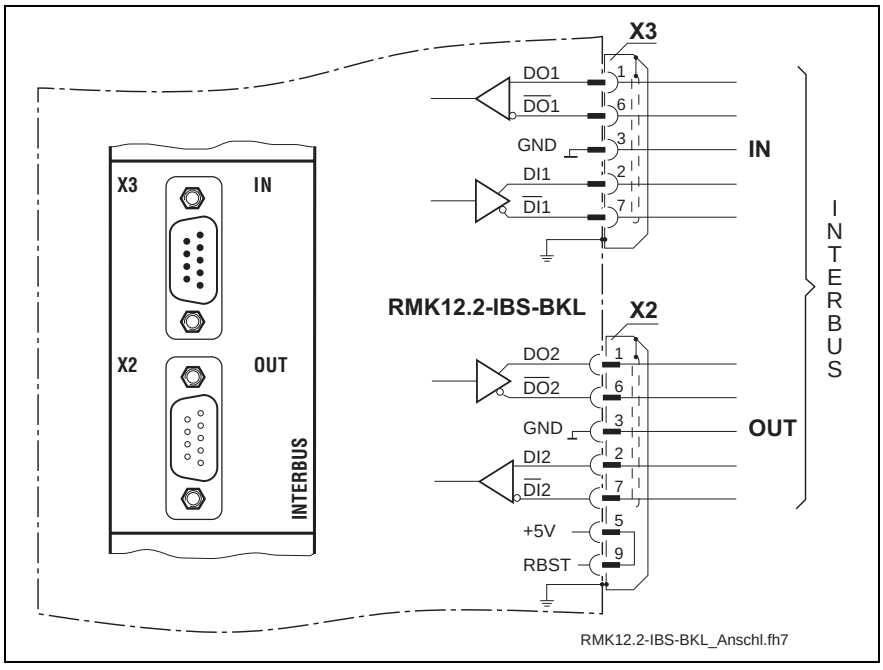


Figure 3-11: Pin assignments of the INTERBUS interface

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Diagnoses

RC	LED green	**R**emote bus **C**heck
		Monitoring the incoming remote bus (X3)
	ON:	Incoming remote bus connection is established
	OFF:	Incoming remote bus connection is disturbed
BA	LED green	**B**us-**A**ctive
	ON:	Data transfer on the INTERBUS is active
	OFF:	No data transfer
RD	LED red	**R**emote bus **D**isable
	ON:	The ongoing remote bus is switched off
	OFF:	The ongoing remote bus is connected
LD	LED red	**L**ocal bus **D**isable
	ON:	The ongoing local bus is switched off
	OFF	The ongoing local bus is connected

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4 RME12.2-16-DC024 INTERBUS Input Module

4.1 Brief Description

The digital 24 VDC input modules are designed for connecting digital control signals that are produced by pushbuttons, limit switches or electronic proximity switches. The 16 inputs are arranged in 2 isolated potential groups.

4.2 Dimensions

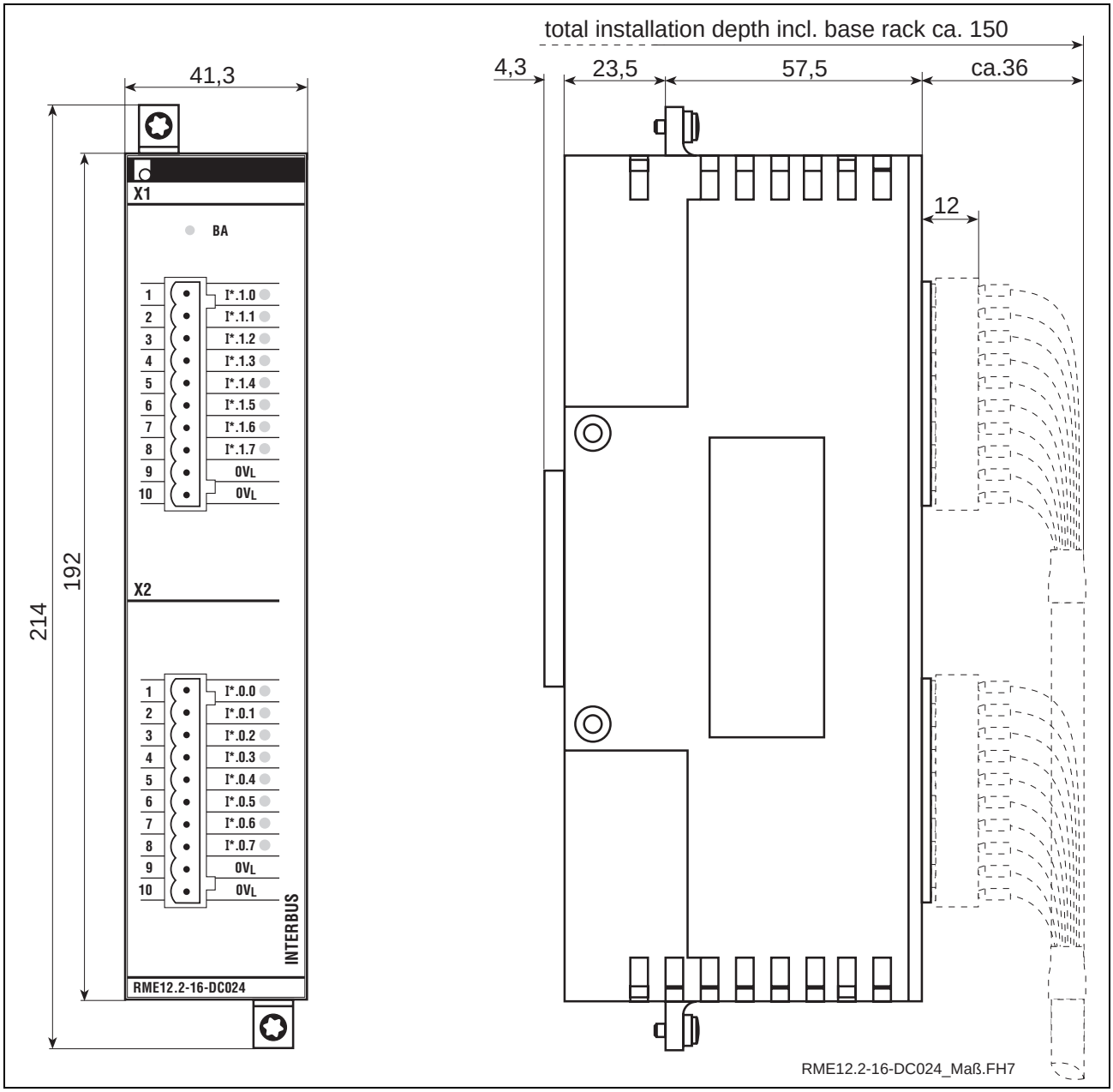


Figure 4-12: Mounting dimensions of RME12.2-16-DC024

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4.3 Pin Assignments

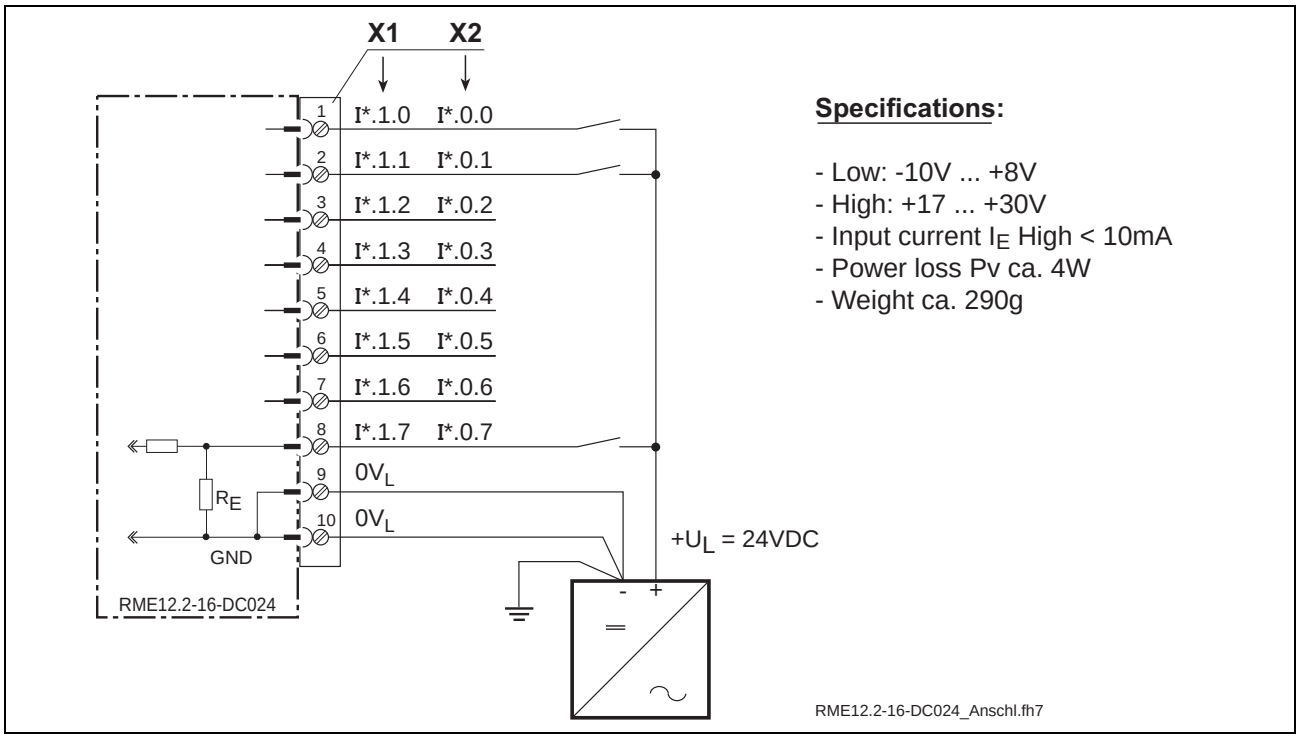


Figure 4-13: Wiring diagram of RME12.2-16-DC024

4.4 Addressing

Local bus device:	DI		
ID code:	$BE_{(HEX)}$	=	$190_{(DEC)}$
Data width:	1 word	=	16 bits

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5 RME12.2-32-DC024 INTERBUS Input Module

5.1 Brief Description

The digital 24 VDC input modules are designed for connecting digital control signals that are produced by pushbuttons, limit switches or electronic proximity switches. The 32 inputs are arranged in 4 isolated potential groups.

5.2 Dimensions

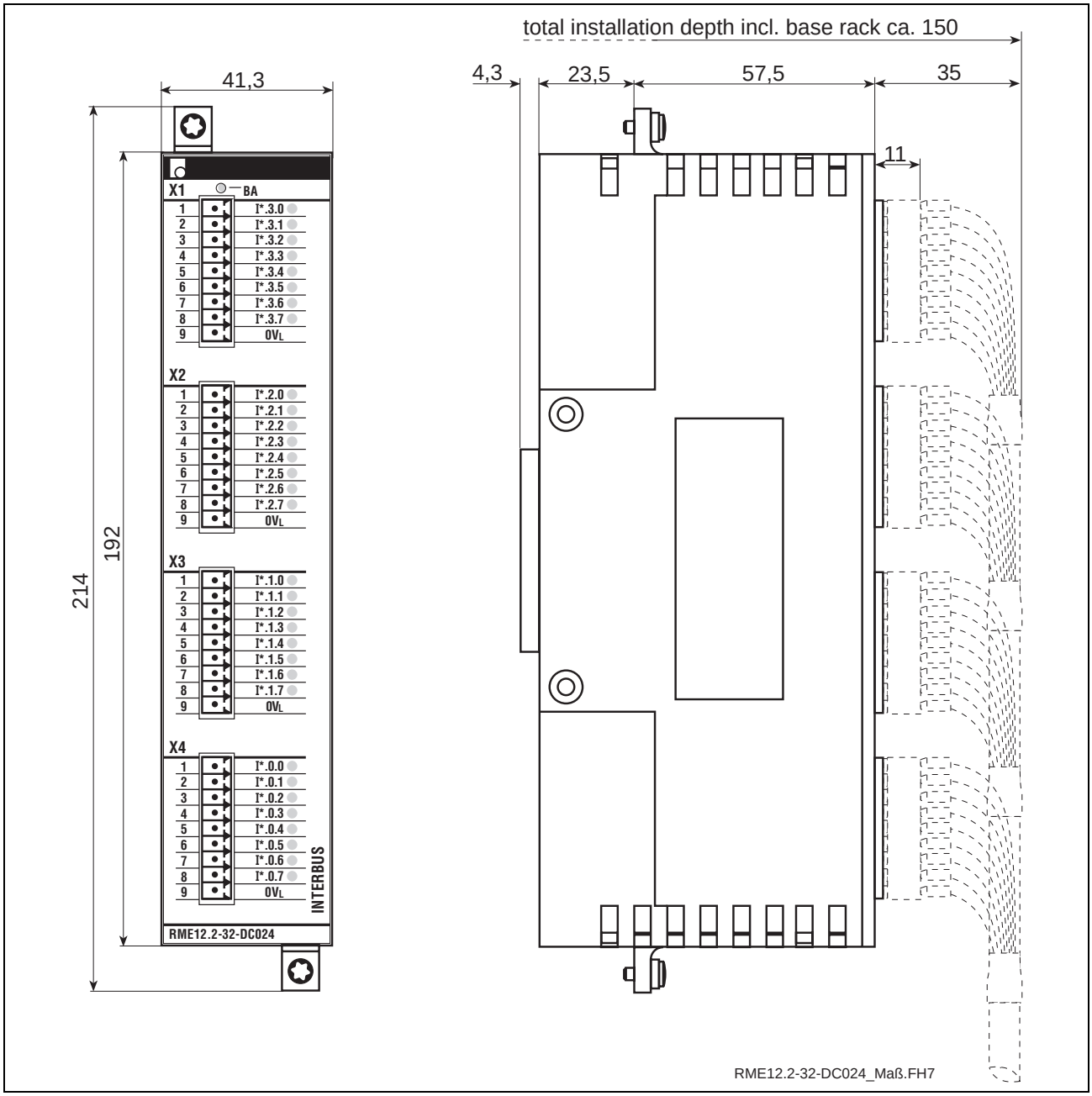


Figure 5-14: Mounting dimensions of RME12.2-32-DC024

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5.3 Pin Assignments

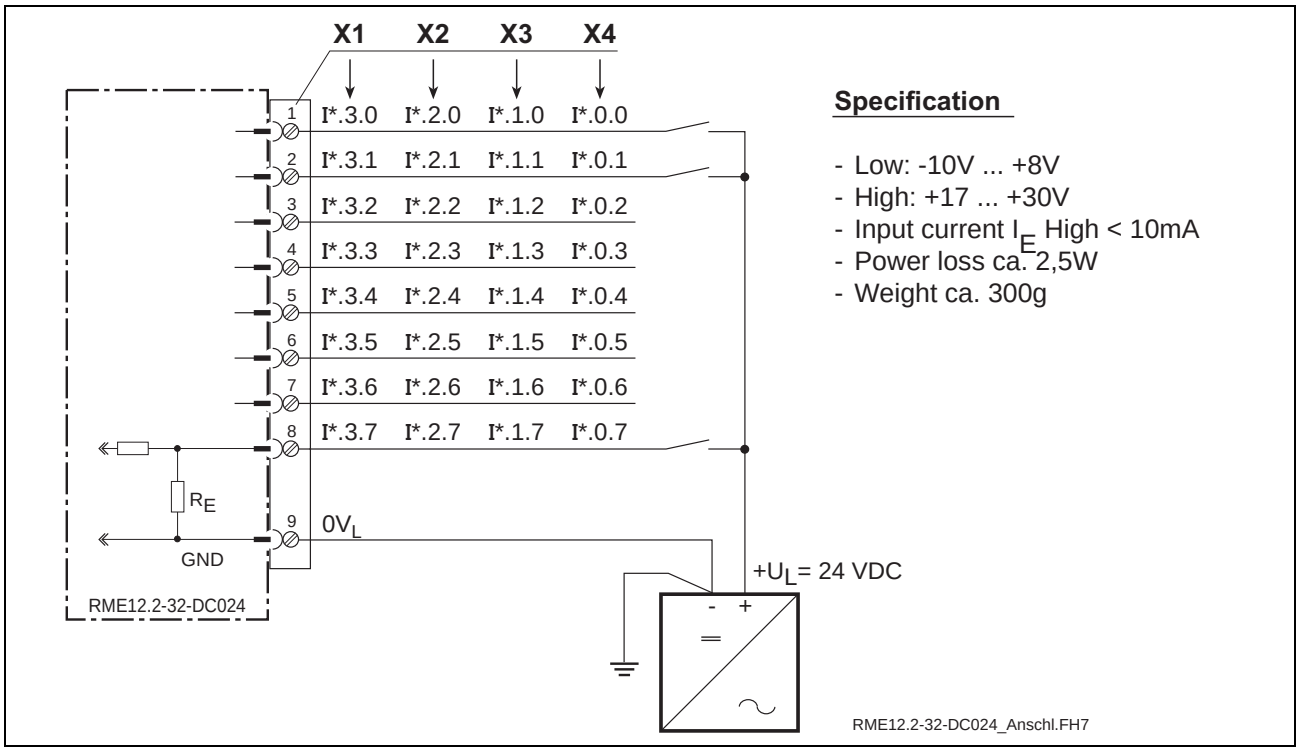


Figure 5-15: Wiring diagram of RME12.2-32-DC024

5.4 Addressing

Local bus device:	DI		
ID code:	$BE_{(HEX)}$	=	$190_{(DEC)}$
Data width:	2 words	=	32 bits

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6 RME12.2-16-AC115 INTERBUS Input Module

6.1 Brief Description

AC sources of a maximum rating of 120VAC / 60Hz can directly be connected to the digital 115VAC input modules. The 16 AC inputs are arranged in 2 isolated potential groups.

6.2 Dimensions

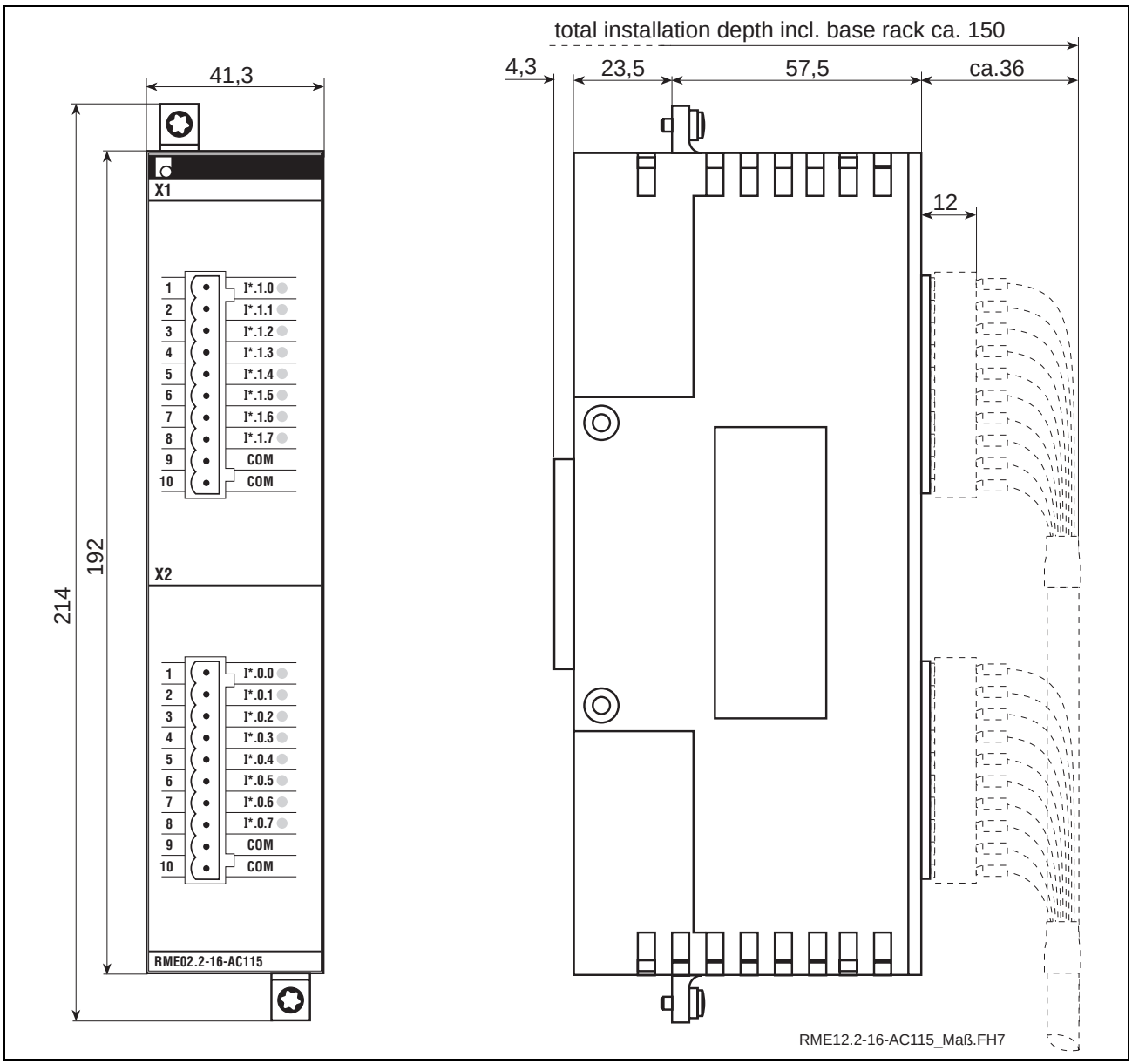


Figure 6-16: Mounting dimensions of RME12.2-16-AC115

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6.3 Pin Assignments

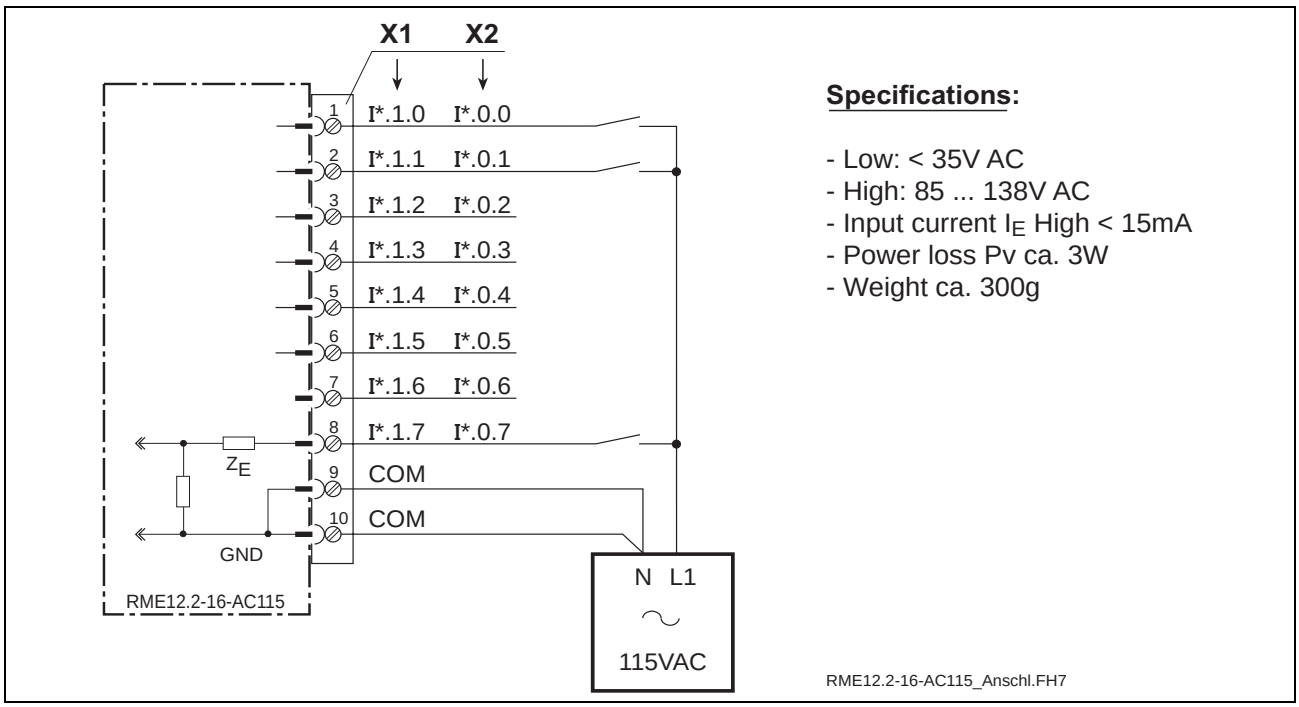


Figure 6-17: Wiring diagram of RME12.2-16-AC115

6.4 Addressing

Local bus device:	DI		
ID code:	$BE_{(HEX)}$	=	$190_{(DEC)}$
Data width:	1 word	=	16 bits

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7 RMA12.2-16-DC024-200 INTERBUS Output Module

7.1 Brief Description

The digital 24VDC output modules are designed for the connection of digital actuators, such as solenoid valves, contactors, or indicator lights. The 16 outputs are FET transitor switches (active 1 switching) that are arranged in 2 isolated groups of 8 outputs each. Each 24V output can source loads up to 2 A.

7.2 Dimensions

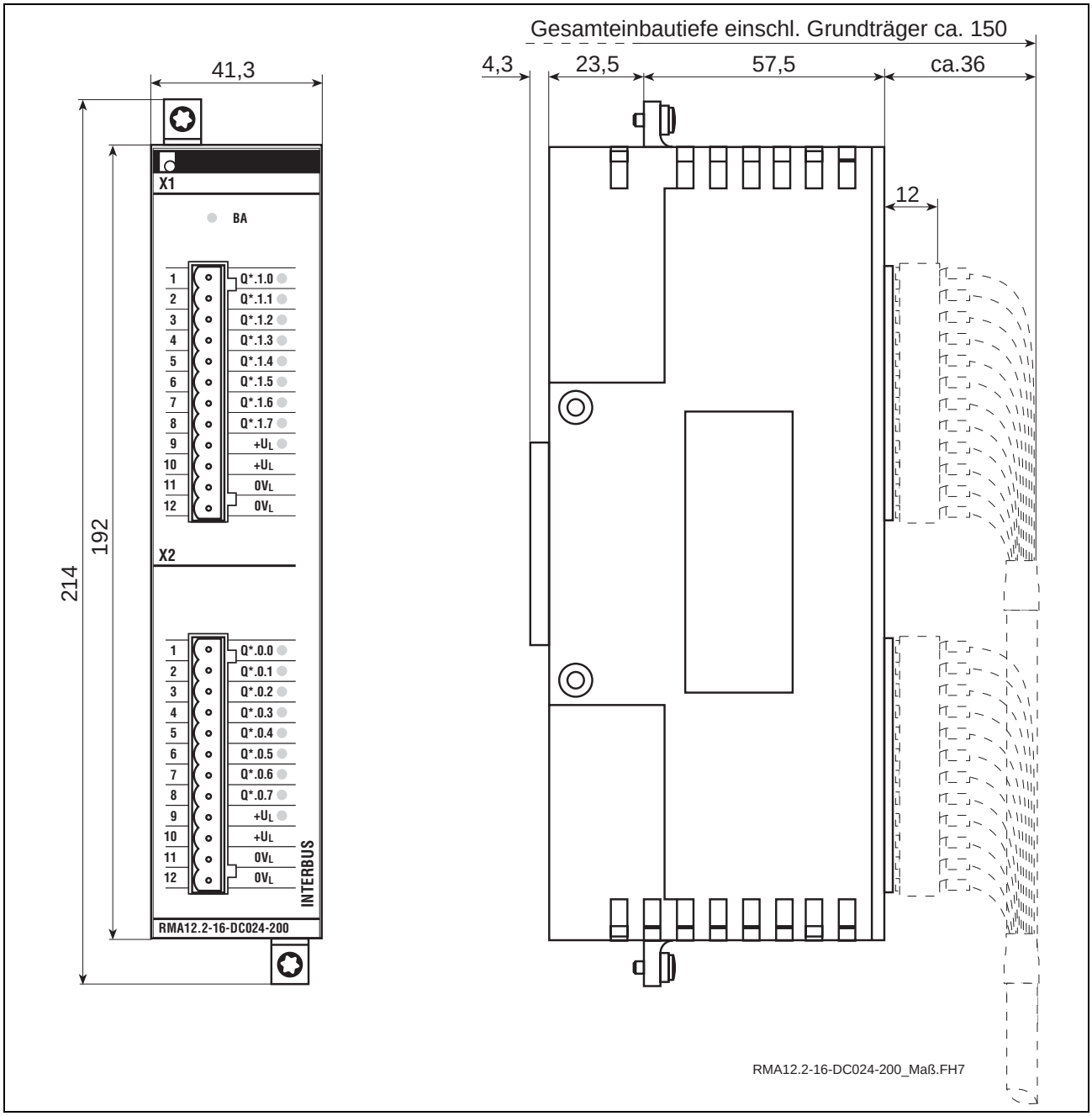
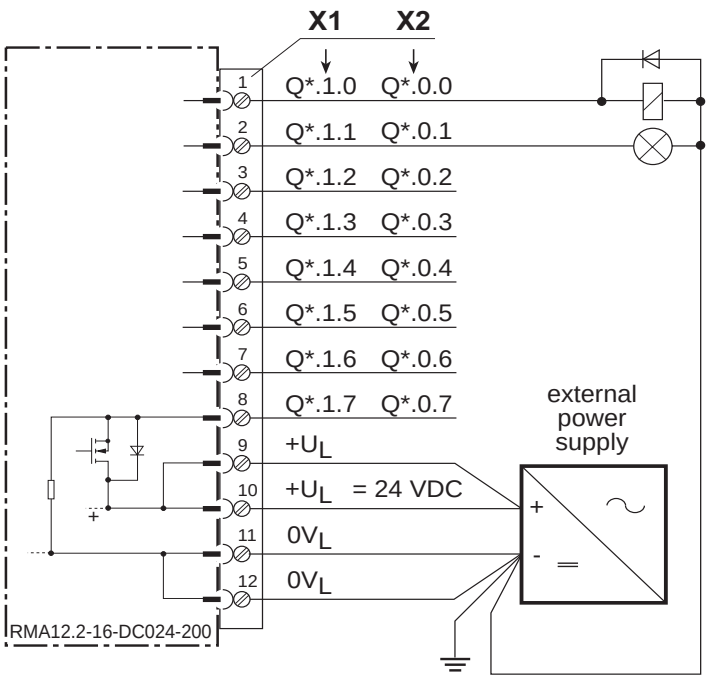


Figure 7-18: Mounting dimensions of RMA12.2-16-DC024-200

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7.3 Pin Assignments



Specifications:

- FET - output switch for 24V DC
- output current I_L = 2A per output
- internal current limitation
- short-circuit-proof
- 2 isolated blocks with 8 outputs each
- with internal voltage monitoring of the externally applied voltage
- power loss Pv ca. 7,5W
- weight ca. 280g

RMA12.2-16-DC024-200_Anschl.FH7

Figure 7-19: Wiring diagram of RMA12.2-16-DC024-200

7.4 Addressing

Local bus device:	DO		
ID code:	$BD_{(HEX)}$	=	$189_{(DEC)}$
Data width:	1 word	=	16 bits

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8 RMA12.2-32-DC024-050 INTERBUS Output Module

8.1 Brief Description

The digital 24VDC output modules are designed for the connection of digital actuators, such as solenoid valves, contactors, or indicator lights. The 32 outputs are FET transitor switches (active 1 switching) that are arranged in 4 isolated groups of 8 outputs each. Each 24V output can source loads up to 500 mA.

8.2 Dimensions

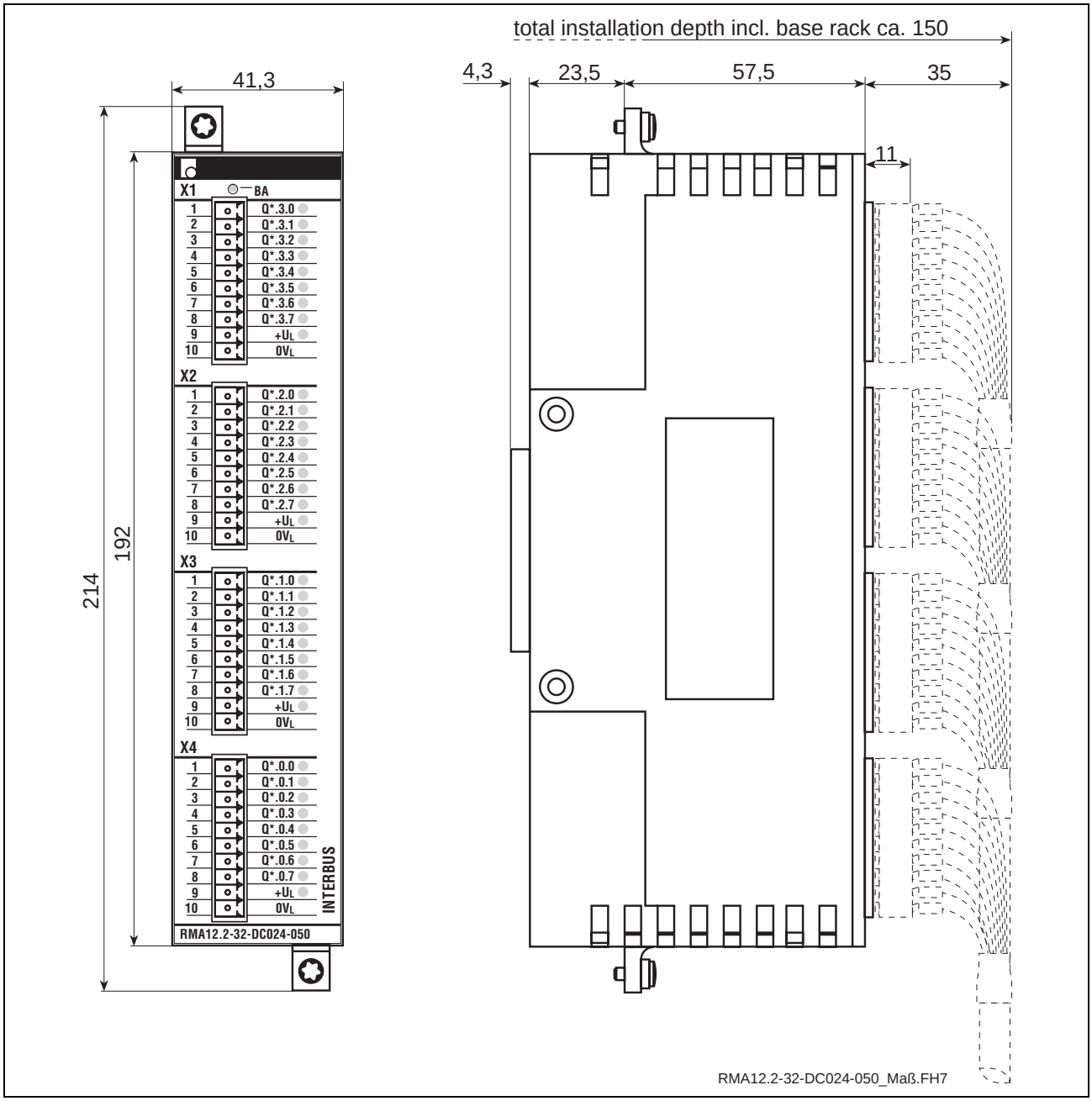
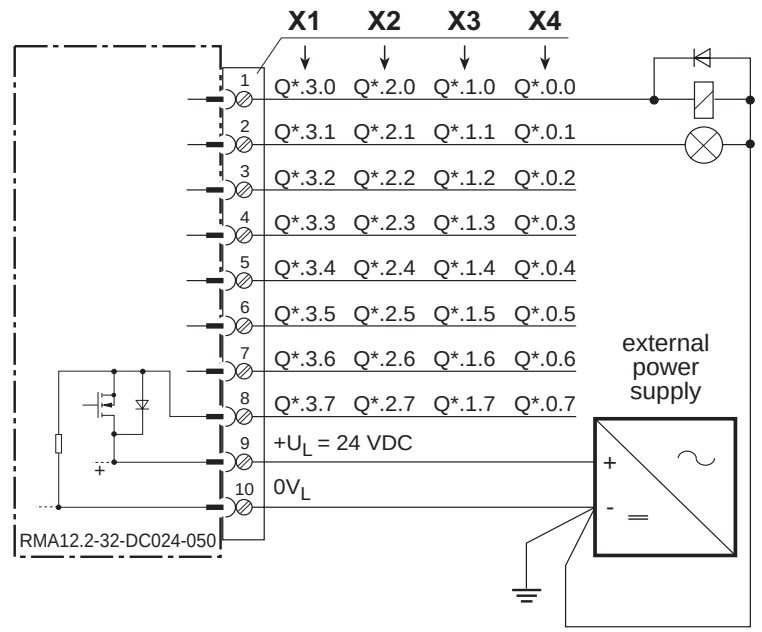


Figure 8-20: Mounting dimensions of RMA12.2-32-DC024-050

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8.3 Pin Assignments



Specifications:

- FET - output switch for 24V DC
- output current I_L = 0.5A per output
- internal current limitation
- short-circuit-proof
- 4 isolated blocks with 8 outputs each
- with internal voltage monitoring of the externally applied voltage
- power loss Pv ca. 2.5W
- weight ca. 300g

RMA12.2-32-DC024-050_Anschl.FH7

Figure 8-21: Wiring diagram of RMA12.2-32-DC024-050

8.4 Addressing

Local bus device:	DO		
ID code:	$BD_{(HEX)}$	=	$189_{(DEC)}$
Data width:	2 words	=	32 bits

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9 RMA12.2-16-AC230-200 INTERBUS Output Module

9.1 Brief Description

The digital AC output modules are designed for the connection of digital actuators that operate on the mains voltage. The 16 active 1 switching outputs are arranged in 2 isolated groups of 8 outputs each. Each 230V AC output is able to source up to 2A.

9.2 Dimensions

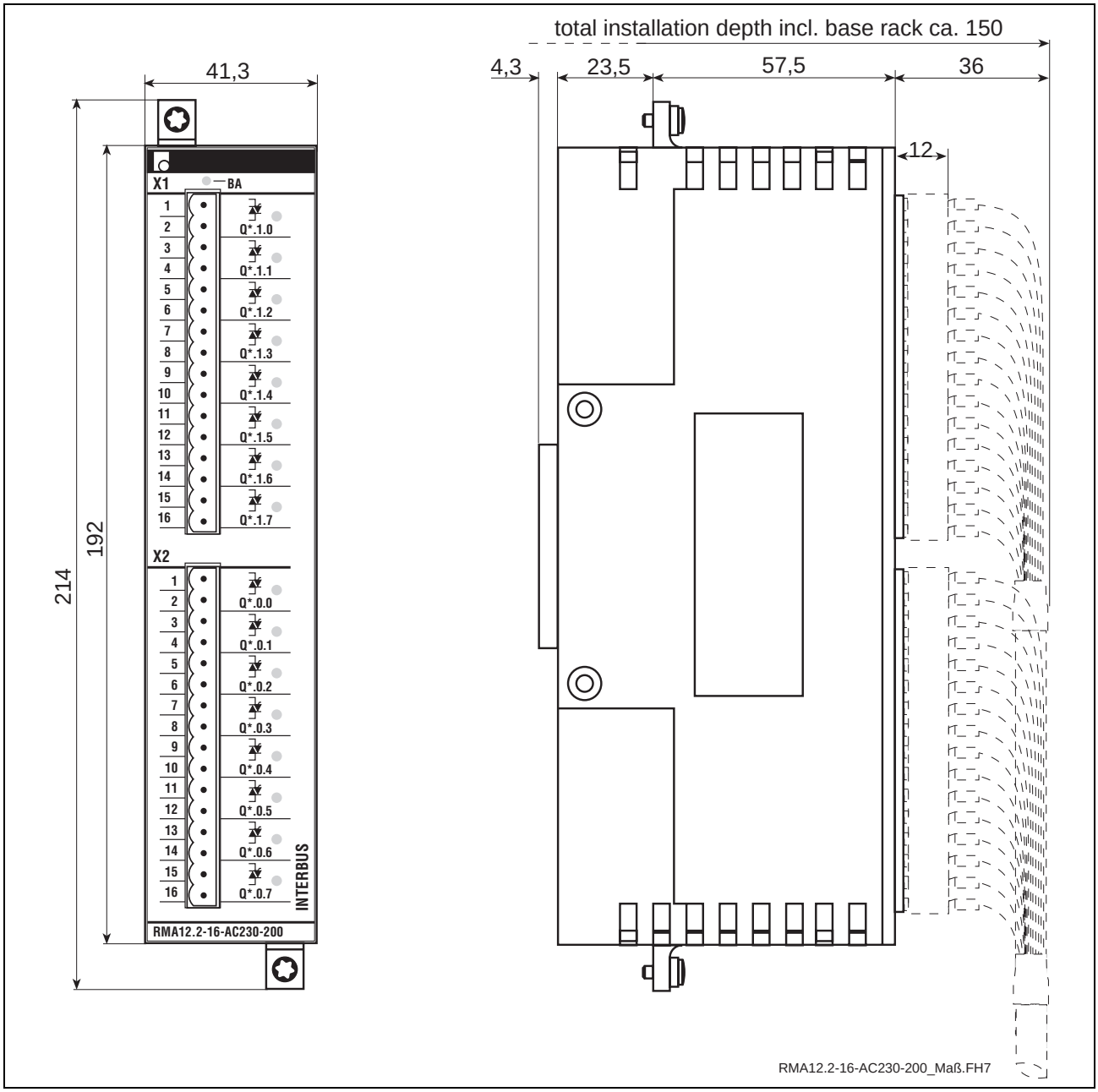


Figure 9-22: Mounting dimensions of RMA12.2-16-AC230-200

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9.3 Pin Assignments

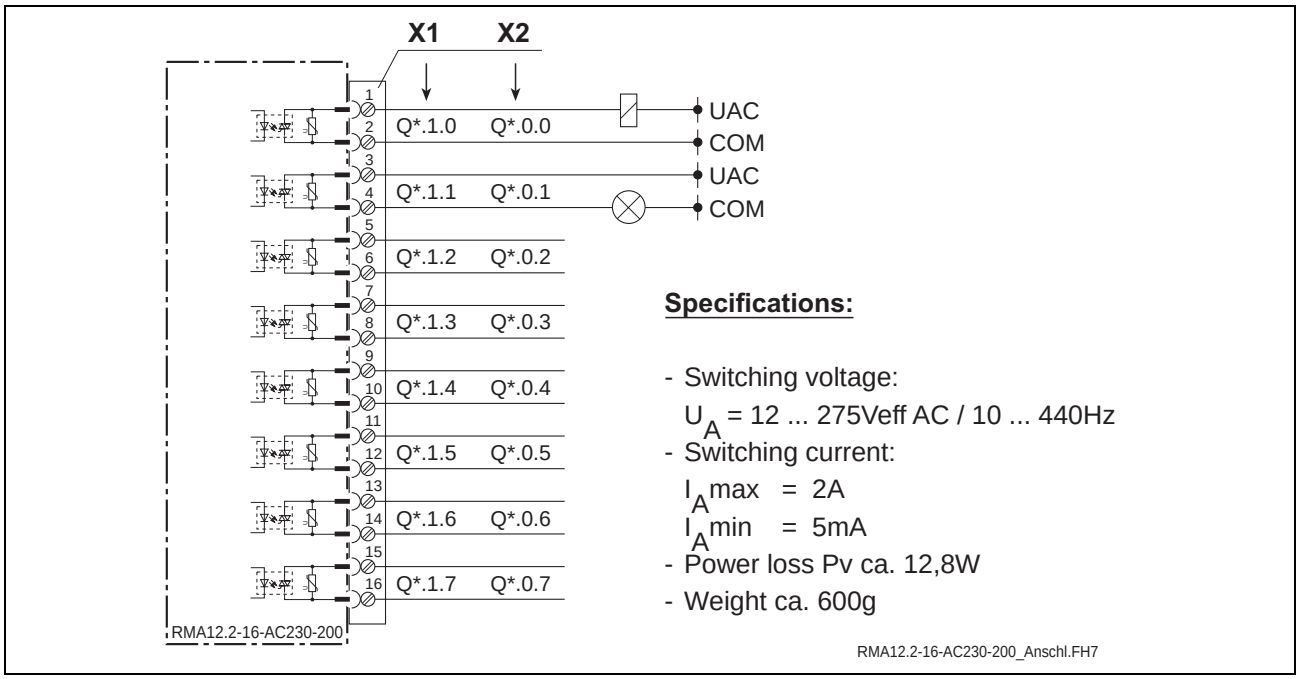


Figure 9-23: Wiring diagram of RMA12.2-16-AC230-200

9.4 Addressing

Local bus device:	DO		
ID code:	$BD_{(HEX)}$	=	$189_{(DEC)}$
Data width:	1 word	=	16 bits

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10 RMA12.2-16-RE230-200 INTERBUS Output Module

10.1 Brief Description

The digital relay output modules are designed as floating switching contacts for AC and DC. The 16 active 1 switching outputs are arranged in 2 isolated groups of 8 outputs each. Depending on the load, the maximum switching capacity of each output is between 50W and 200W (Figure 10-25: Load-related output rating).

10.2 Dimensions

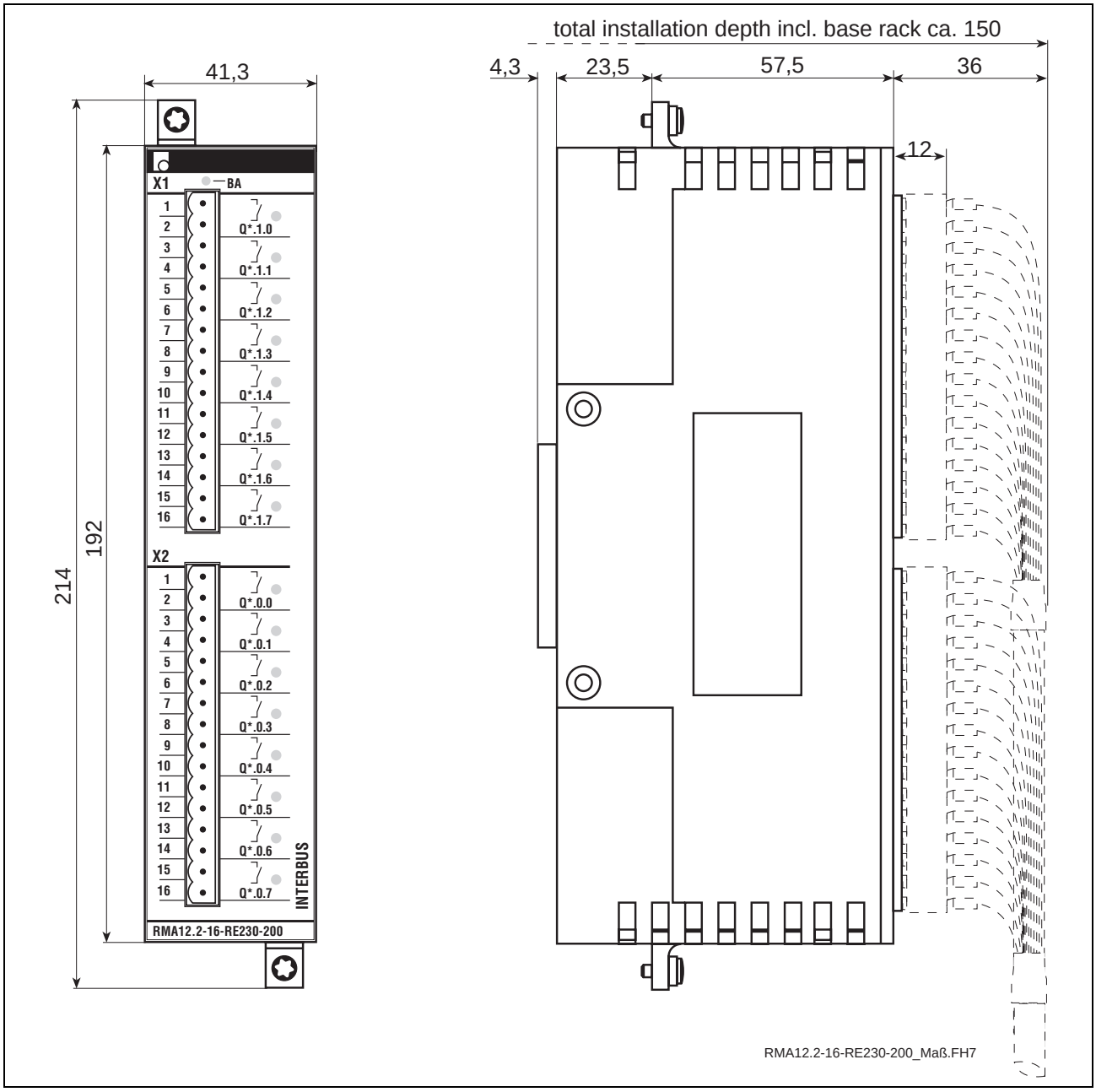


Figure 10-24: Mounting dimensions of RMA12.2-16-RE230-200

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10.3 Load Rating Curve of the Outputs

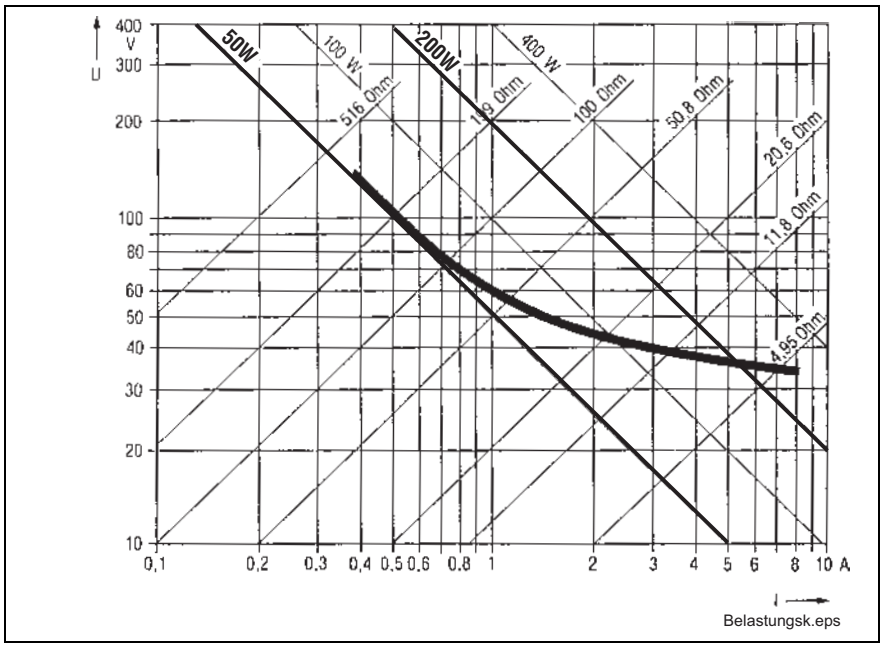


Figure 10-25: Load-related output rating

10.4 Pin Assignments

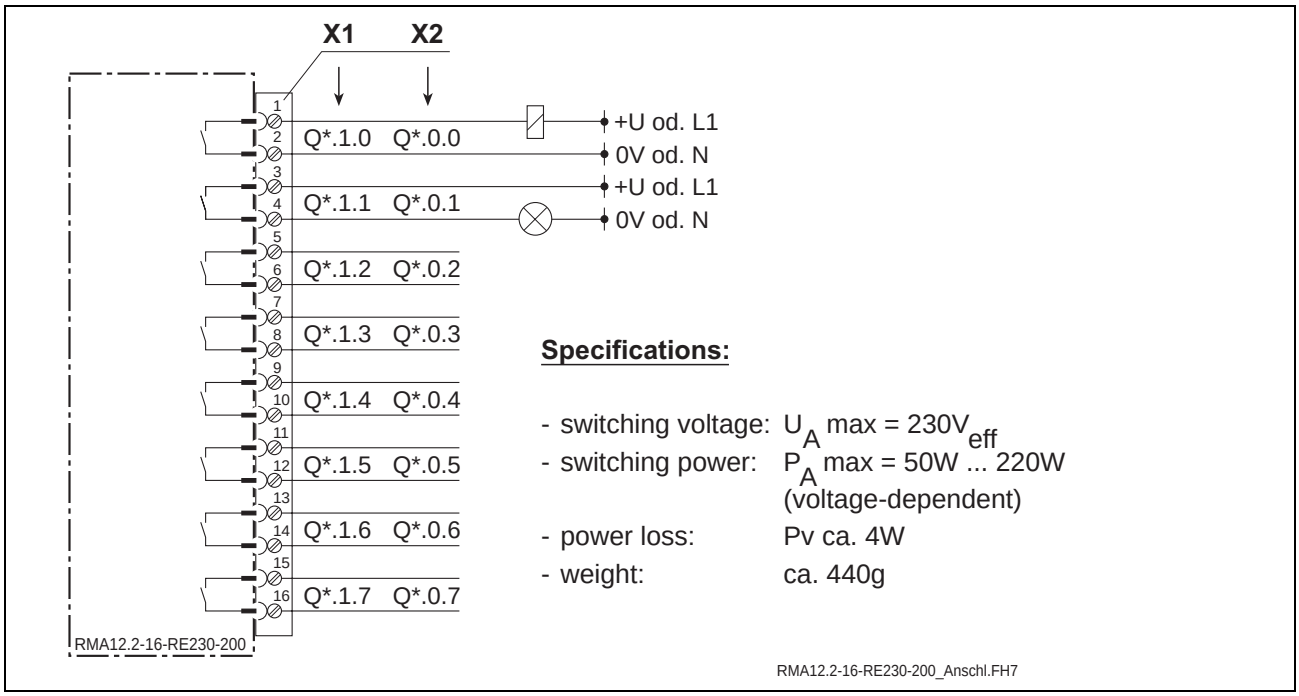


Figure 10-26: Wiring diagram of RMA12.2-16-RE230-200

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10.5 Addressing

Local bus device:	DO		
ID code:	$BD_{(HEX)}$	=	$189_{(DEC)}$
Data width:	1 word	=	16 bits

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11 RMC12.2-2E-1A INTERBUS Analog Module

11.1 General

The RECO module RMC12.2-2E-1A is an analog I/O module for the INTERBUS RECO system. The module is used as a local bus device in a RMB12.2-02 or RMB12.2-04 base rack in conjunction with the RMK12.2-IBS-BKL INTERBUS bus terminal.

The module possesses 2 isolated input channels and one isolated output channel. 2- and 3-wire actuators and/or 2-/3- and 4-wire sensors can be connected to these outputs. Each input connector has its own constant current source (2.5 mA) that eliminates the need for an external power supply for most sensors.

The analog output provides in parallel +/- 10V voltage and 0 - 20 mA current. Each input and output has its own connector. The module's power supply is provided via the local bus. Voltage conditioning, voltage monitoring and reset detection are performed on the RMK12.2-IBS-BKL bus terminal.

Analog section and INTERBUS section are isolated via optocouplers.

DA and AD conversions are always synchronous with the INTERBUS cycle so that time overlapping is not possible and the converted values are always valid.

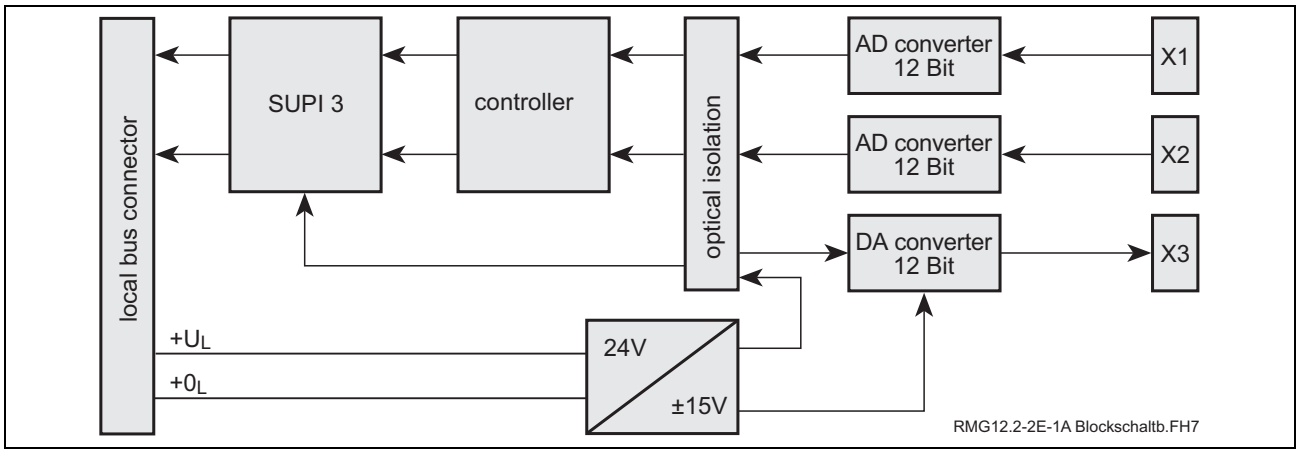


Figure 11-27: Block diagram

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11.2 Dimensions

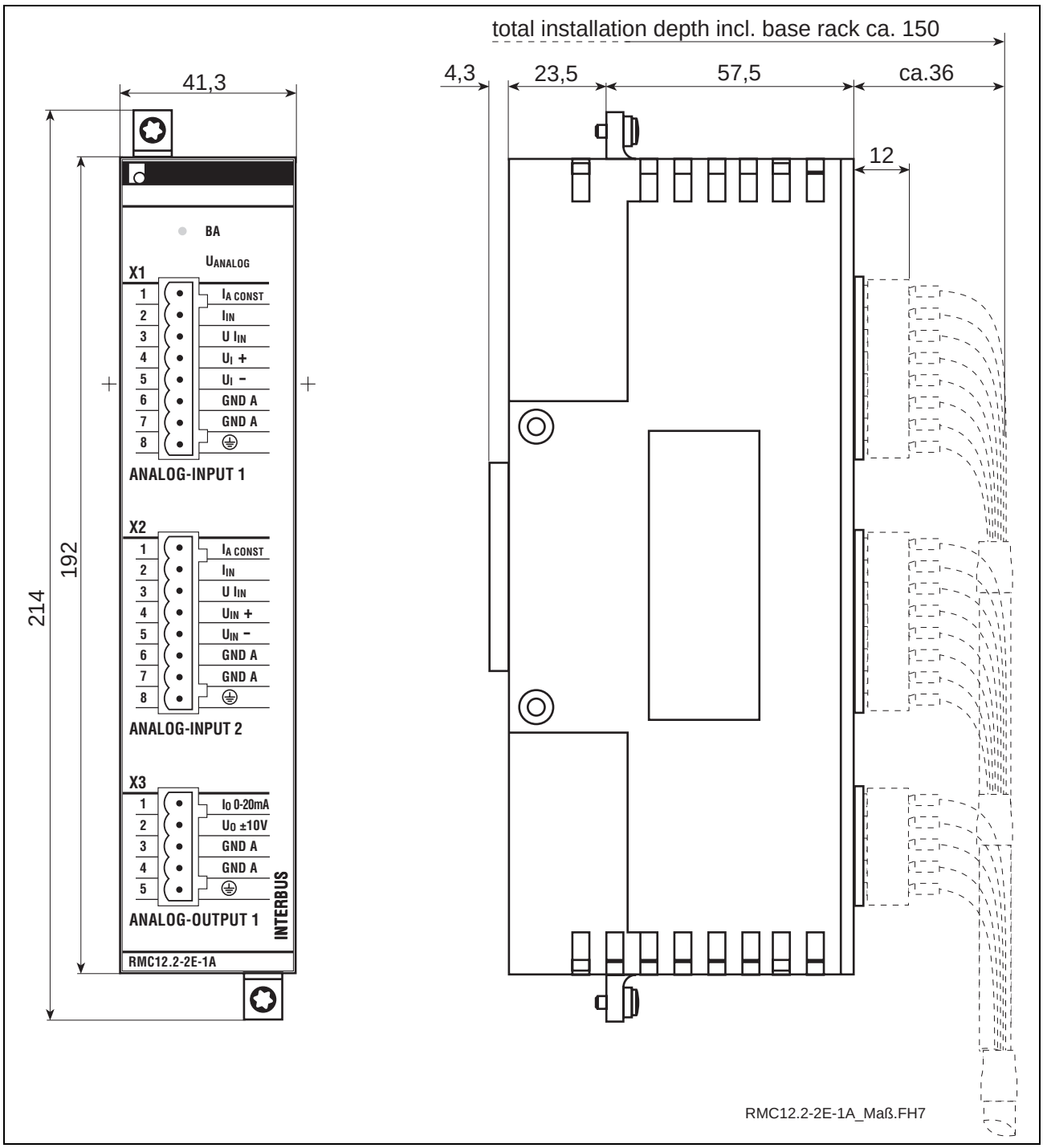


Figure 11-28: Dimensions of RMC12.2-2E-1A

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11.3 Analog Value Inputs X1 and X2

To suppress the influence of long lines, the X1 and X2 analog inputs are set up as differential inputs with a high common-mode rejection value. Thus, the influence of the line length can be neglected.

The measuring range of the inputs can be programmed through parameters.

Input ranges	
Bipolar input voltage range:	±0,5V; ±1V; ±5V; ±10V
Bipolar input current range:	±20mA
Resistance measurement:	0 - 2000Ω (internal current source) 0 < 20KΩ (external voltage source)
Temperature measurement:	Pt 100: -100°C....+850°C
Output ranges	
Bipolar output voltage range:	±10V
Unipolar output current ranges:	0 - 20mA

11.4 Entering the Analog Values

The analog value conversion is performed by an AD converter with a resolution of 16 bits that employs the successive approximation method. The conversion time is approximately 35 µs.

The following measuring inaccuracies occur inside the ambient temperature range 0...50°C:

- Voltage:
  - Measuring range 0.5V: 0.4% MEW (upper range limit)
  - Measuring range 1V: 0.4% MEW
  - Measuring range 5V: 0.2% MEW
  - Measuring range 10V: 0.2% MEW
- Current:
  - Measuring range 20mA: 0.3% MEW
- Resistance:
  - Measuring range 200Ω: 0.6% MEW
  - Measuring range 400Ω: 0.6% MEW
  - Measuring range 2000Ω: 0.4% MEW
- Temperature (Pt100):
  - Measuring range -100...266°C: 1.3% MEW
  - Measuring range -100...850°C: 1.0% MEW

The digital value is provided as a 16-bit word in 2's complement representation via the INTERBUS.

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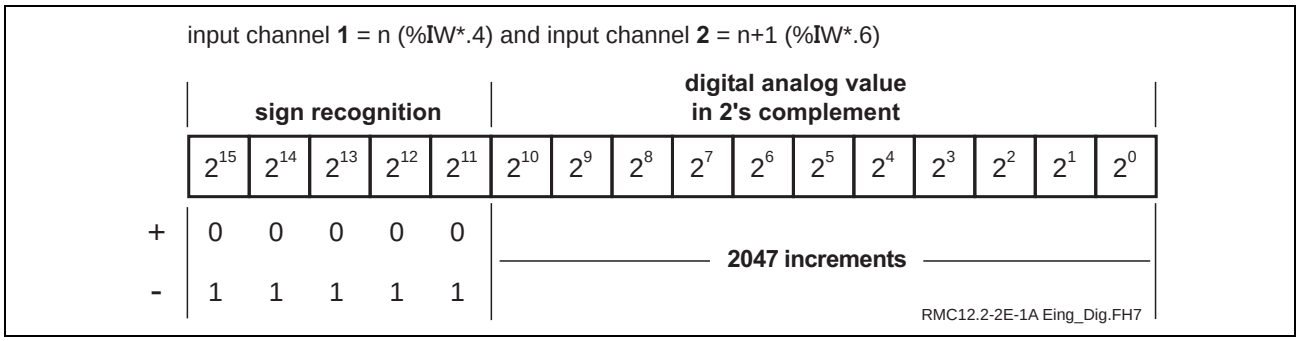


Figure 11-29: Representation of the input channels 1 and 2

11.5 Current Measurement

In current measurement, the current that is to be measured is conducted via an inbuilt 250Ω precision resistor, and the voltage drop across this resistor is measured.

The measuring error is 0.3% of the upper range limit.

11.6 Analog Value Output X3

The D/A converter for analog value output has a resolution of 12 bits and a conversion time of < 5µs. This means that the analog value is available 5µs after the INTERBUS cycle has been completed.

Current output runs in parallel to the voltage output (0V....10V) at a resolution of 2047 steps.

- +10V = 20mA provides a resolution of 9.77µA/increment
- 0V = 0mA
- -10V = 0mA

Note: The current resolution error in the temperature range 0...50°C is 0.2% of the limit value; the voltage resolution error is 1% of the output value.

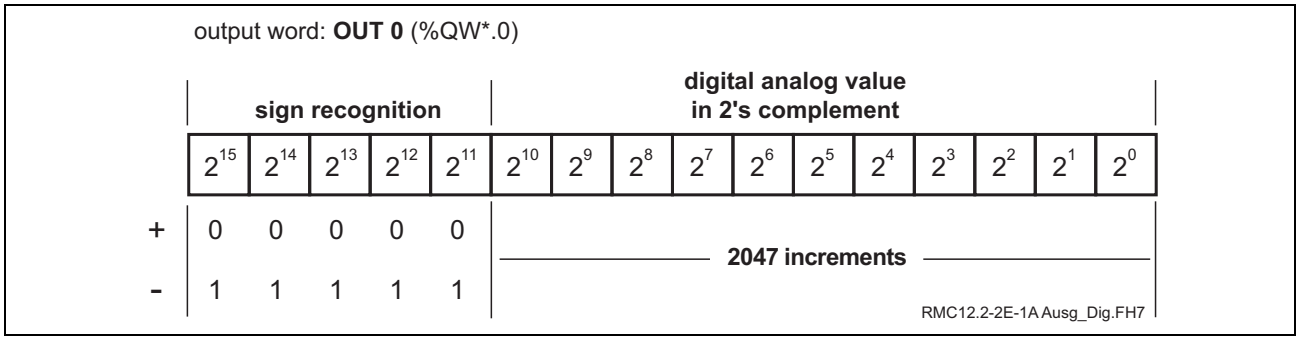


Figure 11-30: Representation of the OUT 0 output word

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11.7 Programming the Input Measuring Ranges

The parameters for the input measuring ranges are transferred in the 2nd output word of the INTERBUS transmission. It must be ensured that the parameters have been set accordingly before input measurement is started.

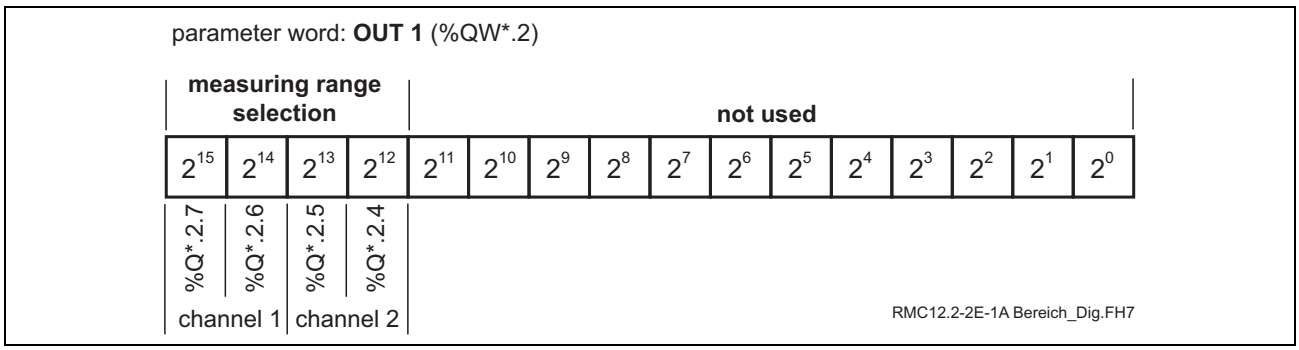


Figure 11-31: Representation of the OUT 1 parameter word

Channel 1		Channel 2		Voltage:	Current	Resistance	Temperature
0	0	0	0	±0.5V	----	200Ω	-100°C ... +266°C
0	1	0	1	±1.0V	----	400Ω	-100°C ... +850°C
1	0	1	0	±5.0V	0 - 20mA	2000Ω	----
1	1	1	1	±10.0V	----	----	----

Figure 11-32: Overview of the selectable measuring ranges

11.8 Structure of the IN/OUT Registers in the INTERBUS

Word M	Word M + 1	IBS word
Analog value channel **1** (%IW*.4)	Analog value channel **2** (%IW*.6)	IN register
Output word **OUT 0** (%QW*.0)	Parameter word **OUT 1** (%QW*.2)	OUT register

Figure 11-33: Register structure

11.9 Addressing

ID code:	$BF_{HEX)}$	=	$191_{(DEC)}$
Data width:	2 words	=	32 bits

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11.10 Diagnosis Indicators

BA	LED green	**B**us **A**ctive
	ON:	Data transfer is active
	OFF:	Data frames are not transferred
U_{Analog}	LED green	±15V indicator
	ON:	±15V present
	OFF:	±15V supply out of tolerance

11.11 Connector Pin Assignments

1	**$I_{A\ CONST}$**	2.5 mA constant current source for sensor power supply
2	**I_{IN}**	Current measuring input
3	**U I_{IN}**	Voltage measurement at **$I_{A\ CONST}$**
4	**U_I +**	Non-inverting voltage input
5	**U_I -**	Inverting voltage input
6	**GND A**	Analog ground
7	**GND A**	Analog ground
8	**Screen**	Pin for additional screening

Figure 11-34: Analog input connectors X1, X2

1	**I_A 0 - 20 mA**	Adjustable current output
2	**U_A ±10V**	Adjustable voltage output
3	**GND A**	Analog ground
4	**GND A**	Analog ground
5	**Screen**	Pin for additional screening

Figure 11-35: Analog output connector X3

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11.12 Typical Applications

±10V voltage output

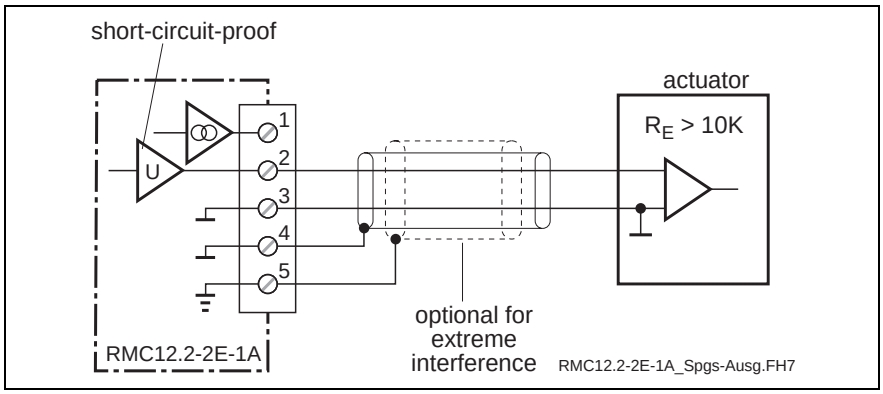


Figure 11-36: Typical wiring of voltage output

±10V voltage measurement (R_{in} > 1MΩ)

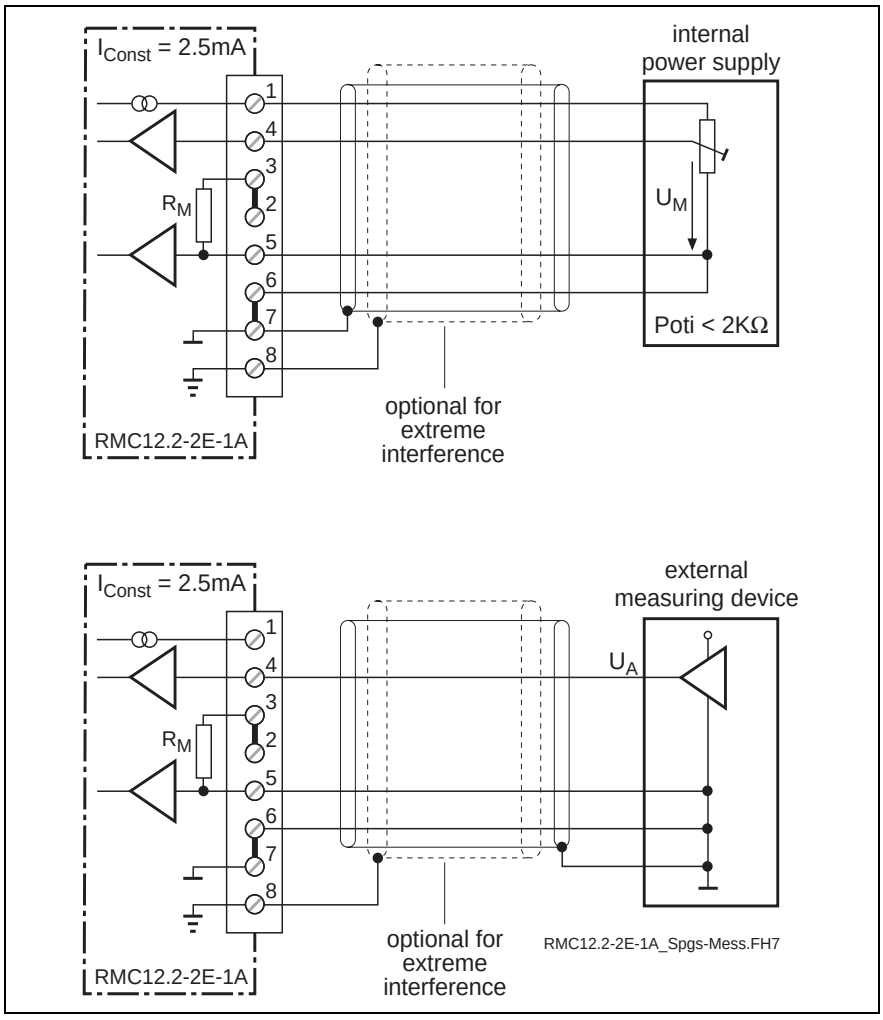


Figure 11-37: Typical wiring of voltage measurement

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0 - 20mA current output

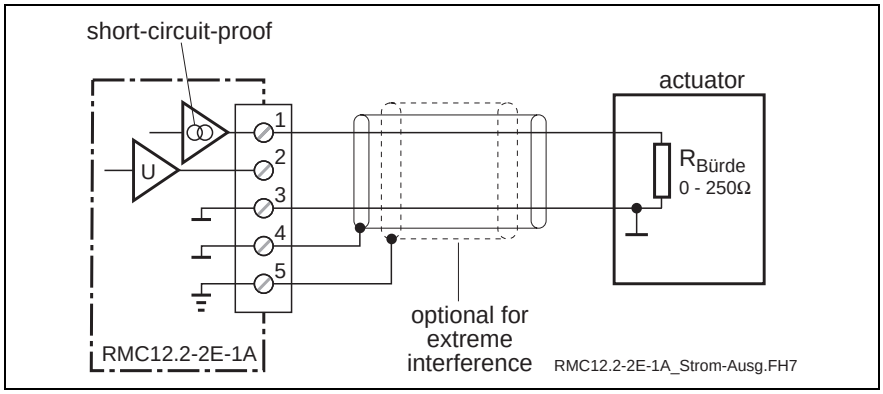


Figure 11-38: Typical wiring of current output

0 - 20mA current measurement

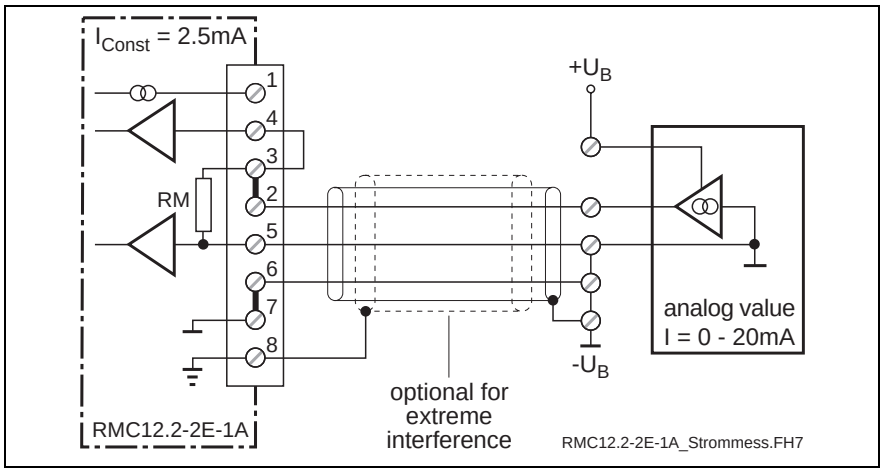


Figure 11-39: Typical wiring of current measurement

Temperature measurement using Pt100 element

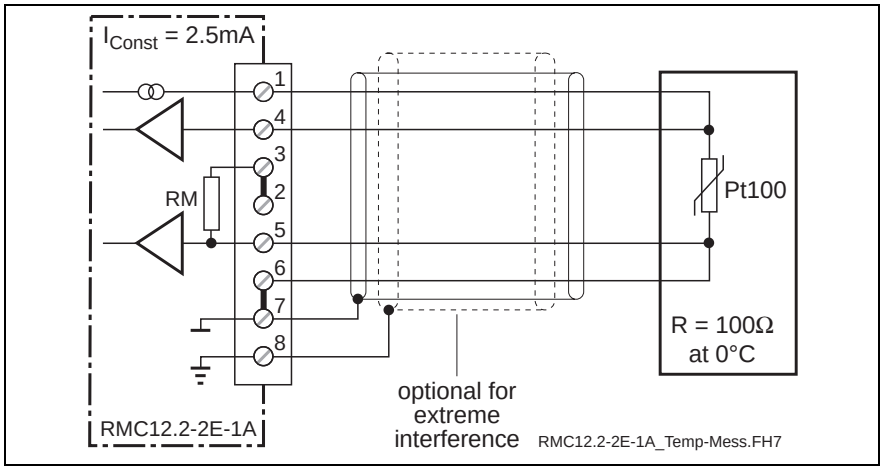


Figure 11-40: Typical connections for temperature measurement using Pt100 element

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12 RECO12.2 Configuration Limits

12.1 General

The maximum number of modules is limited to one RMK12.12.2-IBS-BKL module and 15 I/O modules. With some modules, however, the maximum number of a specific module type must be taken into account.

The following modules can only be used in a limited number when all outputs are triggered at the same time:

RMA12.2-16-RE230-200	max.	8 modules
RMA12.2-32-DC024-050	max.	8 modules
RMA12.2-16-AC230-200	max.	8 modules

If the given limits must be exceeded, the number of outputs that can be switched simultaneously is reduced accordingly.

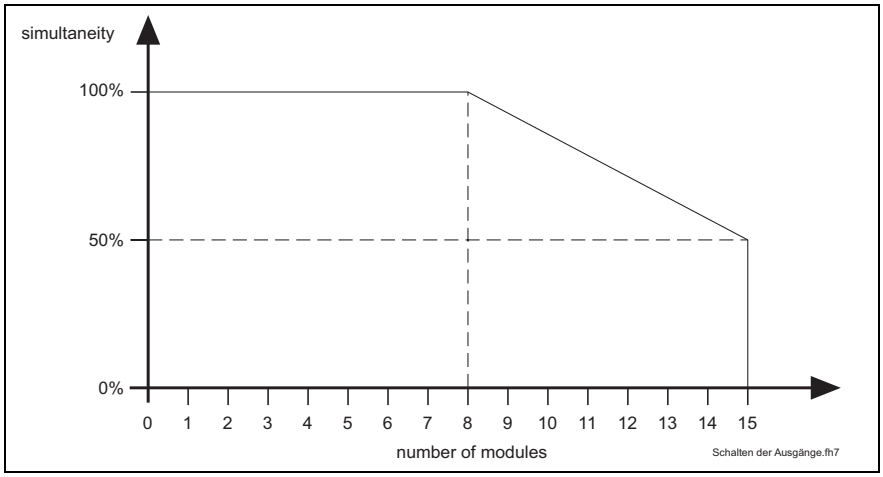


Figure 12-41: Maximum number of outputs that can be switched simultaneously.

12.2 Configuration-Related Current Consumption of the Bus Coupler Unit

The maximum current consumption of the entire RECO12.2 unit depends on the employed modules. The total current requirement of a configuration can easily be determined using the following table:

The power supply unit of the bus coupler module can provide a maximum of 2.5 A for the electronics of the modules. The power supply to the modules is not taken into account here; the corresponding modules must be fed separately.

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Module type		Current consumption	Quantity	Total (mA)
RMK12.2-IBS-BKL	(base consumption)	**approximately 100mA**	**1**	**100**
RME12.2-16-DC024		approximately 5 mA		
RME12.2-32-DC024		approximately 10 mA		
RME12.2-16-AC115		approximately 5 mA		
RMA12.2-16-DC024-200		approximately 30 mA		
RMA12.2-32-DC024-050	(max. 8 units)	approximately 60 mA		
RMA12.2-16-AC230-200	(max. 8 units)	approximately 60 mA		
RMA12.2-16-RE230-200	(max. 8 units)	approximately 160 mA		
			Total current consumption:	

Figure 12-42: Power consumption of a RECO configuration

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13 Accessories

13.1 Cables and Connectors

The following parts are available for building INTERBUS network connections. Using INDRAMAT cables is not absolutely necessary. The cables from Messrs Phoenix Contact, Blomberg that are listed below may also be used.

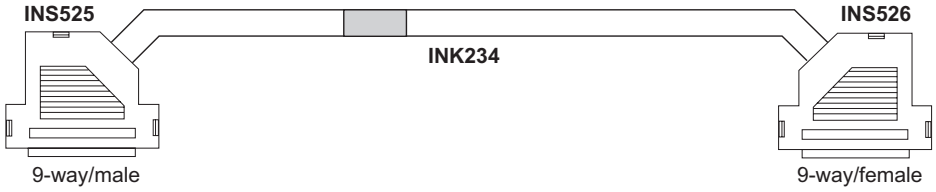
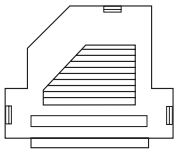
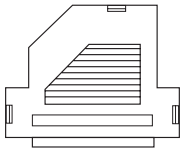
Order number	Mating connector of the unit	INDRAMAT cable	Cable end
IKS0056/000,0 MN: 255 968 (INTERBUS, max. 400 m)			
INS0525 MN: 259 762	 **INS0525/9-way/male**	Connector for building an INTERBUS cable with third-party cables.	
INS0526 MN: 259 762	 **INS0526/9-way/female**	Connector for building an INTERBUS cable with third-party cables.	
Phoenix cable IBS RBC Meter/F-T Part no.: 2723123	Recommendation: Phoenix Contact remote bus cable (cannot be ordered from INDRAMAT)		
Phoenix cable IBS INBC Meter/S Part no.: 2759870	Recommendation: Phoenix Contact installation remote bus cable (cannot be ordered from INDRAMAT)		

Figure 13-43: RECO12.2 accessories

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13.2 Additional Annotation

A transparent carrier sheet that is glued to a side of the module can be used to provide the individual RECO I/O modules with additional annotations. This foil can be glued to the left-hand or to the right-hand side of the module housing. The carrier sheets are provided with an adhesive surface. The sheet is intended to accommodate the prepunched stickers that come in quantities of six on an A4 foil.

The relatively moisture-insensitive stickers can be printed on in a standard laser printer. A word processing program is available that makes annotation easier. This program is a Word 7.0 template for Windows NT that permits 1 through 6 modules per sticker to be labelled. It can be selected whether it is a 16-bit, or 32-bit, an input or an output module, and whether the sticker shall be glued to the right-hand or to the left-hand side of the module.

Designation	Type	Material no.
Carrier sheet	RECO annotation film	281 697
Annotation film	RECO annotation film DIN A4 white	281 696
Annotation software	SWD-RECO**-STP-01VRS-MS-C1,44-WIN-NT	281 691

Figure 13-44: Annotation accessories

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