

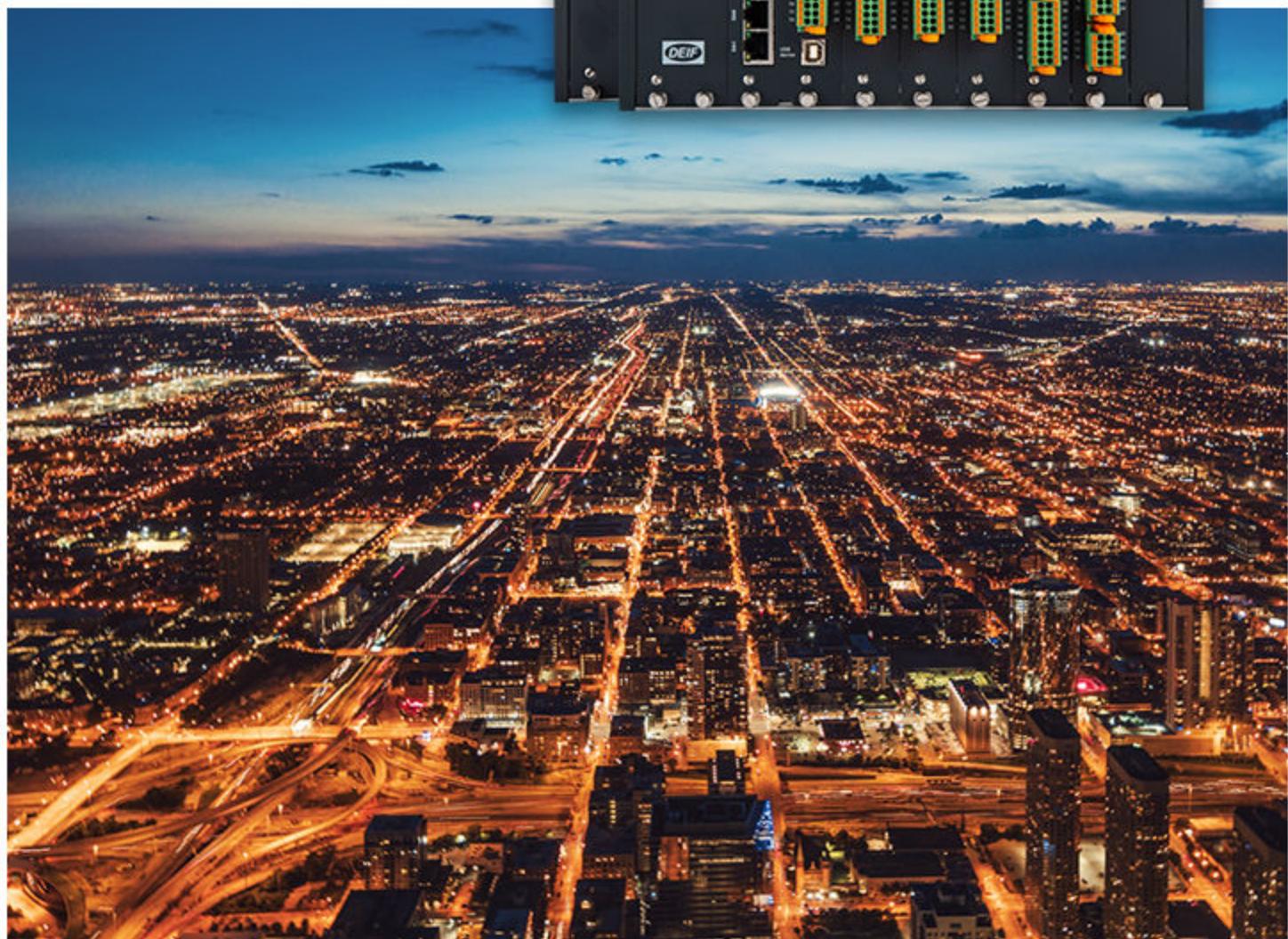
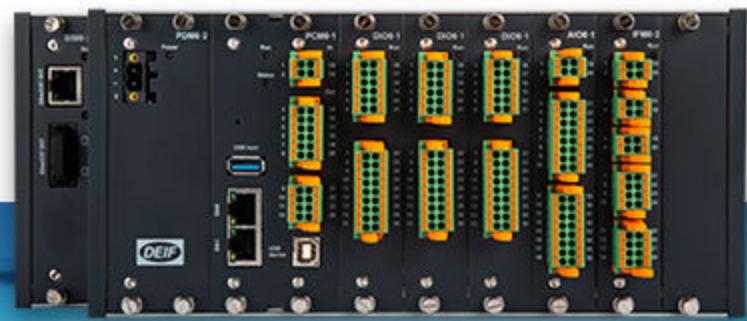
# AMC 600

Programmable Automation Controller with EtherCAT based I/O modules

## Data sheet



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# 1. AMC 600

## 1.1 About the AMC 600

The AMC 600 is designed as a highly flexible, modular PLC and I/O system covering the special demands of for example wind power plants in terms of reliability, robustness and flexibility.

EtherCAT is used as native communication protocol, as the backplane communication, and as interconnection between multiple AMC 600 racks via electrical or fibre optical connections. Other DEIF EtherCAT I/O modules or third party EtherCAT I/O modules can also be connected.



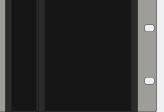
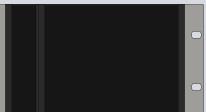
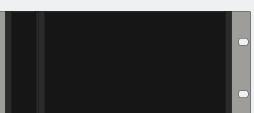
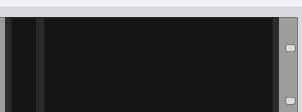
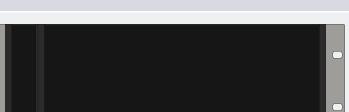
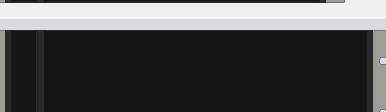
### More information

See [www.deif.com/documentation/amc-600/](http://www.deif.com/documentation/amc-600/) for the AMC 600 documentation.

## 2. Technical specifications

### 2.1 System specifications

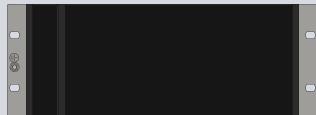
#### Rack sizes

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



#### Example

Rack6·10:



The rack has:

- 1x slot for SIM6·1, SIM6·2 or SIM6·3
- 1x slot for PDM6·1 or PDM6·2
- 8x slots for I/O modules

**NOTE** The PCM6·1 uses 2 slots (3 and 4) and requires PDM6·2 as Power Supply Module in Slot 2.

## Environment

Category	Specification	Standard
Operating temperature	-40 to 70 °C	
Storage temperature	-40 to 85 °C	IEC 60068-2-1 IEC 60068-2-2
Reference temperature	15 to 30 °C	
Altitude	Up-to 4000 m without de-rating (for deployment above 4000 m, contact Product Management).	
Climate	All modules are conformal coated, hence protected against moisture, mold, dust, corrosion and other environmental stresses.	IEC 60068-2-30
	55 °C at 97 % relative humidity, condensing	test Db
	Dry heat test	IEC 60068-2-2
	Cold test	IEC 60068-2-1

## Tests

Category	Specification	Standard
Performance test and performance check	Criteria/standard: All inputs, outputs and interfaces are functional.	
Radiated E-field emission	<ul style="list-style-type: none"> <li>30 to 230 MHz: 50 dB (<math>\mu</math>V/m) Qp 10 m</li> <li>230 to 1,000 MHz: 57 dB (<math>\mu</math>V/m) Qp 10 m</li> <li>1 to 3 GHz: 76 dB (<math>\mu</math>V/m) Q peak 3 m</li> <li>1 to 3 GHz: 56 dB (<math>\mu</math>V/m) average 3 m</li> <li>3 to 6 GHz: 80 dB (<math>\mu</math>V/m) Q peak 3 m</li> <li>3 to 6 GHz: 60 dB (<math>\mu</math>V/m) average 3m</li> </ul>	IEC 61000-6-4 IEC 60255-26
Conducted emission		IEC 61000-6-4 IEC 60255-26
Electrical fast transients test (EFT)	<p>Criteria B</p> <p>Levels extended to:</p> <ul style="list-style-type: none"> <li>DC-power port: <math>\pm</math>4 kV</li> <li>Functional Earth port: <math>\pm</math>4 kV</li> <li>Signal input and output ports: <math>\pm</math>2 kV</li> <li>Communication ports: <math>\pm</math>2 kV</li> <li>Repetition frequencies: 5 KHz and 100 KHz</li> <li>Duration each polarity: 1 min.</li> </ul>	EN 61000-4-4 EN 61000-6-2
RF E-Field immunity	Criteria: A	80 to 2,000 MHz: 12 V/m 2 to 3 GHz: 10 V/m
Electrostatic discharge (ESD)	Criteria: B	Level extended to: Contact 6 kV
Slow transients test, surge	Criteria: B	<p>Levels extended to:</p> <ul style="list-style-type: none"> <li>Digital inputs: <math>\pm</math>1 kVp DM and <math>\pm</math>2 kVp CM</li> <li>Digital outputs: <math>\pm</math>1 kVp DM and <math>\pm</math>2 kVp CM</li> <li>Analogue inputs: <math>\pm</math>3 kVp DM and <math>\pm</math>3 kVp CM</li> <li>Analogue outputs: <math>\pm</math>1 kVp DM and <math>\pm</math>2 kVp CM</li> <li>Temperature inputs: <math>\pm</math>3 kVp DM and <math>\pm</math>3 kVp CM</li> <li>Main power supply: <math>\pm</math>3 kVp DM and <math>\pm</math>3 kVp CM</li> <li>Dig output power supply: <math>\pm</math>3 kVp DM and <math>\pm</math>3 kVp CM</li> <li>RS-422, RS-485, Profibus DP, CAN, Ethernet, SSI: <math>\pm</math>2 kVp CM</li> </ul>

Category	Specification		Standard
RF common mode conducted test	Criteria: A	0.15 to 80 MHz: 12 VRMS	EN 61000-4-6 EN 61000-6-2
Power frequency H-field (magnetic) immunity	Criteria: A	Field: 30 A/m	EN 61000-4-8 EN 61000-6-2
Vibration Test	Operational	3 to 13.2 Hz 2.85 mm peak-peak 13.2 to 100 Hz 1 g	DNV-GL test A
		3 to 15 Hz 5 mm peak-peak 15 to 50 Hz 2.3 g	DNV-GL test C
	Response	10 to 58.1 Hz 0.15 mm peak-peak 58.1 to 150 Hz 1 g	IEC 60255-21-1 class 2
	Endurance	10 to 150 Hz 2 g	IEC 60255-21-1 class 2
	Seismic	3 to 8.15 Hz 15 mm peak-peak 8.15 to 35 Hz 2 g	IEC 60255-21-3 class 2
Shock (Base mounted)	10 g, 11 ms, half sine		IEC 60255-21-2 Response class 2
	30 g, 11 ms, half sine		IEC 60255-21-2 Endurance class 2
	50 g, 11 ms, half sine		IEC 60068-2-27
	Tested with 3 impacts in each direction in all 3 axes, a total of 18 impacts per test		
Bump	25 g, 16 ms, half sine		IEC 60255-21-2 class 2
	1,000 bumps in each direction, 2 directions in each axis, a total of 6,000 bumps		

**NOTE** g = gravitational force (g-force).

## Safety and protection

Category	Specification	Standard
Safety	Installation (over-voltage) category III, 600 V, pollution degree 2	EN 61010-1
Protection	IP30	IEC/EN 60529/A1/A2
Materials	Aluminium case and cover plates (all plastic parts are self-extinguishing)	UL94 (V1)

## Approvals

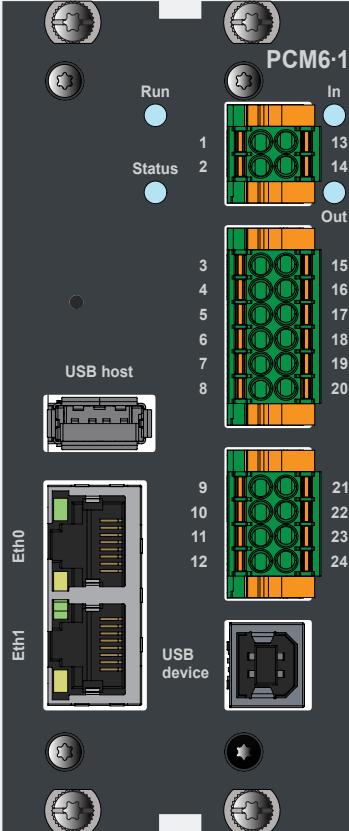
These approvals apply to the controller rack (with all the modules properly installed).

Standards
CE
UKCA
UL/ULC Listed to UL6200:2019 1 <sup>st</sup> edition controllers for use in Power Production
LR approval
DNV approval
Others available on request

## 2.2 Computer modules

### 2.2.1 PCM6·1 computer module specifications

The PCM6·1 module offers a powerful dual core 1.2 GHz CPU, well suited for demanding C/C++ and CODESYS applications.

Computer module		
	Power supply	From backplane
Backplane interfaces	1 x EtherCAT OUT (Port 1) – LVDS 1 x EtherCAT OUT (Port 2) – LVDS	
Digital input (In)	High: 13 to 30 V Low: -30 to +5 V with reference to common Load: Typically, 6 mA (Vin > 7 V) Isolation: Optically isolated from other potentials, 500 V DC	
Digital output (Out)	Solid State Relay with external watchdog, 24 V, maximum 1 A resistive	
Interface, Ethernet	2 x Ethernet (Eth1 and Eth2): 1000BASE-T, 8P8C ("RJ45"), shielded Cat 5e, >0.76 µm gold plating	
Interface, CAN	2 x CAN (CAN 1, CAN 2): ISO 11898, shielded twisted copper cable, 50 to 1,000 kbit/s, software controllable 120 Ω termination resistor	
Interface, UART	2 x RS-422/485 (COM1, COM2) : ANSI/TIA/EIA-422-B and TIA/EIA-485, shielded twisted copper cable 4.8 to 921.6 kbit/s (full duplex), software controllable 120 Ω termination resistor and 500 Ω bias resistor	
Processor	1.2 GHz dual-core industrial grade ARM Cortex-A7 32 bit CPU (ARMv7) with ECC protected cache	
Operating system	DEIF OS, based on real-time embedded Linux® Fail-safe remote SW update Power fail-safe, self-monitoring and error-correcting file system (EXT-4)	
PLC run-time	CODESYS V3 runtime : CODESYS V3 SP15 or later	
Programming	ANSI C/C++ via PCM6·1 SDK and IEC 61131-3 via CODESYS V3 UL/ULC : Make sure Functional testing is part of the end application.	
Protocols	See section <a href="#">Supported software features</a>	
Memory	1 GB DDR3 RAM 64 bit ECC protected Industrial grade	
Internal storage	Non-volatile data storage: 4 GB industrial grade flash (pseudo SLC mode)	
Persistent storage	128 kB user available from CODESYS (requires PDM6·2 power supply for hold-up)	
Real-Time Clock (RTC) battery	Real-time clock with replaceable coin-cell battery (replacement recommended every 5 years). CR2430 3V battery, rated for operation at -40 to 85 °C (-40 to 185 °F). This is not a standard CR2430 battery. The CR2430 battery is an available accessory. Contact DEIF for ordering.	
USB host	USB 3.0, Mass Storage Class	
USB device	USB 2.0, console on virtual COM port, 115.2 kbit/s (D:8,S:1,P:N,F:N)	
Weight	292 g (incl. connectors)	
Power consumption	Max 16.6 W, hereof 5.6 W reserved for USB3.0 host	

Computer module		
Connector, grip (included by default)	2 x 2 terminals: 1790483 2 x 6 terminals: 1790522 2 x 4 terminals: 1790506	
Connector, screw	2 x 2 terminals: 1790292 2 x 6 terminals: 1790331 2 x 4 terminals: 1790315	

## LED specifications

Run LED		Description
OFF	●	Initialisation.
Green blinking	●	Pre-operational.
Single green blink	●	Safe-operational.
Green	●	Operational.
Green flickering	●	Boot loader.

Status LED		Description
OFF	●	Off.
Red	●	Booting.
Red flickering	●	Push the reset button to reset PCM6-1. The module resets in rescue mode. Push and hold the reset button to perform a factory reset.
Orange flickering	●	Factory reset in progress.
Orange	●	Initialisation.
Orange blinking	●	Rescue mode.
Green flickering	●	Updating with an update file (.dupdate).
Single green blink	●	Application mode is not enabled.
Green blinking	●	Initialisation.
Green	●	In operation.

In LED		Description
OFF	●	The digital input is not activate.
Green	●	The digital input is activate.

Out LED		Description
OFF	●	The digital output is not activate.
Green	●	The digital output is activate.

## Ethernet

The two independent Ethernet ports Eth0 and Eth1 are connected directly to the CPU module. They are configured via the System web page. The use case is, for example, as a gateway between upper plant-wide network segments and local network segments. Both Ethernet ports have broadcast storm filters enabled. These protect the real-time capabilities of the CPU.



### More information

See **Communication protocols** in the [Supported software features](#) section for details about the supported Ethernet protocols, for example Modbus TCP, OPC UA, and PROFINET.

## CAN

The two independent CAN ports provide CAN (layer II) support. CANopen Master/Slave communication is done using the CODESYS protocol stacks. The ports are configured using the CODESYS applications. The applications also provide the CAN layer II and CANopen Master/Slave protocol stacks. Enable the termination resistors using the software, mapped to the Linux device interface.

## UART

The two UART serial ports can be configured as RS-422 or RS-485. Enable the termination and bias resistors using the software, mapped to the Linux device interface.

## USB host

The host supports the connection of USB 3.0 mass storage devices. Use the Linux operating system to add support for other USB devices.

## 2.2.2 PCM6-2 computer module specifications

**NOTE** Order this module as an **iE 650 PLC**.

The PCM6-2 module comes with a powerful 1.6 GHz quad-core (64 bit) CPU, well suited for demanding C/C++ and CODESYS applications. Use the network functions for energy and power applications, for example, wind turbines, power parks, hybrid solutions, and battery storage.

The module has a 1 Gbps TSN network interface port for power management networks that are plant-wide and real-time. The module also features a managed 10/100 Mbps switch with 3 ports for local networks.

The DisplayPort connector allows you to connect standard LED/LCD monitors. CAN/CANopen and RS-422/485 connections are available as on-module interfaces using the common snap-locked (or screw-locked) connector.

Computer module		
	Power supply	From backplane using PDM6-1 module or PDM6-2 module
	Backplane interfaces	1 x EtherCAT OUT (Port 1) – LVDS 1 x EtherCAT OUT (Port 2) – LVDS
	Digital input (In)	1 x DI 24 V DC High: 13 to 30 V Low: -30 to +5 V with reference to common Load: Typically 6 mA (Vin > 7 V) Isolation: Optically isolated from other potentials, 500 V DC
	Digital output (Out)	1 x DO 24 V DC Solid State Relay with external watchdog, 24 V, maximum 1 A resistive
	Ethernet	1 x Ethernet with TSN support (Eth0): 100/1000BASE-T, 8P8C ("RJ45"), shielded Cat5e, gold plating 3 x Ethernet, managed switches (Eth1, Eth2, Eth3): 10/100BASE-T, 8P8C ("RJ45"), shielded Cat5e, gold plating
	CAN	2 x CAN (CAN 1, CAN 2): ISO 11898, shielded twisted copper cable, 50 to 1,000 kbit/s, software controllable 120 Ω termination resistor
	UART	2 x RS-422/485 (COM1, COM2): ANSI/TIA/EIA-422-B and TIA/EIA-485, shielded twisted copper cable, 4.8 to 921.6 kbit/s (full duplex), software controllable 120 Ω termination resistor and 500 Ω bias resistor
	Display port	1 x DisplayPort (DP) v1.3 1080 p (full-size connector)
	USB host	1 x USB 3.0 (Type-A connector), mass storage class power, delivery up to 4.5 W
	LED	RUN: Green, EtherCAT in operation STATUS: Red/Blue/Green, software controllable
	Pin-hole switch	Factory reset or provisioning of module (software configurable)
	Processor	1.6 GHz quad-core industrial grade ARMv8 64 bit CPU with ECC protected cache
	Memory	4 GB LPDDR4 with inline Error Code Correction (ECC)

Computer module	
Internal storage	32 GB 3D TLC NAND flash running in pseudo SLC mode. ~8 GB available for user application data
Persistent storage	128 kB user available from CODESYS (256 kB FRAM installed)
Expandable storage	MicroSD slot: High speed (max. 25 MB/s). The MicroSD slot is accessible when the PCM6-2 is not mounted in the rack.
Real-Time Clock (RTC) battery	Real-time clock with replaceable coin-cell battery (replacement recommended every 5 years). CR2430 3V battery, rated for operation at -40 to 85 °C (-40 to 185 °F). This is not a standard CR2430 battery. The CR2430 battery is an available accessory. Contact DEIF for ordering.
Cooling	Passive
Temperature	CPU junction temperature measurement Software reset when the CPU temperature is too high
Operating system	GNU/Linux customized with PREEMPT real-time patch and system drivers C/C++ and CODESYS applications operate in user space mode Fail-safe remote SW update Power fail-safe, self-monitoring and error correcting file system (EXT-4)
System configuration	On-device, web-based configuration System information Host name configuration: The serial number is the default User access management: Operator, service, or administrator. Rights and credentials. Switch configuration: IPv4 address (static/dynamic) Fail-safe software update method (active / fall-back OS image) Simplified update procedures: No special tools, and the procedure is the same for OS and firmware Secure certificate-based access using standard protocols
System network protocols	<ul style="list-style-type: none"> <li>Secure/SSH File Transfer Protocol (SFTP), server</li> <li>Secure Shell (SSH) TLS1.2 and TLS1.3 server and client</li> <li>Network Time Protocol (NTP), client</li> <li>Dynamic Host Configuration Protocol (DHCP), client</li> <li>EtherCAT master (native for C/C++ applications/system network scan)</li> </ul>
PLC run-time	CODESYS V3 runtime : CODESYS V3 SP18 or later
Programming	IEC 61131-3: LD, SFC, FBD, CFC, ST (CODESYS V3.5 SP18+ IDE) ANSI C/C: + ANSI C/C using Linux SDK Python: As containerised software component
Visualisation	CODESYS web visualisation
Application protocols	See section <a href="#">Supported software features</a>
Size	50.80 mm (2 slots)
Weight	241 g (incl. connectors)
Power consumption	Max 17.5 W, hereof 5.6 W reserved for USB3.0 host
Connector, grip (included by default)	2 x 12 terminals: DFMC 1.5/12-ST-3.5-LR – 1790580
Connector, screw	2 x 12 terminals: DFMC 1.5/12-STF-3.5 – 1790399

## LED specifications

Run LED		Description
OFF	●	Initialisation
Green blinking	● ●	Pre-operational
Single green blink	● ●	Safe-operational
Green	●	Operational
Green flickering	● ●	Boot loader

Status LED		Description
OFF	●	Off.
Green	●	Normal operation

## Ethernet

The CPU module can be used as a gateway between the network segments for plant-wide power management and the local network segments. To do this, two independent network interfaces must be made. Eth0 is an Ethernet port connected directly to the CPU, and Ethernet ports Eth1, Eth2, and Eth3 are connected to the CPU using a managed switch. The Eth0 port supports TSN on hardware level.

The module also supports PROFINET controllers (master) and PROFINET devices (slave) with CODESYS stacks.

## CAN

The two independent CAN ports provide CAN (layer II) support. CANopen Master/Slave communication is done using the CODESYS protocol stacks. The ports are configured using the CODESYS applications. The applications also provide the CAN layer II and CANopen Master/Slave protocol stacks. Enable the termination resistors using the software, mapped to the Linux device interface.

## UART

The two UART serial ports can be configured as RS-422 or RS-485. Enable the termination and bias resistors using the software, mapped to the Linux device interface.

## DisplayPort

The DisplayPort connector standard for the graphical display port supports LED/LCD monitors. The standard is very robust in on-site operations in comparison to other commodity standards.

### NOTICE



#### External third-party non-DEIF displays

External third-party non-DEIF displays should be configured to fixed DisplayPort input mode instead of Automatic detection.

## USB host

The USB host is needed to export data, log files, and so on. The host supports the connection of USB 3.0 mass storage devices. Use the Linux operating system to add support for other USB devices.

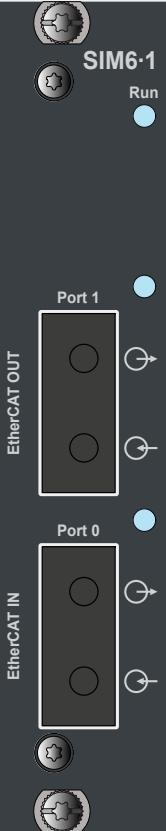
## 2.2.3 EtherCAT interface

The PCM6-1 and PCM6-2 modules have an EtherCAT connection to local I/O modules in the rack through the backplane. You can expand the EtherCAT network with the SIM6-2, SIM6-4, or SIM6-5, which allows you to connect to remote or distributed I/O racks. It is also possible to access the digital inputs and outputs in the PCM6-1 and PCM6-2 modules with the EtherCAT slave interface.

The digital output can be used as a CPU watchdog. If the EtherCAT network in your application is not controlled by the EtherCAT Master, then the watchdog function automatically opens the digital output after 100 ms. The watchdog function is applicable to all EtherCAT Slave modules. If the EtherCAT Master is not in operation, then the slave modules go to a default state (EtherCAT: SAFEOP). Digital outputs are set to LOW and analogue outputs are set to 0 mA or 0 V.

## 2.3 Station interface modules

### 2.3.1 SIM6-1 module specifications

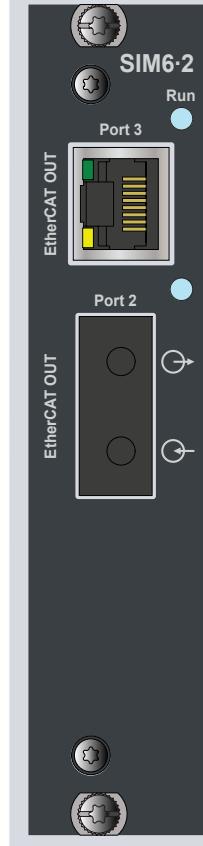
EtherCAT interface	
	Power supply From backplane
Backplane interfaces	1 x EtherCAT OUT (Port 3) - LVDS
Interfaces	1 x EtherCAT IN (Port 0) Optical: 100BASE-FX, SC connectors, multimode fibre glass 50 µm (OM2,OM3,OM4, 1310 nm)
	1 x EtherCAT OUT (Port 1) Optical: 100BASE-FX, SC connectors, multimode fibre glass 50 µm (OM2,OM3,OM4, 1310 nm)
Size	25.40 mm
Weight	83 g
Power consumption	Typical 3.5 W (2 active fibre channels)

### Terminal specifications

Configuration: Slave station

Terminal	Description
EtherCAT IN	EtherCAT Logic Port 0
EtherCAT OUT	EtherCAT Logic Port 1

## 2.3.2 SIM6-2 module specifications

EtherCAT interface	
	<b>For rack holding EtherCAT master</b>
Power supply	From backplane
Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS
Interfaces	1 x EtherCAT OUT (Port 2) Electrical: 100Base-TX, 8P8C ("RJ45"), shielded Cat 5, >0.76 µm gold plating 1 x EtherCAT OUT (Port 1) Optical: 100BASE-FX, SC connectors, multimode fibre glass 50 µm (OM2,OM3,OM4, 1310 nm)
Size	25.40 mm
Weight	83 g
Power consumption	Typical 2.5 W (1 active fibre channel)

## Terminal specifications

Configuration: Master station

Terminal	Description
EtherCAT OUT	EtherCAT Logic Port 2
EtherCAT OUT	EtherCAT Logic Port 1

### 2.3.3 SIM6-3 module specifications

EtherCAT interface		
	Power supply	From backplane
	Backplane interfaces	1 x EtherCAT OUT (Port 3) - LVDS
		1 x EtherCAT IN (Port 0) Electrical: 100Base-TX, 8P8C ("RJ45"), shielded Cat 5, >0.76 µm gold plating
	Interfaces	1 x EtherCAT OUT (Port 1) Optical: 100BASE-FX, SC connectors, multimode fibre glass 50 µm (OM2,OM3,OM4, 1310 nm)
		1 x EtherCAT OUT (Port 2) Electrical: 100Base-TX, 8P8C ("RJ45"), shielded Cat 5, >0.76 µm gold plating
	Size	25.40 mm
	Weight	83 g
	Power consumption	Typical 2.5 W (1 active fibre channel)

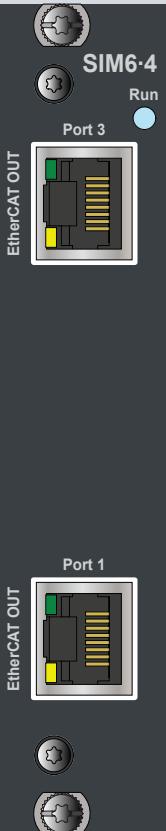
### Terminal specifications

Configuration: Slave station

Terminal	Description
EtherCAT IN	EtherCAT Logic Port 0
EtherCAT OUT	EtherCAT Logic Port 1 EtherCAT Logic Port 2

## 2.3.4 SIM6·4 module specifications

The SIM6·4 module allows EtherCAT redundancy for the interconnection of multiple racks in a system via electrical connections. The Network Interface (NIC) is used for the EtherCAT master.

EtherCAT interface	
	<b>For rack holding EtherCAT master</b>
Power supply	From backplane
Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS
Interfaces	1 x EtherCAT OUT (Port 3) Electrical: 100Base-TX, 8P8C ("RJ45"), shielded Cat 5, >0.76 µm gold plating 1 x EtherCAT OUT (Port 1) Electrical: 100Base-TX, 8P8C ("RJ45"), shielded Cat 5, >0.76 µm gold plating
Size	25.40 mm
Weight	83 g
Power consumption	Typical 1.1 W

### Terminal specifications

Configuration: Master station

Terminal	Description
EtherCAT OUT	EtherCAT Logic Port 3
EtherCAT OUT	EtherCAT Logic Port 1

### 2.3.5 SIM6-5 module specifications

The SIM6-5 module allows EtherCAT redundancy for the interconnection of multiple racks in a system via fibre optical connections. The Network Interface (NIC) is used for the EtherCAT master.

EtherCAT interface	
	<b>For rack holding EtherCAT master</b>
Power supply	From backplane
Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS
Interfaces	<p>1 x EtherCAT OUT (Port 2) Optical: 100BASE-FX, SC connectors, multi-mode fibre glass 50 µm (OM2, OM3, OM4, 1310 nm)</p> <p>1 x EtherCAT OUT (Port 1) Optical: 100BASE-FX, SC connectors, multi-mode fibre glass 50 µm (OM2, OM3, OM4, 1310 nm)</p>
Size	25.40 mm
Weight	83 g
Power consumption	Typical 3.0 W (2 active fibre channels)

#### Terminal specifications

Configuration: Master station

Terminal	Description
EtherCAT OUT	EtherCAT Logic Port 2
EtherCAT OUT	EtherCAT Logic Port 1

## 2.4 Power modules

### 2.4.1 PDM6·1 module specifications

Power module	
	Power supply 30 W power supply Input level: 24 V (18 to 32 V) Black-out hold-up for 10 ms Polarity protection
Backplane power source	Power output to backplane
Backplane interfaces	Not used
Size	40.64 mm
Weight	201 g (incl. connectors)
Power consumption	Standby typical 1.25 W
EMI filter	Common mode EMI input filter
Isolation	Input galvanic isolated from other potentials, 500 V DC
Connector, grip (included by default)	2 terminals: 1792517
Connector, screw	2 terminals: 1873207

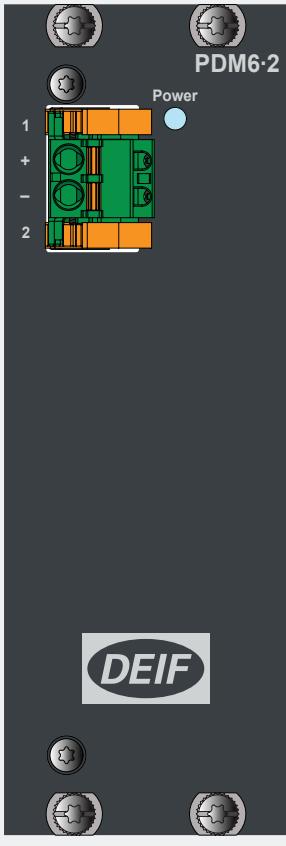
### LED specifications

Power LED	Description
Green 	The voltage is above the operating threshold and power is sourced from this input.

### Terminal specifications

Terminal	Description
1	Power supply +
2	Power supply -

## 2.4.2 PDM6-2 module specifications

Power module	
	<p><b>Power supply</b></p> <p>30 W power supply Input level: 24 V (18 to 32 V) Black out: 10 ms + 300 ms hold up time (128 kB persistent storage on PCM6-1 from CODESYS) Polarity protection</p> <p><b>Backplane power source</b></p> <p>Power output to backplane</p> <p><b>Backplane interfaces</b></p> <p>Not used</p> <p><b>Size</b></p> <p>40.64 mm</p> <p><b>Weight</b></p> <p>250 g (incl. connectors)</p> <p><b>Power consumption</b></p> <p>Standby typical 1.25 W</p> <p><b>EMI filter</b></p> <p>Common mode EMI input filter</p> <p><b>Isolation</b></p> <p>Input galvanic isolated from other potentials, 500 V DC</p> <p><b>Connector, grip (included by default)</b></p> <p>2 terminals: 1792517</p> <p><b>Connector, screw</b></p> <p>2 terminals: 1873207</p>

### LED specifications

Power LED	Description
Green 	The voltage is above the operating threshold and power is sourced from this input.

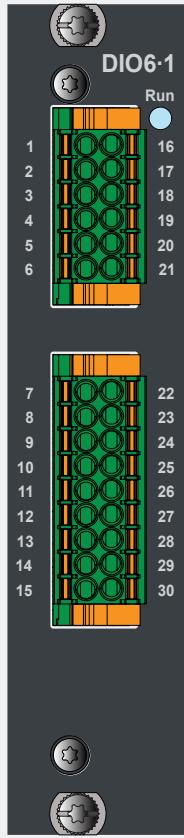
### Terminal specifications

Terminal	Description
1	Power supply +
2	Power supply -

## 2.5 Digital input and output modules

### 2.5.1 DIO6·1 module specifications

DIO6·1 is designed for the rough environment in a wind turbine, and all inputs and outputs are protected and isolated from other potentials.

Digital input and output module		
	Power supply	From backplane Output from external supply
	Backplane interfaces	1 x EtherCAT IN (Port 0) – LVDS 1 x EtherCAT OUT (Port 1) – LVDS
	10 digital outputs	Supply External supply 24V (12 to 32 V) Type Solid-state high side driver Voltage High > Supply voltage -1 V Current Max. 0.5 A per channel (UL: Max. 0.25 A per channel) Maximum total for all outputs: 2 A per group Response time Max. 1 ms Isolation 10 outputs in one group Isolated from other potentials, 500 V DC Protection Short circuit protection Inverse supply voltage protection
	16 digital inputs	Input High: 13 to 30 V Low: -30 V to +5 V Reference to common Load Typically 6 mA (Vin >7 V) Bandwidth ~3 ms filter (200 Hz hardware low pass) Isolation 16 Inputs in 2 groups (8+8) Isolated from other potentials, 500 V DC
	Size	25.40 mm
	Weight	91 g (incl. connectors)
	Power consumption	Typical 0.75 W
	Connector, grip (included by default)	2 x 6 terminals: 1790522 2 x 9 terminals: 1790551
	Connector, screw	2 x 6 terminals: 1790331 2 x 9 terminals: 1790360

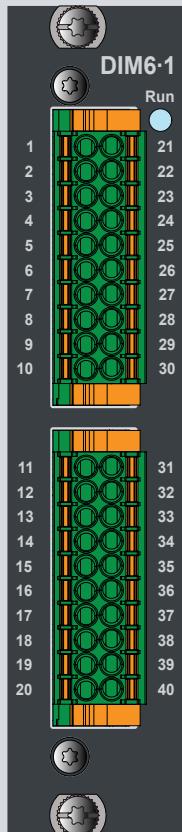
## 2.5.2 DIO6-2 module specifications

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

Digital input and output module																
	Power supply	From backplane using PDM6-1 module or PDM6-2 module														
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS														
	16 digital outputs	<table border="1"> <tr> <td>Supply</td><td>External supply 24 V (12 to 32 V)</td></tr> <tr> <td>Type</td><td>Solid-state high side driver</td></tr> <tr> <td>Voltage</td><td>High &gt; Supply voltage -1 V</td></tr> <tr> <td>Current</td><td>Max. 0.5 A per channel Maximum total for all outputs: 2 A per group</td></tr> <tr> <td>Response time</td><td>Max. 1 ms</td></tr> <tr> <td>Isolation</td><td>16 outputs in 2 groups (8+8) Isolated from other potentials, 500 V DC</td></tr> <tr> <td>Protection</td><td>Short circuit protection with feedback signal from each group Inverse supply voltage protection</td></tr> </table>	Supply	External supply 24 V (12 to 32 V)	Type	Solid-state high side driver	Voltage	High > Supply voltage -1 V	Current	Max. 0.5 A per channel Maximum total for all outputs: 2 A per group	Response time	Max. 1 ms	Isolation	16 outputs in 2 groups (8+8) Isolated from other potentials, 500 V DC	Protection	Short circuit protection with feedback signal from each group Inverse supply voltage protection
Supply	External supply 24 V (12 to 32 V)															
Type	Solid-state high side driver															
Voltage	High > Supply voltage -1 V															
Current	Max. 0.5 A per channel Maximum total for all outputs: 2 A per group															
Response time	Max. 1 ms															
Isolation	16 outputs in 2 groups (8+8) Isolated from other potentials, 500 V DC															
Protection	Short circuit protection with feedback signal from each group Inverse supply voltage protection															
	16 digital inputs	<table border="1"> <tr> <td>Input</td><td>High: 13 to 30 V Low: -30 V to +5 V Reference to common</td></tr> <tr> <td>Load</td><td>Typically 6 mA (<math>V_{in} &gt; 7</math> V)</td></tr> <tr> <td>Bandwidth</td><td>~3 ms filter (200 Hz hardware low pass)</td></tr> <tr> <td>Isolation</td><td>16 inputs in 2 groups (8+8) Isolated from other potentials, 500 V DC</td></tr> </table>	Input	High: 13 to 30 V Low: -30 V to +5 V Reference to common	Load	Typically 6 mA ( $V_{in} > 7$ V)	Bandwidth	~3 ms filter (200 Hz hardware low pass)	Isolation	16 inputs in 2 groups (8+8) Isolated from other potentials, 500 V DC						
Input	High: 13 to 30 V Low: -30 V to +5 V Reference to common															
Load	Typically 6 mA ( $V_{in} > 7$ V)															
Bandwidth	~3 ms filter (200 Hz hardware low pass)															
Isolation	16 inputs in 2 groups (8+8) Isolated from other potentials, 500 V DC															
	Size	25.40 mm														
	Weight	93 g (incl. connectors)														
	Power consumption	Typical 0.75 W														
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564														
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373														

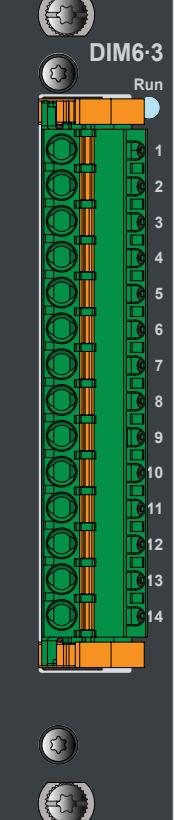
### 2.5.3 DIM6·1 module specifications

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

Digital input module										
	Power supply	From backplane using PDM6·1 module or PDM6·2 module								
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS								
	32 digital inputs	<table> <tr> <td>Input</td><td>High: 13 to 30 V Low: -30 V to +5 V Reference to common</td></tr> <tr> <td>Load</td><td>Typically 6 mA (<math>V_{in} &gt; 7</math> V)</td></tr> <tr> <td>Bandwidth</td><td>~3 ms filter (200 Hz hardware low pass)</td></tr> <tr> <td>Isolation</td><td>32 inputs in 4 groups (8+8+8+8) Isolated from other potentials, 500 V DC</td></tr> </table>	Input	High: 13 to 30 V Low: -30 V to +5 V Reference to common	Load	Typically 6 mA ( $V_{in} > 7$ V)	Bandwidth	~3 ms filter (200 Hz hardware low pass)	Isolation	32 inputs in 4 groups (8+8+8+8) Isolated from other potentials, 500 V DC
Input	High: 13 to 30 V Low: -30 V to +5 V Reference to common									
Load	Typically 6 mA ( $V_{in} > 7$ V)									
Bandwidth	~3 ms filter (200 Hz hardware low pass)									
Isolation	32 inputs in 4 groups (8+8+8+8) Isolated from other potentials, 500 V DC									
	Size	25.40 mm (1 slot)								
	Weight	89 g (incl. connectors)								
	Power consumption	Typical 1.1 W								
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564								
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373								

## 2.5.4 DIM6-3 module specifications

DIM6-3 has 8 x digital inputs. The 8 digital inputs are grouped in two groups, and isolated from other potentials.

Digital input module										
	Power supply	From backplane using PDM6-1 module or PDM6-2 module								
	Backplane interfaces	1 x EtherCAT IN (Port 1) - LVDS 1 x EtherCAT OUT (Port 2) – LVDS								
	8 digital inputs	<table> <tr> <td>Input</td><td>High: 40 to 220 V DC (DC input) / 70 to 240 V AC (AC input) Low: &lt;40 V DC (DC input) / 40 V AC (AC input) Reference to common</td></tr> <tr> <td>Load</td><td>Typically 1 mA (<math>V_{in} &lt; 120</math> V DC / AC) or 2 mA (<math>V_{in} &lt; 220</math> V DC / AC) <math>Z_{in} = 119</math> kOhm</td></tr> <tr> <td>Response time</td><td>ON &lt; 5 mS OFF &lt; 20 mS</td></tr> <tr> <td>Isolation</td><td>8 inputs in two groups Isolated from other potentials, 3250 V 50 Hz for 1 minute</td></tr> </table>	Input	High: 40 to 220 V DC (DC input) / 70 to 240 V AC (AC input) Low: <40 V DC (DC input) / 40 V AC (AC input) Reference to common	Load	Typically 1 mA ( $V_{in} < 120$ V DC / AC) or 2 mA ( $V_{in} < 220$ V DC / AC) $Z_{in} = 119$ kOhm	Response time	ON < 5 mS OFF < 20 mS	Isolation	8 inputs in two groups Isolated from other potentials, 3250 V 50 Hz for 1 minute
Input	High: 40 to 220 V DC (DC input) / 70 to 240 V AC (AC input) Low: <40 V DC (DC input) / 40 V AC (AC input) Reference to common									
Load	Typically 1 mA ( $V_{in} < 120$ V DC / AC) or 2 mA ( $V_{in} < 220$ V DC / AC) $Z_{in} = 119$ kOhm									
Response time	ON < 5 mS OFF < 20 mS									
Isolation	8 inputs in two groups Isolated from other potentials, 3250 V 50 Hz for 1 minute									
	Size	25.40 mm (1 slot)								
	Weight	115 g (incl. connectors)								
	Power consumption	Typical 0.65 W								
	Connector, grip (included by default)	14 pole connector, push-in terminals, with snap lock FKC 2,5/14-ST-5,08-LR								
	Connector, screw	14 pole connector, push-in terminals, with screw lock FKC 2,5/14-STF-5,08								

## 2.5.5 DOM6·1 module specifications

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

Digital output module																
	Power supply	From backplane using PDM6·1 module or PDM6·2 module														
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS														
	32 digital outputs	<table border="1"> <tr> <td>Supply</td><td>External supply 24 V (12 to 32 V)</td></tr> <tr> <td>Type</td><td>Solid-state high side driver</td></tr> <tr> <td>Voltage</td><td>High &gt; Supply voltage -1 V</td></tr> <tr> <td>Current</td><td>Max. 0.5 A per channel Maximum total for all outputs: 2 A per group</td></tr> <tr> <td>Response time</td><td>Max. 1 ms</td></tr> <tr> <td>Isolation</td><td>32 outputs in 4 groups (8+8+8+8) Isolated from other potentials, 500 V DC</td></tr> <tr> <td>Protection</td><td>Short circuit protection with feedback signal from each group Inverse supply voltage protection</td></tr> </table>	Supply	External supply 24 V (12 to 32 V)	Type	Solid-state high side driver	Voltage	High > Supply voltage -1 V	Current	Max. 0.5 A per channel Maximum total for all outputs: 2 A per group	Response time	Max. 1 ms	Isolation	32 outputs in 4 groups (8+8+8+8) Isolated from other potentials, 500 V DC	Protection	Short circuit protection with feedback signal from each group Inverse supply voltage protection
Supply	External supply 24 V (12 to 32 V)															
Type	Solid-state high side driver															
Voltage	High > Supply voltage -1 V															
Current	Max. 0.5 A per channel Maximum total for all outputs: 2 A per group															
Response time	Max. 1 ms															
Isolation	32 outputs in 4 groups (8+8+8+8) Isolated from other potentials, 500 V DC															
Protection	Short circuit protection with feedback signal from each group Inverse supply voltage protection															
	Size	25.40 mm														
	Weight	97 g (incl. connectors)														
	Power consumption	Typical 0.5 W														
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564														
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373														

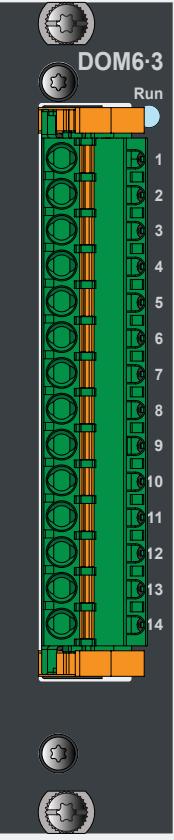
## 2.5.6 DOM6-3 module specifications

DOM6-3 has 8 x high current digital outputs in two groups.

Each output can deliver up to 2 A continues, and 8 A in total per group. They are all configured in Current sourcing (PNP) mode. The outputs have individual over-current protection (thermal shutdown) with feedback to application.

The individual outputs have current sensing feedback ( $>10$  mA) for load detection when output is active as well as wire break detection ( $<1$  mA) when output is non-active (always enabled). Additionally, over-current detection with feedback to the application for handling.

The digital outputs in each group are isolated from other potentials up to 500 V DC.

Digital output module		
	Power supply	From backplane using PDM6-1 module or PDM6-2 module
	Backplane interfaces	1 x EtherCAT IN (Port 1) - LVDS 1 x EtherCAT OUT (Port 2) - LVDS
8 High Current Digital Outputs	Supply	External supply 24 V (18 to 32 V DC)
	Type	Solid-state high side (PNP, Sourcing)
	Voltage	High > Supply voltage -1 V
	Current	Max. 2 A per channel continues. * Maximum total for all outputs: 8 A per group
	Response time	Max. 1 ms Delay On : $<50$ us Delay Off : $<80$ us
	Isolation	8 outputs in 2 groups (4+4) Isolated from other potentials, 500 V DC
	Protections / Special functions	Short circuit protection (thermal) with feedback signal from each output. Overcurrent sensing signal from each digital output (2.06 A $\pm 20$ %) Current sensing feedback signal for load detection on each digital output ( $>10$ mA) - Active DO State Reverse DO supply protection Supply OK feedback signal (within 18..32 V DC) for each group Wire break detection (test current $\sim 2.4$ mA) for each digital output
	Size	25.40 mm
	Weight	112 g (incl. connectors)
	Power consumption	Typical 1.5 W
	Connector, grip (included by default)	14 pole connector, push-in terminals, with snap lock FKC 2,5/14-ST-5,08-LR
	Connector, screw	14 pole connector, push-in terminals, with screw lock FKC 2,5/14-STF-5,08

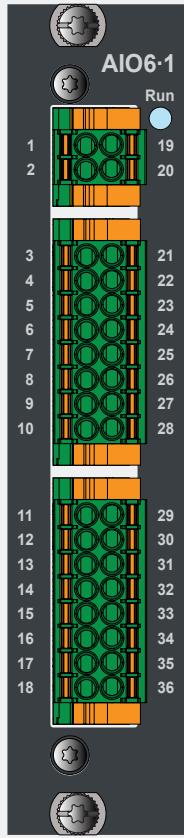
**NOTE** \* The maximum output current is derated to 1.5 A if the ambient temperature exceeds 55°C otherwise the module must be installed in a ventilated environment.

There is always +24 V DC on outputs if they are not loaded due to wire break detection current.

## 2.6 Analogue input and output modules

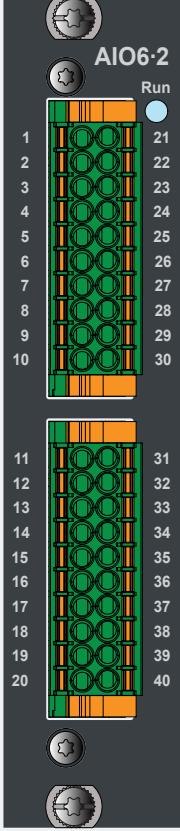
### 2.6.1 AIO6·1 module specifications

AIO6·1 is designed for the rough environment in a wind turbine, and all inputs and outputs are protected and isolated from other potentials.

Analogue input and output module		
	Power supply	From backplane
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS
1 2	2 analogue outputs	Output type Current mode : 0 to 20 mA, 4 to 20 mA, 0 to 24 mA Voltage mode : 0 to 10 V, -10 to 10 V. Software selectable.
3 4 5 6 7 8 9 10		Output range Current mode: 0 to 20 mA, 4 to 20 mA, 0 to 24 mA Voltage mode: 0 to 10 V, -10 to 10 V
		Load Current mode: < 500 Ω Voltage mode: $\geq$ 1000 Ω
		Resolution 16 bit
		Accuracy 0.2 % of full range output (20 mA/10 V) at reference temperature 0.4 % of full range output (20 mA/10 V) at operational temperature
11 12 13 14		Isolation 2 outputs in one group Isolated from other potentials, 500 V DC
15 16 17 18	16 analogue inputs	Input type Current mode: -20 to 20 mA, 0 to 20 mA, 4 to 20 mA, 4 to 20 mA (NAMUR NE43) and 4 to 24 mA Voltage mode: -10 to 10 V, 0 to 10 V, -12 to 12 V and 0 to 12 V Software selectable.
		Impedance Current mode: Max. 50 Ω Voltage mode: Min. 10 kΩ
		Filter 250 Hz hardware low-pass filter
		Sampling < 2 ms
		Resolution 16 bit
		Accuracy 0.2 % of full range input (20 mA/10 V) at reference temperature 0.4 % of full range input (20 mA/10 V) at operational temperature
		Isolation 16 inputs (8+8) in 2 groups Isolated from other potentials, 500 V DC
	Size	25.40 mm
	Weight	96 g (incl. connectors)
	Power consumption	Typical 2.75 W (2 analogue outsourcing 20 mA)
	Connector, grip (included by default)	2 x 2 terminals: 1790483 2 x 8 terminals: 1790548
	Connector, screw	2 x 2 terminals: 1790292 2 x 8 terminals: 1790357

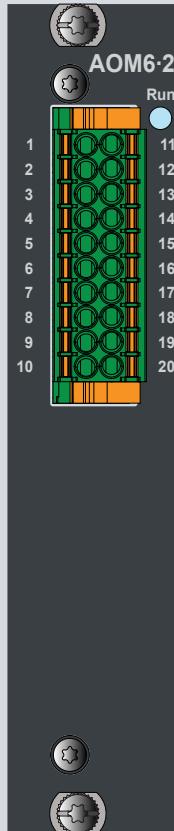
## 2.6.2 AIO6-2 module specifications

AIO6-2 has 8 analogue inputs and 8 analogue outputs. The voltage and current modes for the inputs and outputs are individually software configurable. All the inputs and outputs are protected and isolated from other potentials.

Analogue input and output module		
	Power supply	From backplane using PDM6-1 module or PDM6-2 module
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS
	8 analogue outputs	<p>Output type Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, 0 to 12 V, -10 V to 10 V and -12 to 12 V Software selectable.</p> <p>Output range Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, -10 to 10 V, 0 to 12 V*, -12 to 12 V* (-11,96 V and 11,96 V respectively).</p> <p>Load Current mode: &lt; 500 Ω Voltage mode: <math>\geq 1000 \Omega</math></p> <p>Resolution 16 bit</p> <p>Accuracy 0.2 % of full range output (20 mA/10 V) at reference temperature 0.4 % of full range output (20 mA/10 V) at operational temperature</p> <p>Isolation 8 outputs in 2 groups (4+4) Isolated from other potentials, 500 V DC</p>
	8 analogue inputs	<p>Input type Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, 4 to 20 mA (NAMUR NE43), -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, 0 to 12 V, -10 V to 10 V and -12 to 12 V Software selectable.</p> <p>Impedance Current mode: Max. 50 Ω Voltage mode: Min. 10 kΩ</p> <p>Filter 250 Hz hardware low-pass filter</p> <p>Sampling &lt; 2 ms</p> <p>Resolution 16 bit</p> <p>Accuracy 0.2 % of full range input (20 mA/10 V) at reference temperature 0.4 % of full range input (20 mA/10 V) at operational temperature</p> <p>Isolation 8 inputs in 2 groups (4+4) Isolated from other potentials, 500 V DC</p>
	Size	25.40 mm
	Weight	118 g (incl. connectors)
	Power consumption	Typical 5.1 W (8 analogue outsourcing 20 mA)
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373

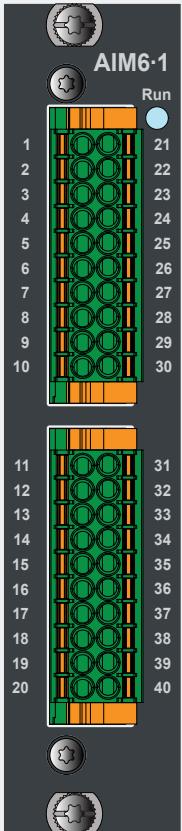
### 2.6.3 AOM6·2 module specifications

AOM6·2 has 8 analogue outputs. The voltage and current modes for the outputs are individually software configurable. The outputs are protected and isolated from other potentials.

Analogue output module		
	Power supply	From backplane using PDM6·1 module or PDM6·2 module
	Backplane interfaces	1 x EtherCAT IN (Port 0) – LVDS 1 x EtherCAT OUT (Port 1) – LVDS
	8 analogue outputs	<p>Output type Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, 0 to 12 V, -10 V to 10 V and -12 to 12 V Software selectable.</p>
	Output range	<p>Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, -10 to 10 V, 0 to 12 V*, -12 to 12 V* (-11,96 V and 11,96 V respectively).</p>
	Load	Current mode: < 500 Ω Voltage mode: $\geq 1000 \Omega$
	Resolution	16 bit
	Accuracy	0.2 % of full range output (20 mA/10 V) at reference temperature 0.4 % of full range output (20 mA/10 V) at operational temperature
	Isolation	8 outputs in 2 groups (4+4) Isolated from other potentials, 500 V DC
	Size	25.40 mm
	Weight	100 g (incl. connectors)
Power consumption	Typical 2.7 W (8 analogue outsourcing 20 mA)	
	Connector, grip (included by default)	1 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564
Connector, screw		1 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373

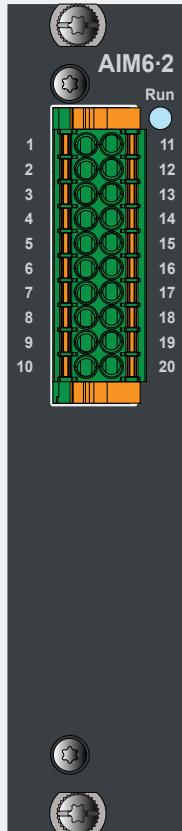
## 2.6.4 AIM6·1 module specifications

AIM6·1 has 16 analogue inputs. The voltage and current modes for the inputs are individually software configurable. All the inputs are protected and isolated from other potentials.

Analogue input module				
	Power supply	From backplane using PDM6·1 module or PDM6·2 module		
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS		
	16 analogue inputs	Input type	Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, 4 to 20 mA (NAMUR NE43), -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, 0 to 12 V, -10 V to 10 V and -12 to 12 V Software selectable.	
		Impedance	Current mode: Max. 50 $\Omega$ Voltage mode: Min. 10 k $\Omega$	
		Filter	250 Hz hardware low-pass filter	
		Sampling	< 2 ms	
		Resolution	16 bit	
		Accuracy	0.2 % of full range input (20 mA/10 V) at reference temperature 0.4 % of full range input (20 mA/10 V) at operational temperature	
		Isolation	16 inputs in 4 groups (4+4+4+4) Isolated from other potentials, 500 V DC	
		Size	25.40 mm	
		Weight	115 g (incl. connectors)	
		Power consumption	Typical 2.3 W	
		Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564	
		Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373	

## 2.6.5 AIM6·2 module specifications

AIM6·2 has 8 analogue inputs. The voltage and current modes for the inputs are individually software configurable. All the inputs are protected and isolated from other potentials.

Analogue input module			
	Power supply	From backplane using PDM6·1 module or PDM6·2 module	
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS	
	8 analogue inputs	Input type	Current mode: 0 to 20 mA, 0 to 24 mA, 4 to 20 mA, 4 to 20 mA (NAMUR NE43), -20 to 20 mA and -24 to 24 mA Voltage mode: 0 to 10 V, 0 to 12 V, -10 V to 10 V and -12 to 12 V Software selectable.
		Impedance	Current mode: Max. 50 $\Omega$ Voltage mode: Min. 10 k $\Omega$
		Filter	250 Hz hardware low-pass filter
		Sampling	< 2 ms
		Resolution	16 bit
		Accuracy	0.2 % of full range input (20 mA/10 V) at reference temperature 0.4 % of full range input (20 mA/10 V) at operational temperature
		Isolation	8 inputs in 2 groups (4+4) Isolated from other potentials, 500 V DC
	Size	25.40 mm	
	Weight	95 g (incl. connectors)	
	Power consumption	Typical 1.4 W	
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564	
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373	

## 2.6.6 MIM6·1 module specifications

MIM6·1 has 16 multifunctional analogue inputs or 8 completely isolated groups. The voltage and current modes for the inputs are individually software configurable. All the inputs are protected against 24 V DC connection failure and isolated from other potentials up to 500 V DC.

The MIM6·1 module provides flexible configuration of analogue input type. The module is designed for projects and installations where the specifications have not yet been finalised or change over time.

Multifunctional input module		
	Power supply	From backplane using PDM6·1 module or PDM6·2 module
	Backplane interfaces	1 x EtherCAT OUT (Port 1) – LVDS 1 x EtherCAT OUT (Port 2) – LVDS
	8 analogue input groups	( See information below)
	Size	25.40 mm
	Weight	128 g (incl. connectors)
	Power consumption	Typical 3.6 W
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373

### 8 analogue input groups

Multifunctional input module	
Digital input	High: +13 to +30 V or -13 to -30 V Low: +5 to -5 V with reference to common
Digital inputs	Dry contact inputs, 2.5 V/ 2 mA DC internal supply
1 x differential current input <b>OR</b> 2 x current input (common ground)	0 to 20 mA 0 to 24 mA 4 to 20 mA (NAMUR NE43) -20 to +20 mA -24 to +24 mA

## 8 analogue input groups

Multifunctional input module	
1 x differential voltage input <b>OR</b>	0 to 10 V -10 to +10 V 0 to 12 V -12 to +12 V
2 x voltage input	Differential mode up to 30 V common mode
1 x resistance measurement input 3-wire, 4-wire (RMI)	0 to 4.5 kΩ
2 x resistance measurement inputs 2-wire (RMI): common reference	0 to 4.5 kΩ
1 x Pt100 (3-wire, 4-wire)	-200 to 590 °C (default range) 0 to 850 °C (extended range)
2 x Pt100 (2-wire)	Cable error: Open inputs and short-circuit are detected (under range, over range and error signals in EtherCAT interface) Resolution: 0.1 °C
1 x Pt1000 (3-wire, 4-wire)	-200 to 590 °C (default range) 0 to 850 °C (extended range)
2 x Pt1000 (2-wire)	Cable error: Open inputs are short-circuit detected (under range, over range and error signals in EtherCAT interface) Resolution: 0.1 °C
1 x thermocouple <b>OR</b>	<ul style="list-style-type: none"> <li>E: -200 to +1000 °C</li> <li>J: -210 to + 1200 °C</li> <li>K: -200 to +1372 °C</li> <li>N: -200 to +1300 °C</li> <li>R: -50 to +1768 °C</li> <li>S: -50 to +1768 °C</li> <li>T: -200 to +400 °C</li> </ul>
2 x thermocouples	Wire break or open inputs are shown as Error bit set, Under and Over range clear and value set to INT16_MAX (32767)
No compensation <b>OR</b>	Internal temperature sensor: <ul style="list-style-type: none"> <li>Range: 0 to 70 °C <ul style="list-style-type: none"> <li>Accuracy: ±1.0 °C</li> </ul> </li> <li>Range: -40 to 0 °C <ul style="list-style-type: none"> <li>Accuracy: ±2.0 °C</li> </ul> </li> </ul>
Internal cold junction compensation (CJC)	
Impedance	Current mode: max. 50 Ω Voltage mode: min. 10 kΩ
Filter	250 Hz hardware low-pass filter
Sampling	< 2 ms - analogue voltage or current mode < 40 ms - temperature or RMI mode
Resolution	16 bit

## Multifunctional input module

Accuracy:	• 0.2 % of full range input (20 mA/ 10 V) at reference temperature
Voltage and current	• 0.4 % of full range input (20 mA/ 10 V) at operational temperature
Accuracy: RMI (3-wire, 4-wire)	• $\pm 1.0 \Omega \pm 0.25 \%$ of actual reading at reference temperature • $\pm 2.0 \Omega \pm 0.25 \%$ of actual reading at operational temperature

## 8 analogue input groups

### Multifunctional input module

Accuracy: RMI (2-wire)	• $\pm 2.0 \Omega \pm 0.25 \%$ of actual reading at reference temperature • $\pm 4.0 \Omega \pm 0.25 \%$ of actual reading at operational temperature
Accuracy: Pt100 (3-wire, 4-wire)	• $\pm 1.0 ^\circ\text{C} \pm 0.25 \%$ of actual reading at reference temperature • $\pm 2.0 ^\circ\text{C} \pm 0.25 \%$ of actual reading at operational temperature
Accuracy: Pt1000 (3-wire, 4-wire)	• $\pm 0.5 ^\circ\text{C} \pm 0.25 \%$ of actual reading at reference temperature • $\pm 1.0 ^\circ\text{C} \pm 0.25 \%$ of actual reading at operational temperature
Accuracy: Pt100 (2-wire)	• $\pm 1.5 ^\circ\text{C} \pm 0.25 \%$ of actual reading at reference temperature • $\pm 2.5 ^\circ\text{C} \pm 0.25 \%$ of actual reading at operational temperature
Accuracy: Pt1000 (2-wire)	• $\pm 1.0 ^\circ\text{C} \pm 0.25 \%$ of actual reading at reference temperature • $\pm 1.5 ^\circ\text{C} \pm 0.25 \%$ of actual reading at operational temperature
Accuracy: Thermocouples type E, J, K, N	• $\pm 2 ^\circ\text{C} \pm 0.25 \%$ of actual reading at reference temperature • $\pm 4 ^\circ\text{C} \pm 0.25 \%$ of actual reading at operational temperature
Accuracy: Thermocouples type R, S, T	• $\pm 4 ^\circ\text{C} \pm 0.25 \%$ of actual reading at reference temperature • $\pm 8 ^\circ\text{C} \pm 0.25 \%$ of actual reading at operational temperature
Isolation	8 groups isolated from other potentials, 500 V DC
Protections	Input circuits designed with protection against 24 V DC connection failure

## 2.6.7 MIM6·2 module specifications

MIM6·2 has 8 multifunctional analogue inputs or 4 completely isolated groups. The voltage and current modes for the inputs are individually software configurable. All the inputs are protected against 24 V DC connection failure and isolated from other potentials up to 500 V DC.

The MIM6·2 module provides flexible configuration of the type of analogue input. The module is designed for projects and installations where the specifications have not yet been finalised or change over time.

Multifunctional input module		
	Power supply	From backplane using PDM6·1 module or PDM6·2 module
	Backplane interfaces	1 x EtherCAT OUT (Port 1) – LVDS 1 x EtherCAT OUT (Port 2) – LVDS
	8 analogue input groups	( See information below)
	Size	25.40 mm
	Weight	106 g (incl. connectors)
	Power consumption	Typical 2.1 W
	Connector, grip (included by default)	2 x 10 terminals: DFMC 1.5/10-ST-3.5-LR – 1790564
	Connector, screw	2 x 10 terminals: DFMC 1.5/10-STF-3.5 – 1790373

### 4 analogue input groups

Multifunctional input module	
Digital input	High: +13 to +30 V or -13 to -30 V Low: +5 to -5 V with reference to common
Digital inputs	Dry contact inputs, 2.5 V/ 2 mA DC internal supply
1 x differential current input <b>OR</b> 2 x current input (common ground)	0 to 20 mA 0 to 24 mA 4 to 20 mA (NAMUR NE43) -20 to 20 mA 0 to 24 mA -24 to 24 mA

## 4 analogue input groups

Multifunctional input module	
1 x differential voltage input <b>OR</b> 2 x voltage input	0 to 10 V -10 to 10 V 0 to 12 V -12 to 12 V Differential mode up to 30 V common mode
1 x resistance measurement input 3-wire, 4-wire (RMI)	0 to 4.5 kΩ
2 x resistance measurement inputs 2-wire (RMI): common reference	0 to 4.5 kΩ
1 x Pt100 (3-wire, 4-wire)	-200 to +300 °C
2 x Pt100 (2-wire)	Cable error: open input and short-circuit are detected Resolution: 0.1 °C
1 x Pt1000 (3-wire, 4-wire)	-200 to +300 °C
2 x Pt1000 (2-wire)	Cable error: open input and short-circuit are detected Resolution: 0.1 °C
1 x thermocouple <b>OR</b> 2 x thermocouples	<ul style="list-style-type: none"> <li>E: -200 to +1000 °C</li> <li>J: -210 to +1200 °C</li> <li>K: -200 to +1372 °C</li> <li>N: -200 to +1300 °C</li> <li>R: -50 to +1768 °C</li> <li>S: -50 to +1768 °C</li> <li>T: -200 to +400 °C</li> </ul> Open inputs are detected (internal current source)
External junction compensation using Pt100/Pt1000 on any channel <b>OR</b> Internal cold junction compensation (CJC)	Internal temperature sensor: <ul style="list-style-type: none"> <li>Range: 0 to 70 °C           <ul style="list-style-type: none"> <li>Accuracy: ±1.0 °C</li> </ul> </li> <li>Range: -40 to 0 °C           <ul style="list-style-type: none"> <li>Accuracy: ±2.0 °C</li> </ul> </li> </ul>
Impedance	Current mode: max. 50 Ω Voltage mode: min. 10 kΩ
Filter	250 Hz hardware low-pass filter
Sampling	< 2 ms - analogue voltage or current mode < 40 ms - temperature or RMI mode
Resolution	16 bit
Accuracy: Voltage and current	<ul style="list-style-type: none"> <li>0.2 % of full range input (20 mA/ 10 V) at reference temperature</li> <li>0.4 % of full range input (20 mA/ 10 V) at operational temperature</li> </ul>
Accuracy: RMI (3-wire, 4-wire)	<ul style="list-style-type: none"> <li>±1.0 Ω ±0.25 % of actual reading at reference temperature</li> <li>±2.0 Ω ±0.25 % of actual reading at operational temperature</li> </ul>

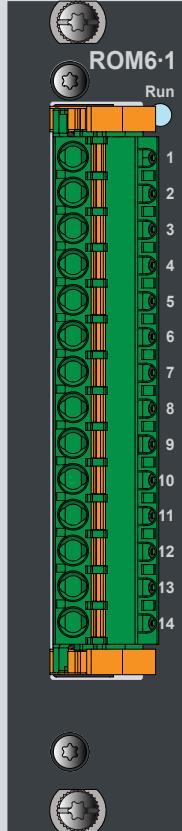
## 4 analogue input groups

Multifunctional input module	
Accuracy: RMI (2-wire)	<ul style="list-style-type: none"> <li>• <math>\pm 2.0 \Omega \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 4.0 \Omega \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Accuracy: Pt100 (3-wire, 4-wire)	<ul style="list-style-type: none"> <li>• <math>\pm 1.0 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 2.0 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Accuracy: Pt1000 (3-wire, 4-wire)	<ul style="list-style-type: none"> <li>• <math>\pm 0.5 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 1.0 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Accuracy: Pt100 (2-wire)	<ul style="list-style-type: none"> <li>• <math>\pm 1.5 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 2.5 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Accuracy: Pt1000 (2-wire)	<ul style="list-style-type: none"> <li>• <math>\pm 1.0 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 1.5 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Accuracy: Thermocouples type E, J, K, N	<ul style="list-style-type: none"> <li>• <math>\pm 2 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 4 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Accuracy: Thermocouples type R, S, T	<ul style="list-style-type: none"> <li>• <math>\pm 4 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at reference temperature</li> <li>• <math>\pm 8 ^\circ\text{C} \pm 0.25 \%</math> of actual reading at operational temperature</li> </ul>
Isolation	8 groups isolated from other potentials, 500 V DC
Protections	Input circuits designed with protection against 24 V DC connection failure

## 2.7 Relay output modules

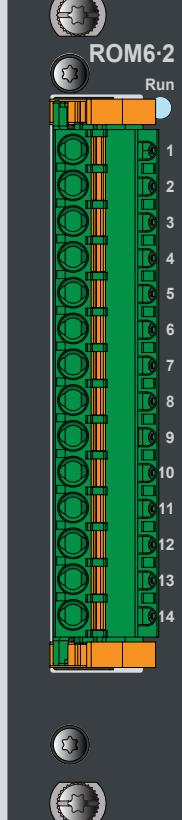
### 2.7.1 ROM6·1 module specifications

ROM6·1 has 8 x normally open relays.

Relay output module		
	Power supply	From backplane using PDM6·1 module or PDM6·2 module
	Backplane interfaces	1 x EtherCAT OUT (Port 1) - LVDS 1 x EtherCAT OUT (Port 2) – LVDS
	8 relay outputs (normally open NO)	<p>Type: Electromechanical</p> <p>Electrical rating:</p> <p>Resistive load (continuously):</p> <ul style="list-style-type: none"> <li>250 VAC @ 2 A</li> <li>120 VAC @ 2 A</li> <li>48 VAC @ 2 A</li> <li>24 VAC @ 2 A</li> </ul> <p>Inductive load: (AC:B300, DC:R300)</p> <p>Altitude derating 2,000-4,000 m</p> <p>Max. 150 VAC</p> <p><b>⚠ CAUTION:</b> Relays with working voltages &gt;150 V AC must be operated within the same relay group and not next to relays with 30 V DC working voltage.</p>
	Load type	Resistive, Inductive B300/R300 (power limit specification for inductive loads), Pilot duty
	Operating cycles	Mechanical: $>1 \times 10^7$ cycles Electrical: >50,000 cycles (depending of load)
	Response time (contact on/brake off)	Operate time (typical): 10 ms Release time (typical): 7 ms
	Isolation	Between relays: 2200 V 50 Hz for 1 minute Between relays and chassis: 3250 V 50 Hz for 1 minute
Size	25.40 mm	
Weight	165 g (incl. connectors)	
Power consumption	Typical 2.6 W (all relays ON)	
Connector, grip (included by default)	14 pole connector, push-in terminals, with snap lock 1810913 - FKC 2.5/14-ST-5.08-LR	
Connector, screw	14 pole connector, push-in terminals, with snap lock 1873320 - FKC 2.5/14-ST-5.08-LR	

## 2.7.2 ROM6-2 module specifications

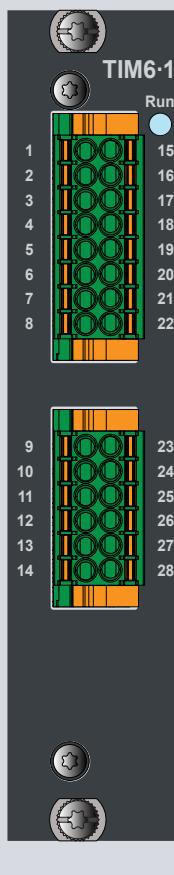
ROM6-2 has 4 x changeover relays.

Relay output module							
	Power supply	From backplane using PDM6-1 module or PDM6-2 module					
	Backplane interfaces	1 x EtherCAT OUT (Port 1) - LVDS 1 x EtherCAT OUT (Port 2) – LVDS					
	4 Relay outputs (changeover)	<table> <tr> <td>Type</td><td>Electromechanical</td></tr> <tr> <td>Electrical rating</td><td>           Resistive load (continuously):            250 VAC @ 2 A            120 VAC @ 2 A            48 VAC @ 2 A            24 VAC @ 2 A              220 VDC @ 0.2 A            110 VDC @ 0.3 A            48 VDC @ 1 A            24 VDC @ 2 A            12 VDC @ 2 A              Inductive load: (AC:B300, DC:R300)            Altitude derating 2,000-4,000 mMax. 150 VAC         </td></tr> <tr> <td colspan="2"> <b>⚠ CAUTION:</b>            Relays with working voltages &gt;150 V AC must be operated within the same relay group and not next to relays with 30 V DC working voltage.         </td></tr> </table>	Type	Electromechanical	Electrical rating	Resistive load (continuously): 250 VAC @ 2 A 120 VAC @ 2 A 48 VAC @ 2 A 24 VAC @ 2 A  220 VDC @ 0.2 A 110 VDC @ 0.3 A 48 VDC @ 1 A 24 VDC @ 2 A 12 VDC @ 2 A  Inductive load: (AC:B300, DC:R300) Altitude derating 2,000-4,000 mMax. 150 VAC	<b>⚠ CAUTION:</b> Relays with working voltages >150 V AC must be operated within the same relay group and not next to relays with 30 V DC working voltage.
Type	Electromechanical						
Electrical rating	Resistive load (continuously): 250 VAC @ 2 A 120 VAC @ 2 A 48 VAC @ 2 A 24 VAC @ 2 A  220 VDC @ 0.2 A 110 VDC @ 0.3 A 48 VDC @ 1 A 24 VDC @ 2 A 12 VDC @ 2 A  Inductive load: (AC:B300, DC:R300) Altitude derating 2,000-4,000 mMax. 150 VAC						
<b>⚠ CAUTION:</b> Relays with working voltages >150 V AC must be operated within the same relay group and not next to relays with 30 V DC working voltage.							
Load type	Resistive, Inductive B300/R300 (power limit specification for inductive loads), Pilot duty						
Operating cycles	Mechanical: $>1 \times 10^7$ cycles Electrical: >50,000 cycles (depending of load)						
Response time (contact on/ brake off)	Operate time (typical): 10 ms Release time (typical): 7 ms						
Isolation	Between relays: 2200 V 50 Hz for 1 minute Between relays and chassis: 3250 V 50 Hz for 1 minute						
Size	25.40 mm						
Weight	131 g (incl. connectors)						
Power consumption	Typical 1.5 W (all relays ON)						
Connector, grip (included by default)	14 pole connector, push-in terminals, with snap lock 1810913 - FKC 2.5/14-ST-5.08-LR						
Connector, screw	14 pole connector, push-in terminals, with snap lock 1873320 - FKC 2.5/14-ST-5.08-LR						

## 2.8 Temperature input modules

### 2.8.1 TIM6·1 module specifications

TIM6·1 is designed for the rough environment in a wind turbine, and all inputs and outputs are protected and isolated from other potentials.

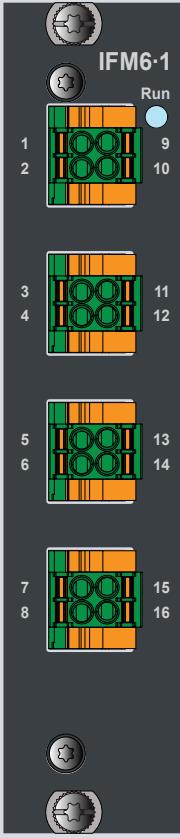
Temperature input module		
	Power supply	From backplane
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS
	14 (6) temperature inputs	Sensor type Pt100
		Range -50 to 200 °C
		Wire 14 (2) x Pt 100 2-wire connection or 0 (6) x Pt 100 3-wire connection, selectable mix
		Sampling ≤ 100 ms
		Cable error Open input and short-circuit are detected
		Resolution 0.1 °C (16 bit ADC)
		Accuracy 1.0 °C at reference temperature 2.5 °C at operational temperature (2-wire cables must be shorter than 1 m)
		Isolation 14 (6) inputs in one group Isolated from other potentials, 500 V DC
	Size	25.40 mm
	Weight	90 g (incl. connectors)
	Power consumption	Typical 1.0 W (all inputs connected)
	Connector, grip (included by default)	2 x 8 terminals: 1790548 2 x 6 terminals: 1790522
	Connector, screw	2 x 8 terminals: 1790357 2 x 6 terminals: 1790331

## 2.9 Communication interface modules

### 2.9.1 IFM6-1 module specifications

IFM6-1 is designed for the rough environment in a wind turbine, and all inputs and outputs are protected and isolated from other potentials.

The interface and Fieldbus module offer 2 x Profibus DP master and 2 x RS-485 ports.

Communication interface module		
	Power supply	From backplane
	Backplane interfaces	1 x EtherCAT IN (Port 0) - LVDS 1 x EtherCAT OUT (Port 1) – LVDS
	Processor	196 MHz industrial grade 32 bit microcontroller
	2 x Profibus DP Master	Supported baud rates 9600, 19200, 45450, 93750, 187500, 500000, 1.5M, 3.0M, 6.0M, 12.0M < 1% error
		Biasing and termination On or off (software select)
		Standards PROFIBUS DP-V0 (cyclic data and diagnostics)
		Slaves Max. 5 per Profibus DP Master
	Com 2 x RS-485 interfaces	Standards TIA/EIA-485 shielded twisted copper cable
		Baud rate 2400, 4800, 9600, 19200, 38400, 45450, 57600, 115200, 230400 and 460800 < 1 % error
		Word length 7 or 8 bits
		Parity None, even, odd
		Stop bits 1 or 2
		Flow control None
		Communication lines 2 wire half duplex
		Biasing and termination On or off (software selected)
	Isolation	Each communication port isolated from other potentials, 500 V DC
	Size	25.40 mm
	Weight	90 g (incl. connectors)
	Power consumption	Typical 3.25 W (4 ports active)
	Connector, grip (included by default)	2 x 2 terminals: 1790483
	Connector, screw	2 x 2 terminals: 1790292

## 2.9.2 IFM6·2 module specifications

IFM6·2 is designed for the rough environment in a wind turbine, and communication ports are protected and isolated from other potentials. The IFM6·2 interface and Fieldbus module offer 2 x CAN, 2 x SSI and 2 x High speed counter input.

Communication interface module																		
	Power supply	From backplane																
	Power supply, SSI	<p>Input level: 24 V (18 to 32 V)</p> <p>Note 1: SSI power input must be left unconnected if SSI is unused.</p> <p>Note 2: SSI power input has a TVS (Transient Voltage Suppression) diode of 33V to shield to protect the connected SSI encoder from damage during surge and burst test. Therefore, the SSI interface is not galvanic isolated from shield.</p>																
	Backplane interfaces	<p>1 x EtherCAT IN (Port 0) - LVDS</p> <p>1 x EtherCAT OUT (Port 1) – LVDS</p>																
	Processor	240 MHz industrial grade 32 bit microcontroller																
	2 x CAN interfaces	<table> <tr> <td>Standards</td><td>ISO 11898</td></tr> <tr> <td>Baud rate</td><td>20, 50, 100, 125, 250, 500, 800 or 1000 kbit/s Sample point at 70 to 85 % &lt; 1% error</td></tr> <tr> <td>Isolation</td><td>Isolated from other potentials, 500 V DC</td></tr> <tr> <td>Termination</td><td>Open/120 Ω (software select)</td></tr> <tr> <td>Protection</td><td>24 V DC resistant data lines</td></tr> </table>	Standards	ISO 11898	Baud rate	20, 50, 100, 125, 250, 500, 800 or 1000 kbit/s Sample point at 70 to 85 % < 1% error	Isolation	Isolated from other potentials, 500 V DC	Termination	Open/120 Ω (software select)	Protection	24 V DC resistant data lines						
Standards	ISO 11898																	
Baud rate	20, 50, 100, 125, 250, 500, 800 or 1000 kbit/s Sample point at 70 to 85 % < 1% error																	
Isolation	Isolated from other potentials, 500 V DC																	
Termination	Open/120 Ω (software select)																	
Protection	24 V DC resistant data lines																	
	2 x SSI	<table> <tr> <td>Standards</td><td>TIA/EIA-422 shielded twisted copper cable</td></tr> <tr> <td>Bit rate</td><td>250 kbps and 1000 kbps</td></tr> <tr> <td>Word length</td><td>16 – 32 bit (default 25 bit). Binary or Gray-code configurable in SW</td></tr> <tr> <td>Termination</td><td>Fixed</td></tr> <tr> <td>Communication lines</td><td>4 wire (clock and data)</td></tr> <tr> <td>Protection</td><td>24 V DC resistant data lines</td></tr> <tr> <td>Isolation</td><td>Isolated from other potentials, 500 V DC</td></tr> <tr> <td>Isolation, SSI</td><td>SSI power input has a TVS diode of 33V to shield to protect the connected SSI encoder from damage during surge and burst test. Therefore, the SSI interface is not galvanic isolated from shield.</td></tr> </table>	Standards	TIA/EIA-422 shielded twisted copper cable	Bit rate	250 kbps and 1000 kbps	Word length	16 – 32 bit (default 25 bit). Binary or Gray-code configurable in SW	Termination	Fixed	Communication lines	4 wire (clock and data)	Protection	24 V DC resistant data lines	Isolation	Isolated from other potentials, 500 V DC	Isolation, SSI	SSI power input has a TVS diode of 33V to shield to protect the connected SSI encoder from damage during surge and burst test. Therefore, the SSI interface is not galvanic isolated from shield.
Standards	TIA/EIA-422 shielded twisted copper cable																	
Bit rate	250 kbps and 1000 kbps																	
Word length	16 – 32 bit (default 25 bit). Binary or Gray-code configurable in SW																	
Termination	Fixed																	
Communication lines	4 wire (clock and data)																	
Protection	24 V DC resistant data lines																	
Isolation	Isolated from other potentials, 500 V DC																	
Isolation, SSI	SSI power input has a TVS diode of 33V to shield to protect the connected SSI encoder from damage during surge and burst test. Therefore, the SSI interface is not galvanic isolated from shield.																	
	2 x digital input with frequency measurement	<table> <tr> <td>Input</td><td>High: 13 to 30 V Low: -30 V to +5 V</td></tr> <tr> <td>Load</td><td>Typically 6mA (Vin &gt;7V)</td></tr> <tr> <td>Bandwidth</td><td>125 kHz hardware low-pass filter</td></tr> <tr> <td>Isolation</td><td>Isolated from other potentials, 500 V DC</td></tr> </table>	Input	High: 13 to 30 V Low: -30 V to +5 V	Load	Typically 6mA (Vin >7V)	Bandwidth	125 kHz hardware low-pass filter	Isolation	Isolated from other potentials, 500 V DC								
Input	High: 13 to 30 V Low: -30 V to +5 V																	
Load	Typically 6mA (Vin >7V)																	
Bandwidth	125 kHz hardware low-pass filter																	
Isolation	Isolated from other potentials, 500 V DC																	
	Size	25.40 mm																
	Weight	92 g (incl. connectors)																
	Power consumption	Typical 3.0W																
	Connector, grip (included by default)	<p>2 x 2 terminals: 1790483</p> <p>2 x 4 terminals: 1790506</p>																
	Connector, screw	<p>2 x 2 terminals: 1790292</p> <p>2 x 4 terminals: 1790315</p>																

## 2.10 Condition monitoring modules

### 2.10.1 CMM6-x module specifications

#### Contact DEIF for availability

The module has built-in current excitation and all inputs are optically isolated from other potentials. CMM6-1 and CMM6-2 provide up to 4 high frequency analogue inputs. Use the inputs for:

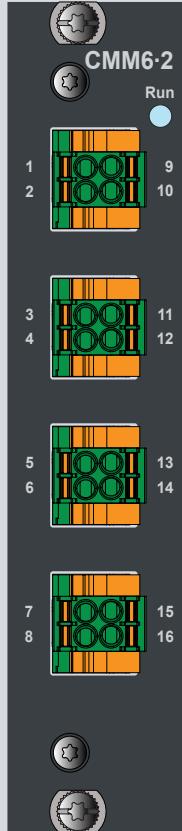
- Measuring voltage signals up to 20 kHz
- Interfacing IEPE vibration sensors

#### CMM6-1 specifications

2 x high frequency analogue input module		
	Power supply	From backplane
	Backplane interfaces *	1 x EtherCAT® OUT (Port 0) – LVDS 1 x EtherCAT® OUT (Port 1) – LVDS
	Sensor type	IEPE or Voltage input
	Excitation	Current: Selectable 0, 2, 4 and 6 mA Voltage: 24 V (minimum)
	Input range	Selectable range: • DC-mode: -10 to 20, ±10 to ±5, 2.5, 1.25, 0.62, 0.31, 0.16, 0.08, 0.40, 0.20 V (11 steps) • IEPE (AC)-mode: ±10, 5, 2.5, 1.25, 0.62, 0.31, 0.16, 0.08, 0.40, 0.20 V (10 steps)
	Impedance	300 kOhm
	Frequency range	DC- mode: 0.05 to 20.000 Hz (3dB) Anti-aliasing filter (DC/AC mode): Low pass -3 dB, 20 kHz butterworth, 3rd order, 77 dB in stop band @ >30 kHz AC- mode (IEPE): High pass is 0.05 Hz
	Sample rate	Up to 57kHz, 2 channels simultaneous Software selectable sample rate : 57594, 29297, 14648 or 7324 Hz Selectable down sampling : 1:2, 1:5, 10, 25, 50, 100, 250, 500, 1000, 2500, 5000
	Resolution	24 bit delta-sigma $\Delta\Sigma$ (including sign) 300 nV (gain 1, Range ±2.5Vp) ENOB = 19 @ OSR=256, 29297 sps
	SNR	Typical > 100 dB @ Range ±2.5 Vp
	Accuracy	± 0.5 % of selected range
	Diagnostic	Wire-break and short circuit
	Isolation	2 inputs in 2 groups, each optically isolated from other potentials, 500 V DC
	Connector, grip	CMM6-1: 2 x 2 terminals: 1790483 (included by default)
	Size	25.4 mm
	Weight	110 g (incl. connectors)
	Power consumption	Max. 4 W

## CMM6-2 specifications

### 4 x high frequency analogue input module

 <p>4 High frequency analogue inputs</p>	Power supply	From backplane
	Backplane interfaces *	1 x EtherCAT® OUT (Port 0) – LVDS 1 x EtherCAT® OUT (Port 1) – LVDS
	Sensor type	IEPE or Voltage input
	Excitation	Current: Selectable 0, 2, 4 and 6 mA Voltage: 24 V (minimum)
	Input range	Selectable range: <ul style="list-style-type: none"> <li>DC-mode: -10 to 20, ±10 to ±5, 2.5, 1.25, 0.62, 0.31, 0.16, 0.08, 0.40, 0.20 V (11 steps)</li> <li>AC-mode (IEPE): ±10, 5, 2.5, 1.25, 0.62, 0.31, 0.16, 0.08, 0.40, 0.20 V (10 steps)</li> </ul>
	Impedance	300 kOhm
	Frequency range	DC-mode: 0.05 to 20.000 Hz (3dB) Anti-aliasing filter DC/AC mode: Low pass -3 dB, 20 kHz butterworth, 3rd order, 77 dB in stop band @ >30 kHz IEPE (AC)-mode: High pass is 0.05 Hz
	Sample rate	Up to 57kHz, 4 channels simultaneous (Max 20kHz via EtherCAT for 4 channels) Software selectable sample rate : 57594, 29297, 14648 or 7324 Hz Selectable down sampling : 1:2, 1:5, 10, 25, 50, 100, 250, 500, 1000, 2500, 5000
	Resolution	24 bit delta-sigma $\Delta\Sigma$ (including sign) 300 nV (gain 1, Range ±2,5Vp) ENOB = 19 @ OSR=256, 29297 sps
	SNR	Typical > 100 dB @ Range ±2.5 Vp
	Accuracy	± 0.5 % of selected range
	Diagnostic	Wire-break and short circuit
	Isolation	4 inputs in 4 groups, each optically isolated from other potentials, 500 V DC
	Connector, grip	CMM6-2: 2 x 2 terminals: 1790483 (included by default)
	Size	25.4 mm
	Weight	110 g (incl. connectors)
	Power consumption	Max. 6 W

**NOTE** \* Data is buffered and transferred continuously via EtherCAT® to the EtherCAT® master. Use of data transfer bandwidth on the EtherCAT® bus has to be considered. The number of high speed analogue channels, down sampling rate and collecting intervals, and CPU power of EtherCAT® master has influence on bandwidth used for data transfer.

Available on request:

- Sample CODESYS application and library for Basic Signal processing, Frequency Analysis, Statistics, Level detection for Warning and Alarms.
- CMM6-3 and CMM6-4: 2- and 4-channel variants with shielded M12 connectors.

## 2.11 Accessories

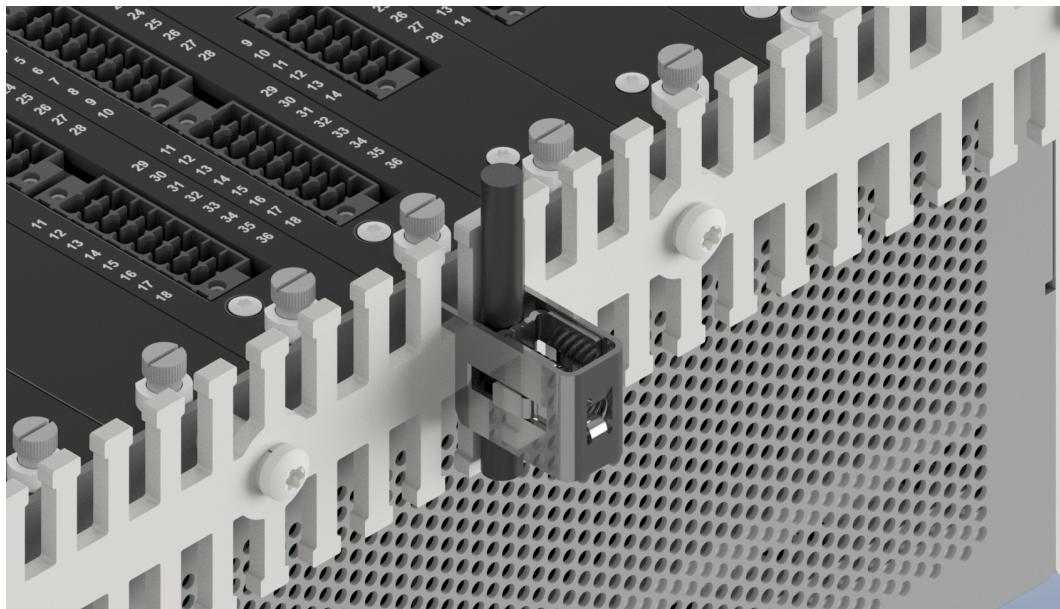
### 2.11.1 Wire support

The controller rack can be ordered with wire support brackets that are pre-mounted from the factory. The wire support is a 3 x 10 mm metal bar with hooks to secure and support wires, and is mounted at the top and bottom of the rack.

Shield clamps, typically used for communication cables (3 to 10 mm in diameter), can be mounted on the wire support bar. The clamps provide an EMC shield that is close to the input terminals.

Rack	Accessory
Rack6·10	Wiresupport, Rack6·10
Rack6·12	Wiresupport, Rack6·12
Rack6·14	Wiresupport, Rack6·14
Rack6·4	Wiresupport, Rack6·4
Rack6·6	Wiresupport, Rack6·6
Rack6·8	Wiresupport, Rack6·8

#### Wire support bracket mounted on a controller rack



### 2.11.2 Optional connector kits

Connector kit	Description
Conn. kit AIO6·1	Connector kit for AIO6·1
Conn. kit CMM6·1	Connector kit for CMM6·1
Conn. kit CMM6·2	Connector kit for CMM6·2
Conn. kit DIO6·1	Connector kit for DIO6·1
Conn. kit IFM6·1	Connector kit for IFM6·1
Conn. kit IFM6·2	Connector kit for IFM6·2
Conn. kit PCM6·1	Connector kit for PCM6·1
Conn. kit PCM6·2	Connector kit for PCM6·2

Connector kit	Description
Conn. kit PDM6·1	Connector kit for PDM6·1
Conn. kit PDM6·2	Connector kit for PDM6·2
Conn. kit TIM6·1	Connector kit for TIM6·1
Conn. kit 1..20	Connector kit for I/O module (1 pcs 2 x 20 pin)
Conn. kit 1..40	Connector kit for I/O module (2 pcs 2 x 20 pin)

### 2.11.3 Blind module

#### Blank / blind

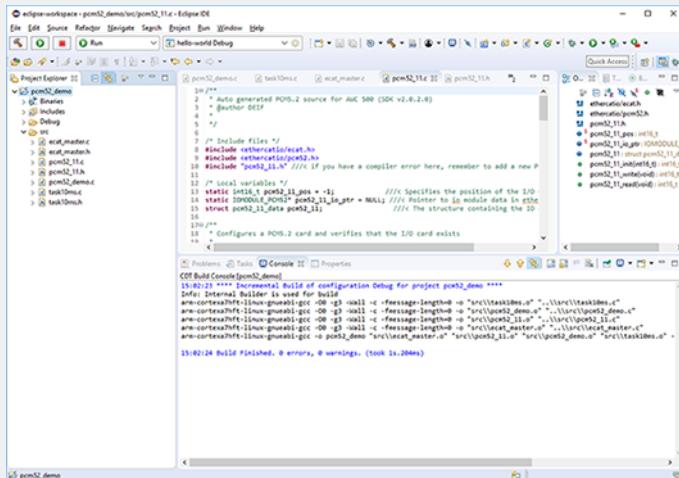
Specifications	
Size	25.40 mm
Weight	25 g

### 3. Application development

#### 3.1 Software packages

##### 3.1.1 C/C++ programming

###### Application development



```
/* Auto generated POM-2 source for AIC 540 (SDK v2.4.2-2.8)
 * + Bashter DEIF
 * + EcatMaster
 * + EcatTask
 * + Ecat
 * + EcatMaster
 * + Includes
 * + Libraries
 * + Debug
 * + Task10m
 * + pcm211
 * + pcm211_demo
 * + task10m
 * + task10m
 */
/* Local variables */
static int16_t pcm211_pos = 1; //%% Specifies the position of the I/O
static struct ecat_task *task10m_ecat_id_ptr = NULL; //%% Pointer to the module data in the structure containing the I/O
struct pcm211_data pcm211; //%% The structure containing the I/O

/* Configures a POM-2 card and verifies that the I/O card exists */

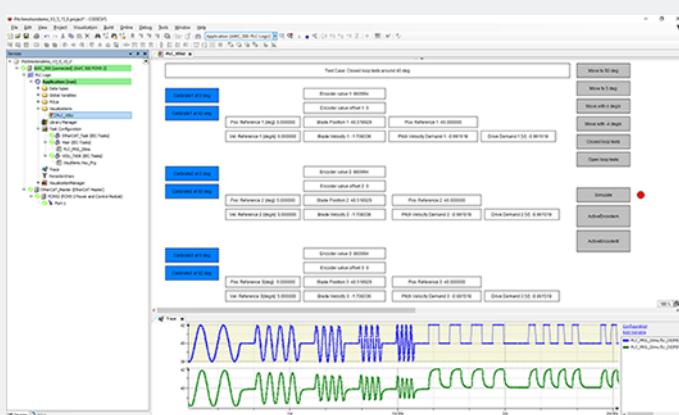
Linux® SDK (Software Development Kit) available for use with for example Eclipse IDE, Visual Studio IDE or CODESYS IDE.
```

AMC 600 Linux SDK

- Docker image with GNU gcc/gdb toolchain installed for remote compilation.

##### 3.1.2 IEC61131-3 programming

###### Application Development



AMC 600 CODESYS package



IEC61131-3 PLC-programmed based on CODESYS V3  
Programming languages:

- Sequential Function Chart (SFC)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Ladder Diagram (LD)
- ANSI C/C++ (via AMC 600 Linux SDK)
- Multi-language help in Chinese, German and English
- Programmed via Ethernet connection (TCP/IP)
- Download of boot projects and source code
- Integrated PLC and task configuration
- Web visualisation on PanelPC or remote via Secure communication (HTTPS)
- Online debugging and sampling
- Trace-integrated simulation

- CODESYS V3.5 IDE
- DEIF AMC 600 TSP (Target Support Package) with EtherCAT device description files.

### 3.1.3 Supported software features

Software	AMC 600 Linux SDK	AMC 600 CODESYS (with Web visualization)
<b>PLC runtime</b>	-	CODESYS V3.5 SP18+
<b>Programming</b>		
IEC61131-3	-	LD, SFC, FBD, CFC, ST
	-	CODESYS V3.5 SP18+ IDE
C/C++	ANSI C/C++	Yes, as External Implemented libraries components and Components (.so files)
<b>Network protocols</b>		
	File Transfer Protocol (FTP), server and client (disabled by default)	
	Secure/SSH File Transfer Protocol (SFTP), server	
	Trivial File Transfer Protocol (TFTP), client	
	Secure Copy (SCP), server and client	
	Secure Shell (SSH), version 2, server and client	
	Network Time Protocol (NTP), client	
	Dynamic Host Configuration Protocol (DHCP), client	
	Access to cUrl from Linux OS	
<b>Visualisation</b>		
	HTML5/Javascript via build-in webservers	CODESYS Web visualisation
<b>System Configuration</b>		
	Webbased system configuration for IP address (static/dynamic), host name, change root, operator, admin, service user passwords, system information etc.	
Device handling	See separate Application Note <a href="https://docs.deif.com/secure/linux-sdk-examples/interface-local-io-pcm61-via-ethercat-vscode/index.html">https://docs.deif.com/secure/linux-sdk-examples/interface-local-io-pcm61-via-ethercat-vscode/index.html</a>	CODESYS Device handling (EtherCAT Master, CANOpen Manager, Profibus Master etc.)
<b>Configuration</b>		
Visualisation designer		CODESYS V3.5 visualisation
Scope/trace		Scope/trace
<b>HMI visualisation tool</b>		CODESYS web visualisation
		Panel PC and remote HMI client (communication via HTTPS) Requires: Browser with HTML5/JavaScript support, such as Chrome, Firefox, Safari, Edge, and more
<b>Controller redundancy</b>	-	Yes - CODESYS Controller Redundancy (Option)

### Communication protocols

Software	AMC 600 Linux SDK	AMC 600 CODESYS (with Web visualization)
OPC UA Server	-	Yes - CODESYS OPC UA Server
OPC UA Client	-	Yes - CODESYS OPC UA Client via Single License (purchase separately from CODESYS Store)
Modbus TCP Server	-	Yes - Modbus TCP Server (CODESYS)

Software	AMC 600 Linux SDK	AMC 600 CODESYS (with Web visualization)
		libModbus (DEIF)
Modbus TCP Client	-	Yes - Modbus TCP Server (CODESYS) libModbus (DEIF)
Modbus RTU Master	-	Yes - Modbus TCP Server (CODESYS) libModbus (DEIF)
Modbus RTU Slave	-	Yes - Modbus RTU Slave (CODESYS)
EtherCAT Master	Yes	Yes - EtherCAT Master (CODESYS)
CAN Layer II	-	Yes - via CODESYS library
CANopen Master	-	Yes - CANopen Master (CODESYS)
CANopen Slave	-	Yes - CANopen Slave (CODESYS)
PROFINET V2.3 Class A RT CONTROLLER	-	Yes - (CODESYS)
PROFINET V2.3 Class A RT DEVICE	-	Yes - (CODESYS)
Others		On request or via CODESYS Single License

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

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