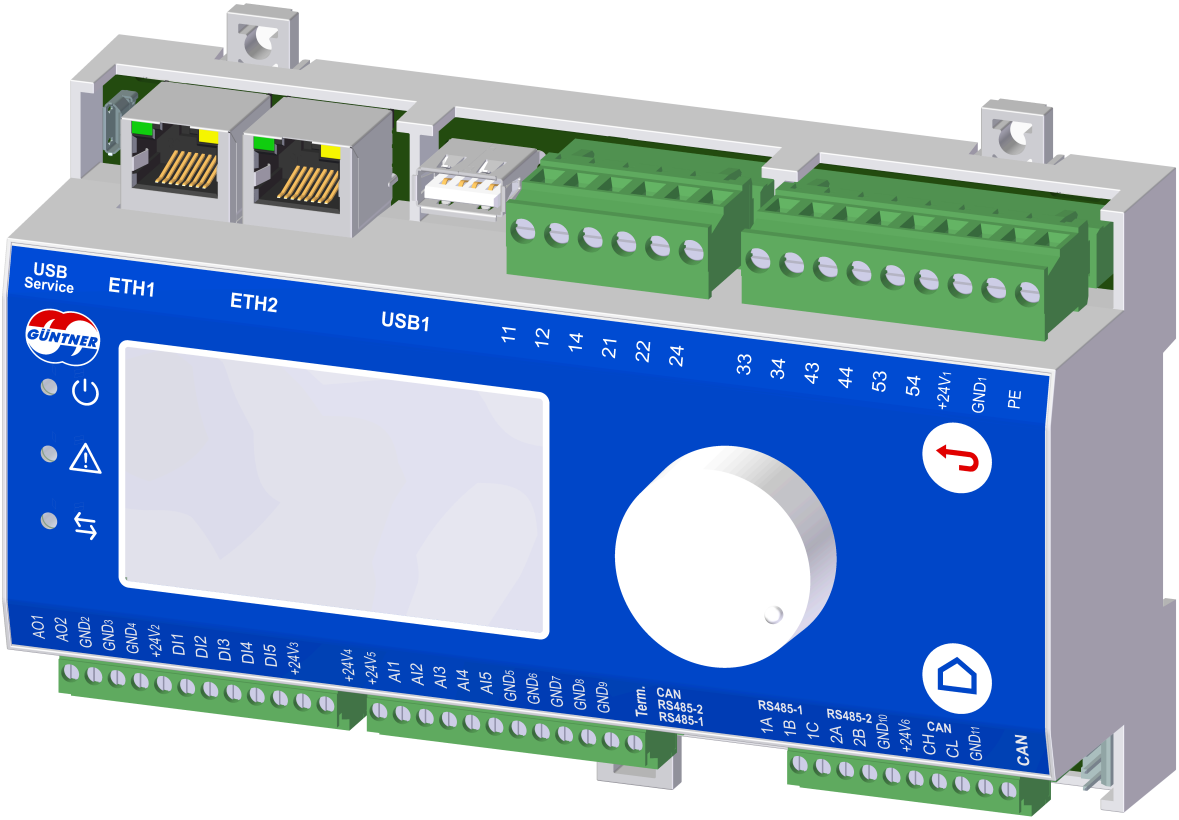
Data sheet GMMnext Rail.1



ERP No.:	5207684	GMMnext Rail.1

www.guentner.de

Contents

1 GMMnext Rail.1

1.1 Functional description

The GMMnext Rail.1 serves to control fans. The speed of the connected fans is adjusted depending on the control deviation between the actual value and the setpoint.

In order to ensure controlled operation, the controller must have a power supply and must be enabled via the digital input (DI1 by default). If it is not enabled, the process will not be controlled.

The unit has an internal PID controller, whose parameters (amplification factor, integral and differential time) can be configured either via the menu or via a field bus interface like e.g. Modbus RTU (RS485-1) or Modbus TCP (ETH1/ETH2).

The setpoint can be specified via the internal menu, an external analogue value or an internal or external communication interface. The actual value is determined via a pressure sensor (4-20mA), a temperature sensor (PT1000) or a 0-10V signal.

Via an GMOD 08 communication modul extension, up to 8, 16 or 24 EC fans can be controlled. These fans must be set up for the condenser or dry cooler, depending on the design of the heat exchanger. These settings are necessary on initial commissioning and may need to be repeated when a fan is replaced.

This commissioning determines the performance and noise emissions.

The GMMnext Rail.1 automatically detects whether commissioning is necessary when it is switched on. If this is the case, it will jump to the commissioning menu and the user will be guided through the commissioning process.

The GMMnext Rail.1 has the following inputs and outputs:

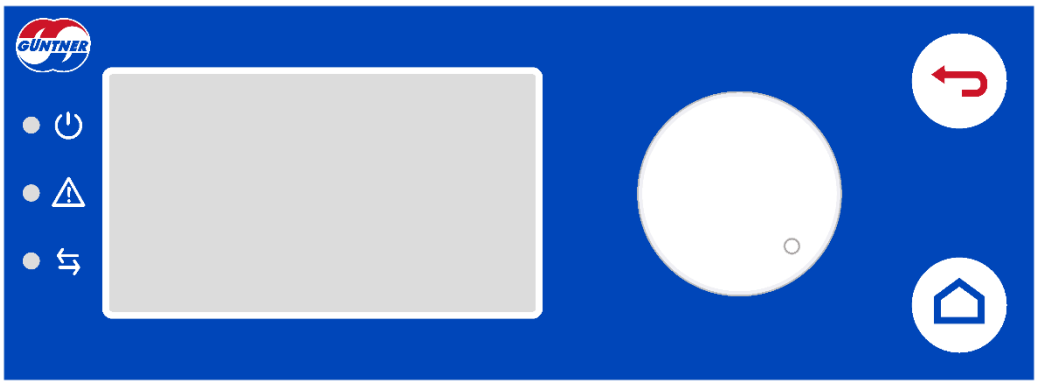
- 5 analogue inputs (AI1 to AI5), each one variably configurable
- 2 analogue outputs (AO1 to AO2)
- 5 digital inputs (DI1 to DI5)
- 5 digital relay outputs (DO1+ DO2 changeover contacts, DO3 to DO5 closers).

The profiles and functions of the inputs and outputs can be set via the IO-configuration menu in conjunction with settings for the functions themselves. The digital inputs are designed for positive voltages of a nominal +24V.

NOTICE

Please note that connecting the wrong voltage (e.g. 230V) may destroy the controller!

1.2 Operating unit



Controls GMMnext Rail.1

Status LED	Description
⏻	**General operating state** *1) LED status: Off → No supply voltage Green → Ready, no error Orange → Warning Red → Serious error in the control device, user must take action
⚠	**Alarm status** *1) LED status: Off → No active control activity Green → System operating normally Orange → Warning, maintenance request, critical operating state (e.g. overload) Red → Control error, user must take action
⇆	**Internal/external communication** *1) LED status: Off → No active int. / ext. communication Green → Active communication status Orange → Warning (faults, overload...) Red → Error, communication disrupted

Status display GMMnext Rail.1

*1) More detailed information regarding the meaning of LED statuses and flashing LEDs can be found in the user manual.

1.3 Configuration table

NOTICE

The following table shows a “standard configuration” of the control device following commissioning. Details of all possible configurations can be found in the section Function table, page 6.

	I/O	Signal/Profile	Function
X1	DI1	24V	Enable
	DI2		No function
	DI3		No function
	DI4		No function
	DI5		No function
X2	AI1	0...10V 2...10V 0...20mA 4...20mA Resistance thermometer	4...20 mA pressure sensor (scaling 0-25 bar) *1)
	AI2		0...10V no function
	AI3		PT1000 outlet temperature (-30...100°C) *2)
	AI4		0...10V control value slave (0...100%) *3)
	AI5		0...10V no function
X1	AO1	0...10V 2...10V	Control value of fan group 1
	AO2		No function
X9	DO1	Floating relays	Alarm message Prio 1 (contact11/12 closed)
	DO2		Alarm message Prio 2 (contact 21/22 closed)
X10	DO3		Operating state
	DO4		Threshold function
	DO5		No function

Configuration table GMMnext Rail.1

*1): Condition: Heat exchanger = condenser and operating mode = automatic internal
*2): Condition: Heat exchanger = dry cooler and operating mode = automatic internal
*3): Condition: Operating mode = slave external analogue

1.4 Function table

The following table shows the possible functions of the GMMnext. Depending on the wiring of the controller, these functions can be selected individually in the service menu/the I/O configuration or rather in the sensor configuration and in the respective functions. Some functions (e.g. digital inputs) can be assigned several times to different functions. A multitude of different sensors can be configured, which can then be assigned to the respective analog inputs. For the analog inputs, by selecting a profile, the measurement can be switched between current, voltage and resistance.

I/O type	Function	Possible I/Os	Recommendation *1
DO (relay)	Alarms prio 1	DO1 + DO2	DO1
DO (relay)	Alarms prio 2	DO1 + DO2	DO2
DO (relay)	Operating state	DO1 to DO5	DO3
DO (relay)	Threshold function	DO1 to DO5	DO4
DI (24 V)	Enable fans	DI1 to DI5	DI1
DI (24 V)	Switch over to setpoint 2	DI1 to DI5	DI3
DI (24 V)	Heating mode	DI1 to DI5	DI3
DI (24 V)	Switch on manual mode	DI1 to DI5	DI4
DI (24 V)	Switch on night setback	DI1 to DI5	DI2
DI (24 V)	Switch on inverse operation	DI1 to DI5	DI5
DI (24 V)	External fault message	DI1 to DI5	DI5
AI (0...20 mA)	Currently no function	AI1 to AI5	
AI (4...20 mA)	Pressure sensor, e.g. actual value for the control cycle (scaling should be configured separately, e.g. 0...25 bar or 0...40 bar)	AI1 to AI5	AI1
AI (4...20 mA)	Active temperature sensor, actual value for the control cycle (scaling should be configured separately, e.g. -30....70°C)	AI1 to AI5	AI3
AI (4...20 mA)	Active temperature sensor, external temperature (scaling should be configured separately, e.g. -50....50°C)	AI1 to AI5	AI2
AI (4...20 mA)	Control value 0...100 % for the fans in slave external analogue operating mode	AI1 to AI5	AI4
AI (4...20 mA)	External setpoint (scaling should be configured separately)	AI1 to AI5	
AI (4...20 mA)	Setpoint displacement (scaling should be configured separately)	AI1 to AI5	
AI (0...10 V)	Pressure sensor, e.g. actual value for the control cycle (scaling should be configured separately, e.g. 0...25 bar or 0...40 bar)	AI1 to AI5	

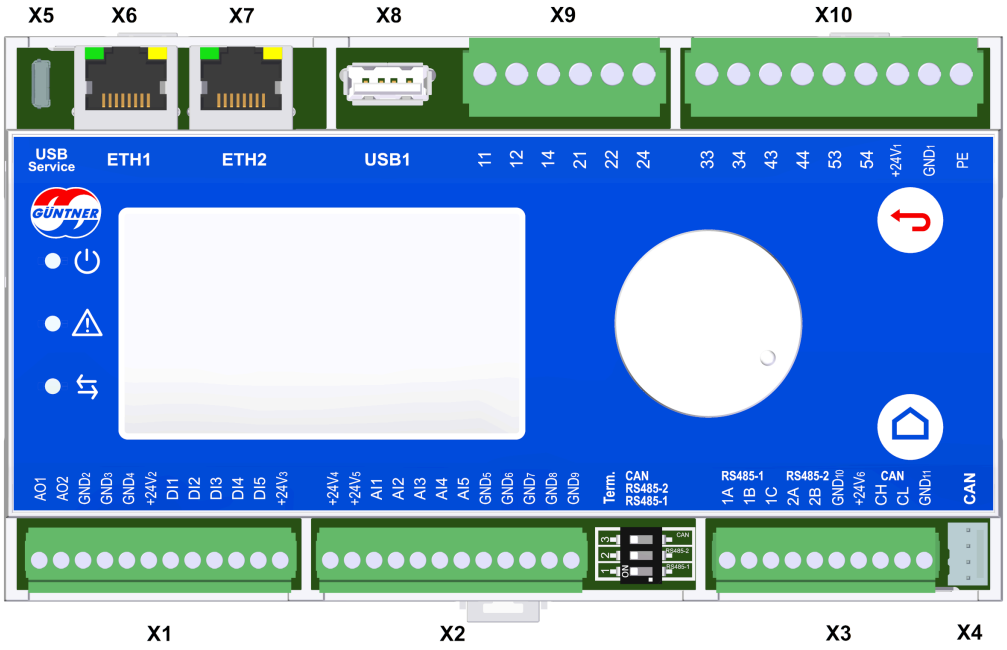
Function table GMMnextRail.1

I/O type	Function	Possible I/Os	Recommendation *1
AI (0...10 V)	Active temperature sensor, e.g. actual value for the control cycle or external temperature (scaling should be configured separately, e.g. -30....70°C)	AI1 to AI5	
AI (0...10 V)	Active temperature sensor, external temperature (scaling should be configured separately, e.g. -50....50°C)	AI1 to AI5	
AI (0...10 V)	Control value 0...100 % for the fans in slave external analogue operating mode	AI1 to AI5	AI4
AI (0...10 V)	External setpoint (scaling should be configured separately)	AI1 to AI5	
AI (0...10 V)	Setpoint displacement (scaling should be configured separately)	AI1 to AI5	
AI (PT1000)	Recording the outlet temperature	AI1 to AI5	AI3
AI (PT1000)	Recording the inlet temperature	AI1 to AI5	AI2
AI (PT1000)	External temperature	AI1 to AI5	
AO (0...10 V)	Control value 0...100 % of the PID controller (control cycle 1...5)	AO1/AO2	
AO (0...10 V)	Control value of the fan group 1	AO1/AO2	AO1
AO (0...10 V)	Control signal for the subcooler fan	AO1/AO2	AO2

Function table GMMnextRail.1

*1: The recommendation is a suggestion for a consistent system configuration.

1.5 Connections



Connections and component parts GMMnext Rail.1

	Name	Description
X1	AO1	Analogue outputs, depending on the configuration 0-10V
	AO2	
	GND_2	Ground potential for analogue outputs / digital inputs
	GND_3	Ground potential for analogue outputs / digital inputs
	GND_4	Ground potential for digital inputs
	$+24V_2$	+24V - Positive supply voltage for digital inputs (when floating switching contacts are used) and connected sensors
	DI1	Digital inputs +24V, GND_{2-4} as reference potential
	DI2	
	DI3	
	DI4	
	DI5	
	$+24V_3$	+24V – Positive supply voltage for digital inputs

	Name	Description	
X2	$+24V_4$	+24V – Positive supply voltage for connected sensors and encoders	
	$+24V_5$		
	AI1	Analogue inputs, depending on the configuration 0-10V, 2-10V, 0..20mA, 4.20mA or PT1000	
	AI2		
	AI3		
	AI4		
	AI5		
	GND_5	Ground potential for analogue inputs	
	GND_6		
	GND_7		
	GND_8		
	GND_9		
X3	1A	Signal A / Data +	RS485-1: External Modbus interface (galvanically isolated)
	1B	Signal B / Data -	
	1C	Common / GND reference potential RS485-1	
	2A	Signal A / Data +	RS485-2: Internal Modbus interface master mode
	2B	Signal B / Data -	
	GND_{10}	Common / GND reference potential RS485-2	
	$+24V_6$	+24 VDC (max. 500mA)	+24V – Positive supply voltage for Modbus / CAN units
	CL	CAN low	CAN bus
	CH	CAN high	
	GND_{11}	GND reference potential	Ground potential for CAN bus
X4	CAN	CAN bus plug-in connector	
X5	USB service	Service interface (micro USB socket, USB2.0 high speed). This interface is intended exclusively for service applications.	
X6	ETH1	Ethernet interface *1)	
X7	ETH2	Ethernet interface *1)	

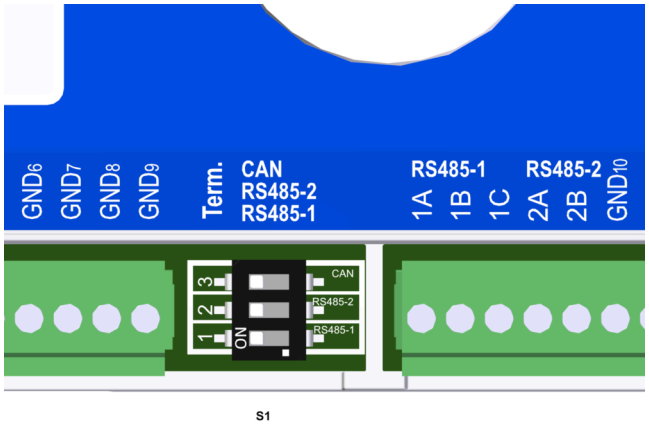
	Name	Description	
X8	USB1	USB expansion interface (USB type A, socket, USB2.0 high speed). This interface can be used for: • Connection of a USB storage medium to: ° Make software updates ° Save and load parameter sets (configuration data) • Connect external peripheral devices such as network adapters (WLAN/LAN)	
X9	DO1	11 (COM)	Digital output 1 / relay 1
		12 (NC)	
		14 (NO)	
	DO2	21 (COM)	Digital output 2 / relay 2
		22 (NC)	
		24 (NO)	
X10	DO3	33 (COM)	Digital output 3 / relay 3
		34 (NO)	
	DO4	43 (COM)	Digital output 4 / relay 4
		44 (NO)	
	DO5	53 (COM)	Digital output 5 / relay 5
		54 (NO)	
	$+24V_1$	+24 VDC	Supply voltage with functional earthing
	GND_1	GND reference potential	
	PE	Protective earth	

GMMnext Rail.1 connections

*1) The Ethernet interfaces ETH1 + ETH2 are separately configurable interfaces. The assignment of the usable functions (e.g. Ethernet-based field buses) to the respective interface is done in the service menu. For details please refer to the operating manual.

1.6 DIP switch

The termination of the RS485-1 bus, the RS485-2 bus and the CAN bus can be switched on and off using the DIP switch S1 on the base board.



DIP switch S1

	Switch	State	Description	Interface
S1	1	OFF	RS485-1 – Termination off	RS485-1 Modbus interface (galvanically isolated) *1), *2)
		ON	RS485-1 – Termination active	
	2	OFF	RS485-2 – Termination off	RS485-2 Modbus interface *1), *2)
		ON	RS485-2 – Termination active	
	3	OFF	CAN bus – Termination off	CAN bus *3)
		ON	CAN bus – termination active	

DIP switch settings

*1) Termination must be activated only for the first and last unit in the Modbus network. Termination may be deactivated for all other units.

*2) This interface has polarization for the RS-485 bus which can be configured via interface parameters. Polarization is the pre-defined state of the signalling lines when the bus is inactive via pull-up and pull-down resistors. If a unit requires polarization, it must be activated in the RS485 network. However, polarization may only be active at one location in the bus. This is typically achieved on the master or management point of the bus. If it is not possible to activate polarization there, it can also be activated on another bus subscriber.

*3) Termination must be switched on for the first and last CAN bus subscriber. Termination must be switched off for all other subscribers.

1.7 Electrical properties of

Description	Min	Type	Max	Unit
Power supply				
Supply voltage	20	24	28	V
Current consumption (24 VDC) *1)		200	400	mA
Power consumption *1)		4.8	9.6	W
Digital inputs				
Potential separation	No			
High level (digital mode) *2)	16	24	28	V
Low level (digital mode) *2)	-1	0	5	V
Frequency (digital mode) *2)			20	kHz
Input resistor:	35			kΩ
Relay outputs				
Potential separation	Yes			
Voltage DC		24	30	V
Voltage AC			250	V
Current resistive load (30 VDC)			1.0	A
Current inductive load (30 VDC)			0.45	A
Current resistive load (250 VAC)			1.5	A
Current inductive load (250 VAC)			0.6	A
Switch cycles, mechanical	$1*10^5$			Switching cycles
Switching cycles, electrical	$1*10^5$			Switching cycles

*1) The maximum current consumption includes supplying 2 connected pressure transmitters and 1 connected temperature sensor.

*2) Digital inputs can be operated in analogue or digital mode. The switching levels in analogue mode are configured via software parameters.

Description	Min	Type	Max	Unit
Analogue input general				
Potential separation		No		
Dielectric strength	-5		30	V
Resolution			12	Bit
Analogue input voltage mode 0..10V				
Measuring range	0		12	V
Error		0.25	0.5	%[*3)]
Input resistor:	100			kΩ
Analogue input current mode 0..25mA				
Measuring range	0		25	mA
Error		0.25	0.5	%[*3)]
Input resistor in the measuring range (without protective circuit)		110	150	Ω
Analogue input PT1000 mode				
Measurement range (resistance)	800		1500	Ω
Error (resistance)		1.5	2.0	Ω
Measuring range (temperature)	-50		130	°C
Error (temperature)		0.4	0.6	K
Measured current		1	1.4	mA
Voltage output 0..10V				
Potential separation		No		
Voltage range	0		10	V
Load resistance		>=5		kΩ
Resolution			12	Bit
Error (I_{out} <= 1mA)			1	%[*4)]
Short circuit protection		Yes		
Short circuit current (I_{out_max})			5	mA
Ethernet interface 1 / 2				
Dielectric strength			2	kV
Transmission rate	10		100	MBit
Autonegotiation		Yes		
Auto MDI-X		Yes		
Galvanic separation		Yes		

[*3)] error relating to measuring range end value

[*4)] error relating to range end value

Description	Min	Type	Max	Unit
USB service interface				
OTG capability		Yes		
Voltage supply U_{out} (host mode)	4.5	5		V
Voltage supply I_{out} (host mode)			500	mA
Transmission rate	1.5		480	Mbit/s
USB1 interface				
OTG capability		No		
Voltage supply U_{out} (host mode)	4.5	5		V
Voltage supply I_{out} (host mode)			500	mA
Transmission rate	1.5		480	Mbit/s
CXP interface				
Plug and play recognition of expansion module		Yes		

Electrical properties

1.8 Installation / Operating conditions

- The module is designed for mounting on a top-hat rail.
- All measurement and signalling lines must be connected via shielded cables.
- The shielding of measuring, signal and bus lines must be earthed at one end only.
- Suitable shielding and routing measures must be taken to ensure that mains cables and motor cables do not give rise to any interference in signal and control lines.
- Recommended RS 485 cables: Belden9841, Lapp Unitronic LD 2170203 / 2170204 / 2170803, Helukabel 81910
- Recommended Ethernet cables: min. CAT.5e (CAT.5 from 2003), recommended: CAT.6, CAT.7; cable structure: S/FTP (overall shield mesh, pair shield foil), F/FTP (overall shield foil, pair shield foil), SF/FTP (overall shield mesh+foil, pair shield foil)
- Temperature in operation: -20°C ~ +65°C
- Temperature for storage and transport -20°C ~ +70°C, dry
- Protection class: IP 20

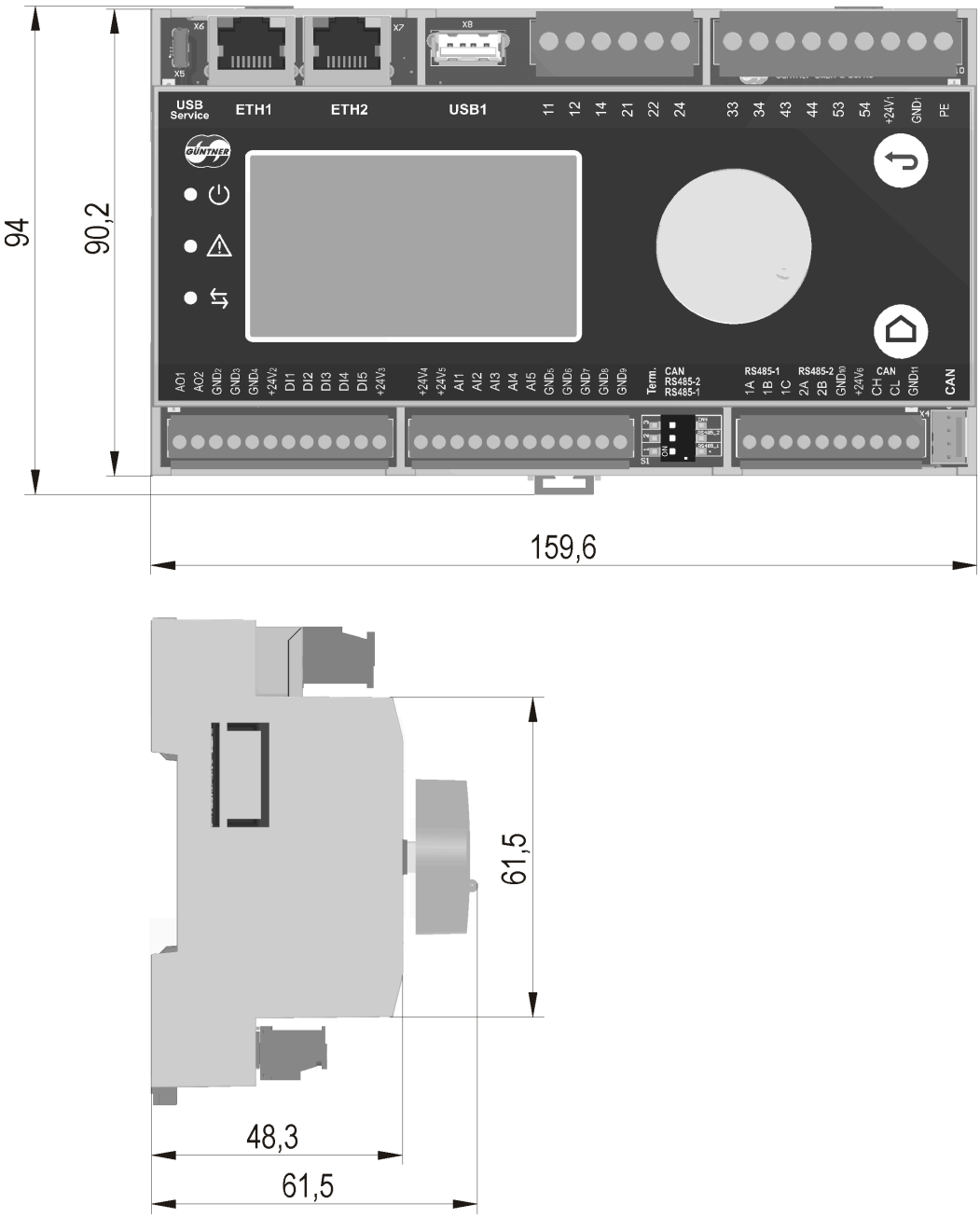
The GMMnext Rail.1 complies with the following EMV standards:
- EN 61000-6-2 (Interference immunity for industrial environments)
- EN 61000-6-3 (Noise emission for residential use)
- IEC 61000-4-4/-5/-6/-11

1.9 Scope of delivery

- GMMnext Rail.1 pre-assembled with board connector
- Data sheet

1.10 Dimensions / weight

GMMnext Rail.1



Dimensions of GMMnext Rail.1

All values in mm

Weight: approx. 337g

1.11 Options

The GMMnext Rail.1 can be expanded with an interface module.

The module is placed on the left side of the controller and uses the controller's Communication Expansion Port (CXP). This port is located behind the removable cover on the left side panel.

For technical details, please see the relevant data sheets or interface specifications.

These can be downloaded from the "Controls" area of the Güntner homepage (www.guentner.eu).

2 Picture index

3 Table index