I/O modules manual



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REGIN

THE CHALLENGER IN BUILDING AUTOMATION

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Revision B, January 2014

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Chapter 1 General description

There are two types of I/O modules available: A large model with 16 I/O:s, as well as a small model with either 7 or 10 I/O:s.

The 16 I/O models enable expansion of the EXOflex, EXOcompact, CLEVER master, RU6X and RU9X controllers. The smaller models supports EXOflex and EXOcompact.

Integration of the I/O modules into an EXO system is intended for advanced system integrators only. Up to 32 I/O modules can be connected to one controller but the limit is set by the system integrator and the application.

Models with 16 I/O:s

When using the I/O modules in combination with CLEVER master, up to 32 I/O modules (512 terminals) can be connected. When using the I/O modules in combination with RU6X or RU9X, up to two additional modules (32 terminals) can be added.

All I/O modules with output terminals (digital/analogue) can be operated manually. The state of the digital signals (DI/DO) is indicated by an LED.

Each I/O module is equipped with 16 terminals (input and/or output). The type and number of the terminals depend on the type of module. The terminals can be freely assigned within the controllers.

Communication takes place via EXOline or CAN-Bus.

To be able to connect with the I/O modules, RU9X and RU6X require software version 3 (for example, H6.3.01 in RU6X). The CLEVER master controller requires the latest software CM0.1.02 (dated 17 April 2012 or later).

Models with 7 or 10 I/O:s

These I/O modules communicate via EXOline (RS485).

For a complete list of EXOline communication variables, as well as information on how to use the modules in an EXO project, please refer to the document ***I/O modules in EXO systems***. This manual can be downloaded from Regin's FTP server. It is intended for our system customers who need to share files with us, e.g. at technical support. Contact one of our sales engineers to get access to the FTP server.

Chapter 2 **Types/functions**

Models with 16 I/O:s

The following 6 types are available:

IO-16AI



IO-16DI



IO-16DO-M



IO-8DO8AI-M



IO-8DO8AO-M



IO-4X4-M



IO-16AI

I/O module for 16 analogue input signals.

The analogue inputs support PT1000, Ni1000 (only CAN-Bus), microsensor, 0...10 V, 0(4)…20 mA, 0…10 kΩ (to use with e.g. a setpoint device). CAN-Bus has a special mode for using the analogue inputs as digital inputs.

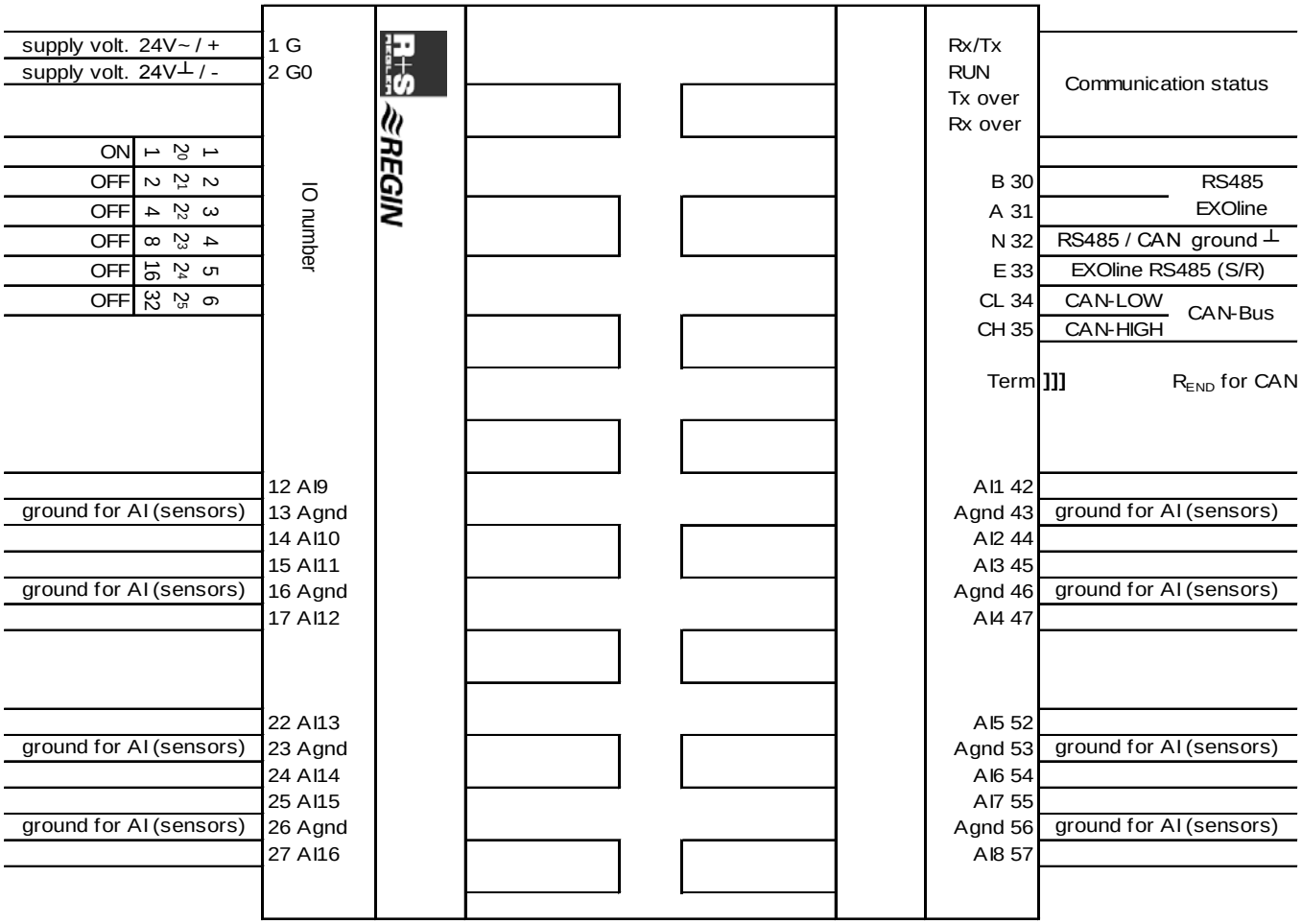


Fig. 1: IO-16AI terminals

IO-16DI

I/O module for 16 digital input signals with LED signalling for signal contacts. DI1…DI8 can be used for pulse counters, instantaneous power, key function; reference potential +C for all digital inputs.

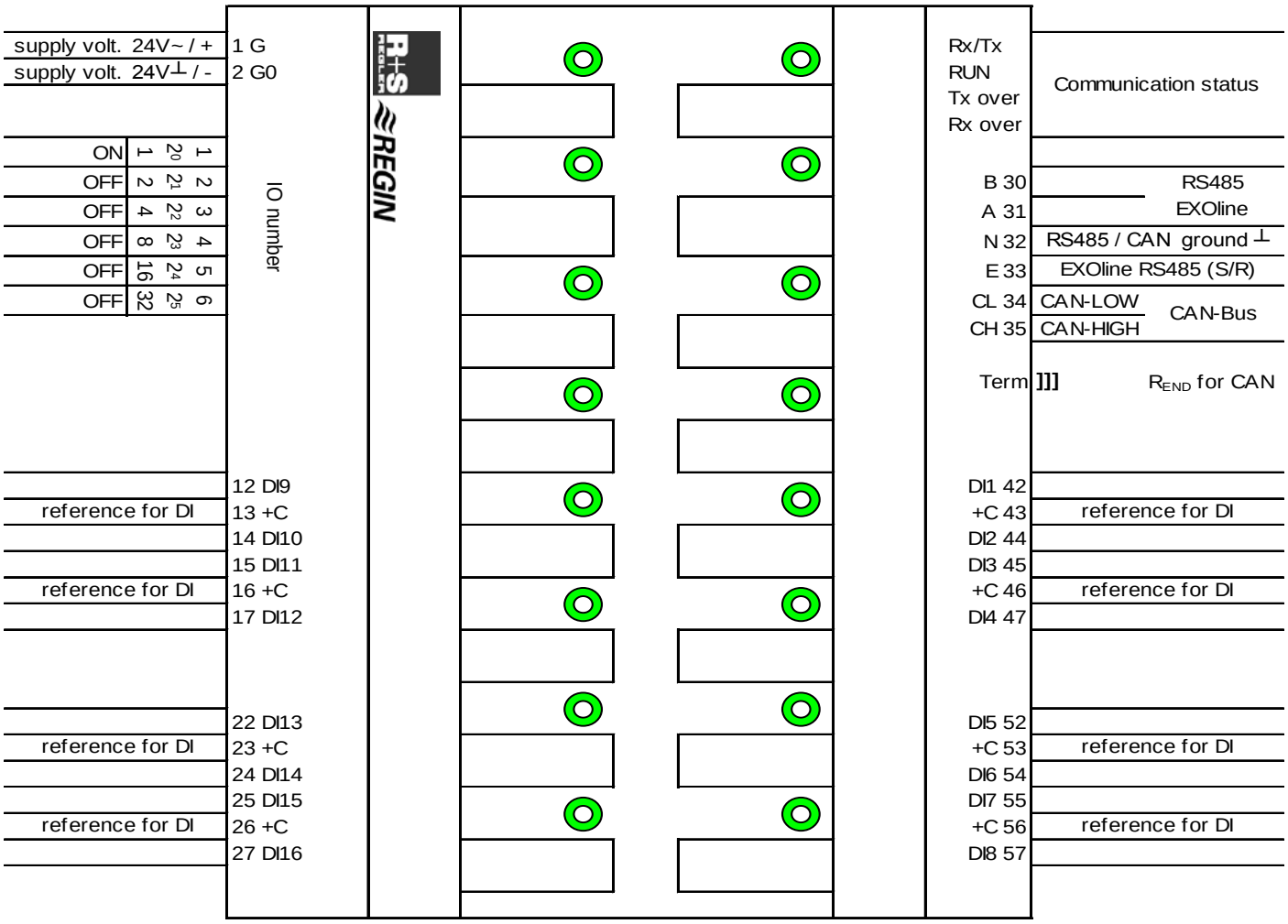


Fig. 2: IO-16DI terminals

IO-16DO-M

I/O module with 16 digital outputs, relay contacts with manual operation and LED signalling, potential-free closing contact, 230 V / 24 V (not mixable).

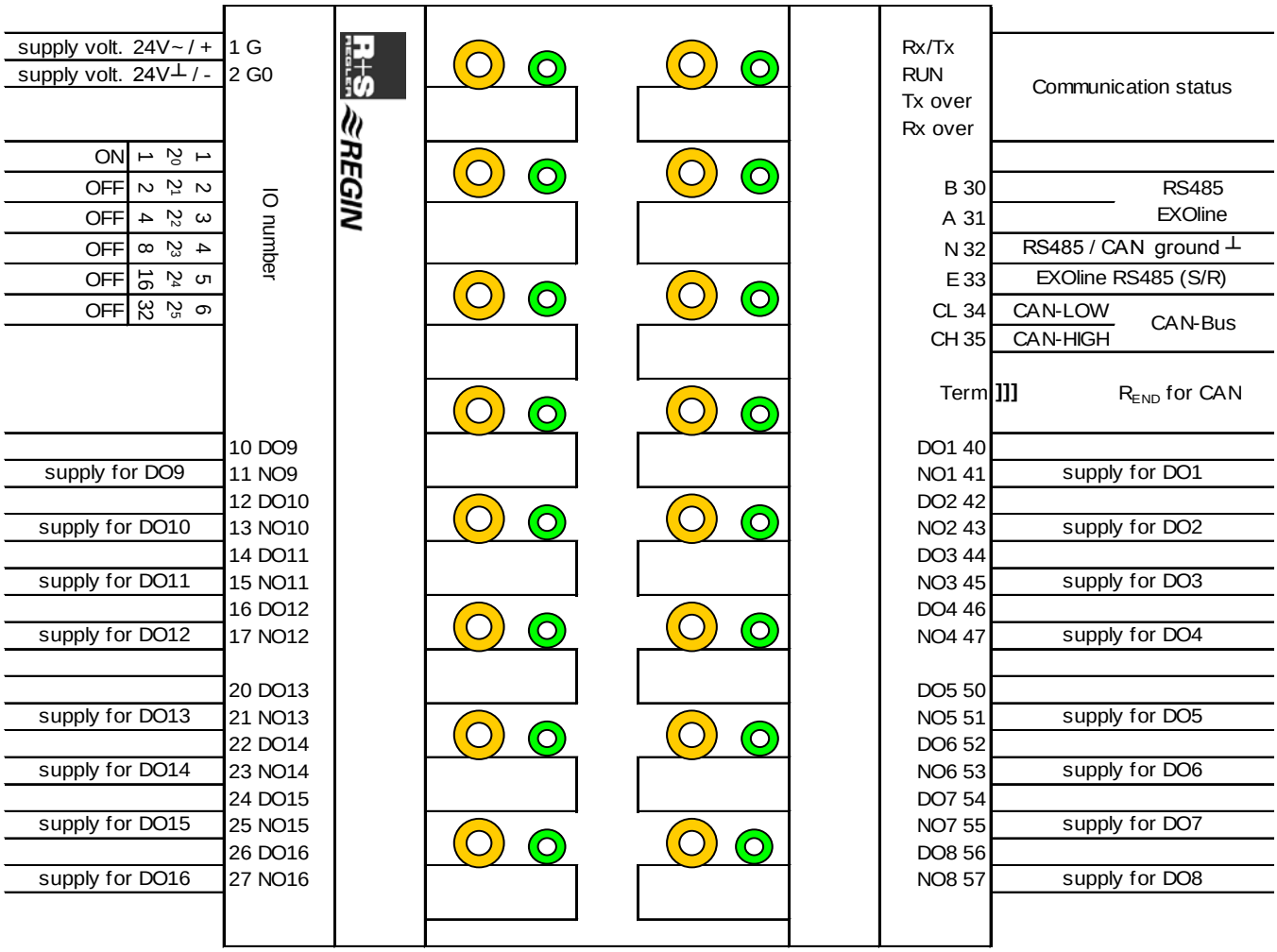


Fig. 3: IO-16DO-M terminals

IO-8DO8AI-M

I/O mixed module with 8 digital outputs and 8 analogue inputs.

DO: Relay contacts with manual operation and LED signalling, potential-free closing contact, 230 V / 24 V (not mixable).

AI: PT1000, Ni1000 (only CAN-Bus), microsensor, 0…10 V, 0(4)…20 mA, 0…10 kΩ (to use with e.g. a setpoint device). CAN-Bus has a special mode for using the analogue inputs as digital inputs.

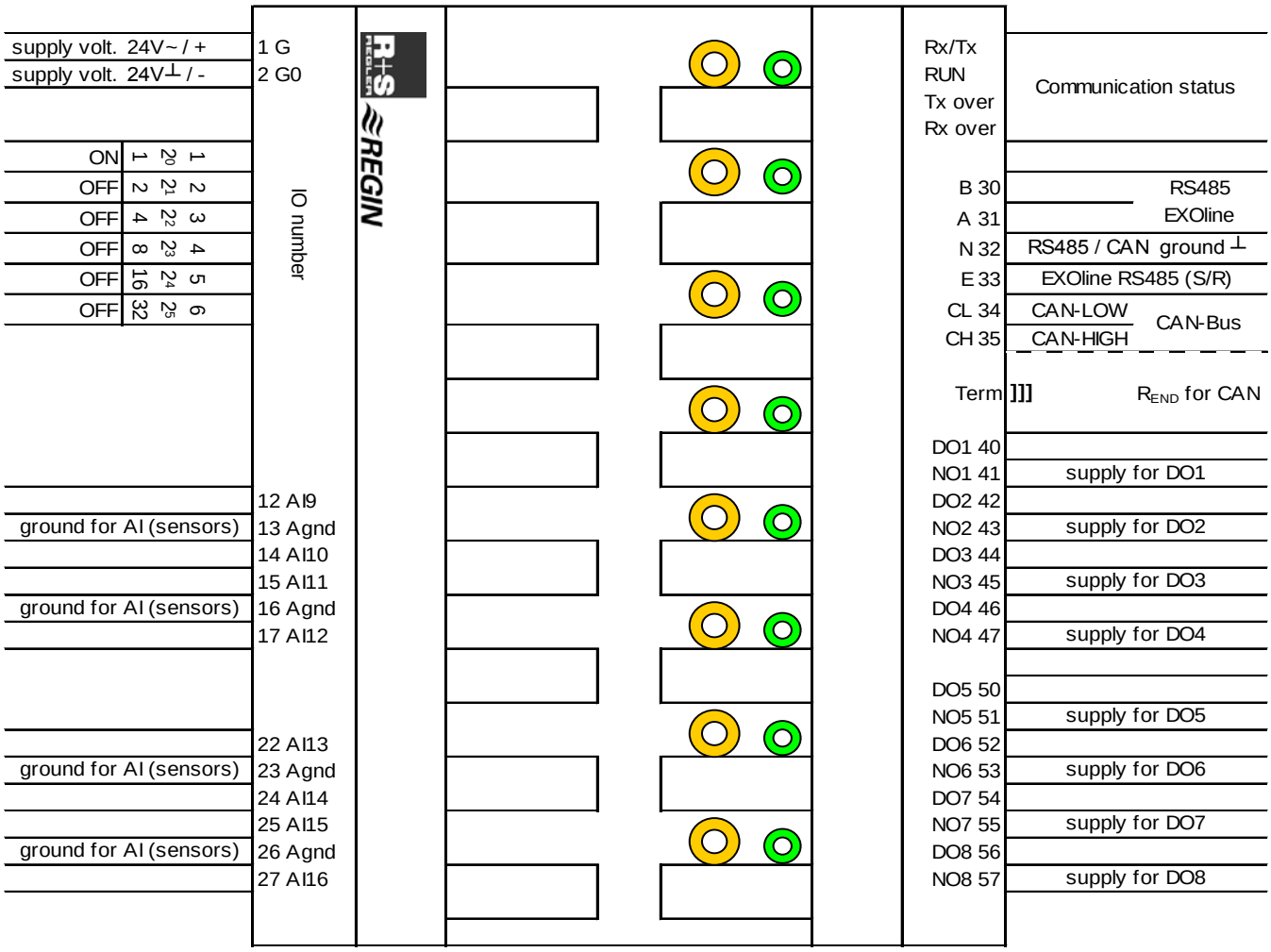


Fig. 4: IO-8DO8AI-M terminals

IO-8DO8AO-M

I/O mixed module with 8 digital and 8 analogue outputs.

DO: Relay contacts with manual operation and LED signalling, potential-free closing contact, 230 V / 24 V (not mixable).

AO: Continuous control signal 0…10 V with manual operation switch and potentiometer.

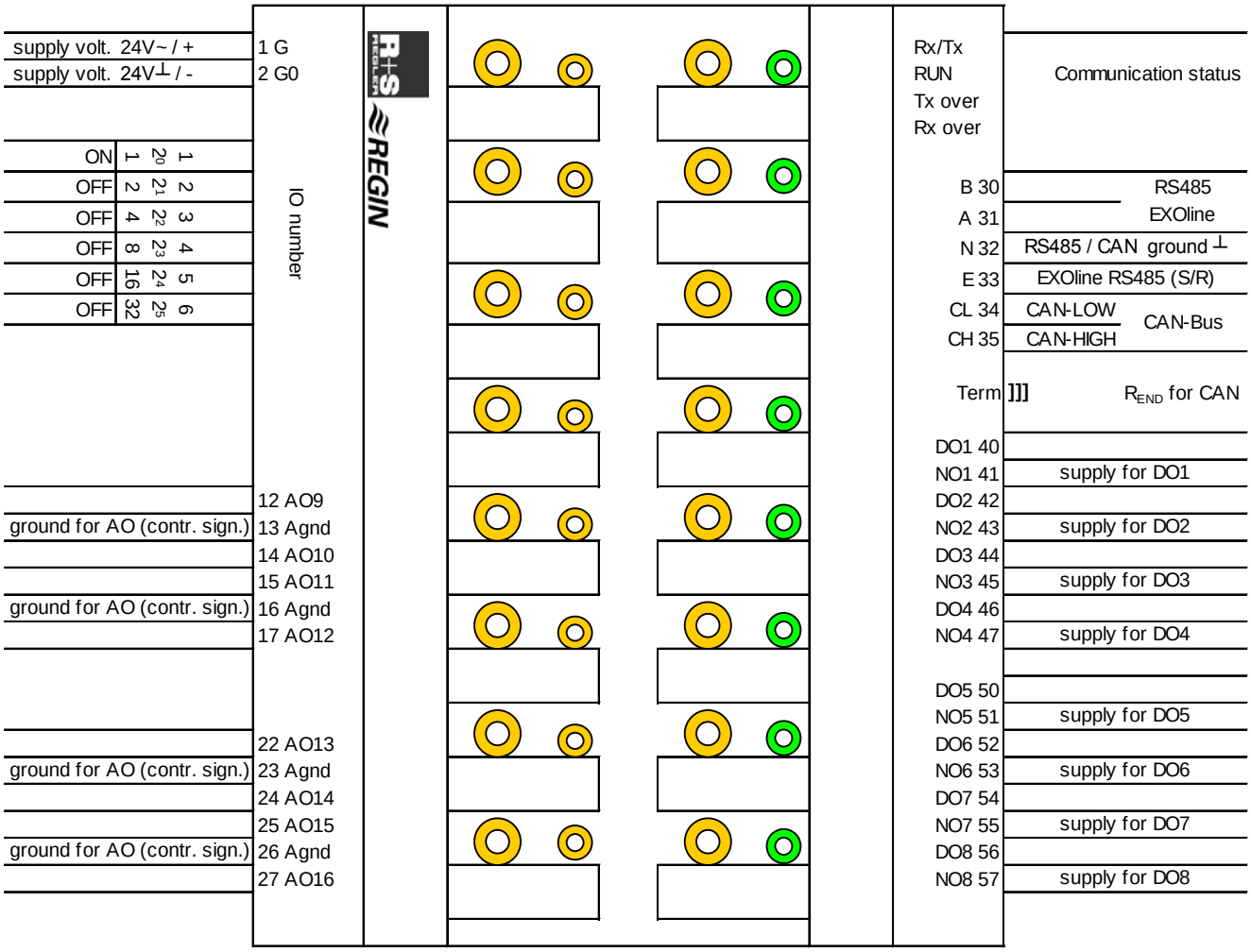


Fig. 5: IO-8DO8AO-M terminals

IO-4X4-M

I/O mixed module with 4 digital inputs, 4 digital outputs, 4 analogue inputs and 4 analogue outputs.

DI: Digital input signals, signal contacts with LED signalling (reference potential +C).

DO: Relay contacts with manual operation and LED signalling, potential-free closing contact, 230 V / 24 V (not mixable).

AI: PT1000, Ni1000 (only CAN-Bus), microsensor; 0…10 V, 0(4)…20 mA, 0…10 kΩ (to use with e.g. a setpoint device).

AO: Continuous control signal 0…10 V with manual operation switch and potentiometer. CAN-Bus has a special mode for using the analogue inputs as digital inputs.

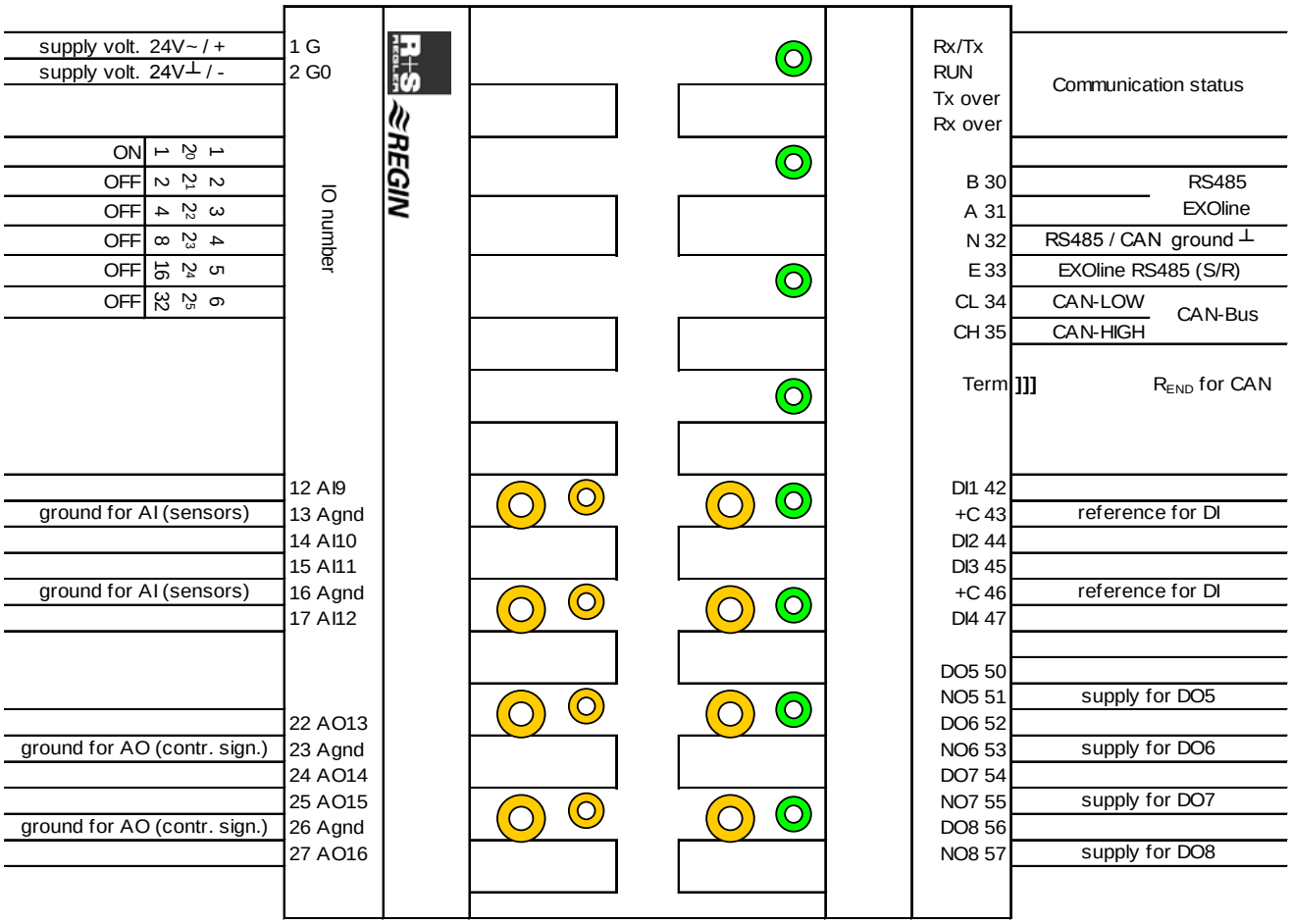


Fig. 6: IO-4X4-M terminals

Models with 7 or 10 I/O:s

There are two models available: I/O-RU-7 and I/O-RU-10. Both models have the same appearance.



IO-RU-7

I/O module with 1 analogue input, 1 universal input, 2 digital inputs, 1 digital output and 2 universal outputs.

Analogue in	30	AI1	G	10	Supply voltage 24 V AC
Universal in	31	UI1	G0	11	Supply voltage 0 V
Digital in	32	DI1	-	12	No connection
For Regin's condensation detector KG-A/1 or a potential-free contact	33	DI2/CI	-	13	No connection
			-	14	No connection
24 V DC out common for DI and UI	40	+C	GDO	20	24 V AC out common for DO
Analogue ground, reference for AI and UI	41	Agnd	G0	21	0 V common for UO
RS485 communication	42	A	UO3	22	Universal out
RS485 communication	43	B	UO1	23	Universal out
			UO2	24	Universal out

Fig. 7: IO-RU-7 terminals

IO-RU-10

I/O module with 1 analogue input, 1 universal input, 2 digital inputs, 4 digital outputs and 2 universal outputs.

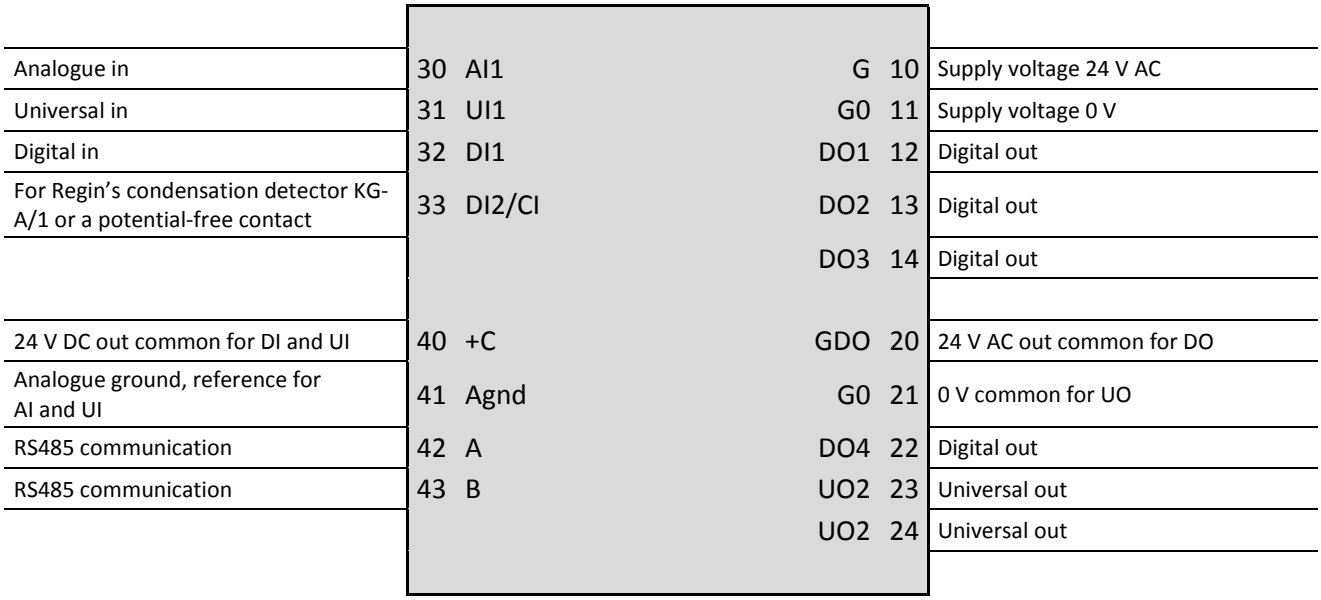


Fig. 8: IO-RU-10 terminals

Chapter 3 **Display/manual operation**

Only I/O modules with 16 I/O:s have indications and can be operated manually.

The figure below shows an example of an IO-4X4-M model I/O module. The digital inputs (DI1…DI4) and the digital outputs (DO5…DO8) are all equipped with LEDs that indicate terminal status.

The digital outputs (DO5…DO8) and the analogue outputs (AO13…AO16) can be manually operated via the switch (AO: switch + potentiometer).

Analogue inputs (AI9…AI12) do not have display or manual control elements.

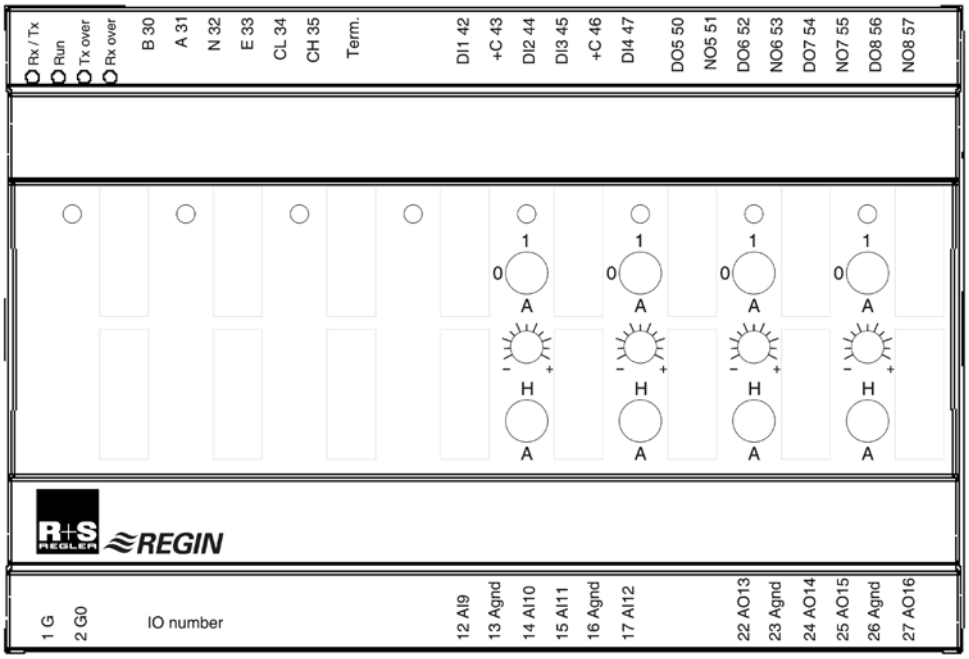


Fig. 9: IO-4X4-M frontal view

AI No display or manual operation elements are available for the analogue input terminals.

DI An LED is assigned to every digital input terminal. It indicates the state of the connected signal contact. The LED lights up when the contact is closed.

DO The state of a digital output terminal is indicated when the corresponding LED lights up (the LED lights up when the relay output is activated). Manual operation of the output is possible with the A-0-1 switch. In switch position A, the relay is activated via the control function. The switching output is set manually to OFF or ON by switching between positions 0 and 1.

When using two digital outputs for 3-point control (CAN-Bus only), both switches (for ON and OFF) must be set to position A (as in AUTO), so that the calculated impulses for opening and closing the actuator can be generated. **NOTE:** Setting both switches to position 1 (simultaneous manual control of ON and OFF) will NOT be blocked by the I/O module and may damage the connected actuator.

AO Analogue outputs may be manually operated via switches A-H and the control signal generator (potentiometer -/+). The control signal calculated by the controller is generated in position A. The generated signal can be set manually by switching to position H (as in HAND) and turning the control signal generator (-/+…0…10 V).

LEDs 4 LEDs are placed adjacent to the connecting plug for the interfaces, indicating the communication status.

Run

Green Run LED indicates EXOline communication and power on. If CAN communication is selected, the Run LED shines continuously for power on and error-free CAN communication. A blinking Run LED signals failure in the CAN Bus data transfer.

Rx/Tx

In EXOline communication, data transfer is indicated on the send and receive paths by the illumination of the bicoloured Rx/Tx LED. The colour assignment is: (A)Rx = yellow, (B)Tx = green. The LED remains off for CAN communication.

Tx over + RX over

The overflow of send and receive memory in CAN communication is signalled through the blinking of the corresponding LED.

Tx over	Rx over	Run	Meaning	Remedy
OFF	OFF	ON	Normal operation	
Neutral	Neutral	Slow blinking	No CAN communication	Check CAN bus connection and activation
OFF	OFF	OFF	Power supply, I/O module faulty	Check power supply
Rapid blinking alternating with RX over	Rapid blinking alternating with TX over	Neutral	Warning (too many errors on the CAN-BUS)	Check BUS connection
Rapid blinking	Rapid blinking	Neutral	CAN-Bus communication is faulty	Execute reset/warm start

Table 1: LED indications

Chapter 4 Installation and wiring

Models with 16 I/O:s

Mounting

The I/O modules are designed for mounting on a DIN-rail in a DIN-standard casing (electrical distributor, plastic casing, control cabinet; at least 9 modular units). Mounting inside a control cabinet door is possible via the front mounting kit FMCE.



Fig. 10: Front mounting kit FMCE



Fig. 11: Plastic casing EK216 (12TE=1xIO module)

Wiring

The below table lists the functions of the connection terminals for the IO-4X4-M module. The terminal numbers depend on the module. Inputs and outputs have different references. The corresponding reference potential is required depending on the type of terminal.

Terminal	Function	Description	Reference
1	G (F24~)/+	Supply voltage 24 V AC phase/DC+	
2	G0 (F24⊥)/-	Supply voltage 24 V AC ground/DC-	
30	B	EXOline RS485	EXOline ground: Terminal 32 N
31	A		
32	N	EXOline RS485 / CAN ground ⊥	
33	E	EXOline RS485 (send/receive)	
34	CL	CAN-Low	CAN-Bus ground: Terminal 32 N
35	CH	CAN-High	
42	DI1	Digital input 1	Terminal 43 +C
43	+C	24 V DC for all digital inputs	
44	DI2	Digital input 2	Terminal 43 +C
45	DI3	Digital input 3	Terminal 46 +C
46	+C	24 V DC for all digital inputs	
47	DI4	Digital input 4	Terminal 46 +C
50	DO5	Digital output 5; closing contact normally open	Terminal 51 NO5

Terminal	Function	Description	Reference
51	NO5	Supply for DO5	
52	DO6	Digital output 6; closing contact normally open	Terminal 53 NO6
53	NO6	Supply for DO6	
54	DO7	Digital output 7; closing contact normally open	Terminal 55 NO7
55	NO7	Supply for DO7	
56	DO8	Digital output 8; closing contact normally open	Terminal 57 NO8
57	NO8	Supply for DO8	
12	AI9	Analogue input 9	Terminal 13 Agnd
13	Agnd	Ground for all analogue inputs	
14	AI10	Analogue input 10	Terminal 13 Agnd
15	AI11	Analogue input 11	Terminal 16 Agnd
16	Agnd	Ground for all analogue inputs	
17	AI12	Analogue input 12	Terminal 16 Agnd
22	AO13	Analogue output 13	Terminal 23 Agnd
23	Agnd	Ground for all analogue outputs	
24	AO14	Analogue output 14	Terminal 23 Agnd
25	AO15	Analogue output 15	Terminal 26 Agnd
26	Agnd	Ground for all analogue outputs	
27	AO16	Analogue output 16	Terminal 26 Agnd

Table 2: Connection terminals for the module IO-4X4-M

Models with 7 or 10 I/O:s

Mounting

The modular design with a separate bottom plate for wiring makes these units easy to install and commission. The bottom plate can be put into place before the electronics are installed. Mounting takes place directly on the wall or on an electrical connection box.

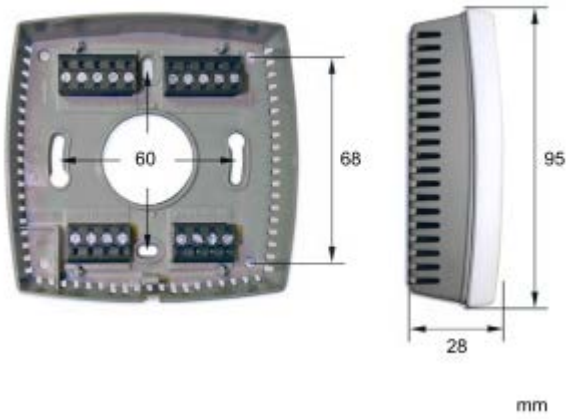


Fig.12: Mounting holes and dimensions

Wiring

The below table lists the functions of the connection terminals for the module IO-RU-10.

Terminal	Function	Description
10	G	Supply voltage 24 V AC
11	G0	Supply voltage 0 V
12	DO1	24 V AC output, max 0.5 A. A 24 V AC relay is connected between terminal 12 and terminal 20, GDO.
13	DO2	24 V AC output, max 0.5 A. A 24 V AC relay is connected between terminal 13 and terminal 20, GDO.
14	DO3	24 V AC output, max 0.5 A. A 24 V AC relay is connected between terminal 14 and terminal 20, GDO.
20	GDO	24 V AC out common for DO. Internally connected to terminal 10, G.
21	G0	0 V common for UO. Internally connected to terminal 11, G0.
22	DO4	24 V AC output, max 0.5 A. A 24 V AC actuator is connected between terminal 22 and terminal 20, GDO.
23	UO1	0...10 V DC, max 5 mA (FS). The 0…10 V signal terminal is connected to terminal 23 and its supply terminals to terminals 10 and 11. Make sure that the reference pole G0 is connected to the correct terminal on connected device. *alternatively* 24 V AC, max 2.0 A. The output is connected between terminals 23 and 20, GDO.
24	UO2	0...10 V DC, max 5 mA (FS). The 0…10 V signal terminal is connected to terminal 24 and its supply terminals to terminals 10 and 11. Make sure that the reference pole G0 is connected to the correct terminal on connected device. *alternatively* 24 V AC, max 2.0 A. The output is connected between terminals 24 and 20, GDO.
30	AI1	For an external PT1000 sensor. Measuring range 0...50°C. The sensor is connected between terminals 30 and 41, AGnd.
31	UI1	For an external PT1000-sensor. Measuring range: 0...100°C. The sensor is connected between terminals 31 and 41, AGnd. *alternatively* For a potential-free contact. A potential-free contact is connected between terminals 31 and 40, +C.
32	DI1	A potential-free contact is connected between terminals 32 and 40, +C.
33	DI2/CI	Regin's condensation detector, KG-A/1 (FS). The sensor is connected between terminals 33 and 41, AGnd. *alternatively* A potential-free contact is connected between terminals 33 and 40, +C.
40	+C	24 V DC out common for DI and UI (with digital function)
41	AGnd	Analogue ground, reference for AI and UI (with analogue function)
42	A	RS485-communication A
43	B	RS485-communication B

Table 3: Connection terminals for the module IO-RU-10

Chapter 5 **Communication settings**

Models with 7 or 10 I/O:s

In these models, only DIP switch 4 is used. The position of the other DIP switches has no impact on the function.

	ON	OFF	Function
SW1-3	Not used		
SW4	DI	CI, Regin's condensation detector, KG-A/1 (FS).	The function of terminal 33.
SW5-8	Not used		

Table 4: Admissible DIP switch settings for 10 I/O models

Models with 16 I/O:s

The DIP switches for setting the communication type of interfaces are located in the terminal area, next to the power supply plug. **If all DIP switches are set to 0** (pointing up, away from the circuit board), communication will be set to **EXOline** (RS485).

The I/O number for CAN-bus communication is selected via DIP switches 1–6. I/O numbers 1 and 2 are admissible for connection to RU6X/RU9X controllers. The CLEVER master controller can communicate with I/O numbers 1 to 32.

Switch	1	2	3	4	5	6	7	8
HEX	2^0	2^1	2^2	2^3	2^4	2^5	No function	
DEC	1	2	4	8	16	32		
I/O number							ON = ⇩	
0	EXOline communication via RS485							
1	ON		CAN-bus communication				RU6X RU9X	CAN-bus communication
2		ON						
3	ON	ON						
4			ON					
5	ON		ON					
6		ON	ON					
7	ON	ON	ON					
8				ON				
9	ON			ON				
10		ON		ON				
11	ON	ON		ON				
12			ON	ON				
13	ON		ON	ON				
14		ON	ON	ON				
15	ON	ON	ON	ON				
16					ON			
17	ON				ON			
18		ON			ON			
19	ON	ON			ON			
20			ON		ON			
21	ON		ON		ON			
22		ON	ON		ON			
23	ON	ON	ON		ON			
24				ON	ON			
25	ON			ON	ON			
26		ON		ON	ON			
27	ON	ON		ON	ON			
28			ON	ON	ON			
29	ON		ON	ON	ON			
30		ON	ON	ON	ON			
31	ON	ON	ON	ON	ON			
32						ON		

Table 5: Permissible DIP switch settings for 16 I/O models

Chapter 6 **Technical data**

Models with 16 I/O:s

Power supply

Supply voltage ..... 24 V AC/DC ±15 %, 50…60 Hz
Power consumption ..... Max. 3.5 VA

General data

Ambient temperature ..... 0…50°C
Ambient humidity ..... Max. 90 % RH
Storage temperature ..... -20…+70°C
Connection terminals ..... Terminal opening suitable for cables up to 2.5 mm^2
Protection class IP20
Casing material ..... Polycarbonate, PC
Mounting ..... DIN-rail

Dimensions

Modules without manual operation switches..... 148 x 123 x 60 mm (WxHxD) incl. terminals
Modules with manual operation switches..... 148 x 123 x 71 mm (WxHxD) incl. terminals
Corresponds to 8.5 modular units (Euronorm standard).

Communication port

Protocol ..... EXOline (RS485) or CAN-Bus
Communication speed
  EXOline ..... 9600 bps
  CAN-bus ..... 20000 bps

Analogue inputs, AI

Basic ADC resolution ..... 10 bit
Measurement range ..... Program selectable/channel
Temperature (PT1000) ..... -60…+450°C
  accuracy (-20…+120°C) (excl. sensor) ..... ±0.3°C
  accuracy (<-20°C; >+120°C) (excl. sensor) ..... ±3.8°C
Temperature (Ni1000 DIN), only CAN-Bus ..... -40…+150°C
  accuracy (-10…+75°C) (excl. sensor) ..... 0.4°C
  accuracy (<-10°C; >+75°C) (excl. sensor) ..... ±3.8°C
Temperature (microsensor)..... -60…+160°C
  accuracy (-10…+90°C) ..... ±0.3°C
  accuracy (<-10°C; >+90°C)..... ±1.5°C
Current..... 0(4)…20 mA
  accuracy (% of full scale) ..... ±0.5 %
Voltage ..... 0…10 V
  accuracy (% of full scale) ..... ±0.3 %
Resistance..... 0...10 kΩ
  accuracy (% of full scale) ..... ±1 %

Digital inputs, DI

Type..... 24 V DC, floating contact, powered from +C output
Logic 0..... 0…5 V DC
  input current at 0V..... 0 mA
Logic 1..... 12…24 V DC
  input current at 24 V DC ..... 3 mA
Frequency range (only the first 8 inputs)..... Max. 25 Hz
Shortest pulse length for detection (transient flag)..... 20 ms

Analogue outputs, AO

Basic DAC resolution ..... 8 bit
Output level ..... 0…10 V DC
Max. load ..... 5 mA

Digital outputs, DO type relay

Output (potential-free NO) ..... 24 / 230 V AC (not mixable)
Max. inductive load ..... 1 A
Max. resistive load ..... 4 A

Low Voltage Directive (LVD) standards

This product conforms to the requirements of the European Low Voltage Directive (LVD) 2006/95/EC through product standards EN 60730-1 and EN 60730-2-9.

EMC emissions & immunity standards

This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-3:2001 and EN 61000-6-1:2001.

RoHS

This product conforms to the Directive 2011/65/EU of the European Parliament and of the Council.

Models with 7 or 10 I/O:s

Power supply

Supply voltage ..... 18...30 V AC, 50...60 Hz
Power consumption ..... 2.5 VA

General data

Ambient temperature ..... 0…50°C
Ambient humidity ..... Max. 90 % RH
Storage temperature ..... -20…+70°C
Protection class IP20
Casing material ..... Polycarbonate, PC
Mounting ..... Wall or sheet metal
Dimensions ..... 95 x 95 x 28 mm (WxHxD)

Communication port

Protocol ..... EXOline (RS485)
Communication speed
EXOline ..... 9600 bps

Analogue inputs, AI

Temperature (PT1000) ..... 0...50°C
accuracy ..... ±0.1°C

Digital inputs, DI

Type ..... Closing potential-free contact connected to +C in one end
CI ..... Regin's condensation detector, KG-A/1

Universal inputs, UI

AI (PT1000) ..... 0...100°C
accuracy ..... ± 0.2°C
AI (V) ..... 0…10V
DI ..... see DI above

Digital outputs, DO

Output ..... 24 V AC, max 0.5 A

Universal output, UO

DO ..... 24 V AC, max 2.0 A
AO ..... 0...10 V DC, max 5 mA

Low Voltage Directive (LVD) standards

This product conforms to the requirements of the European Low Voltage Directive (LVD) 2006/95/EC through product standards EN 60730-1 and EN 60730-2-9.

EMC emissions & immunity standards

This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-3:2001 and EN 61000-6-1:2001.

RoHS

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