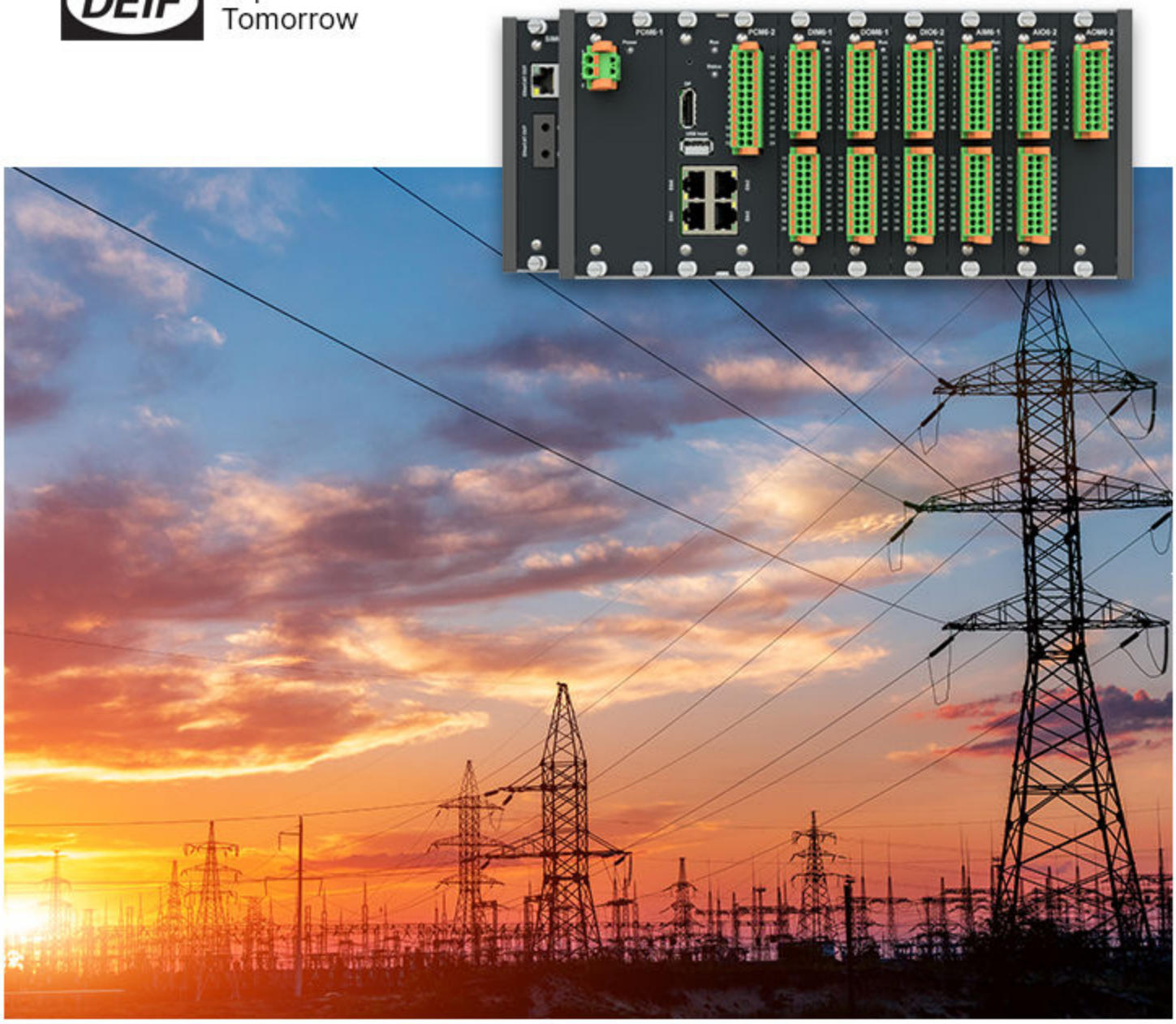
iE 650 PLC

4189341398C

Programmable Automation Controller

Installation instructions

DEIF Improve Tomorrow



1. About the installation instructions

2. Prepare for installation

3. Mount the equipment

4. Wire the equipment

1. About the installation instructions

1.1 Intended users of the Installation instructions

The Installation instructions are intended for the installer and cabinet designer who mounts and wires up the equipment. The Installation instructions can also be used for commissioning to check the installation.

You can find other technical documentation at www.deif.com/documentation/

1.2 Symbols for hazard statements

DANGER!

This shows dangerous situations.

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.

WARNING

This shows potentially dangerous situations.

If the guidelines are not followed, these situations could result in death, serious personal injury, and equipment damage or destruction.

CAUTION

This shows low level risk situation.

If the guidelines are not followed, these situations could result in minor or moderate injury.

NOTICE

This shows an important notice

Make sure to read this information.

1.3 Symbols for general notes

NOTE This shows general information.

More information
This shows where you can find more information.

Example

This shows an example.

How to ...
This shows a link to a video for help and guidance.

1.4 Warnings and safety

Safety during installation and operation

When you install and operate the equipment, you may have to work with dangerous currents and voltages. The installation must only be carried out by authorised personnel who understand the risks involved in working with electrical equipment.

DANGER!

Hazardous live currents and voltages

Do not touch any terminals, especially the AC measurement inputs or any relay terminals, as this could lead to injury or death.

1.4.1 Data security

The iE PLC includes a firewall.

While DEIF has taken great attention to data security and has designed the product to be a secure product, we recommend adopting Information Technology (IT) and Operational Technology (OT) security best practices when connecting the controller to a network.

To minimise the risk of data security breaches we recommend:

- Only connect to trusted networks and avoid public networks and the Internet.
- Use additional security layers like a VPN for remote access.
- Restrict access to authorised persons.

Metal fragments and other objects

Keep metal fragments and other objects out of the controller, as these can damage the equipment. Be especially careful when you install the equipment.

Electrostatic discharge

ATTENTION

Observe precautions for handling

Electrostatic sensitive devices

Protect the equipment terminals from electrostatic discharge when not installed in a grounded rack.

Electrostatic discharge could damage the equipment.

Connect the controller (or extension rack) protective earth

DANGER!

Failure to ground

Failure to ground the controller (or extension rack) could lead to injury or death.

You must ground the controller (or extension rack) to a protective earth.

PLC design and testing

The controller is supplied with CODESYS as PLC-runtime. DEIF is not responsible for the PLC program design, testing, operation and following maintenances and upgrades.

Do not use unsupported hardware modules

Only use the hardware modules that are listed in the Technical specifications. Unsupported hardware modules can make the controller malfunction.

1.5 Legal information

Open source software

This product contains open source software licensed under, for example, the GNU General Public License (GNU GPL) and GNU Lesser General Public License (GNU LGPL). The source code for this software can be obtained by contacting DEIF at support@deif.com. DEIF reserves the right to charge for the cost of the service.

General warranty

The warranty period for the purchased product is defined in the contract and order acknowledgement. In general, DEIF's Terms and Conditions of Sale and Delivery apply.

The product continuously monitors the operating temperature and stores this information in a log file on the device. DEIF uses this information for service purpose and to validate if issues with the product are covered by the warranty.

The software packages supplied are believed to be of the highest quality. Due to the nature of the software development process, it is possible that there are hidden defects in the software which may affect its use, or the operation of any software or device developed with this software package.

DEIF does not undertake responsibility for determining whether this package is suitable for the application, nor for ensuring the correct operation of the application software and hardware.

The warranty does not cover product wear parts, such as:

- Internal flash disc
- If applicable, SD card (purchased separately)
- Replaceable coil-cell battery, used for the real-time clock (available as a spare part)

Trademarks

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

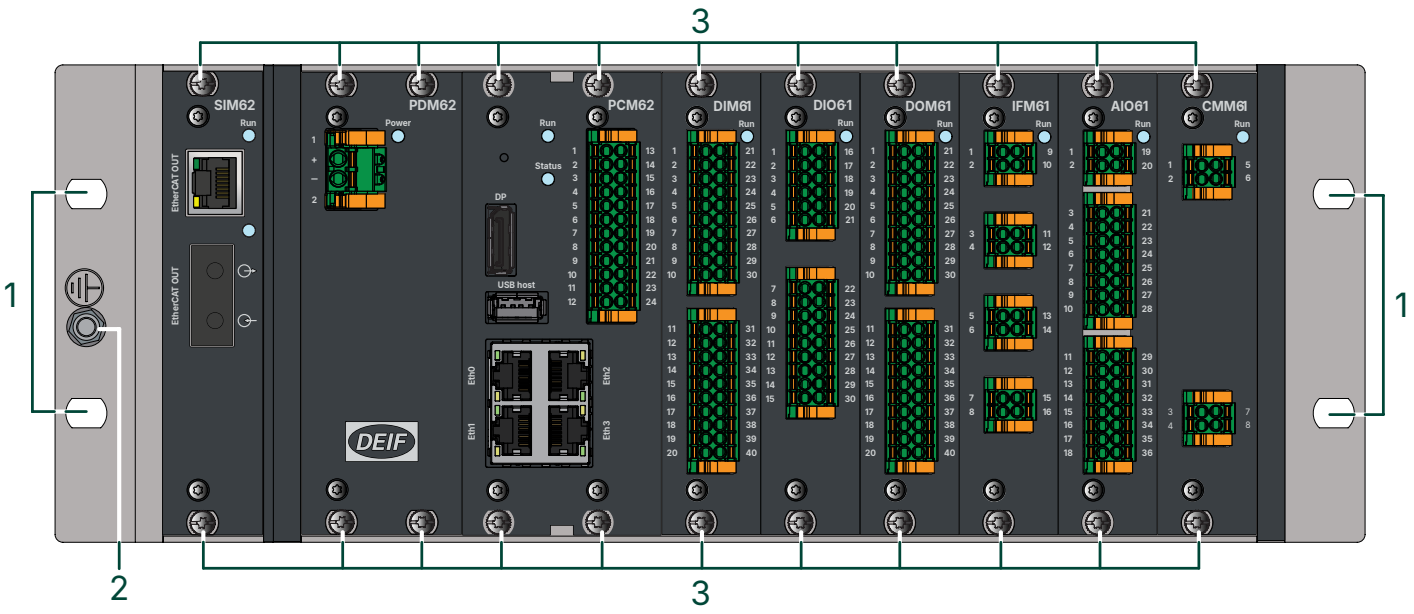
Copyright

2. Prepare for installation

2.1 Installation location

As the product is designed for pollution degree 2, the product must be installed in sealed non ventilated enclosure or air filtered ventilated enclosures. This is required for UL/ULC compliant installations.

2.2 Tools



#	Tool	Attachment	Torque	Used to
1	Wrench *	10 mm hex socket for 6 mm nuts (7/16 in hex socket for 1/4 in nuts)	5 N·m (44 lb-in)	Tighten the nuts on the mounting bolts.
2	Wrench *	5 mm M5	3 N·m (26 lb-in)	Tighten the earth bolt.
3	Screwdriver	5 mm (0.2 in) flat-bladed bit or M2.5 TX10	0.5 N·m (4.43 lb-in)	Remove or add modules in the rack.
-	Wire stripper, pliers and cutters.	-	-	Prepare wiring. Trim cable ties.
-	Safety equipment	-	-	Personal protection according to local standards and requirements.
-	Conducting wrist strap	-	-	Prevent damage from electrostatic discharge.

NOTE * The size of the torque wrench attachment depends on the nut and bolt size of the mounting bolts. These parts are not supplied by DEIF and the sizes mentioned are only a recommendation.

NOTICE

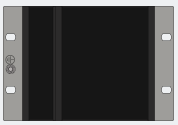
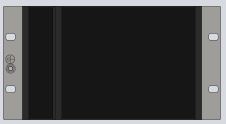
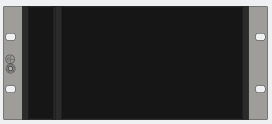
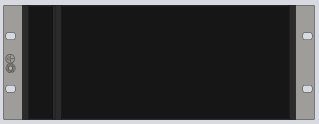
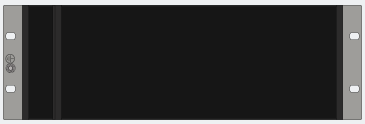
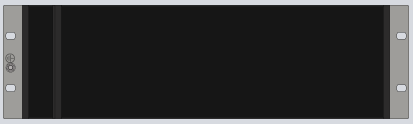
Torque damage to equipment

Do not use power tools during the installation. Too much torque damages the equipment.

Follow the instructions for the correct amount of torque to apply.

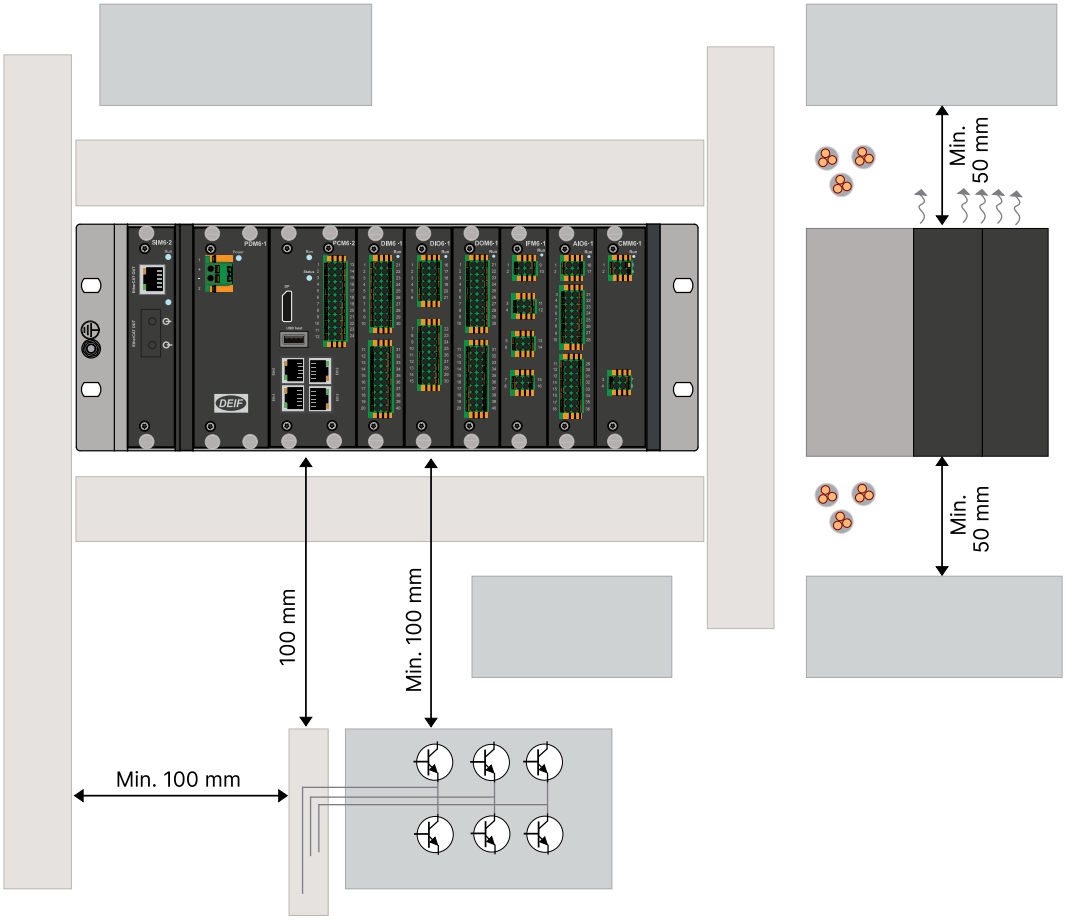
2.3 Rack sizes

The controller rack is available in six different sizes:

Rack	Slots	Ground plate dimensions HxDxW (mm)	Weight (g)	Rack
Rack6·4	4	122.0 x 113.9 x 182.4	715	
Rack6·6	6	122.0 x 113.9 x 233.2	870	
Rack6·8	8	122.0 x 113.9 x 284.4	1020	
Rack6·10	10	122.0 x 113.9 x 334.8	1175	
Rack6·12	12	122.0 x 113.9 x 385.6	1335	
Rack6·14	14	122.0 x 113.9 x 436.4	1500	

2.4 Ventilation

When the controller is installed in an enclosure, we recommend to have free space above and below the cabinet for at least 50 mm in order to ensure sufficient ventilation.



Lifetime is affected by temperature, and we recommend to install and operate forced ventilation if enclosure temperature is above 40 °C. Lowering the temperature by 10 °C will double the estimated lifetime. Keep other heating elements in the same enclosure away from the controller.

NOTICE

Ventilation requirement for PCM6·2

If PCM6·2 is used in the configuration and the ambient temperature exceeds 60 °C, the module must be in a ventilated environment.

2.5 Precaution on ambient cabinet temperature

The ambient temperature T_{AMB} for the controller (the temperature within the control cabinet) dictates the design lifetime of the electronic circuits in the rack.

Ambient temperature	Design lifetime
T_{AMB} up to 40 °C	10 years

2.6 Separation for noisy modules and cables

When noisy modules (i.e. inverters) are placed in the same cabinet we recommend to place power and motor cables in separate cable trays and keep at least 100 mm distance to the controller and signal cables.

2.7 Rack electromagnetic compatibility (EMC)

The controller system is CE marked. The system's electrical noise immission and emission comply with the EN for electromagnetic compatibility (EMC).

The rack (with hardware modules and cover plates) with a grounded metal cage, are part of the approved EMC. In order to ensure an intact EMC, the rack frame and the metal front covers must be in a solid electrical connection.

Modules that have been out of the rack must be checked that they are firmly mounted in the rack frame. Check all the screws in the front covers are tightened with 0.5 N·m.

3. Mount the equipment

3.1 Before you begin the installation

The controller comes with the ordered hardware modules pre-installed. Additional modules can be added or removed in factory or on site.

Changing the delivered configuration

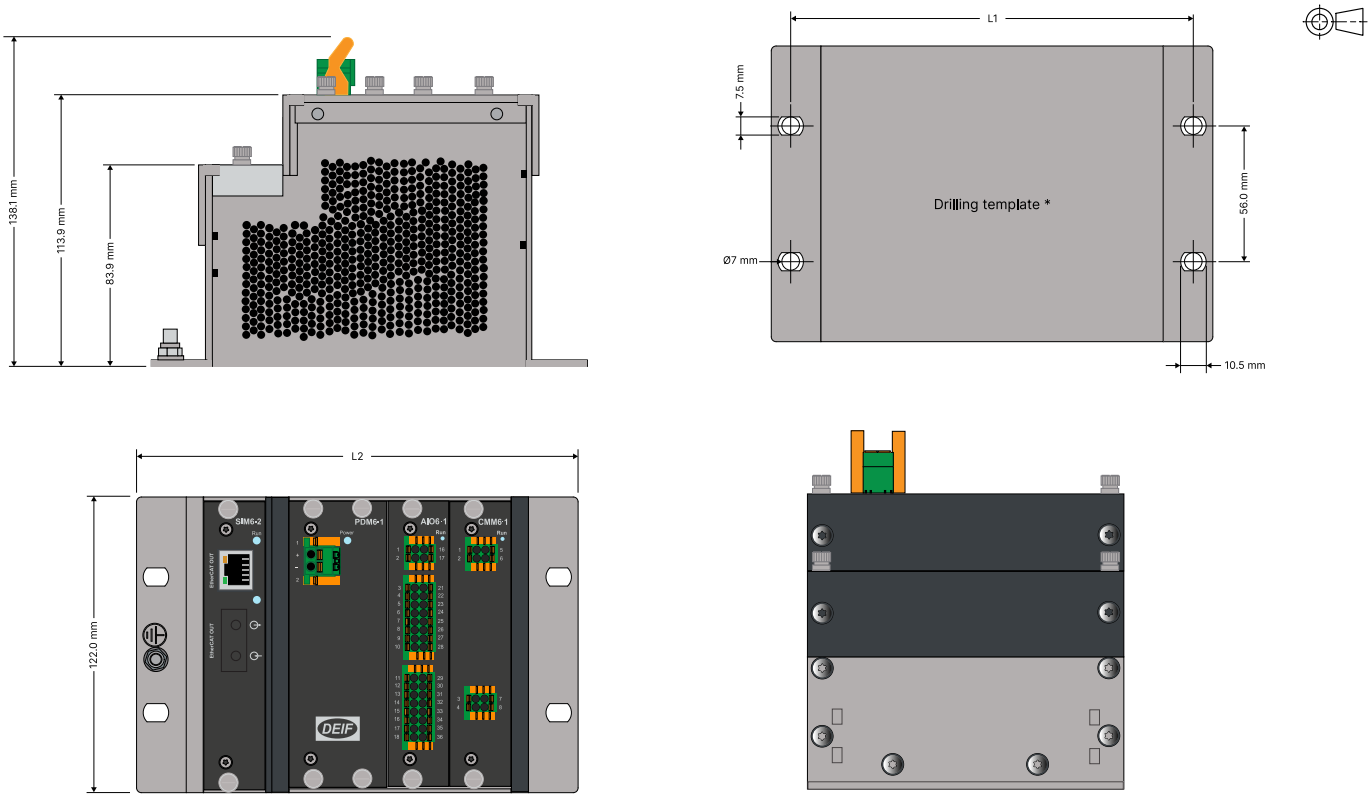
You can mount the hardware modules in a different order from that recommended in these instructions. If you choose to do so, we recommend that you document the changes and include this information in the system documentation:

- Module name
- Module's rack slot number in the default configuration
- Module's rack slot number in your customised configuration

CAD drawings for the controller rack can be downloaded from www.deif.com

The download is available as AutoCAD file or STEP file.

3.2 Rack dimensions



NOTE * The drilling template is only a guideline. Use the dimensions given to create your drilling template.

Dimensions for mounting the cabinet:

Rack	Mounting holes (mm)	L1 (mm)	Grounding plate dimensions HxDxW (mm)	L2 (mm)	Weight (g)
Rack6·4	56.0 × 166.4	166.4	122.0 x 113.9 x 182.4	182.4	715
Rack6·6	56.0 × 217.2	217.2	122.0 x 113.9 x 233.2	233.2	870

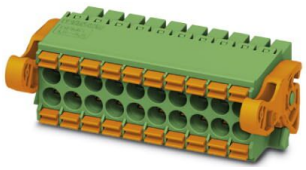
Rack	Mounting holes (mm)	L1 (mm)	Grounding plate dimensions HxDxW (mm)	L2 (mm)	Weight (g)
Rack6·8	56.0 × 268.4	268.4	122.0 x 113.9 x 284.4	284.4	1020
Rack6·10	56.0 × 318.8	318.8	122.0 x 113.9 x 334.8	334.8	1175
Rack6·12	56.0 × 369.6	369.6	122.0 x 113.9 x 385.6	385.6	1335
Rack6·14	56.0 × 420.4	420.4	122.0 x 113.9 x 436.4	436.4	1500
Blind plate	-		118.0 × 25.2		25

Category	Specification
Mounting	Base mount, using four stainless steel M6 screw bolts with matching plain washer of A2-70 ISO 3506 quality or better. The bolts and self-locking washers (or self-locking screws) are not included with the rack. UL/ULC : For use on a flat surface of a type 1 enclosure UL/ULC : To be installed in accordance with the NEC (United States) or the CEC (Canada).
Tightening	Mounting bolts : 5 Nm (45 lb-in) or equivalent.

4. Wire the equipment

4.1 Connectors

The controller terminals are removable push-in spring connectors of the grip fastened type:



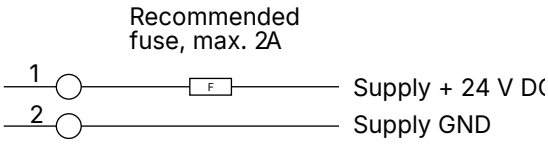
Category	Specification
Terminal connections	**Frame ground and power supply (PDM6·1 or PDM6·2):** Connectors (terminals): See specific module 0.2 to 2.5 mm^2 (AWG24 to AWG12), multi-stranded **Other connections:** Connectors (terminals): See specific module 0.2 to 1.5 mm^2 (AWG24 to AWG16), multi-stranded
Wiring	UL/ULC: Wiring must be minimum 90 °C (194 °F) copper conductors only UL/ULC: The connection of wiring shall be made at the installation site with unprepared conductors by skilled electricians or under controlled conditions by the manufacturer.

4.2 Power supply

All inputs and outputs must only be connected to limited voltage circuits from a battery or Class 1 power-limited circuit protected by maximum 2 A DC rated fuse. This is required for UL/ULC compliant installations.

PDM6·1 is a 30 W power supply, with input level: 24 V (18 to 32 V) includes polarity protection.

Power supply wiring



More information
See the **iE 650 PLC Data sheet** for the full technical specifications.

4.3 Grounding the rack

When mounting the rack it is very important to make sure that the metal rack frame gets a solid electrical connection with the presumed grounded cabinet. A firmly grounded Rack is important both with a view to crew/operator safety precautions, and also in order to form a complete grounded metal cage, which is part of the approved EMC.

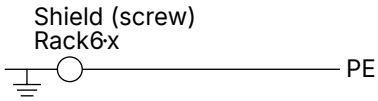
DANGER!

Failure to ground

Failure to ground the controller (or extension rack) could lead to injury or death.

You must ground the controller (or extension rack) to a protective earth.

Ground/Earth wiring

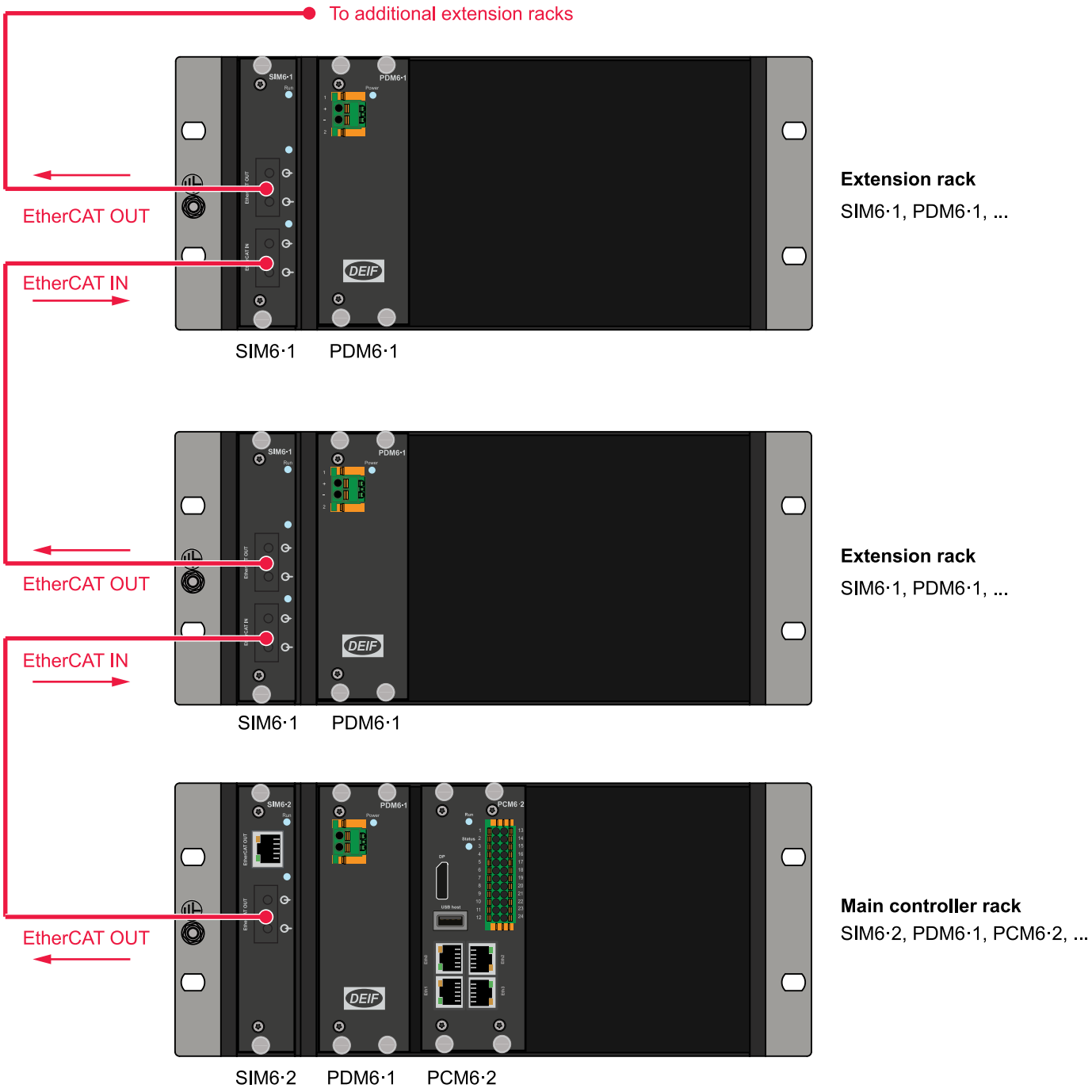


Recommended min. 2.5 mm² wiring

4.4 Station interface modules

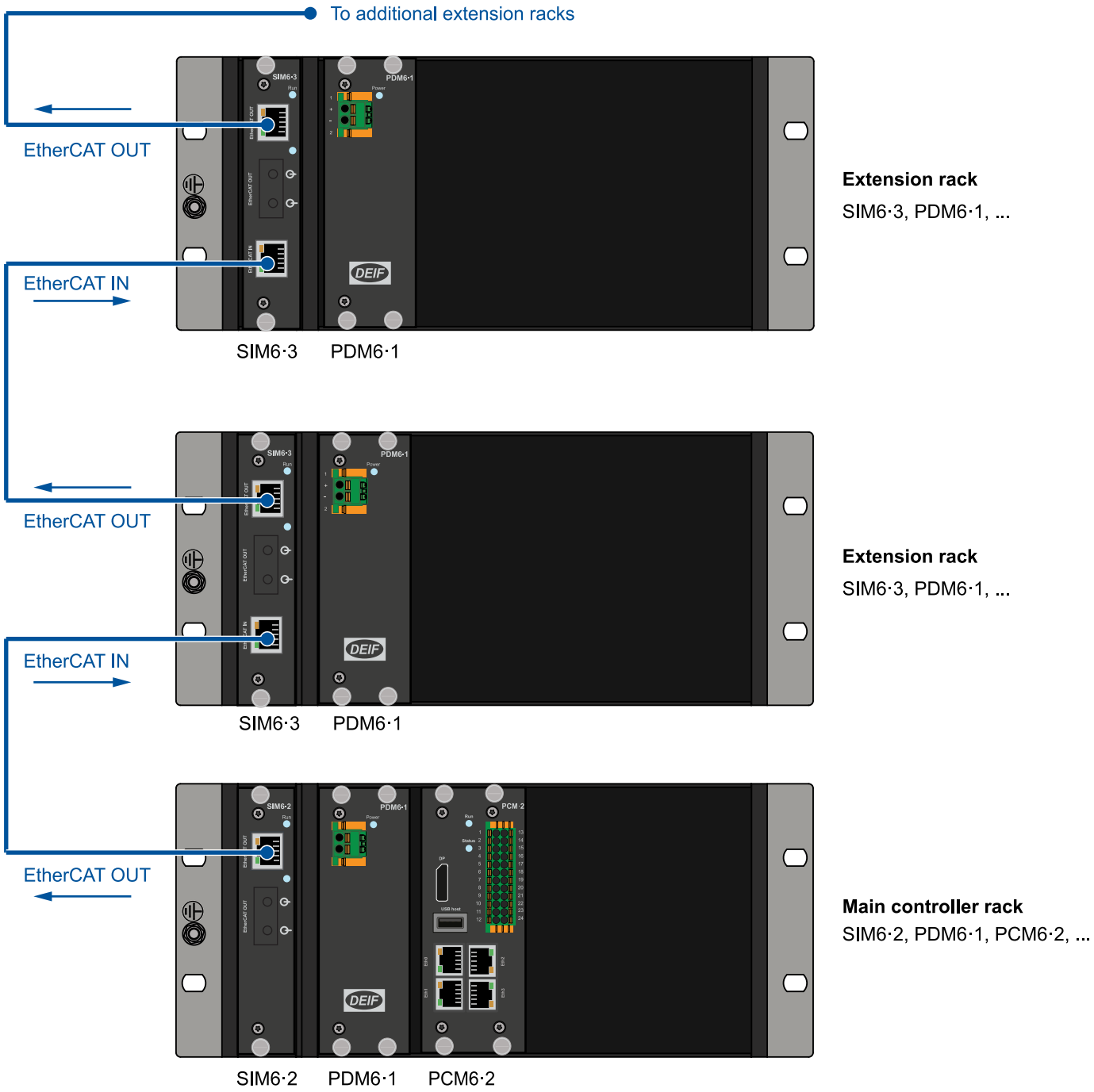
4.4.1 Fiber optical EtherCAT connection chain

Fiber optical EtherCAT interconnection of the racks in daisy chain from EtherCAT OUT on SIM6.2 to EtherCAT IN port on next SIM6.x port.



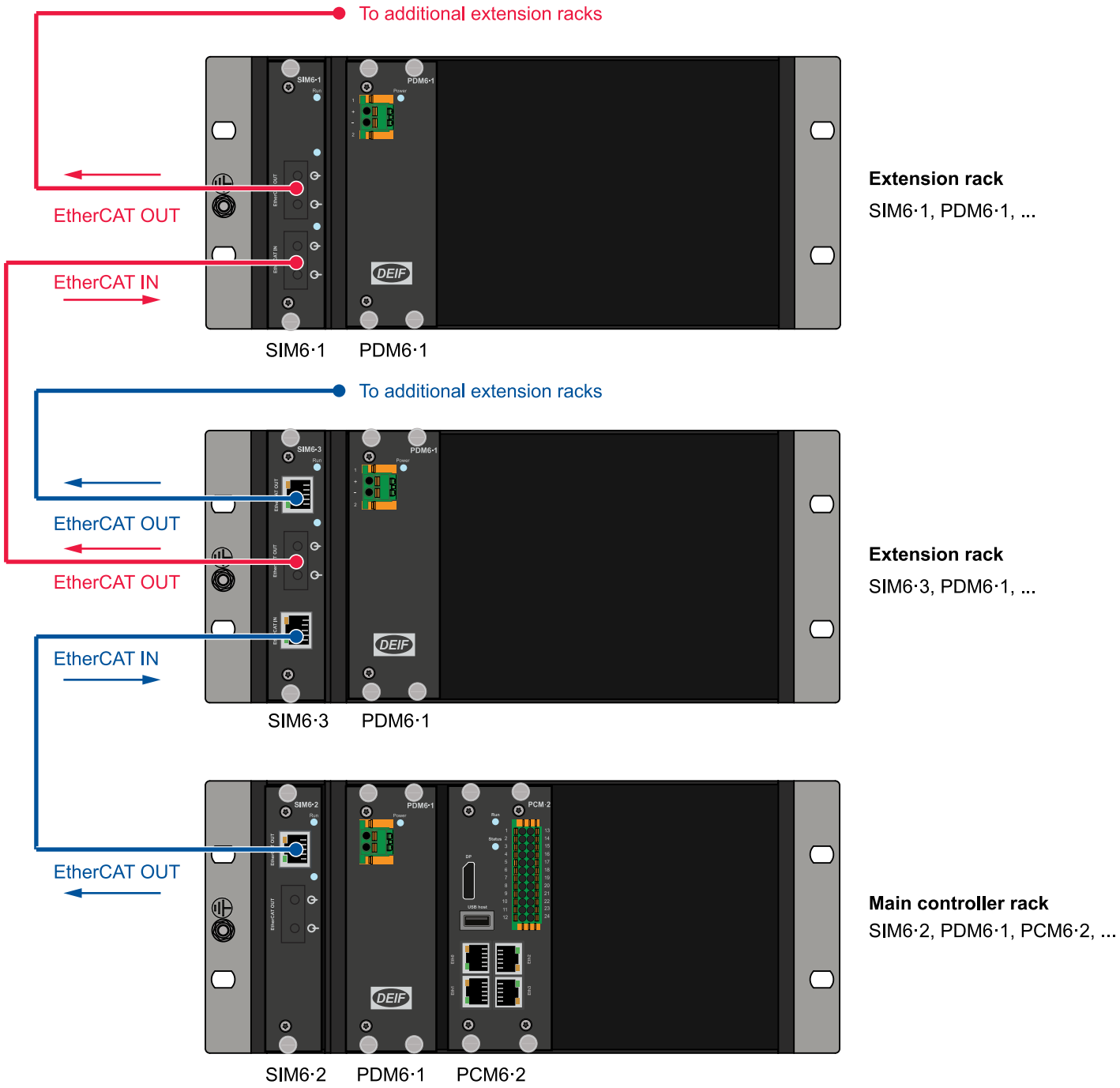
4.4.2 Electrical EtherCAT connection chain

Electrical EtherCAT interconnection of the racks in daisy chain from EtherCAT OUT on SIM6.2 to EtherCAT IN port on next SIM6.x port.



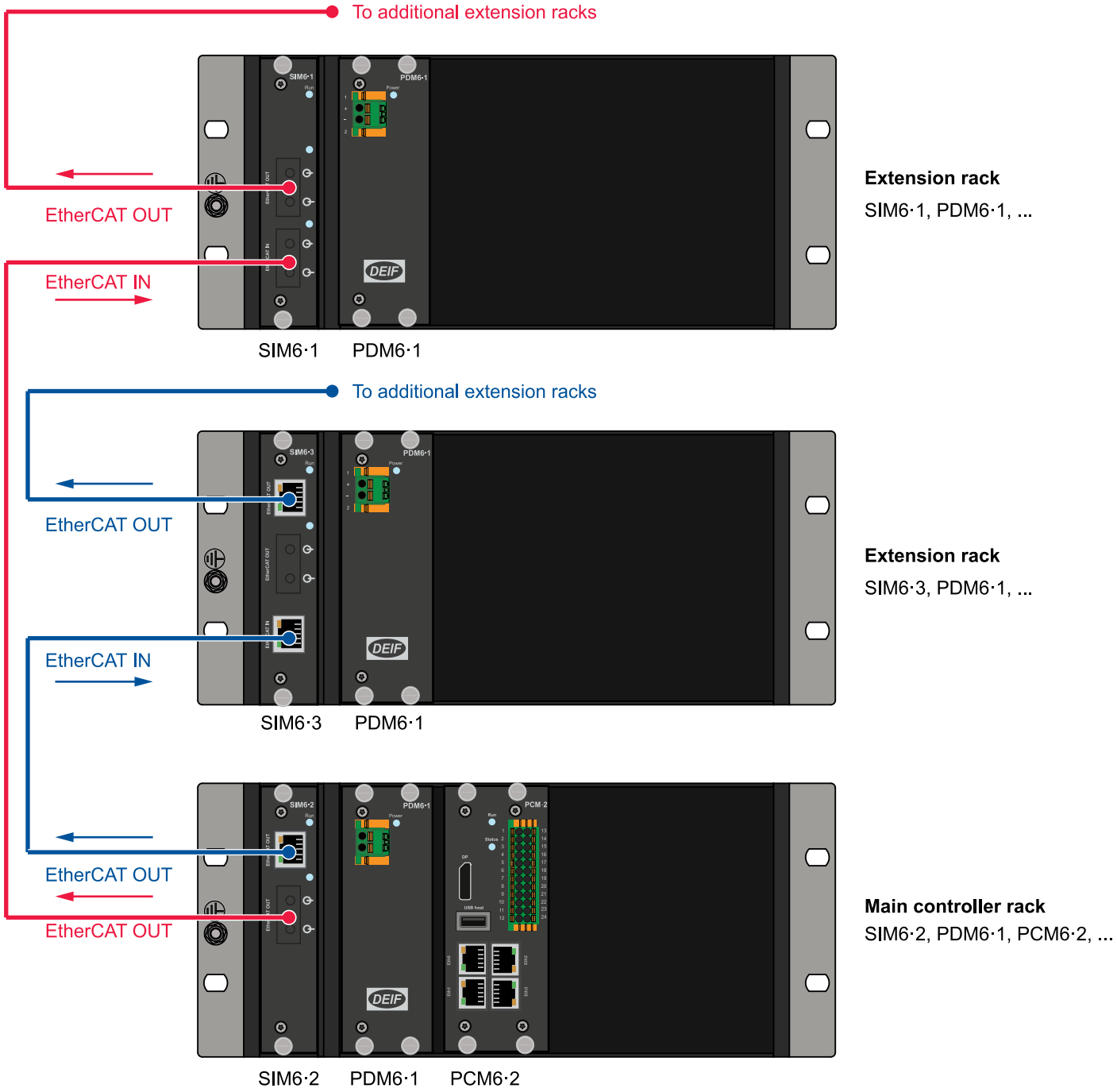
4.4.3 Mixed EtherCAT connection chain

Mixed electrical and fiber optical EtherCAT interconnection of the racks in daisy chain from EtherCAT OUT on SIM6.2 to EtherCAT IN port on next SIM6.x port.



4.4.4 Mixed EtherCAT connection star

Mixed electrical and fiber optical EtherCAT interconnection of the racks in star connection from EtherCAT OUT on SIM6.2 to EtherCAT IN port on next SIM6.x port.



Extension rack

SIM6·1, PDM6·1, ...

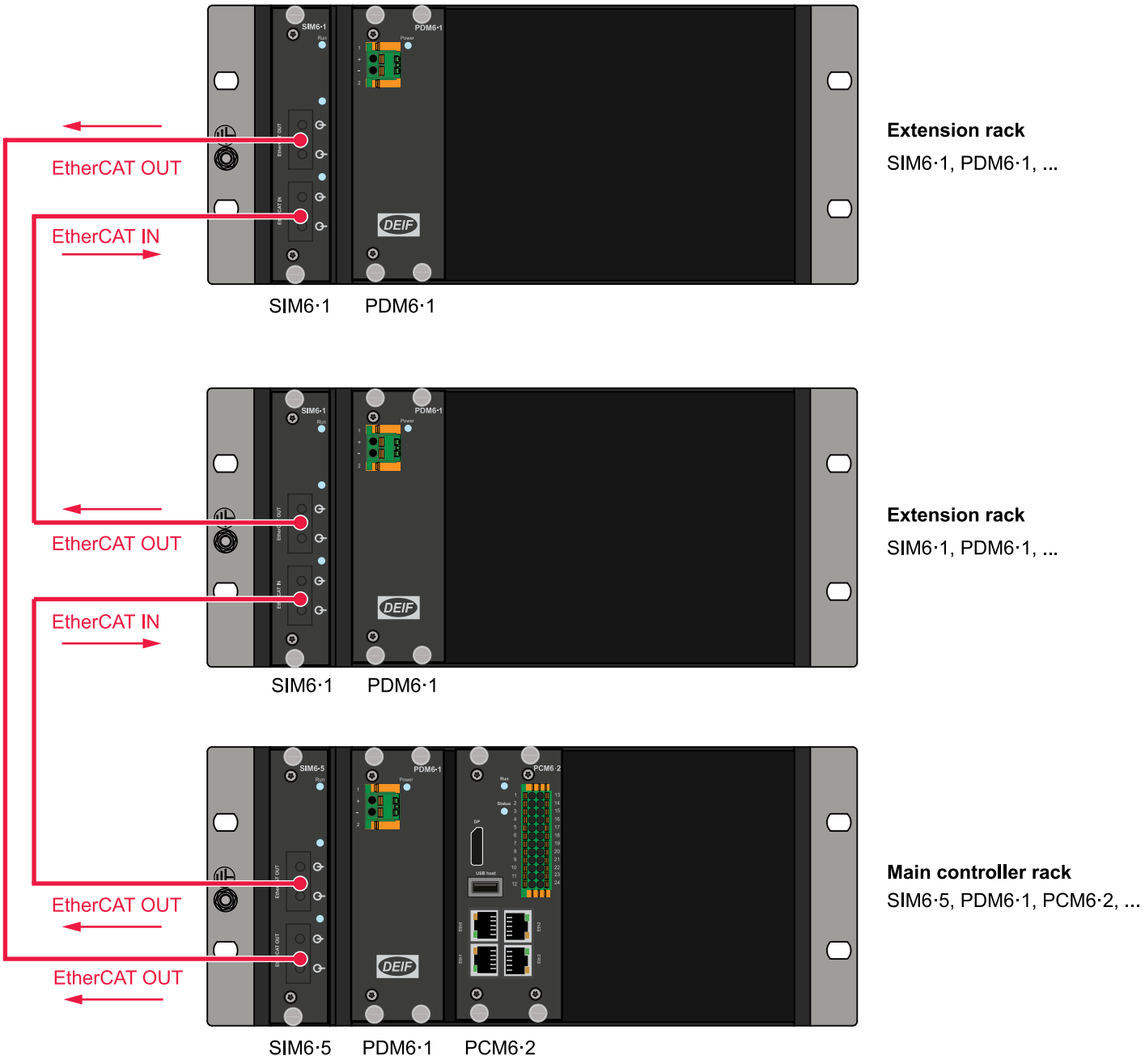
Extension rack

SIM6·3, PDM6·1, ...

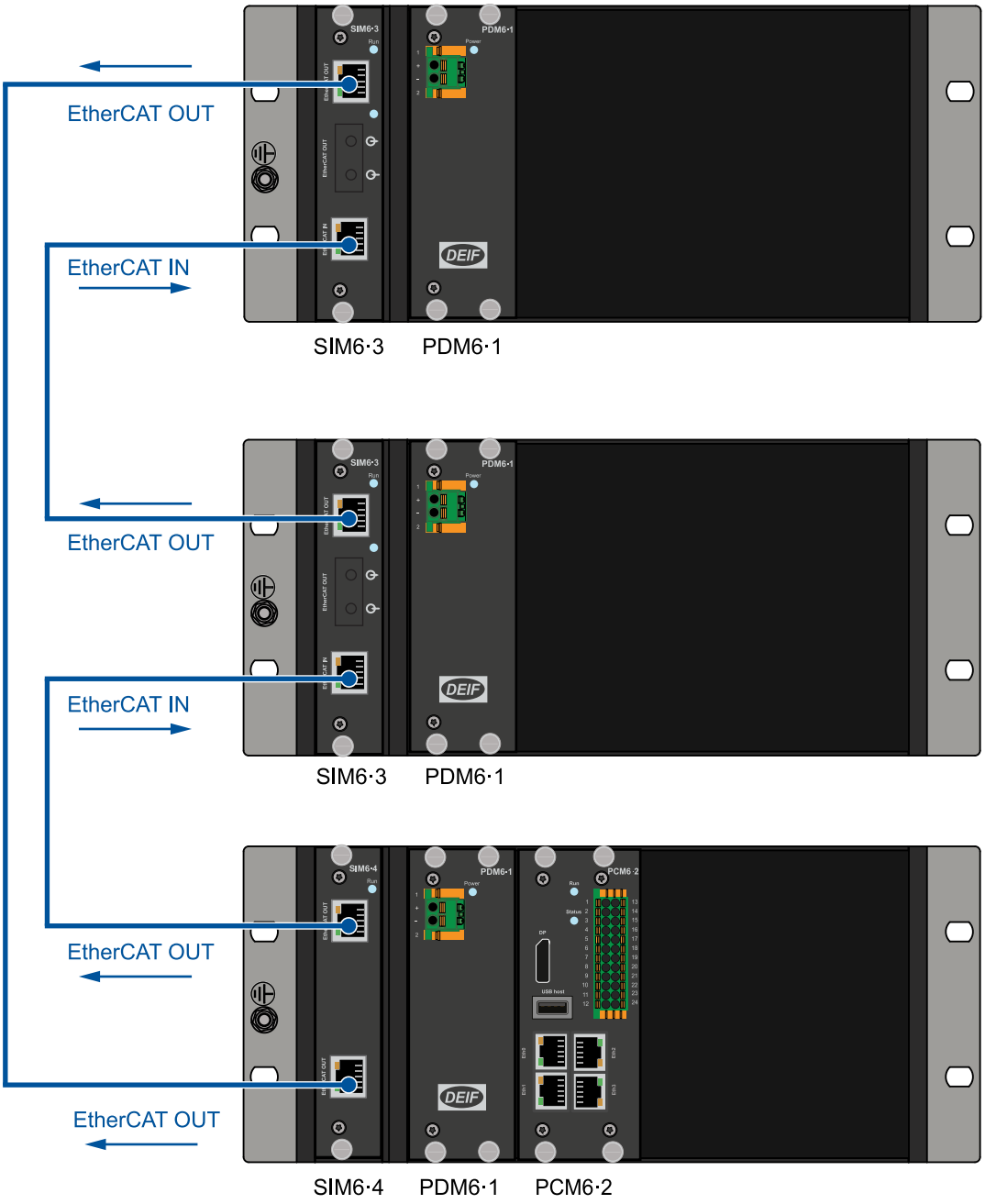
Main controller rack

SIM6·2, PDM6·1, PCM6·2, ...

4.4.5 Fiber EtherCAT cable redundancy



4.4.6 Electrical EtherCAT cable redundancy



Extension rack
SIM6·3, PDM6·1, ...

Extension rack
SIM6·3, PDM6·1, ...

Main controller rack
SIM6·4, PDM6·1, PCM6·2, ...

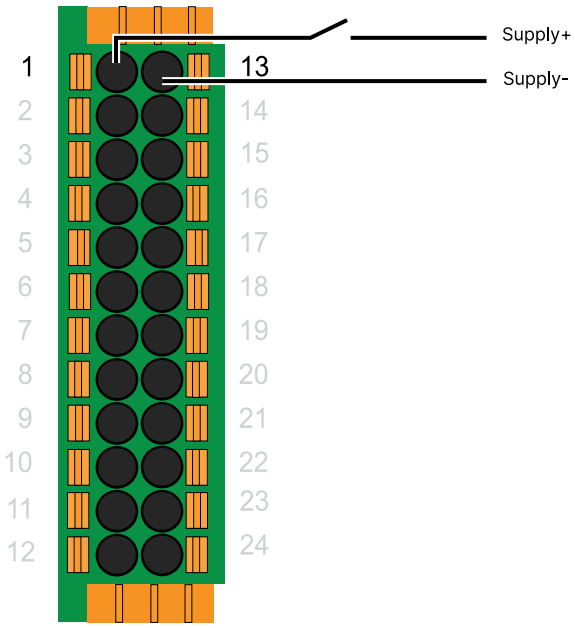
4.5 Computer modules

4.5.1 PCM6·2 terminal specifications

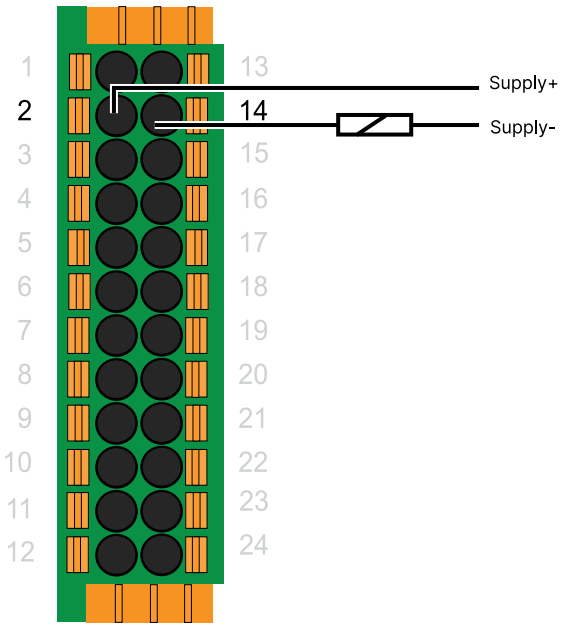
Terminal		Description
1	IN : Supply+	Digital input (for example, Safety Chain feedback)
2	OUT +	Digital output. Solid State Relay with EtherCAT DO Watchdog (for example, for Safety Chain)
3	RS-422 1: RxD + RS-485 1: Data +	Differential receive signal, '+', non-inverting pin Differential data signal, '+', non-inverting pin
4	RS-422 1: TxD +	Differential transmit signal, '+', non-inverting pin
5	RS-422 1: GND RS-485 1: GND	Ground Ground
6	RS-422 2: RxD + RS-485 2: Data +	Differential receive signal, '+', non-inverting pin Differential data signal, '+', non-inverting pin
7	RS-422 1: TxD +	Differential transmit signal, '+', non-inverting pin
8	RS-422 2: GND RS-485 2: GND	Ground Ground
9	CAN 1 - High	Differential data signal, '+', non-inverting pin
10	CAN 1 - GND	Ground
11	CAN 2 - High	Differential data signal, '+', non-inverting pin
12	CAN 2 - GND	Ground
13	IN : Common	Common for Digital input (for example, Safety Chain feedback)
14	OUT	Digital output. Solid State Relay with EtherCAT DO Watchdog (for example, for Safety Chain)
15	RS-422 1: RxD – RS-485 1: Data -	Differential receive signal, '-', inverting pin Differential data signal, '-', inverting pin
16	RS-422 1: TxD -	Differential transmit signal, '-', inverting pin
17	RS-422 1: SHIELD RS-485 1: SHIELD	Shield Shield
18	RS-422 2: RxD – RS-485 2: Data -	Differential receive signal, '-', inverting pin Differential data signal, '-', inverting pin
19	RS-422 2: TxD -	Differential transmit signal, '-', inverting pin
20	RS-422 2: SHIELD RS-485 2: SHIELD	Shield Shield
21	CAN 1 - Low	Differential data signal, '-', inverting pin
22	CAN 1 - SHIELD	Shield
23	CAN 2 - Low	Differential data signal, '-', inverting pin
24	CAN 2 - SHIELD	Shield
	Eth0, Eth1, Eth2, Eth3	Ethernet 0, 1, 2, and 3
	USB host	USB Standard-A plug, Mass Storage Class (MSC)
	DisplayPort	v1.3 1080 p (full-size connector)

4.5.2 PCM6·2 wiring

Digital input/output wiring

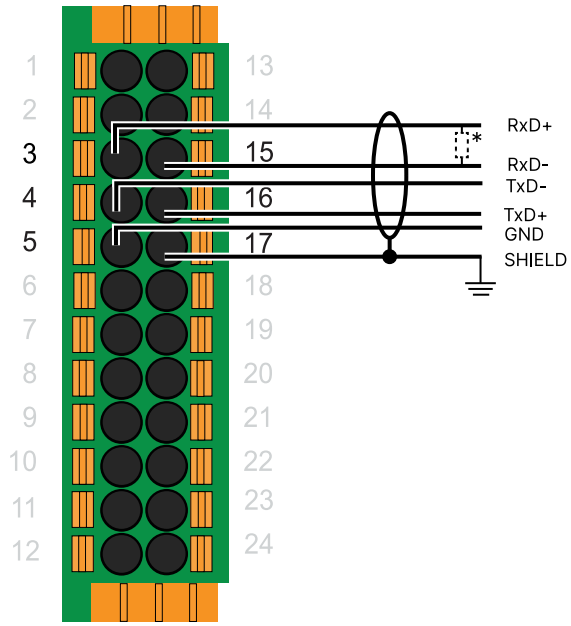


Digital in

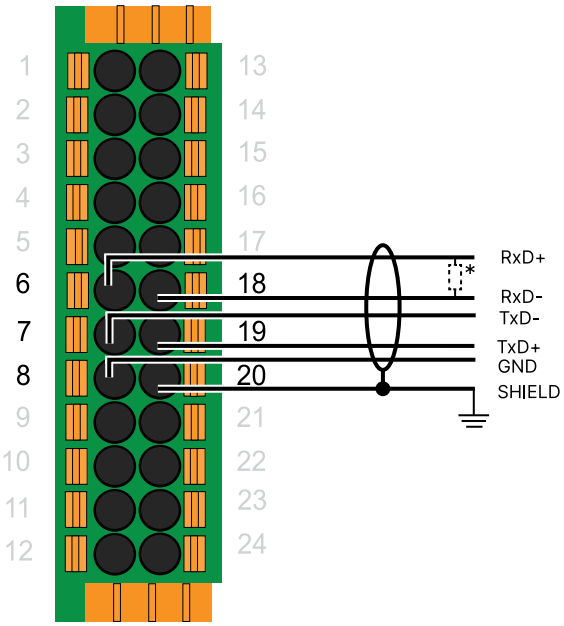


Digital out

RS-422 wiring

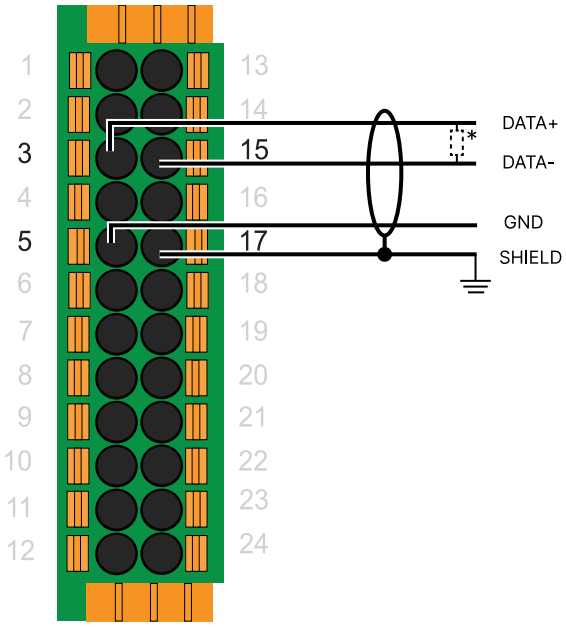


RS-422 port 1*

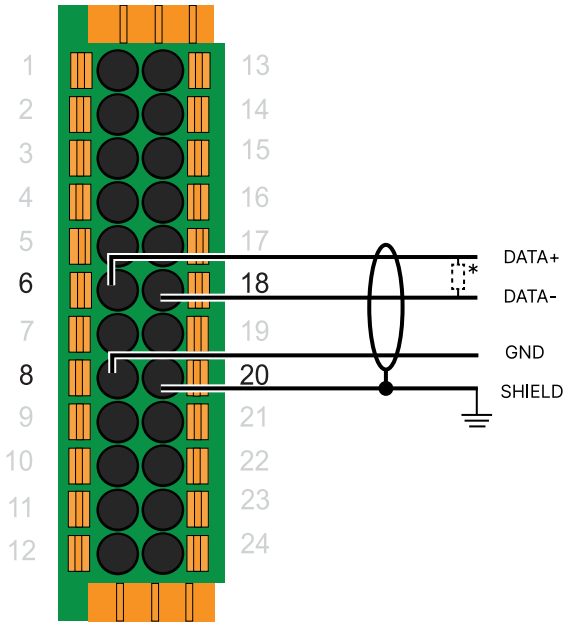


RS-422 port 2*

RS-485 wiring

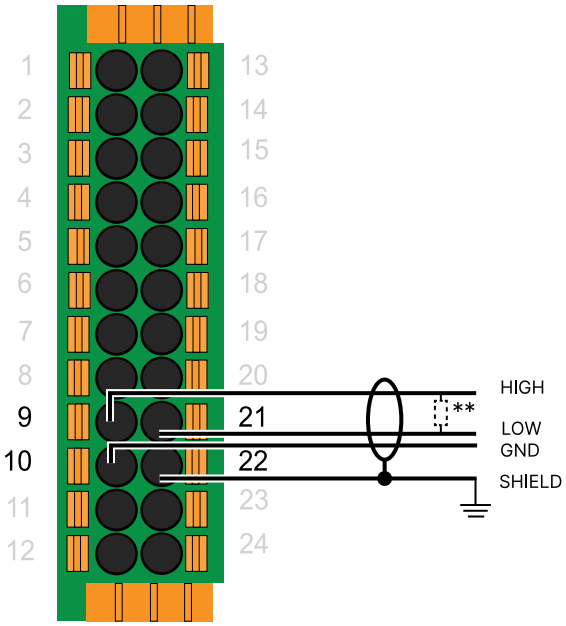


RS-485 port 1*

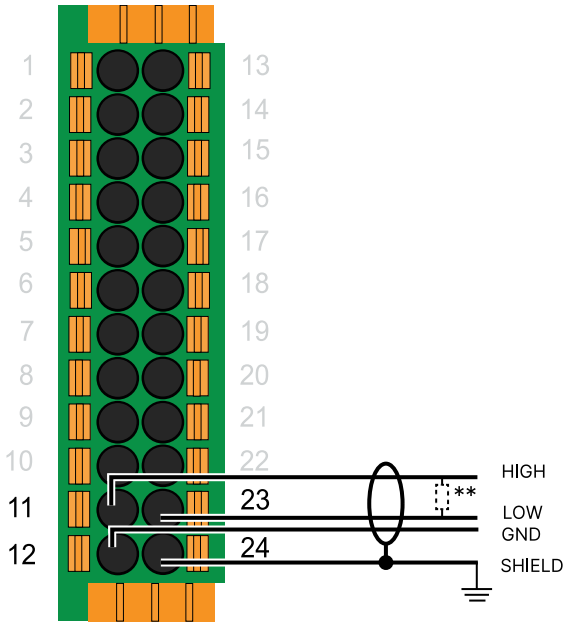


RS-485 port 2*

CAN wiring



CAN port 1**



CAN port 2**

NOTE * SW configurable (on/off) termination resistor (120 Ω). SW configurable (on/off) bias (pull up/pull down, 500 Ω). GND decoupled to shield through 1.5 MΩ || 1.5 nF.

** SW configurable (on/off) termination resistor (120 Ω). GND decoupled to shield through 1.5 MΩ || 1.5 nF.

4.5.3 External third-party display

External third-party non-DEIF displays connected to the DisplayPort, should be configured to **Input** mode instead of **Automatic** detection.

4.6 Digital input and output modules

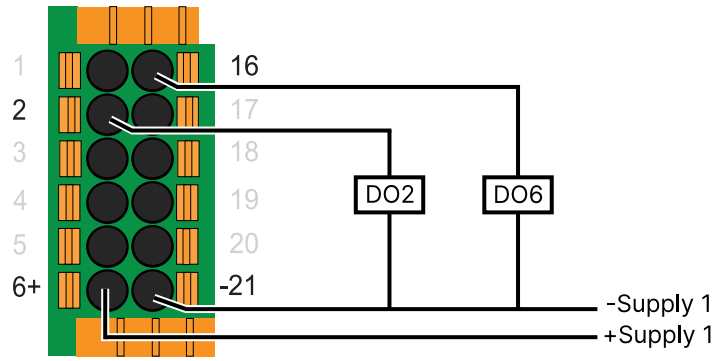
4.6.1 DIO6·1 terminal specifications

DIO6·1 has 10 x digital outputs and 16 x digital inputs. All the inputs and outputs are protected and isolated from other potentials.

Terminal		Description
1	DO1	Digital output 1
2	DO2	Digital output 2
3	DO3	Digital output 3
4	DO4	Digital output 4
5	DO5	Digital output 5
6	DO SUP+	+24 V digital output supply
16	DO6	Digital output 6
17	DO7	Digital output 7
18	DO8	Digital output 8
19	DO9	Digital output 9
20	DO10	Digital output 10
21	DO SUP-	Common digital output supply
7	DI1	Digital input 1
8	DI2	Digital input 2
9	DI3	Digital input 3
10	DI4	Digital input 4
11	DI5	Digital input 5
12	DI6	Digital input 6
13	DI7	Digital input 7
14	DI8	Digital input 8
15	DI SUP-	Digital common input reference supply (DI1 to DI8)
22	DI9	Digital input 9
23	DI10	Digital input 10
24	DI11	Digital input 11
25	DI12	Digital input 12
26	DI13	Digital input 13
27	DI14	Digital input 14
28	DI15	Digital input 15
29	DI16	Digital input 16
30	DI SUP-	Digital common input reference supply (DI9 to DI16)

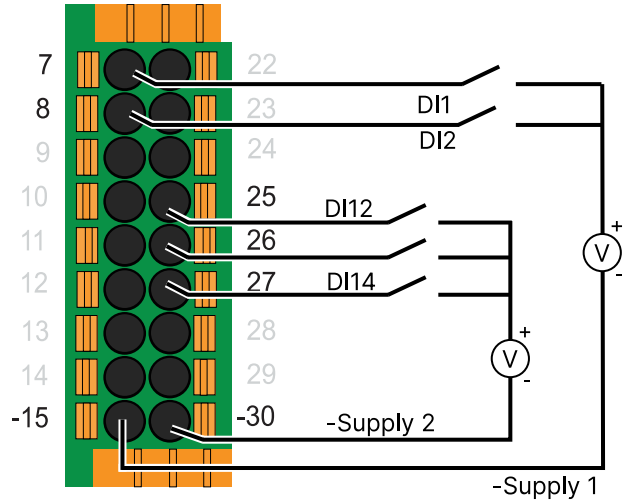
4.6.2 DIO6·1 wiring

Digital outputs wiring



Digital outputs

Digital inputs wiring



Digital inputs

4.6.3 DIO6·2 terminal specifications

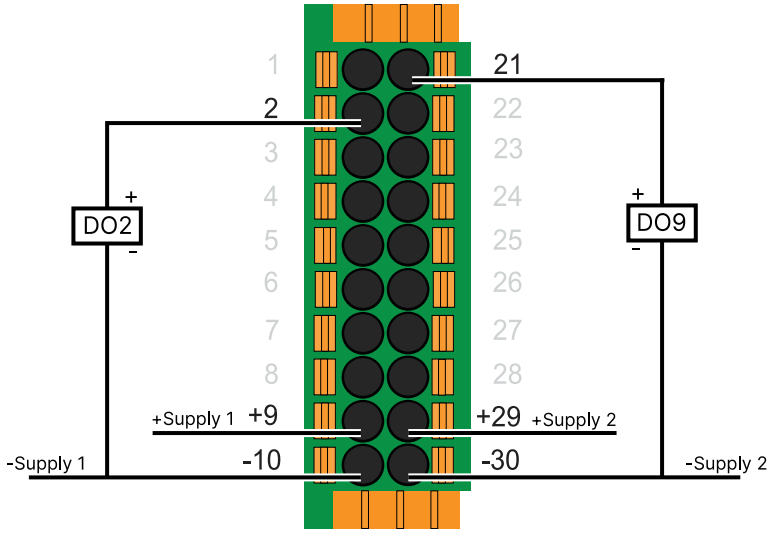
DIO6·2 has 16 x digital outputs and 16 x digital inputs. All the inputs and outputs are protected and isolated from other potentials.

Terminal		Description
1	DO1	Digital output 1
2	DO2	Digital output 2
3	DO3	Digital output 3
4	DO4	Digital output 4
5	DO5	Digital output 5
6	DO6	Digital output 6
7	DO7	Digital output 7
8	DO8	Digital output 8
9	24 V (1) DO SUP+	+24 V digital output supply, Group 1 (DO1 to DO8)
10	GND (1) DO SUP-	Common digital output supply, Group 1 (DO1 to DO8)
21	DO9	Digital output 9
22	DO10	Digital output 10
23	DO11	Digital output 11
24	DO12	Digital output 12
25	DO13	Digital output 13
26	DO14	Digital output 14
27	DO15	Digital output 15
28	DO16	Digital output 16
29	24 V (2) DO SUP+	+24 V digital output supply, Group 2 (DO9 to DO16)
30	GND (2) DO SUP-	Common digital output supply, Group 2 (DO9 to DO16)
11	DI1	Digital input 1
12	DI2	Digital input 2
13	DI3	Digital input 3
14	DI4	Digital input 4
15	DI5	Digital input 5
16	DI6	Digital input 6
17	DI7	Digital input 7
18	DI8	Digital input 8
19	-	Not used
20	GND (3) DI SUP-	Digital common input reference supply, Group 3 (DI1 to DI8)
31	DI9	Digital input 9
32	DI10	Digital input 10

Terminal		Description
33	DI11	Digital input 11
34	DI12	Digital input 12
35	DI13	Digital input 13
36	DI14	Digital input 14
37	DI15	Digital input 15
38	DI16	Digital input 16
39	-	Not used
40	GND (4) DI SUP-	Digital common input reference supply, Group 4 (DI9 to DI16)

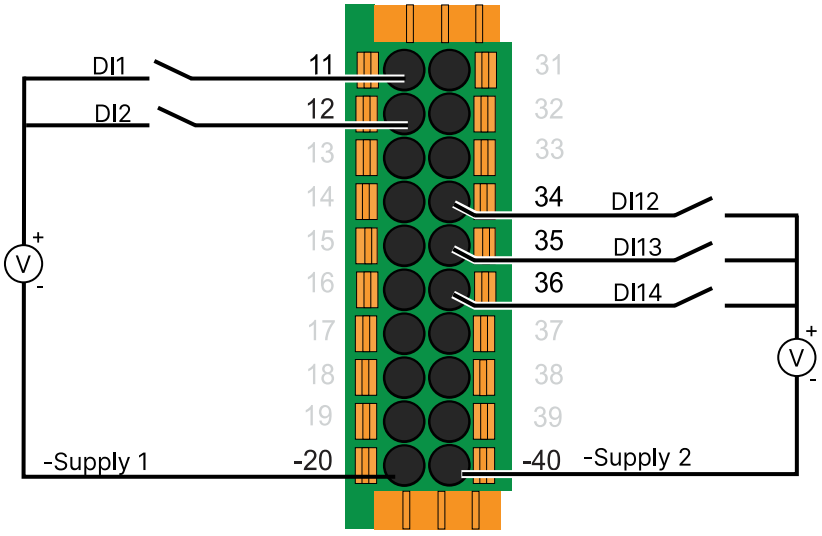
4.6.4 DIO6·2 wiring

Digital outputs wiring



Digital outputs

Digital inputs wiring



Digital inputs

4.6.5 DIM6·1 terminal specifications

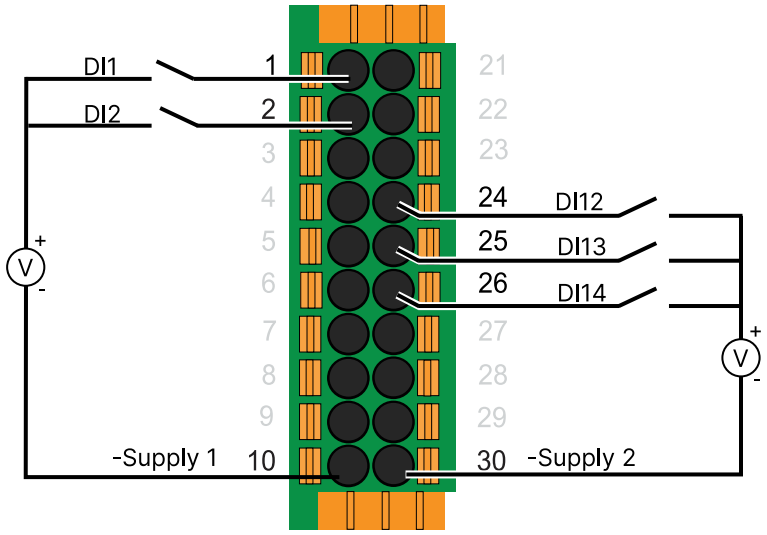
DIM6·1 has 32 x digital inputs. All the inputs are protected and isolated from other potentials.

Terminal		Description
1	DI1	Digital input 1
2	DI2	Digital input 2
3	DI3	Digital input 3
4	DI4	Digital input 4
5	DI5	Digital input 5
6	DI6	Digital input 6
7	DI7	Digital input 7
8	DI8	Digital input 8
9	-	Not used
10	GND (1) DI SUP-	Digital common input reference supply, Group 1 (DI1 to DI8)
21	DI9	Digital input 9
22	DI10	Digital input 10
23	DI11	Digital input 11
24	DI12	Digital input 12
25	DI13	Digital input 13
26	DI14	Digital input 14
27	DI15	Digital input 15
28	DI16	Digital input 16
29	-	Not used
30	GND (2) DI SUP-	Digital common input reference supply, Group 2 (DI9 to DI16)
11	DI17	Digital input 17
12	DI18	Digital input 18
13	DI19	Digital input 19
14	DI20	Digital input 20
15	DI21	Digital input 21
16	DI22	Digital input 22
17	DI23	Digital input 23
18	DI24	Digital input 24
19	-	Not used
20	GND (3) DI SUP-	Digital common input reference supply, Group 3 (DI17 to DI24)
31	DI25	Digital input 25
32	DI26	Digital input 26
33	DI27	Digital input 27
34	DI28	Digital input 28

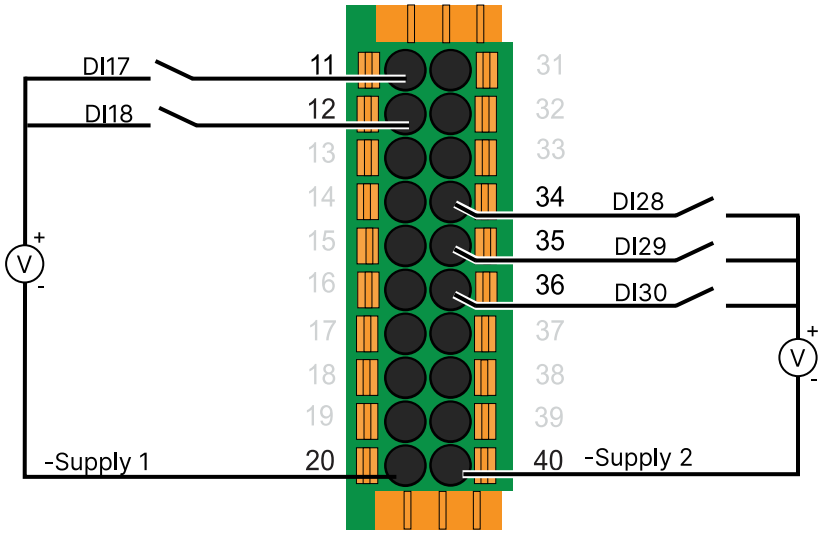
Terminal		Description
35	DI29	Digital input 29
36	DI30	Digital input 30
37	DI31	Digital input 31
38	DI32	Digital input 32
39	-	Not used
40	GND (4) DI SUP-	Digital common reference input supply, Group 4 (DI25 to DI32)

4.6.6 DIM6·1 wiring

Digital inputs wiring



Digital inputs 1 to 16



Digital inputs 17 to 32

4.6.7 DOM6·1 terminal specifications

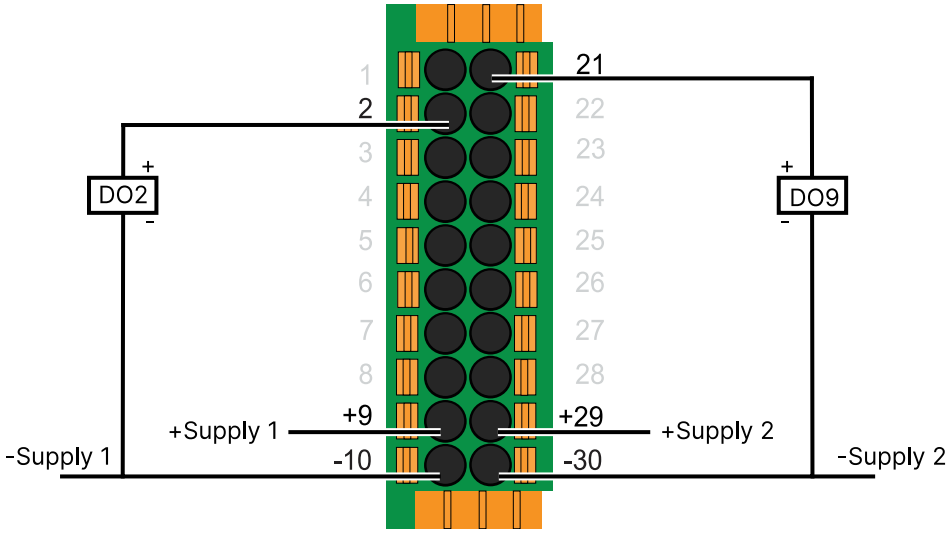
DOM6·1 has 32 x digital outputs. All the outputs are protected and isolated from other potentials.

Terminal		Description
1	DO1	Digital output 1
2	DO2	Digital output 2
3	DO3	Digital output 3
4	DO4	Digital output 4
5	DO5	Digital output 5
6	DO6	Digital output 6
7	DO7	Digital output 7
8	DO8	Digital output 8
9	24 V (1) DO SUP+	+24 V digital output supply, Group 1 (DO1 to DO8)
10	GND (1) DO SUP-	Common digital output supply, Group 1 (DO1 to DO8)
21	DO9	Digital output 9
22	DO10	Digital output 10
23	DO11	Digital output 11
24	DO12	Digital output 12
25	DO13	Digital output 13
26	DO14	Digital output 14
27	DO15	Digital output 15
28	DO16	Digital output 16
29	24 V (2) DO SUP+	+24 V digital output supply, Group 2 (DO9 to DO16)
30	GND (2) DO SUP-	Common digital output supply, Group 2 (DO9 to DO16)
11	DO17	Digital output 17
12	DO18	Digital output 18
13	DO19	Digital output 19
14	DO20	Digital output 20
15	DO21	Digital output 21
16	DO22	Digital output 22
17	DO23	Digital output 23
18	DO24	Digital output 24
19	24 V (3) DO SUP+	+24 V digital output supply, Group 3 (DO17 to DO24)
20	GND (3) DO SUP-	Common digital output supply, Group 3 (DO17 to DO24)
31	DO25	Digital output 25
32	DO26	Digital output 26

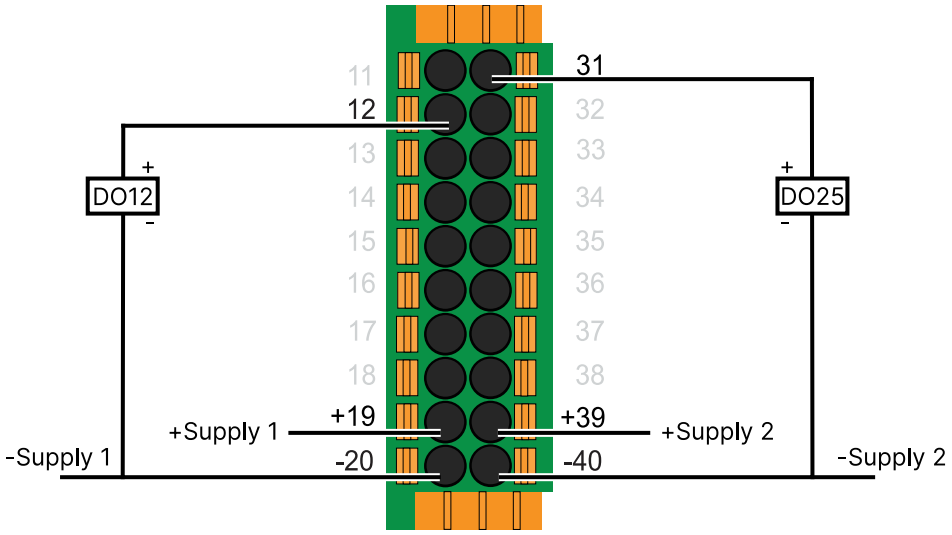
Terminal		Description
33	DO27	Digital output 27
34	DO28	Digital output 28
35	DO29	Digital output 29
36	DO30	Digital output 30
37	DO31	Digital output 31
38	DO32	Digital output 32
39	24 V (4) DO SUP+	+24 V digital output supply, Group 4 (DO25 to DO32)
40	GND (4) DO SUP-	Common digital output supply, Group 4 (DO25 to DO32)

4.6.8 DOM6·1 wiring

Digital outputs wiring



Digital outputs 1 to 16



Digital outputs 17 to 32

4.7 Analogue input and output modules

4.7.1 AIO6·1 terminal specifications

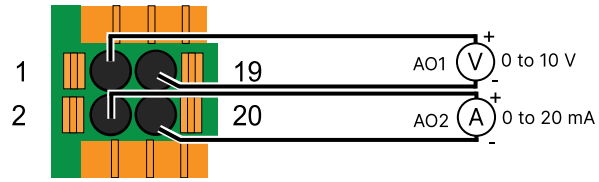
AIO6·1 has 2 x analogue outputs and 16 x analogue inputs. All the inputs and outputs are protected and isolated from other potentials.

Terminal		Description
1	AO1	Analogue output 1 (+)
19	AO1	Analogue output 1 (-)
2	AO2	Analogue output 2 (+)
20	AO2	Analogue output 2 (-)
3	AI1	Analogue input 1 (+)
21	AI1	Analogue input 1 (-)
4	AI2	Analogue input 2 (+)
22	AI2	Analogue input 2 (-)
5	AI3	Analogue input 3 (+)
23	AI3	Analogue input 3 (-)
6	AI4	Analogue input 4 (+)
24	AI4	Analogue input 4 (-)
7	AI5	Analogue input 5 (+)
25	AI5	Analogue input 5 (-)
8	AI6	Analogue input 6 (+)
26	AI6	Analogue input 6 (-)
9	AI7	Analogue input 7 (+)
27	AI7	Analogue input 7 (-)
10	AI8	Analogue input 8 (+)
28	AI8	Analogue input 8 (-)
11	AI9	Analogue input 9 (+)
29	AI9	Analogue input 9 (-)
12	AI10	Analogue input 10 (+)
30	AI10	Analogue input 10 (-)
13	AI11	Analogue input 11 (+)
31	AI11	Analogue input 11 (-)
14	AI12	Analogue input 12 (+)
32	AI12	Analogue input 12 (-)
15	AI13	Analogue input 13 (+)
33	AI13	Analogue input 13 (-)
16	AI14	Analogue input 14 (+)
34	AI14	Analogue input 14 (-)
17	AI15	Analogue input 15 (+)
35	AI15	Analogue input 15 (-)

Terminal		Description
18	AI16	Analogue input 16 (+)
36	AI16	Analogue input 16 (-)

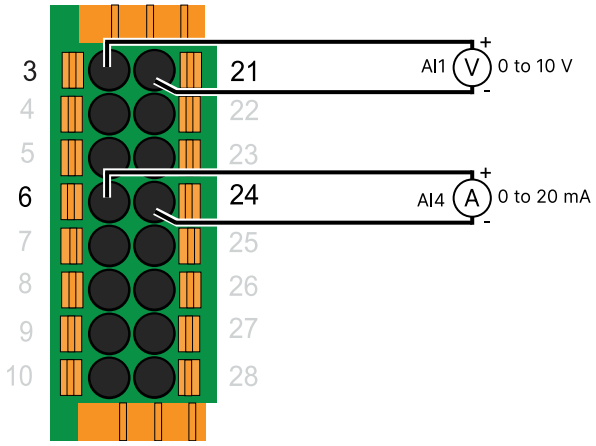
4.7.2 AIO6·1 wiring

Analogue outputs wiring

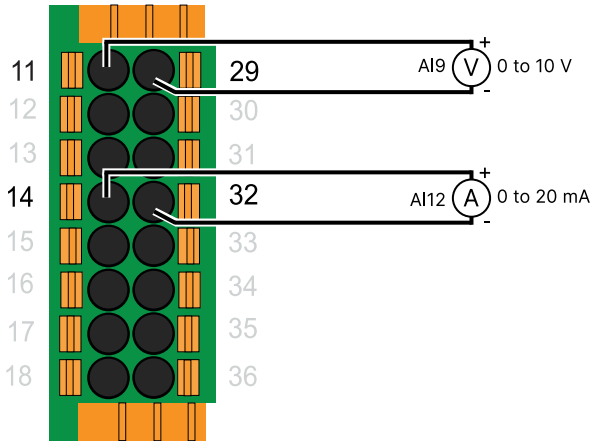


Analogue outputs

Analogue inputs wiring

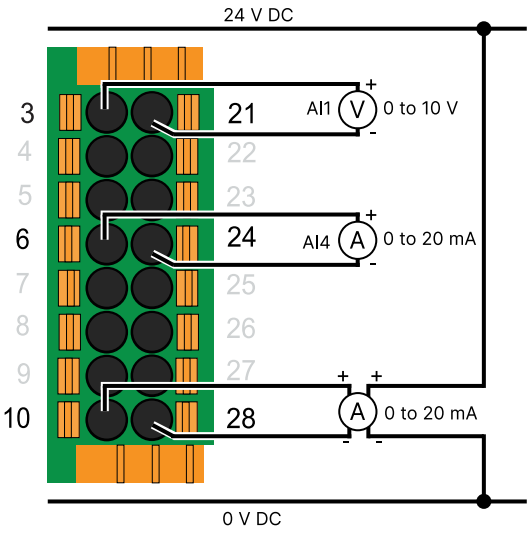


Analogue inputs 1 to 8

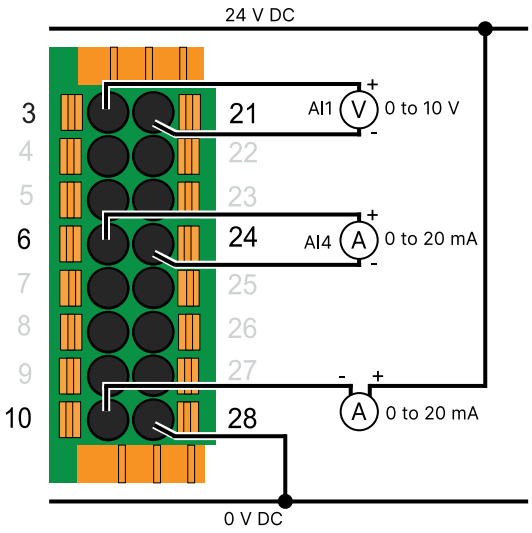


Analogue inputs 9 to 16

Connection of active and passive transducers



Active transducer



Passive transducer

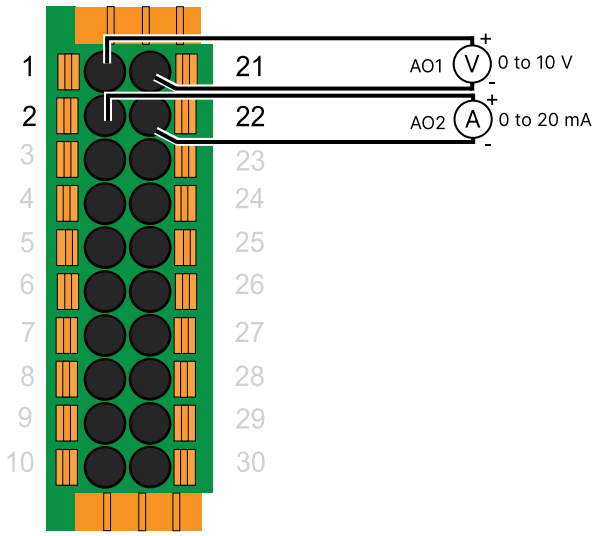
4.7.3 AIO6·2 terminal specifications

AIO6·2 has 8 x analogue outputs and 8 x analogue inputs. All the inputs and outputs are protected and isolated from other potentials.

Terminal		Description
1	AO1	Analogue output 1 (+)
21	AO1	Analogue output 1 (-)
2	AO2	Analogue output 2 (+)
22	AO2	Analogue output 2 (-)
3	AO3	Analogue output 3 (+)
23	AO3	Analogue output 3 (-)
4	AO4	Analogue output 4 (+)
24	AO4	Analogue output 4 (-)
5	AO5	Analogue output 5 (+)
25	AO5	Analogue output 5 (-)
6	AO6	Analogue output 6 (+)
26	AO6	Analogue output 6 (-)
7	AO7	Analogue output 7 (+)
27	AO7	Analogue output 7 (-)
8	AO8	Analogue output 8 (+)
28	AO8	Analogue output 8 (-)
9/ 29	-	Not used
10 / 30	-	Not used
11	AI1	Analogue input 1 (+)
31	AI1	Analogue input 1 (-)
12	AI2	Analogue input 2 (+)
32	AI2	Analogue input 2 (-)
13	AI3	Analogue input 3 (+)
33	AI3	Analogue input 3 (-)
14	AI4	Analogue input 4 (+)
34	AI4	Analogue input 4 (-)
15	AI5	Analogue input 5 (+)
35	AI5	Analogue input 5 (-)
16	AI6	Analogue input 6 (+)
36	AI6	Analogue input 6 (-)
17	AI7	Analogue input 7 (+)
37	AI7	Analogue input 7 (-)
18	AI8	Analogue input 8 (+)
38	AI8	Analogue input 8 (-)
19/39	-	Not used
20/40	-	Not used

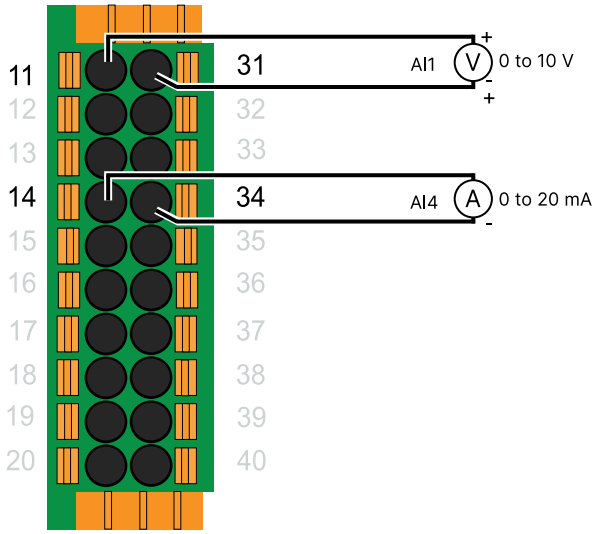
4.7.4 AIO6·2 wiring

Analogue outputs wiring



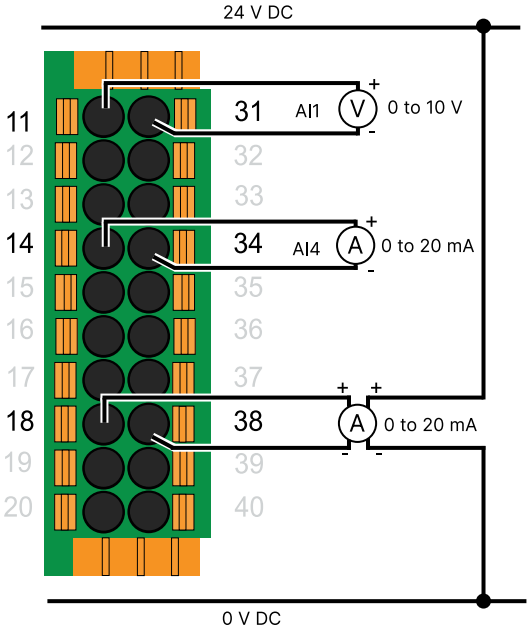
Analogue outputs

Analogue inputs wiring

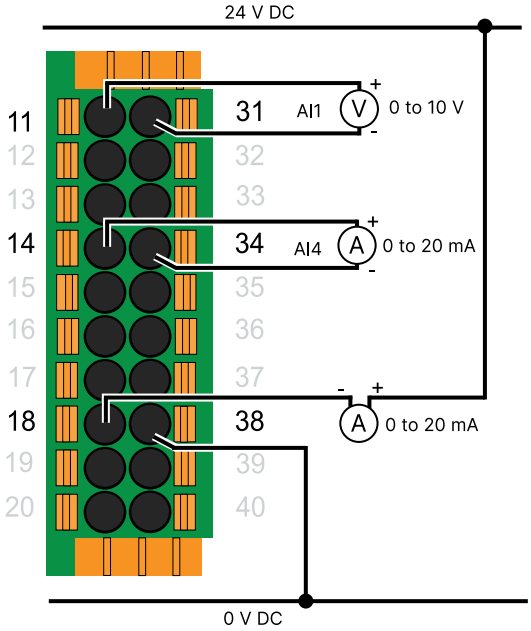


Analogue inputs

Connection of active and passive transducers



Active transducer



Passive transducer

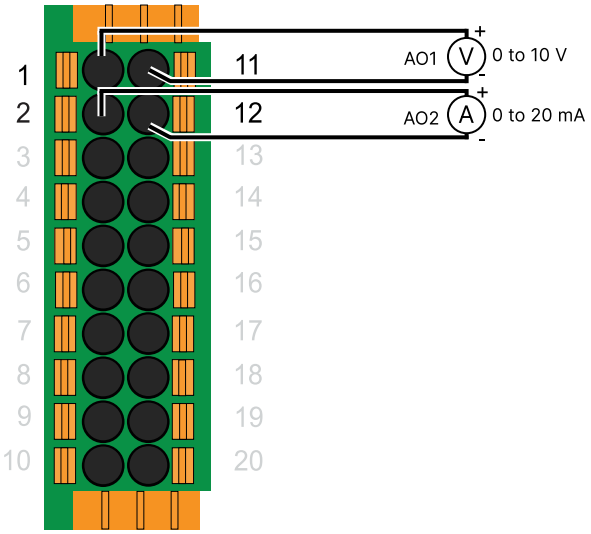
4.7.5 AOM6·2 terminal specifications

AOM6·2 has 8 x analogue outputs. All the outputs are protected and isolated from other potentials.

Terminal		Description
1	AO1	Analogue output 1 (+)
11	AO1	Analogue output 1 (-)
2	AO2	Analogue output 2 (+)
12	AO2	Analogue output 2 (-)
3	AO3	Analogue output 3 (+)
13	AO3	Analogue output 3 (-)
4	AO4	Analogue output 4 (+)
14	AO4	Analogue output 4 (-)
5	AO5	Analogue output 5 (+)
15	AO5	Analogue output 5 (-)
6	AO6	Analogue output 6 (+)
16	AO6	Analogue output 6 (-)
7	AO7	Analogue output 7 (+)
17	AO7	Analogue output 7 (-)
8	AO8	Analogue output 8 (+)
18	AO8	Analogue output 8 (-)
9/ 19	-	Not used
10 / 20	-	Not used

4.7.6 AOM6·2 wiring

Analogue outputs wiring



Analogue outputs

4.7.7 AIM6·1 terminal specifications

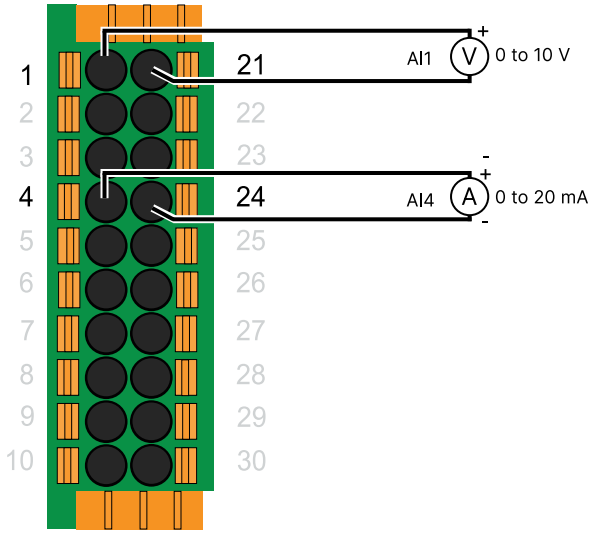
AIM6·1 has 16 x analogue inputs. All the inputs are protected and isolated from other potentials.

Terminal		Description
1	AI1	Analogue input 1 (+)
21	AI1	Analogue input 1 (-)
2	AI2	Analogue input 2 (+)
22	AI2	Analogue input 2 (-)
3	AI3	Analogue input 3 (+)
23	AI3	Analogue input 3 (-)
4	AI4	Analogue input 4 (+)
24	AI4	Analogue input 4 (-)
5	AI5	Analogue input 5 (+)
25	AI5	Analogue input 5 (-)
6	AI6	Analogue input 6 (+)
26	AI6	Analogue input 6 (-)
7	AI7	Analogue input 7 (+)
27	AI7	Analogue input 7 (-)
8	AI8	Analogue input 8 (+)
28	AI8	Analogue input 8 (-)
9	-	Not used
29	-	Not used
10	-	Not used
30	-	Not used
11	AI9	Analogue input 9 (+)
31	AI9	Analogue input 9 (-)
12	AI10	Analogue input 10 (+)
32	AI10	Analogue input 10 (-)
13	AI11	Analogue input 11 (+)
33	AI11	Analogue input 11 (-)
14	AI12	Analogue input 12 (+)
34	AI12	Analogue input 12 (-)
15	AI13	Analogue input 13 (+)
35	AI13	Analogue input 13 (-)
16	AI14	Analogue input 14 (+)
36	AI14	Analogue input 14 (-)
17	AI15	Analogue input 15 (+)
37	AI15	Analogue input 15 (-)
18	AI16	Analogue input 16 (+)
38	AI16	Analogue input 16 (-)

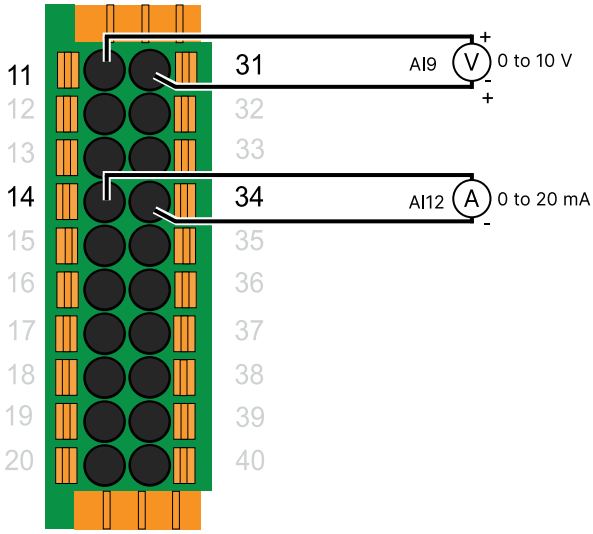
Terminal		Description
19	-	Not used
39	-	Not used
20	-	Not used
40	-	Not used

4.7.8 AIM6·1 wiring

Analogue inputs wiring

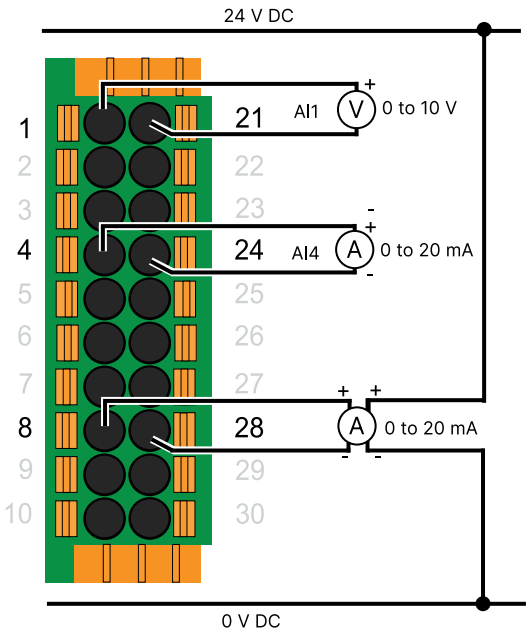


Analogue inputs 1 to 8

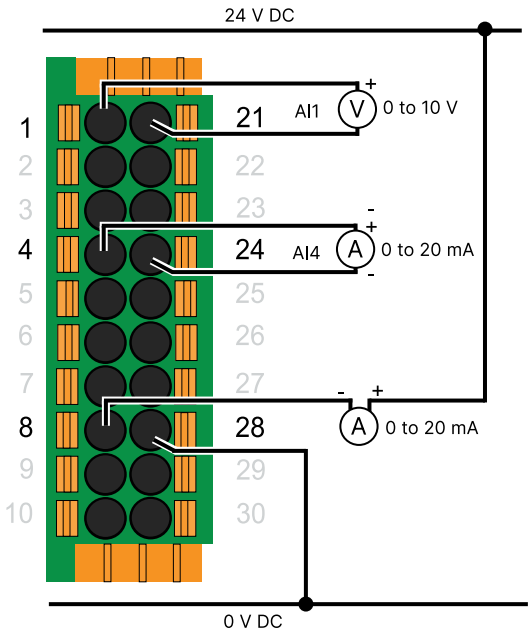


Analogue inputs 9 to 16

Connection of active and passive transducers



Active transducer



Passive transducer

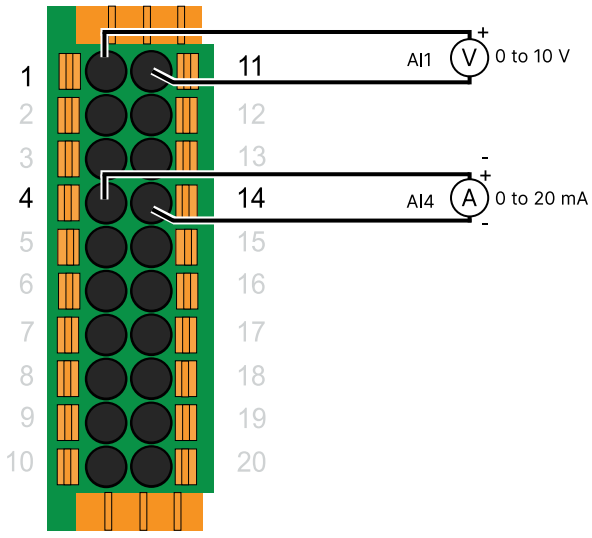
4.7.9 AIM6·2 terminal specifications

AIM6·2 has 8 x analogue inputs. All the inputs are protected and isolated from other potentials.

Terminal		Description
1	AI1	Analogue input 1 (+)
11	AI1	Analogue input 1 (-)
2	AI2	Analogue input 2 (+)
12	AI2	Analogue input 2 (-)
3	AI3	Analogue input 3 (+)
13	AI3	Analogue input 3 (-)
4	AI4	Analogue input 4 (+)
14	AI4	Analogue input 4 (-)
5	AI5	Analogue input 5 (+)
15	AI5	Analogue input 5 (-)
6	AI6	Analogue input 6 (+)
16	AI6	Analogue input 6 (-)
7	AI7	Analogue input 7 (+)
17	AI7	Analogue input 7 (-)
8	AI8	Analogue input 8 (+)
18	AI8	Analogue input 8 (-)
9	-	Not used
19	-	Not used
10	-	Not used
20	-	Not used

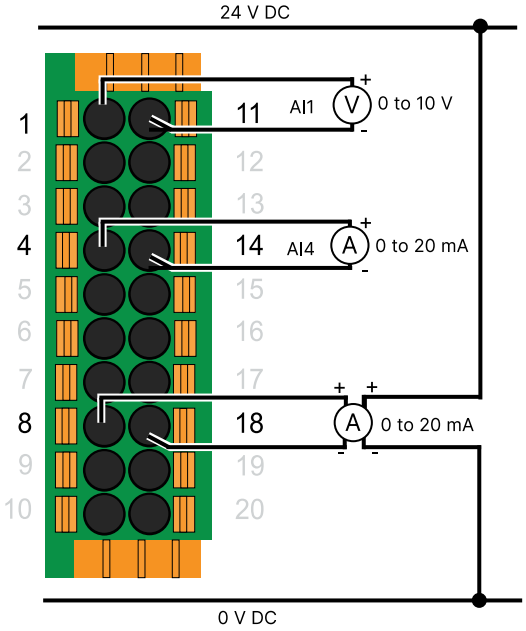
4.7.10 AIM6·2 wiring

Analogue inputs wiring

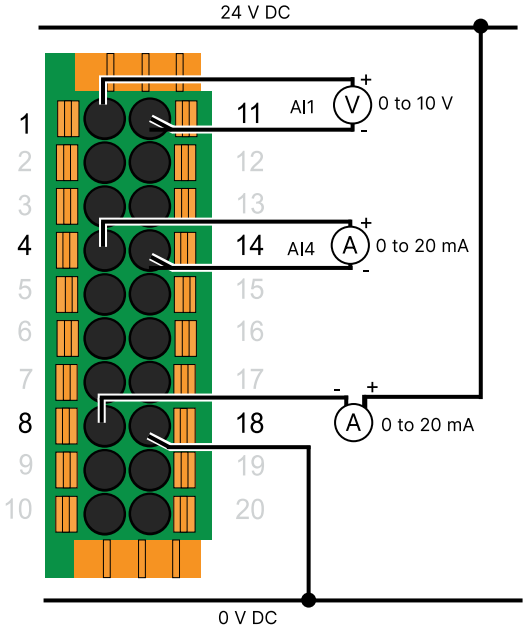


Analogue inputs

Connection of active and passive transducers



Active transducer



Passive transducer

4.8 Relay output modules

4.8.1 ROM6·1 terminal specifications

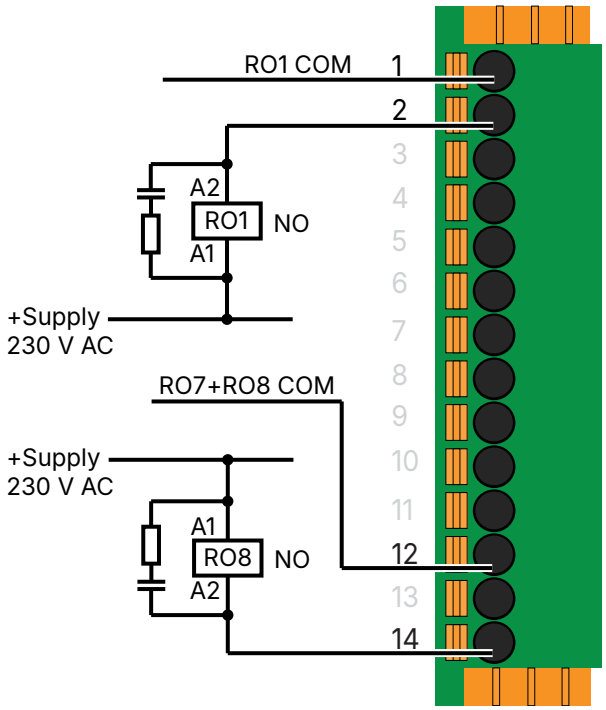
ROM6·1 has 8 x normally open relays.

Terminal		Description
1	RO1	COM
2		Normally Open
3	RO2	COM
4		Normally Open
5	RO3	COM
6		Normally Open
7	RO4	COM
8		Normally Open
9	RO5 + RO6	COM
10	RO5	Normally Open
11	RO6	Normally Open
12	RO7 + RO8	COM
13	RO7	Normally Open
14	RO8	Normally Open

4.8.2 ROM6·1 wiring

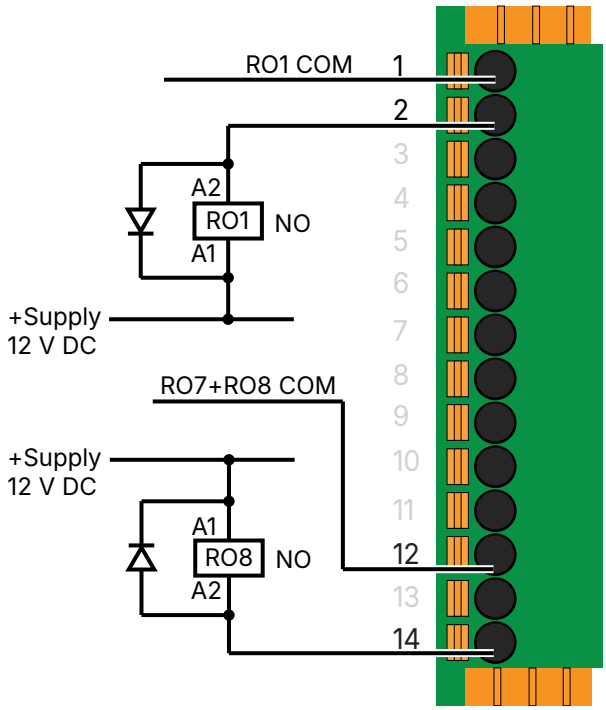
Normally open (NO) relay output wiring

AC supply



Relay output 1 to 8

DC supply



Relay output 1 to 8

For AC contactors, we strongly recommend that you use an RC snubber for noise suppression across the contactor.

For DC contactors, we strongly recommend that you use a freewheeling diode to prevent a sudden voltage spike across the inductive load when the voltage source is removed.
Use a diode size as recommended by the relay supplier.

4.8.3 ROM6·2 terminal specifications

ROM6·2 has 4 x changeover relays.

Terminal		Description
1	RO1	COM
2		Normally Closed
3		Normally Open
4	RO2	COM
5		Normally Closed
6		Normally Open
7	RO3	COM
8		Normally Closed
9		Normally Open
10	RO4	COM
11		Normally Closed
12		Normally Open
13		
14		

4.8.4 ROM6·2 wiring

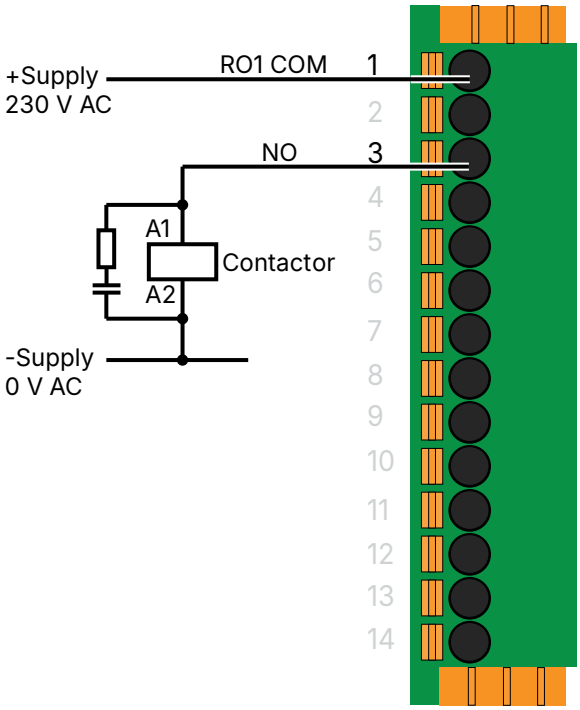
Each changeover relay has three terminals: Normally closed (NC), common (COM) and Normally open (NO).

You can connect wiring to:

- All three terminals.
- Common (COM) and Normally open (NO) terminals.
- Common (COM) and Normally closed (NC) terminals.

Changeover Normally open (NO) relay output wiring

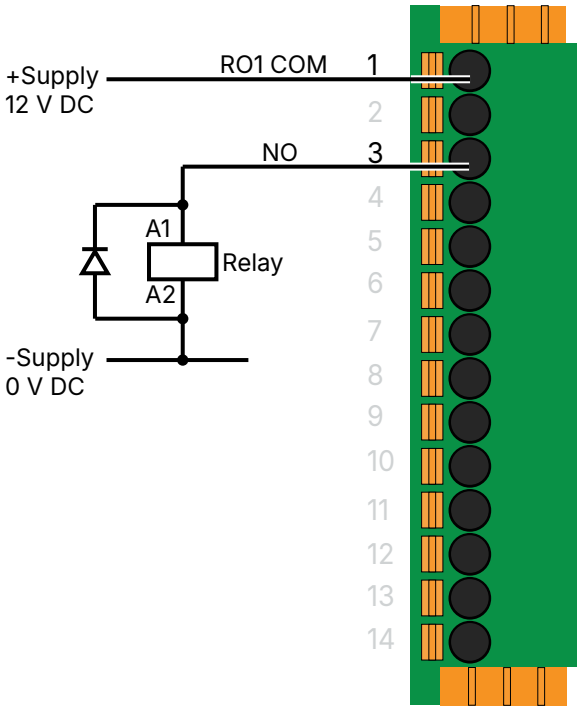
AC supply



Relay output 1 to 4

For AC contactors, we strongly recommend that you use an RC snubber for noise suppression across the contactor.

DC supply

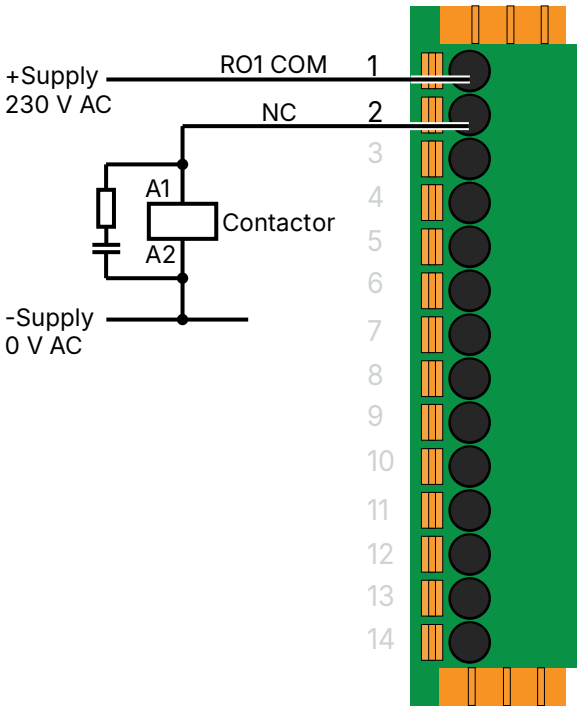


Relay output 1 to 4

For DC contactors, we strongly recommend that you use a freewheeling diode to prevent a sudden voltage spike across the inductive load when the voltage source is removed.
Use a diode size as recommended by the relay supplier.

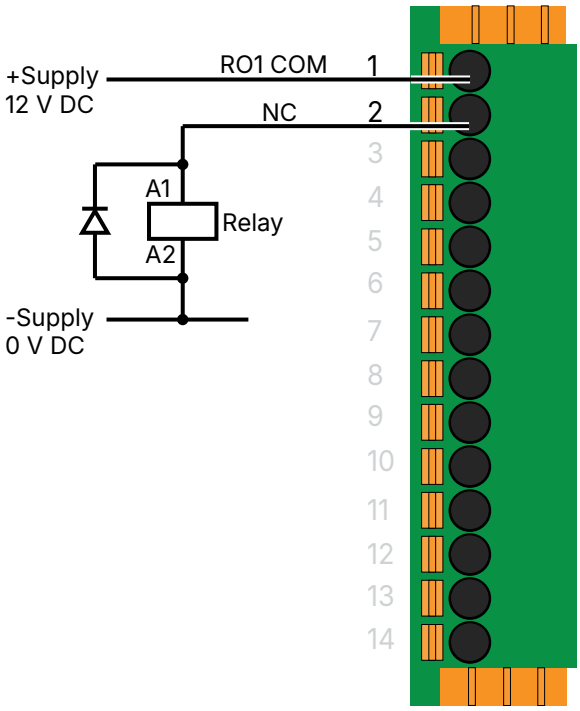
Changeover Normally closed (NC) relay output wiring

AC supply



Relay output 1 to 4

DC supply



Relay output 1 to 4

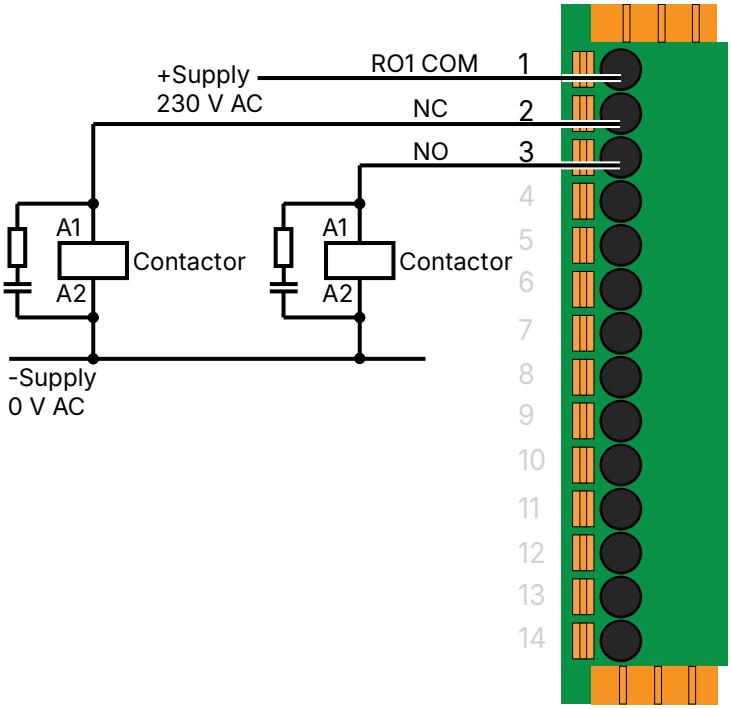
For AC contactors, we strongly recommend that you use an RC snubber for noise suppression across the contactor.

For DC contactors, we strongly recommend that you use a freewheeling diode to prevent a sudden voltage spike across the inductive load when the voltage source is removed.
Use a diode size as recommended by the relay supplier.

Changeover all three terminals relay output wiring

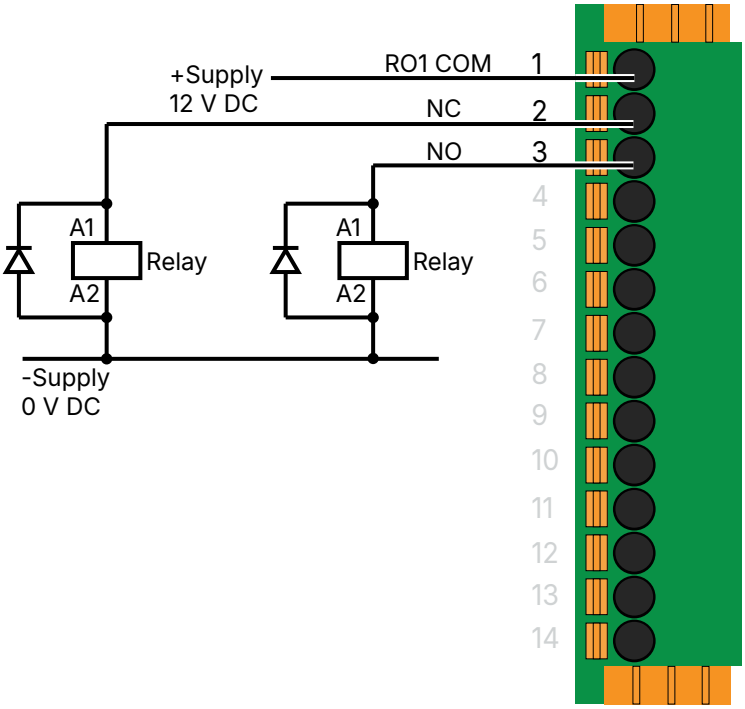
For this configuration, current flows through the equipment connected to the Normally closed (NC) terminal when the relay is de-energised. The current flows through the equipment connected to the Normally open (NO) terminal when the relay is energised.

AC supply



Relay output 1 to 4

DC supply



Relay output 1 to 4

For AC contactors, we strongly recommend that you use an RC snubber for noise suppression across the contactor.

For DC contactors, we strongly recommend that you use a freewheeling diode to prevent a sudden voltage spike across the inductive load when the voltage source is removed.
Use a diode size as recommended by the relay supplier.

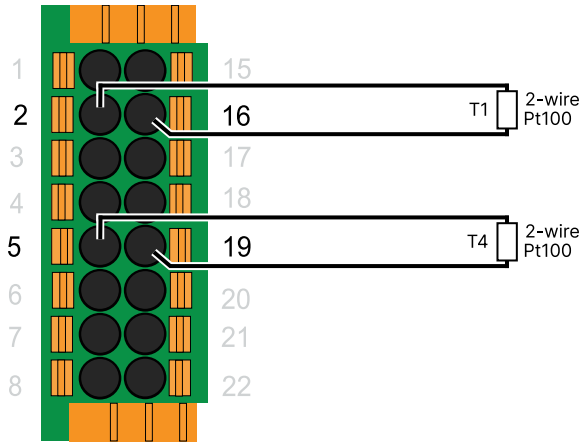
4.9 Temperature input modules

4.9.1 TIM6·1 terminal specifications

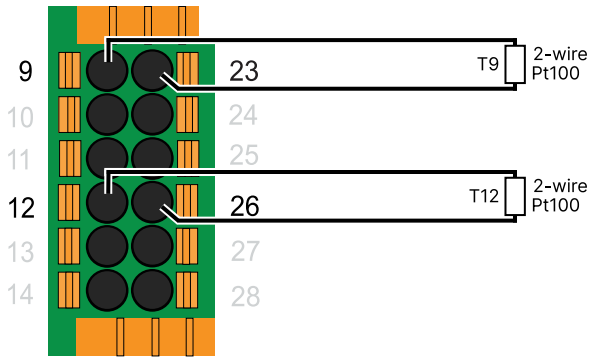
Terminal		Description
1 / 15	TI1	Temperature 1 (15 T3 3-wire compensation)
2 / 16	TI2	Temperature 2 (16 T4 3-wire compensation)
3 / 17	TI3	Temperature 3
4 / 18	TI4	Temperature 4
5 / 19	TI5	Temperature 5 (19 T7 3-wire compensation)
6 / 20	TI6	Temperature 6 (20 T8 3-wire compensation)
7 / 21	TI7	Temperature 7
8 / 22	TI8	Temperature 8
9 / 23	TI9	Temperature 9 (23 T11 3-wire compensation)
10 / 24	TI10	Temperature 10 (24 T12 3-wire compensation)
11 / 25	TI11	Temperature 11
12 / 26	TI12	Temperature 12
13 / 27	TI13	Temperature 13
14 / 28	TI14	Temperature 14

4.9.2 TIM6·1 wiring

Example 2-wire temperature inputs wiring

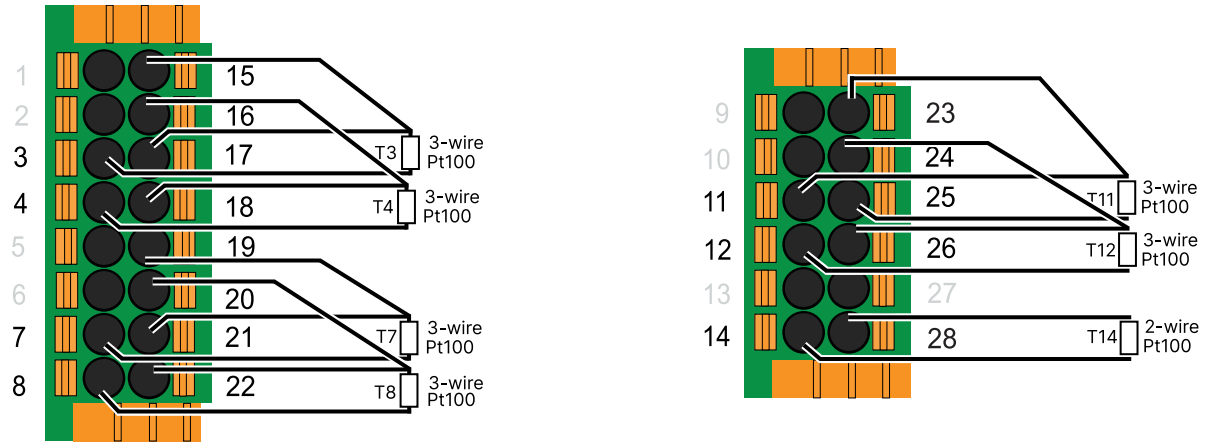


Temperature inputs 1 to 8 (Pt100)



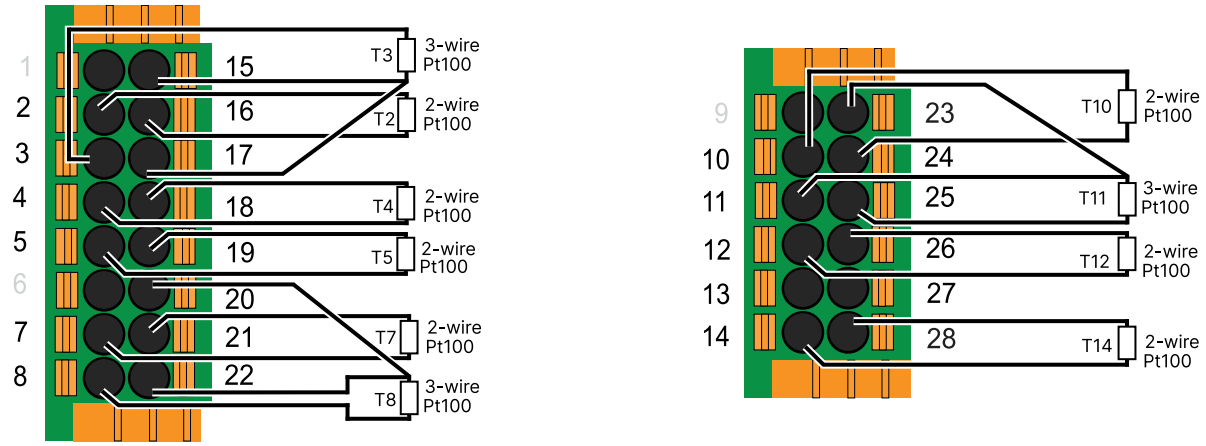
Temperature inputs 9 to 14 (Pt100)

Example with six 3-wire and one 2-wire temperature inputs wiring



Temperature inputs 1 to 28 (Pt100)

Example with three 3-wire and seven 2-wire temperature inputs wiring



Temperature inputs 1 to 28 (Pt100)

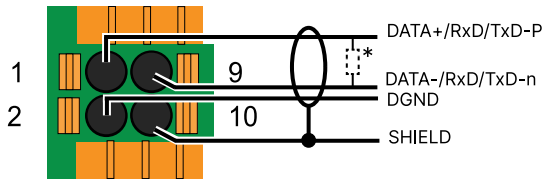
4.10 Communication interface modules

4.10.1 IFM6·1 terminal specifications

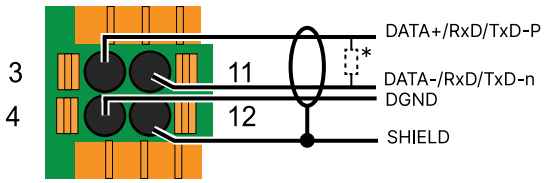
Terminal		Description
1	DATA+	Profibus DP 1: differential data signal, '+', non-inverting pin
9	DATA-	Profibus DP 1: differential data signal, '−', inverting pin
2	GND	Profibus DP 1: reference potential
10	Shield	Shield
3	DATA+	Profibus DP 2: differential data signal, '+', non-inverting pin
11	DATA-	Profibus DP 2: differential data signal, '−', inverting pin
4	GND	Profibus DP 2: reference potential
12	Shield	Shield
5	DATA+	RS-485 1: differential data signal, '+', non-inverting pin
13	DATA-	RS-485 1: differential data signal, '−', inverting pin
6	GND	RS-485 1: reference potential
14	Shield	Shield
7	DATA+	RS-485 2: differential data signal, '+', non-inverting pin
15	DATA-	RS-485 2: differential data signal, '−', inverting pin
8	GND	RS-485 2: reference potential
16	Shield	Shield

4.10.2 IFM6·1 wiring

Profibus Master wiring

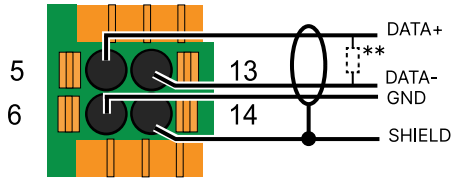


Profibus Master port 1

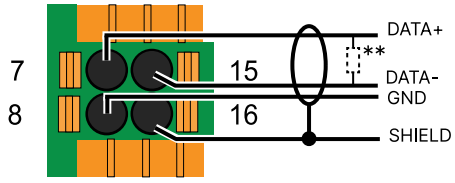


Profibus Master port 2

COM - RS-485 wiring



COM - RS-485 port 1



COM - RS-485 port 2

NOTE * SW configurable (on/off) termination (internally 195 Ω for Profibus DP). SW configurable (on/off) bias (pull up/pull down, 500 Ω). GND decoupled to Chassis through 1.5 MΩ || 1.5 nF.

** SW configurable (on/off) termination (internally 120 Ω for RS-485). SW configurable (on/off) bias (pull up/pull down, 500 Ω). GND decoupled to Chassis through 1.5 MΩ || 1.5 nF.

The standard PROFIBUS Cable Type A (the 2-wire purple cable) has typical characteristic impedance of 150 Ω (135 to 165 Ω). It is important to connect the cable screen to both GND and SHIELD of the IFM6·1 port to provide a Signal Ground for the A and B signals.

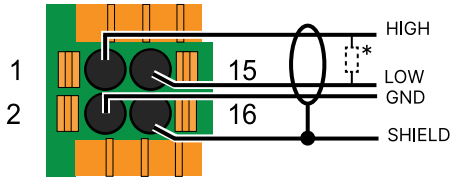
NOTE In general, Use of 3-wire cable to provide proper data ground is recommended.

4.10.3 IFM6·2 terminal specifications

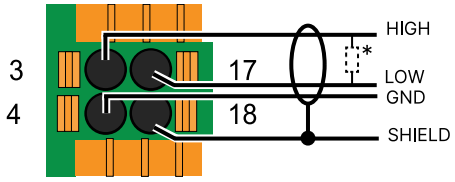
Terminal		Description
1	CAN H	CAN 1: high
15	CAN L	CAN 1: low
2	GND	CAN 1: reference potential
16	Shield	Shield
3	CAN H	CAN 2: high
17	CAN L	CAN 2: low
4	GND	CAN 2: reference potential
18	Shield	Shield
5 / 19	+ 24V	SSI encoders supply input +24V
6 / 20	0 V	SSI encoders supply input 0V
7	+24V	SSI Encoder 1: +24V supply
21	Digital in	Digital input 1: Frequency input.
8	DATA+	SSI Encoder 1: differential data signal, '+', non-inverting pin
22	DATA-	SSI Encoder 1: differential data signal, '−', inverting pin
9	Clock +	SSI Encoder 1: differential clock signal, '+', non-inverting pin
23	Clock -	SSI Encoder 1: differential clock signal, '−', inverting pin
10	GND	SSI Encoder 1: reference potential
24	Shield	Shield
11	+24V	SSI Encoder 2: +24V supply
25	Digital in	Digital input 2: Frequency input.
12	DATA+	SSI Encoder 2: differential data signal, '+', non-inverting pin
26	DATA-	SSI Encoder 2: differential data signal, '−', inverting pin
13	Clock +	SSI Encoder 2: differential clock signal, '+', non-inverting pin
27	Clock -	SSI Encoder 2: differential clock signal, '−', inverting pin
14	GND	SSI Encoder 2: reference potential
28	Shield	Shield

4.10.4 IFM6·2 wiring

CAN wiring



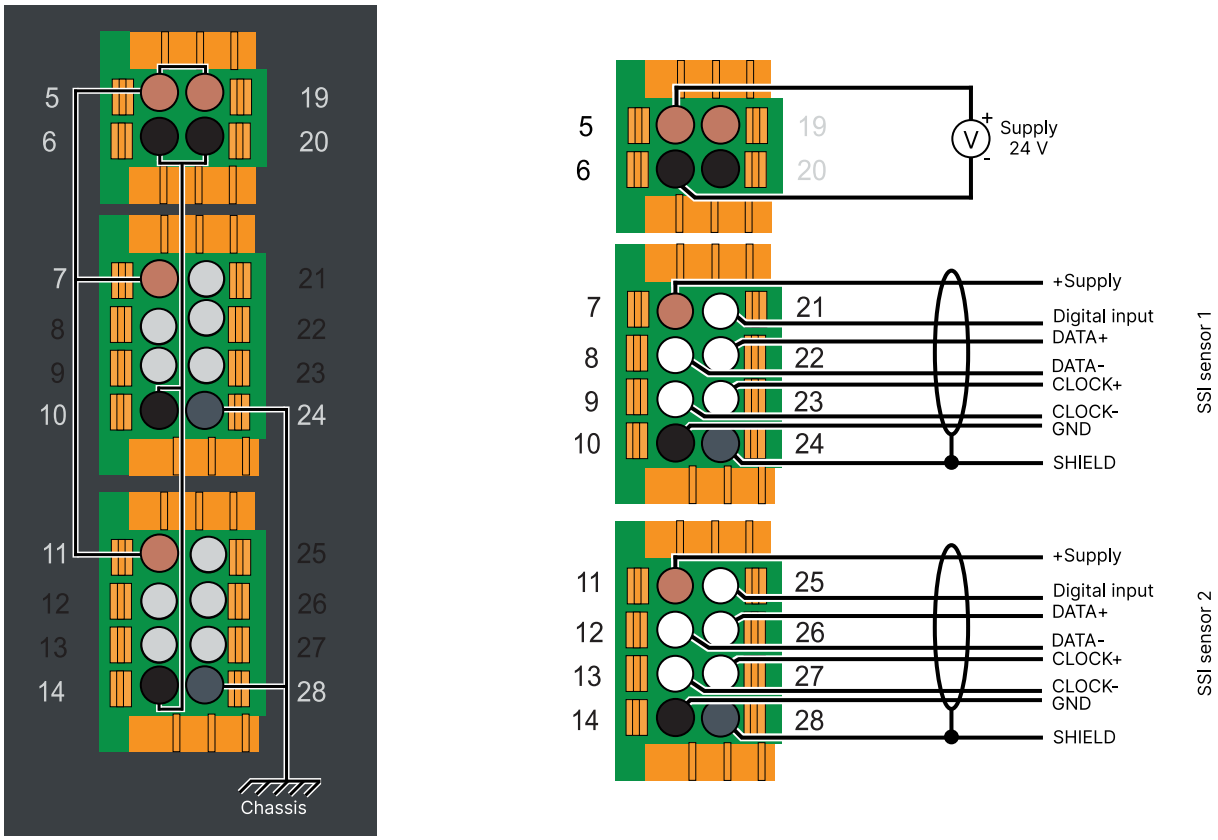
CAN port 1



CAN port 2

NOTE * SW configurable (on/off) termination resistor (120 Ω). GND decoupled to shield through 1.5 MΩ || 1.5 nF.

SSI wiring



2 x SSI port with extra digital frequency counter input

5. Maintenance

5.1 Equipment protection

NOTICE

Correct handling of modules

Failure to follow these instructions could lead to damage to the modules.

Read and follow the instructions to avoid damage to the modules.

NOTICE

Electrostatic discharge

During manufacturing and testing, the products have been kept in static shielding bags, and all personnel handling the products have been protected against static electricity and the subsequent ESD (electrostatic discharge).

Be sure to carry a connection to earth when handling our PCBs. If the correct equipment (bracelet, IC tongs) is not available, you must improvise. You may e.g. place an open wire under your watch and connect this to earth via a heavy resistor (1 MΩ). As to earth connection, it should be possible to use the rack frame or the cabinet. Note that the limit for registration of static electricity for a human being is considerably higher than the limit above which electronics and electronic components are damaged.

5.2 Replace modules

Each module is fastened to the rack with M2.5 collar screws. These should be loosened before the extraction handles are used to lift the module free of the rack. When remounting the modules the M2.5 collar screws must be tightened with 0.5 N·m to assure the products robustness towards vibration as well as shocks.

NOTICE

Torque damage to equipment

Do not use power tools during the installation. Too much torque damages the equipment.

Follow the instructions for the correct amount of torque to apply.

5.3 Replace RTC battery on the PCM6·2 module

The PCM6·2 has a lithium battery for maintaining the real-time clock, for when power is not available. It is recommended to replace the battery every 5th year on a scheduled basis.

The battery is a CR2430 3V battery, rated for operation at -40 to +85 °C (-40 to 185 °F). This is not a standard CR2430.

To replace the battery, you need to remove the PCM module.

Location of the battery on the PCM6·2 module