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MANUAL

ADD:IO



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1	Introduction	5
1.1	General	5
1.2	Layout	5
1.3	Dimensions	6
1.4	Mounting	6
1.5	Communication	6
1.6	Naming	7
2	Deployment.....	8
2.1	Installation recommendations.....	8
2.2	General status indicator	8
2.3	System addressing	9
3	Model IO-EC16UID-X.....	10
3.1	Terminals	10
3.2	Wiring	12
4	Model IO-EC16UOb-X.....	13
4.1	Terminals	13
4.2	Wiring, AC.....	15
4.3	Wiring, DC	15
5	Model IO-EC16DOE-X.....	16
5.1	Terminals	16
5.2	Wiring	17
6	Model IO-EC32DIB-X	18
6.1	Terminals	18
6.2	Wiring	20
7	Model IO-EC8UID8UOB-X	21
7.1	Terminals	21
7.2	Wiring	22
Appendix A	Technical data.....	23
A.1	General data	23
A.2	Serial port data	23
A.3	Material	23
A.4	I/O data	24
A.5	Terminal connectors & wire installation.....	24
A.5.1	Push-in connectors.....	24
A.5.2	Table for connector type vs conductor data	25
Appendix B	Model overview	26
Appendix C	Inputs and outputs specifications.....	27

I Introduction

I.1 General

The Add:io series is intended for use in combination with EXOclever and EXOcompact to expand the number of I/Os in a system. Each unit expands the system with 16 I/Os. An EXOclever controller can be expanded with unlimited I/Os and an EXOcompact with up to 50 I/Os.

The units are programmable in EXOdesigner, the same environment used for all other EXO controllers.

I.2 Layout

All available Add:io models have a similar design and layout. It is shown in *Figure I-1*.

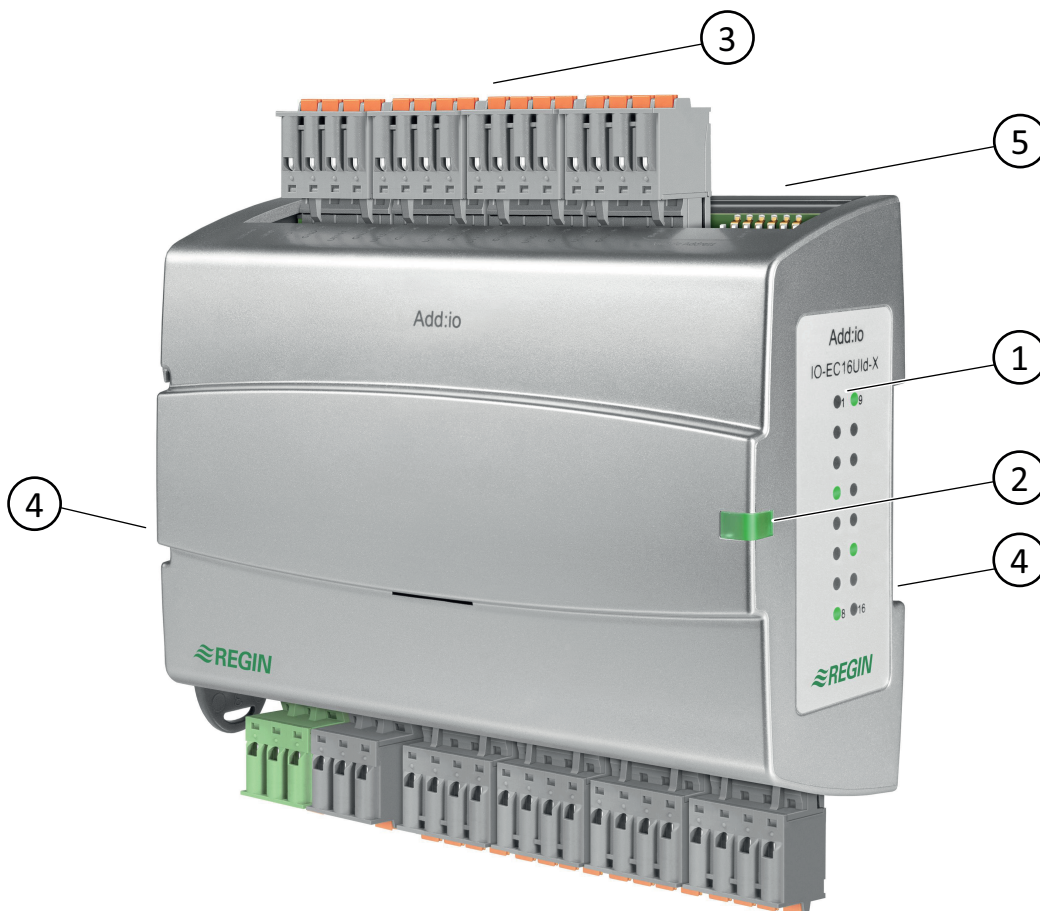
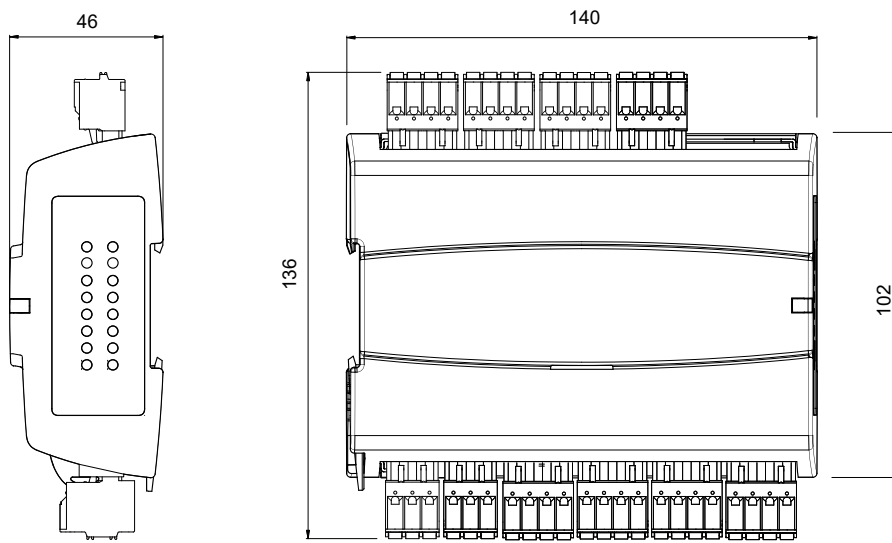


Figure I-1 Add:io layout with status indications

- ① DO or DI indications
- ② General status indications
- ③ Push-in terminals
- ④ Grooves for DIN-rail mounting on short- or backside
- ⑤ DIP-switches for system addressing

1.3 Dimensions



[mm]

1.4 Mounting

The controllers are designed to be mounted on a DIN-rail. They can be mounted in two ways, either on their backside or stacked on the short side with a high packing density as a result. When stacked they fit smoothly together thus requiring minimal space (see *Figure 1-2 Stacked units*)



Figure 1-2 Stacked units

1.5 Communication

The EFX-port is the communication channel used between the Add:io and a master controller (e.g. EXOclever). EFX is RS485-based communication.

1.6 Naming

All Add:io models are named the following way:

IO-ECzzyyy-X	IO-EC = Add:io family naming zz = Number of IOs yyy = IO-type, e.g. Uld -X = EFX communication
---------------------	---

2 Deployment

2.1 Installation recommendations

Follow these guidelines regarding shielded cables:

- ✓ Only use shielded cables when the installation environment requires it.
- ✓ No need for shielded cables between modules, if installed in close proximity
- ✓ Connect shield to chassis ground at only one end of the cable.

For RS485 communication, the terminal *N* is only required between systems not sharing the same ground potential. When used, it is not recommended to connect it to the cable screen. Note that it may be a single wire, but must be drawn together.

When the cable length is less than 30 m in RS485, a terminator is not required in normal cases. The use of terminators will decrease signal integrity thus try without first. When used, match the terminator value to the characteristic impedance of the cable.



Note! For analogue input signals, do not mix and use one GND for several inputs.

The technical earth terminal in the IO modules power connector is not intended as a connection for cable screens.

When connecting and measuring an external transmitter in an UI port this is done between terminals UI_x and GND_x (where x is the channel number between 1...16). Note that the intention is to use the corresponding GND for the connected UI, especially when measuring sensitive signals or using DI pulse (fast) mode.

Wiring examples can be found under each specific Add:io model in the following chapters.

2.2 General status indicator

The Add:io has a general status indicator mounted at the middle right front side, see *Figure 1-1*, which can be inspected both when the unit is mounted on its back and side. This indicator changes colour depending on its actual status as shown in *Table 2-1*.

Table 2-1 Status indication at the front

LED status	Controller status
Green, solid	Power on and communication is established
Red, solid	Battery problem
Yellow, blink 2.5 Hz	Identification (wink)
Orange, blink 1 Hz	IO-board is not in contact with CPU-board (via EFX)

The status indications that are present on the side, see *Figure 1-1*, are only active when the universal inputs or outputs are configured as DI and DO. The indicator colours are shown in *Table 2-2*.

Table 2-2 Status indications on the side

UI configuration	LED colour	IO status
DI	Green	ON
DO	Yellow	ON



Note! The values in *Table 2-2* are default configurations. The LEDs can also be configured for other indications. For example, red for a DI that is used for an alarm.

2.3 System addressing

The module has to be given an address between 2-32 in order to be able to communicate with it in a system. The address is set with the 8-bit DIP-switch marked with *Module Address* on the Add:io unit. The least significant bit (LSB) is marked *Bit 1* and the most significant bit (MSB) is marked *Bit 8*.

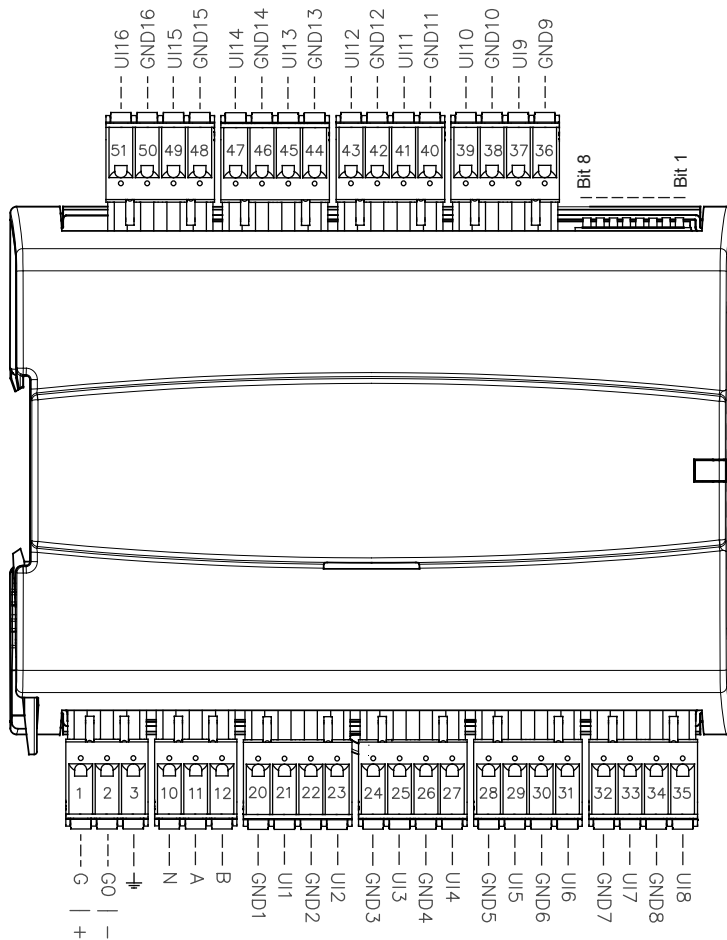
A switch is activated by setting it to 1. In *Figure 2-1* the address is set to 3.



Figure 2-1 DIP-switches for system addressing

3 Model IO-ECI 6UId-X

3.1 Terminals



Terminal	Label	Notes
1	G+	Supply voltage
2	G0-	Supply voltage, system ground (0 V)
3		Technical earth (EMI), connect to earth rail
10	N	Communication port: port earth
11	A	Communication port: inverted (-) data signal line
12	B	Communication port: non-inverted (+) data signal line
20	GND1	Universal ground channel 1
21	UI1	Universal input channel 1
22	GND2	Universal ground channel 2
23	UI2	Universal input channel 2
24	GND3	Universal ground channel 3
25	UI3	Universal input channel 3
26	GND4	Universal ground channel 4
27	UI4	Universal input channel 4
28	GND5	Universal ground channel 5
29	UI5	Universal input channel 5
30	GND6	Universal ground channel 6

Terminal	Label	Notes
31	UI6	Universal input channel 6
32	GND7	Universal ground channel 7
33	UI7	Universal input channel 7
34	GND8	Universal ground channel 8
35	UI8	Universal input channel 8
36	GND9	Universal ground channel 9
37	UI9	Universal input channel 9
38	GND10	Universal ground channel 10
39	UI10	Universal input channel 10
40	GND11	Universal ground channel 11
41	UI11	Universal input channel 11
42	GND12	Universal ground channel 12
43	UI12	Universal input channel 12
44	GND13	Universal ground channel 13
45	UI13	Universal input channel 13
46	GND14	Universal ground channel 14
47	UI14	Universal Input channel 14
48	GND15	Universal ground channel 15
49	UI15	Universal Input channel 15
50	GND16	Universal ground channel 16
51	UI16	Universal Input channel 16
Bit1...Bit8	Bit1 = LSB Bit8 = MSB	The module address is set with 8 DIP-switches

3.2 Wiring

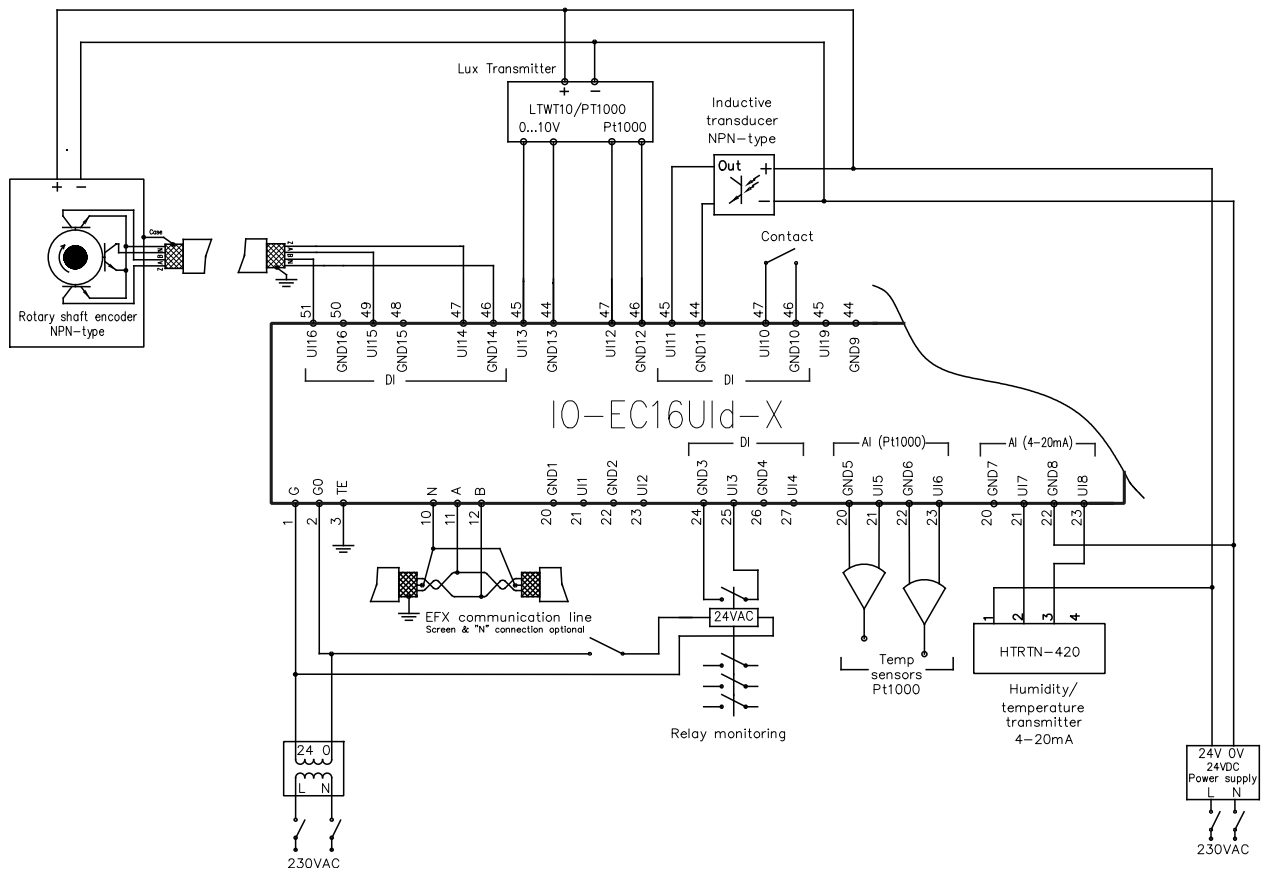
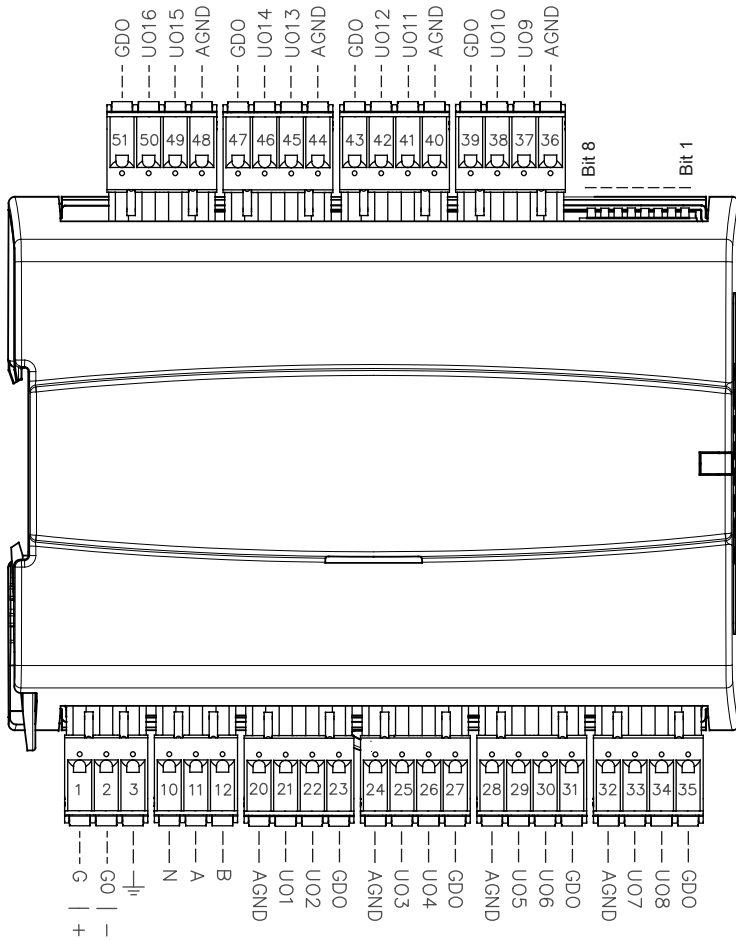



Figure 3-1 General wiring example with 24 V AC supply and some loads driven from 24 V DC

4 Model IO-ECI6UOb-X

4.1 Terminals



Terminal	Label	Notes
1	G+	Supply voltage
2	G0-	Supply voltage, system ground (0 V)
3		Technical earth (EMI), connect to earth rail
10	N	Communication port: port earth
11	A	Communication port: inverted (-) data signal line
12	B	Communication port: non-inverted (+) data signal line
20	AGND	Analog ground
21	UO1	Universal output channel 1
22	UO2	Universal output channel 2
23	GDO	Fused power for digital output
24	AGND	Analog ground
25	UO3	Universal output channel 3
26	UO4	Universal output channel 4
27	GDO	Fused power for digital output
28	AGND	Analog ground
29	UO5	Universal output channel 5
30	UO6	Universal output channel 6

Terminal	Label	Notes
31	GDO	Fused power for digital output
32	AGND	Analog ground
33	UO7	Universal output channel 7
34	UO8	Universal output channel 8
35	GDO	Fused power for digital output
36	AGND	Analog ground
37	UO9	Universal output channel 9
38	UO10	Universal output channel 10
39	GDO	Fused power for digital output
40	AGND	Analog ground
41	UO11	Universal output channel 11
42	UO12	Universal output channel 12
43	GDO	Fused power for digital output
44	AGND	Analog ground
45	UO13	Universal output channel 13
46	UO14	Universal output channel 14
47	GDO	Fused power for digital output
48	AGND	Analog ground
49	UO15	Universal output channel 15
50	UO16	Universal output channel 16
51	GDO	Fused power for digital output
Bit1...Bit8	Bit1 = LSB Bit8 = MSB	The module address is set with 8 DIP-switches

4.2 Wiring, AC

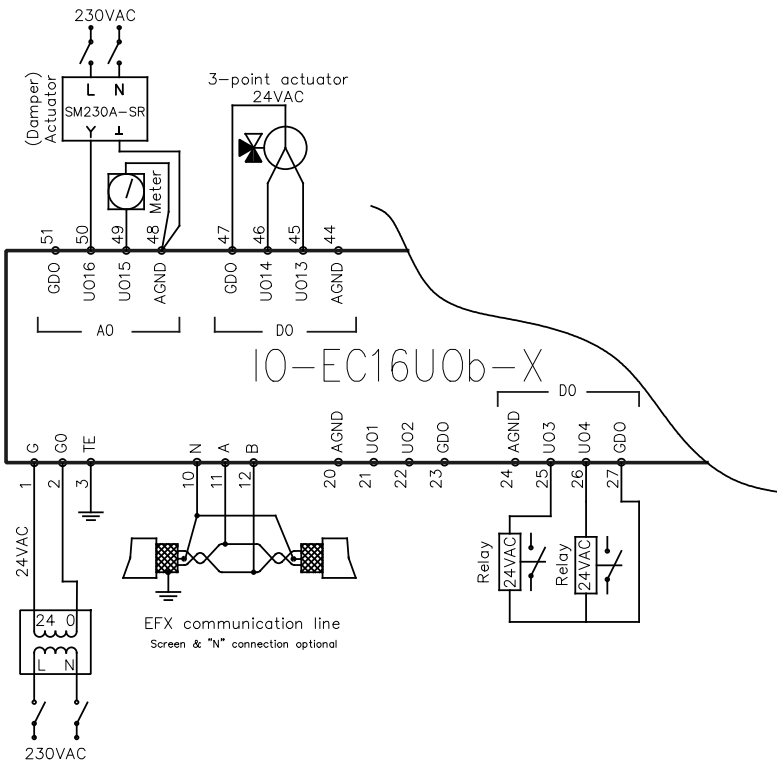


Figure 4-1 General wiring example with 24 V AC supply

4.3 Wiring, DC

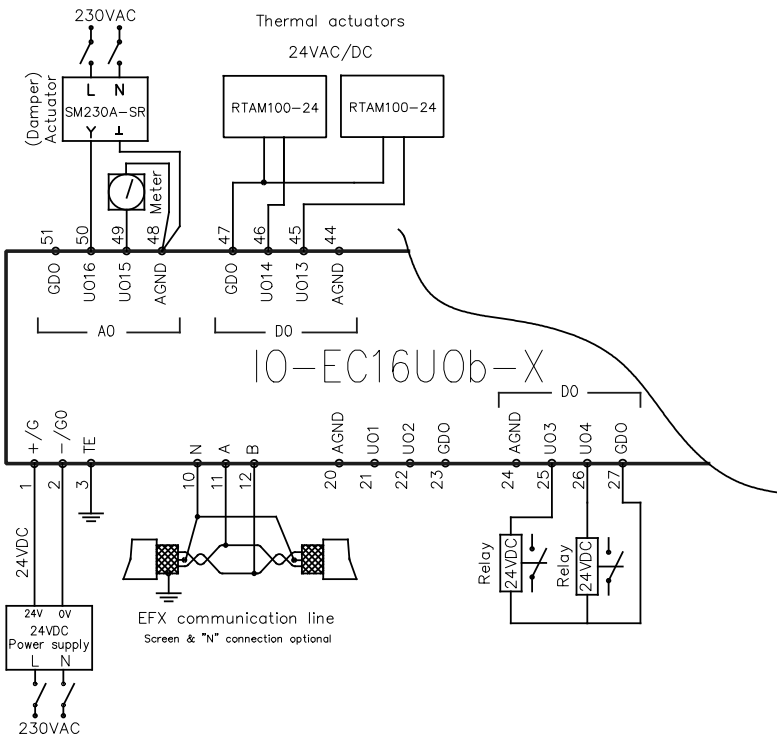
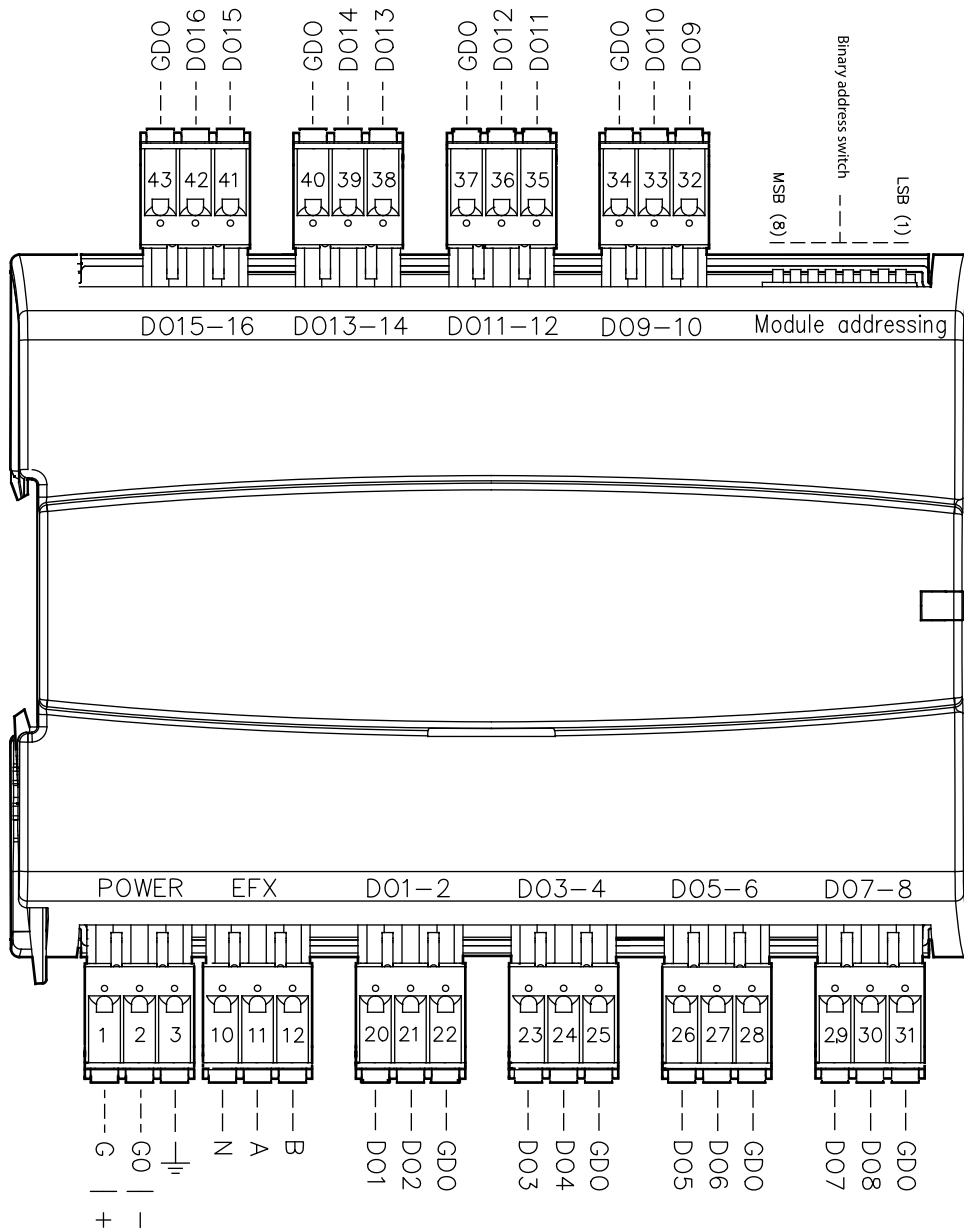


Figure 4-2 General wiring example with 24 V DC supply

5 Model IO-ECI6DOE-X

5.1 Terminals



Terminal	Label	Notes
1	G+	Supply voltage
2	G0-	Supply voltage, system ground (0 V)
3		Technical earth (EMI), connect to earth rail
10	N	Communication port: port earth
11	A	Communication port: inverted (-) data signal line
12	B	Communication port: non-inverted (+) data signal line
20	DO1	Digital output 1
21	DO2	Digital output 2
22	GDO	Fused power for digital output
23	DO3	Digital output 3

Terminal	Label	Notes
24	DO4	Digital output 4
25	GDO	Fused power for digital output
26	DO5	Digital output 5
27	DO6	Digital output 6
28	GDO	Fused power for digital output
29	DO7	Digital output 7
30	DO8	Digital output 8
31	GDO	Fused power for digital output
32	DO9	Digital output 9
33	DO10	Digital output 10
34	GDO	Fused power for digital output
35	DO11	Digital output 11
36	DO12	Digital output 12
37	GDO	Fused power for digital output
38	DO13	Digital output 13
39	DO14	Digital output 14
40	GDO	Fused power for digital output
41	DO15	Digital output 15
42	DO16	Digital output 16
43	GDO	Fused power for digital output

5.2 Wiring

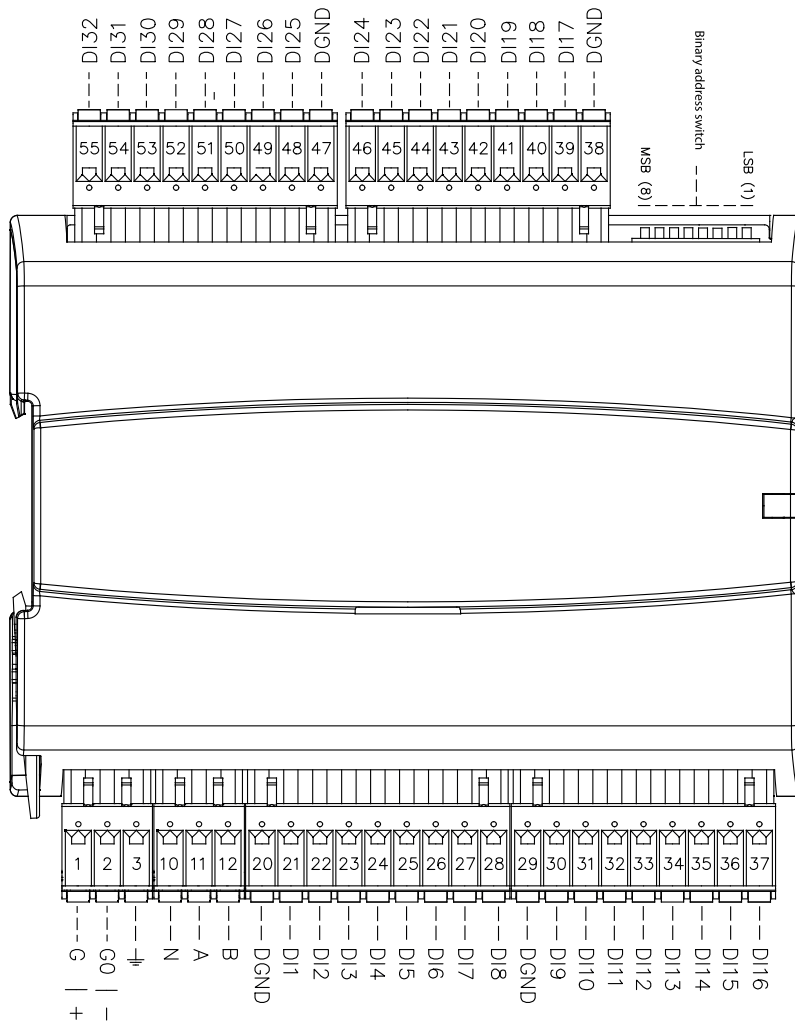
See wiring diagram 4-1 *General wiring example with 24 V AC supply* and 4-2 *General wiring example with 24 V DC supply* .



Note! Applicable for the digital outputs.

6 Model IO-EC32DIB-X

6.1 Terminals



Terminal	Label	Notes
1	G+	Supply voltage
2	G0-	Supply voltage, system ground (0 V)
3		Technical earth (EMI), connect to earth rail
10	N	Communication port: port earth
11	A	Communication port: inverted (-) data signal line
12	B	Communication port: non-inverted (+) data signal line
20	DGND	Digital ground
21	DI1	Digital input channel 1
22	DI2	Digital output channel 2
23	DI3	Digital output channel 3
24	DI4	Digital output channel 4
25	DI5	Digital output channel 5
26	DI6	Digital output channel 6
27	DI7	Digital output channel 7
28	DI8	Digital output channel 8

Terminal	Label	Notes
29	DGND	Digital ground
30	DI9	Digital output channel 9
31	DI10	Digital output channel 10
32	DI11	Digital output channel 11
33	DI12	Digital output channel 12
34	DI13	Digital output channel 13
35	DI14	Digital output channel 14
36	DI15	Digital output channel 15
37	DI16	Digital output channel 16
38	DGND	Digital ground
39	DI17	Digital output channel 17
40	DI18	Digital output channel 18
41	DI19	Digital output channel 19
42	DI20	Digital output channel 20
43	DI21	Digital output channel 21
44	DI22	Digital output channel 22
45	DI23	Digital output channel 23
46	DI24	Digital output channel 24
47	DGND	Digital ground
48	DI25	Digital output channel 25
49	DI26	Digital output channel 26
50	DI27	Digital output channel 27
51	DI28	Digital output channel 28
52	DI29	Digital output channel 29
53	DI30	Digital output channel 30
54	DI31	Digital output channel 31
55	DI32	Digital output channel 32

6.2 Wiring

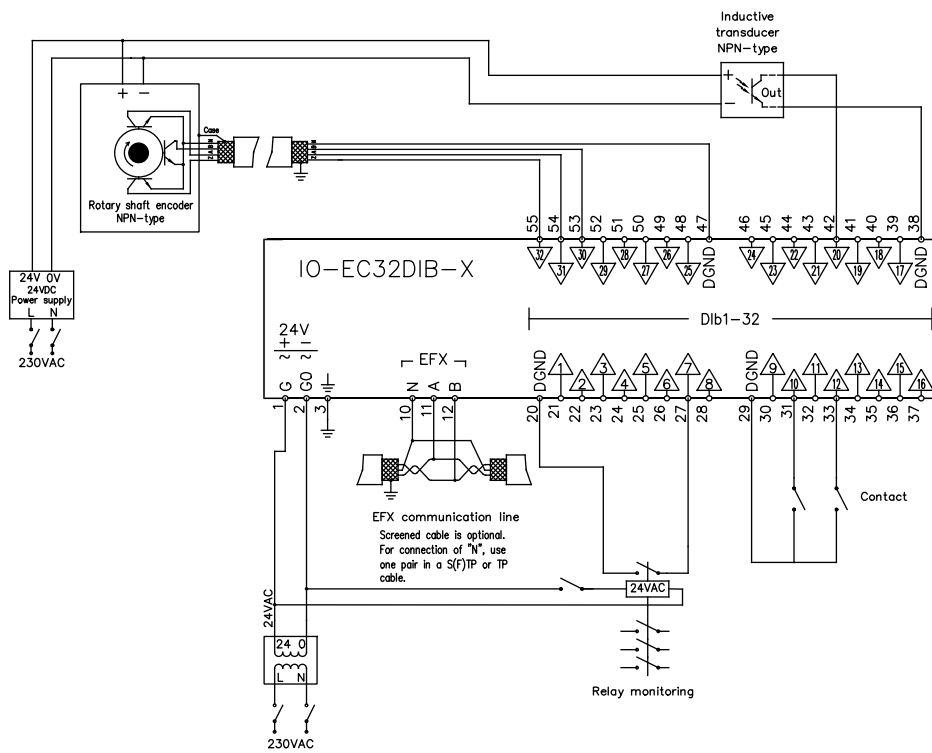
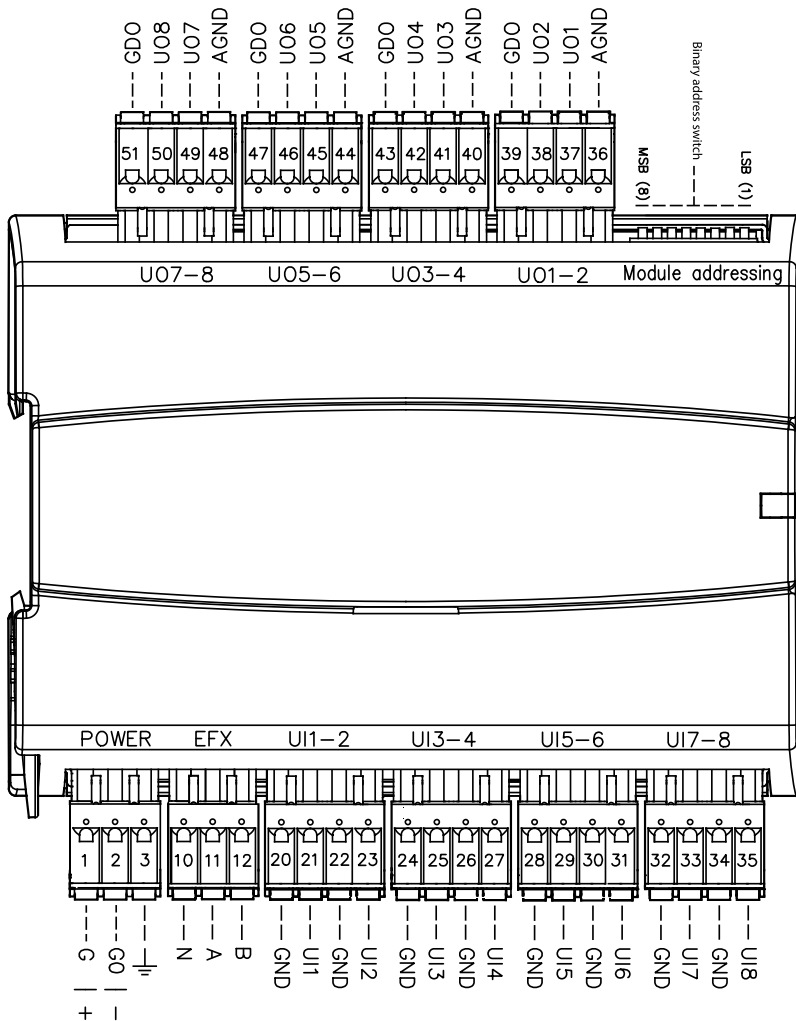


Figure 6-1 General wiring example with 24 V AC supply

7 Model IO-EC8UID8UOB-X

7.1 Terminals



Terminal	Label	Notes
1	G+	Supply voltage
2	G0-	Supply voltage, system ground (0 V)
3		Technical earth (EMI), connect to earth rail
10	N	Communication port: port earth
11	A	Communication port: inverted (-) data signal line
12	B	Communication port: non-inverted (+) data signal line
20	GND	Ground
21	UI1	Universal input 1
22	GND	Ground
23	UI2	Universal input 2
24	GND	Ground
25	UI3	Universal input 3
26	GND	Ground
27	UI4	Universal input 4
28	GND	Ground
29	UI5	Universal input 5

Terminal	Label	Notes
30	GND	Ground
31	UI6	Universal input 6
32	GND	Ground
33	UI7	Universal input 7
34	GND	Ground
35	UI8	Universal input 8
36	AGND	Analogue ground
37	UO1	Universal output 1
38	UO2	Universal output 2
39	GDO	Fused power for digital output
40	AGND	Analogue ground
41	UO3	Universal output 3
42	UO4	Universal output 4
43	GDO	Fused power for digital output
44	AGND	Analogue ground
45	UO5	Universal output 5
46	UO6	Universal output 6
47	GDO	Fused power for digital output
48	AGND	Analogue ground
49	UO7	Universal output 7
50	UO8	Universal output 8
51	GDO	Fused power for digital output

7.2 Wiring

For UI connections, see 3.2 *Wiring*.

For UO connections, see 4.2 *Wiring, AC* and 4.3 *Wiring, DC*.

Appendix A Technical data

A.1 General data

Supply voltage	24 V AC 50...60 Hz or 24 V DC
Tolerance	18...26 V AC / 22...30 V DC
Power consumption, nominal	IO-EC16UID-X: 4.5 VA / 1.8 W IOEC16UIC-X: 4.5 VA / 1.8 W IO-EC16UOB-X: 7.8 VA / 3.5 W IO-EC16DOE-X: 4.3 VA / 1.5 W IO-EC32DIB-X: 5.2 VA / 2.2 W IO-EC8UID8UOB-X: 5.7 VA / 2.5 W
Protection class	IP20
Ambient humidity	Max. 95 % RH
Ambient temp. (working)	0...55 °C
Storage temperature	-20...+70 °C
Mounting	DIN-rail
Number of modules	8
Inputs/Outputs	See data on the physical product.
Display	No
Status indication type	LED for communication information
I/O indication, front label	LED for indication; status DO/DI
Cable connection	Push-in connectors
Dimensions, external (WxHxD)	140 x 136 x 46 mm
Weight (incl. packaging)	0.30 kg

A.2 Serial port data

Port type	RS485
Default protocol	EFX
Supported protocols	EFX slave
Port isolation	Yes, 170 V
Communication speed	115200 bps
Cable length	max 300 m

A.3 Material

Material, housing	Polycarbonate (PC)
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A.4 I/O data

Universal input d (UId)	<p>AI:</p> <ul style="list-style-type: none"> ✓ 0(2)...10 V DC ✓ 0(4)...20 mA (Shunt 150Ω, overcurrent protected) ✓ 800...1600 Ω (Pt1000, Ni1000 LG, Ni1000 DIN) ✓ 0...4000 Ω (Pt1000 ext, Ni1000 LG ext, Ni1000 DIN ext) ✓ Tolerant against misconnection with 24V AC/DC <p>DI:</p> <ul style="list-style-type: none"> ✓ Sourcing input type, GND is ref ✓ Pulse counting (pulse width >4ms) ✓ Tolerant against misconnection with 24V AC/DC
Universal input c (UIc)	<p>AI:</p> <ul style="list-style-type: none"> ✓ 0(2)...10 V DC ✓ 800...1600 Ω (Pt1000, Ni1000 LG, Ni1000 DIN) ✓ 0...4000 Ω (Pt1000 ext, Ni1000 LG ext, Ni1000 DIN ext) ✓ Tolerant against mis-connection with 24V AC/DC <p>DI:</p> <ul style="list-style-type: none"> ✓ Sourcing input type, GND is ref ✓ Pulse counting (pulse width >4ms) ✓ Tolerant against mis-connection with 24V AC/DC
Universal output b (UOb)	<p>AO:</p> <ul style="list-style-type: none"> ✓ 0(2)...10 V DC, (5 mA, short-circuit protected) ✓ Tolerant against mis-connection with 24V AC/DC <p>DO:</p> <ul style="list-style-type: none"> ✓ 24 V AC/DC sinking MOSFET, DC (2 A, DC short circuit protected)
Digital output e (DOe)	<p>DO:</p> <ul style="list-style-type: none"> ✓ 24 V AC/DC sinking MOSFET, DC (2 A, DC short circuit protected)
Digital input b (DIb)	<p>DI:</p> <ul style="list-style-type: none"> ✓ Sourcing input type, GND is ref ✓ Pulse counting (pulse width >4 ms) ✓ Tolerant against mis-connection with 24V AC/DC

A.5 Terminal connectors & wire installation

All terminal ports contains a detachable plug part and must not be connected or disconnected when under voltage or load. Also wire installation or removal to the connector plugs must not be made under voltage or load. Use specified min/max cable areas for the connector type.

A.5.1 Push-in connectors

To make a secure and correct wire connection to a spring loaded push-in terminal, please follow the below. instructions.

Solid wire

- ✓ Strip cable insulation to the length as specified for the connector type.
- ✓ Only one wire / terminal is allowed.

Stranded wire

- ✓ Strip cable insulation to the length as specified for the connector type.

- ✓ Use a wire ferrule with a length matching the stripped cable and crimp it on the wire end with a suitable crimping tool.
- ✓ Dual wires can be connected to one connector terminal if the wire ferrule is suitable for dual wires, are within max allowed area and if specified in the table for the connector type.

Installation of wire

- ✓ Push firmly the wire in all the way, no uninsulated wire must be exposed outside of the connector housing. Releasing the spring force by pushing inwards on the orange knob with a small screwdriver at the same time as the wire is pushed in will make the entry easier, especially when using cable with small wire area.
- ✓ End the wire installation by checking so the wire is securely fitted to the connector terminal by trying to pull it out again by using a small but reasonable force.

A.5.2 Table for connector type vs conductor data

Connector types and conductor data (IEC)	
solid. min , mm ²	0,2
solid. max , mm ²	2,5
stranded. min , mm ²	0,2
stranded. max , mm ²	2,5
flexible, with min ferrule without plastic sleeve, mm ²	0,25
flexible, with max ferrule without plastic sleeve, mm ²	2,5
flexible, with min ferrule with plastic sleeve, mm ²	0,25
flexible, with max ferrule with plastic sleeve, mm ²	2,5
2 conductors with same cross section flexible, min twinfer- rules with plastic sleeve, mm ²	0,5
2 conductors with same cross section flexible, max twinfer- rules with plastic sleeve, mm ²	1,0
Stripping Length (mm)	10-11

Appendix B Model overview

Article	Universal input c (Uic)	Universal input d (UId)	Universal output b (UOb)	Digital input b (DIb)	Digital output e (DOe)
IO-EC8UID8UOB-X	-	8	8	-	-
IO-EC16DOE-X	-	-	-	-	16
IO-EC16UIC-X	16	-	-	-	-
IO-EC16UID-X	-	16	-	-	-
IO-EC16UOB-X	-	-	16	-	-
IO-EC32DIB-X	-	-	-	32	-

Appendix C Inputs and outputs specifications

Please refer to the manual *Inputs and outputs specifications* for detailed information regarding the inputs and outputs.



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