SIEMENS

Desigo™ TRA

Compact room automation stations, BACnet MS/TP, AC 230 V

DXR2.M09.., DXR2.M09T.., DXR2.M10..

For building with increased demands placed on functionality and flexibility in Total Room Automation applications (TRA) and fan coil applications.

- Compact, programmable room automation stations for HVAC, lighting, and shading
- Communication BACnet MS/TP (BTL certified)
- KNX PL-Link bus to connect sensors, actuators, and operator units (including bus power)
- USB interface
- Operating voltage AC 230 V
- Mounted on standard DIN rails or on the wall
- Plug-in terminal blocks

Features

Programmable

The DXR2... room automation stations provide the infrastructure for system and application-specific functions and can be programmed.

Compact series

The compact build permits mounting in narrow spaces and on standardized rails, and is particularly well suited for compact panels or plants with integrated panel.

Plug-in terminal blocks

Plug-in terminal blocks to easily exchange room automation stations.

Use

- Radiators, chilled/heated ceilings, fan coil applications.
- Total Room Automation (TRA) applications combining multiple disciplines (HVAC, lighting, shading) into one comprehensive solution. TRA offers the highest level of flexibility for energy-optimized solutions without sacrificing comfort.
- TRA applications can be extended with lighting and blinds applications via KNX PL-Link.

Preinstalled applications

- Fan coil: Cooling or heating, cooling and heating (2-pipe), or cooling/heating (4-pipe), supply air minimum limitations, outside air control
- Chilled beam active or passive cooling (2-pipe) or cooling/heating (2-pipe) or cooling/heating (4-pipe)
- Radiant ceiling: Cooling, cooling and heating (2-pipe), or cooling/heating (4-pipe)
- Radiator: Hot water, steam (2 or 4-pipe) or electric stepped controlled
- Light: Up to 4 separate zones
- Blinds: 1 or 2 motors

Application options

- Separate temperature setpoints for up to 4 operating modes.
- Chilled water and hot water valve (2-pipe or 4-pipe)

Functions

The selected application and its parameters as well as input and output configuration determine the room automation station's functionality.

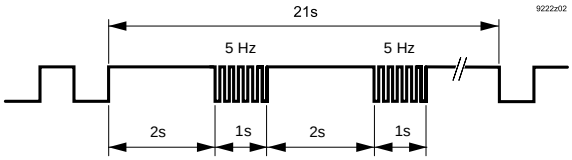
A detailed description of functionality is available in the ABT (Automation Building Tool) online help.

Communication

- BACnet MS/TP
- USB connection for service and commissioning, firmware download, and LAN access.
- The following functions are available with the KNX PL-Link bus:
  - Communication with room operator units, switches, sensors, actuators, and luminaires.
  - Plug-and-play connection of Siemens field devices with KNX PL-Link.

LED indication

LED	Color	Activity	Function
RUN	Green	Steady ON	Device is ready for operation
		Steady OFF	Device is not powered
		Regular flashing	Start-up or the program is stopped

LED	Color	Activity	Function
	Red	Steady OFF	OK
		Steady ON	Program error Communications error (KNX PL-Link) Hardware fault
		Rapid flashing	Wrong or corrupt software No application loaded
		Blinking per wink command	Physical device identification
			

Service button (SVC)

Physical identification on the network.

Technical design

Power supply

The power supply provides controlled voltages to the actuators. The room automation stations also supply AC 24 V field supply. The supply is located in the device to simplify wiring and diagnostics.

The processor controls the power supply. This ensures clean conditions for field devices connected to the I/Os during startup, shutdown, and undervoltage.

Bus power supply

The room automation station includes the bus power for KNX PL-Link. The bus power is switched on by default, but can be switched off via web interface or configuration in the Automation Building Tool (ABT).

The internal KNX PL-Link supply cannot be operated parallel to external power supplies. The internal KNX PL-Link power must be switched off during the engineering phase for external power. This is typically the case if the 50 mA from the internal supply is not enough to supply all devices connected on the KNX PL-Link bus.

Type summary

The devices are supplied without terminal covers. The terminal covers must be ordered separately. See Section **Accessories**.

Type	Stock number	Applications	Inputs	Outputs
DXR2.M09-101A	S55376-C116	Fan coil, radiant ceiling, radiator, 4 luminaires & 2 blinds	1 DI, 2 UI	3 relays, 3 AO
DXR2.M09T-101A	S55376-C117			4 Triacs, 1 AO, 1 relay
DXR2.M10-101A	S55376-C115			4 Triacs, 3 relays

Accessories

Type	Stock number	Designation
DXA.H110	S55376-C119	Terminal cover for DXR.. 110 mm, 2 pieces

Product documentation

Topic	Title	Document ID:
Installation, cable length, topology	Desigo TRA installation guide	CM111043
Engineering and commissioning, workflow	ABT online help	n/a
Commissioning	Desigo TRA - Setup and Service Assistant	CM111050
Product environmental declaration	Product environmental declaration 230 V	CM1E9204
Product environmental declaration	Product environmental declaration 24 V	CM1E9205

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Notes

Safety

⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

Engineering

Identification

Each device has a unique serial number to ensure efficient commissioning. It is provided on the adhesive barcode label. The serial number can be read directly into the engineering tool using a barcode reader.

Wiring

Wiring must be sufficiently insulated to the available rated voltage. Sizing and fusing of the wiring depends on the connected load.

The looped supply (230 V) is interrupted when plug 51-54 is disconnected from the device. Bridges 51-53 and 52-54 are located on the PCB, not the plug.

Potential-free relay outputs AC 230 V

Potential-free relay outputs allow for switching loads up to AC 250 V, 4 A (3 A). The circuits have no internal fuse. They must have an external fuse (≤ 10 A).

Sizing Triacs on preloaded applications

The entire load (Triacs) for actuators cannot exceed 4 VA (6 VA briefly for heating up thermal actuators).

On preloaded applications, PWM, priorities, alternating locking, and division of sequences ensures that no more than one Triac is active at any time.
For details, see Installation guide Desigo TRA CM111043.

In other words, only the highest connected load on one of the Triacs is relevant to calculating power.

An exception is the use of Triacs as digital outputs. Triacs as digital outputs are not subject to locking or prioritization and must be added to the power consideration.

They must be operated with internal power to protect Triac outputs against overloading.

The maximum overall load is calculated as follows:

Highest load at one of the Triacs used by the application

\+ Load at digital outputs

Examples

	Example 1: DXR2x10.., 09T			Example 2: DXR2.x10.., 09T			
Use	**Type**	**Signal**	**Load**	**Use**	**Type**	**Signal**	**Load**
Fan coil heating	STP73	PWM	2.5 W / (6 VA)	**Radiator**	STP73	PWM 5...50%	2.5 W / (6 VA)
Chilled ceiling cooling	STP73	PWM	2.5 W / (6 VA)	**Radiator**	STP73	PWM 5...50%	2.5 W / (6 VA)
Outside air damper	GEB131.1E	3-position	**4 VA**	**Chilled ceiling**	STP73	PWM 5...50%	2.5 W / (6 VA)
Digital output	-	-	-	**Chilled ceiling**	STP73	PWM 5...50%	2.5 W / (6 VA)
Overall load			**4 VA / (6 VA)**				**2.5 W / (6 VA)**

Sizing DC 0…10 V outputs and field supply

Total load (V~) cannot exceed 4 VA (6 VA briefly for actuator synchronization at start up or boost heating of thermal actuators).

The DC 0…10 V outputs supply max. 1 mA.

	Example 1: DXR2x09			Example 2: DXR2.x09			
Use	**Type**	**Signal**	**Load**	**Use**	**Type**	**Signal**	**Load**
Fan coil heating	SSB61	DC 0...10 V	2.5 VA	**Radiator**	STP63	DC 0...10 V	2.5 W / (6 VA)
Chilled ceiling cooling	-	-	-	**Radiator**	-	-	-
Outside air damper	GLB161.1E	DC 0...10 V	**3 VA**	**Chilled ceiling**	STP63	DC 0...10 V	2.5 W / (6 VA)
Digital output	Relay	BO	0.5 VA	**Chilled ceiling**	-	-	-
Overall load			**3.5 VA**				**2.5 W / (6 VA)**

	Example 3: DXR2x09		
Use	**Type**	**Signal**	**Load**
Chilled/heated ceiling	-	-	-
6-port control ball valve	GDB116.9E	0…10 V	**3 VA**
Condensation monitor	QXA2100	DI	**1 VA**
Overall load			**4 VA**

!	*NOTICE*
	Separate AC 24 V supply for field devices (V~) A separate AC 24 V field supply is required if field devices and Triac outputs use more than 4 VA or have peak loads in excess of 6 VA.

Digital inputs

Digital inputs are not suitable for operating lighting or blinds. Use the KNK PL-Link pushbutton.

Mounting

The room automation stations can be snapped onto standard rails or screwed onto a flat surface.

⚠ CAUTION

Risk of overheating for failure to comply with ambient temperature

Burning and damage to the device

- Ensure sufficient ventilation to comply with the permissible ambient temperature within the panel or installation box. The temperature must be 10° C (18° F) lower outside the installation box.

Mounting position

Ambient temperature -5...45 °C (23...113°F)	Ambient temperature -5...50 °C (23...122°F)
1. Overhead 2. Wall, vertically – From top to bottom – From bottom to top 3. On a horizontal surface	• Wall, horizontal – From left to right – From right to left

Installation

NOTICE

No protection against incorrect wiring on 230 V

The device is damaged

- Do not connect mains power to the low voltage side.

⚠ WARNING

No internal line protection for supply lines to external consumers

Risk of fire and injury due to short-circuits!

- Adapt the line diameters as per local regulations to the rated value of the installed fuse.

Connection terminals

⚠ WARNING

The connected plug-in terminals supply mains voltage

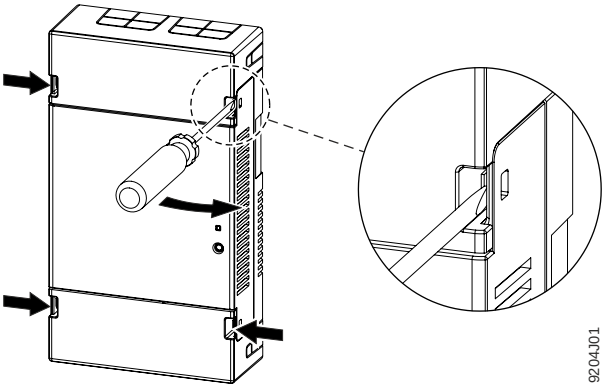
Can result in death or serious injury.

- Disconnect all power to the plug-in terminals prior to plugging in or taking off the connectors.

Terminal cover

Terminal covers protect the connection terminals against dirt, and users against electrical shock. Break off the cable inlets to insert the cables to the room automation station.

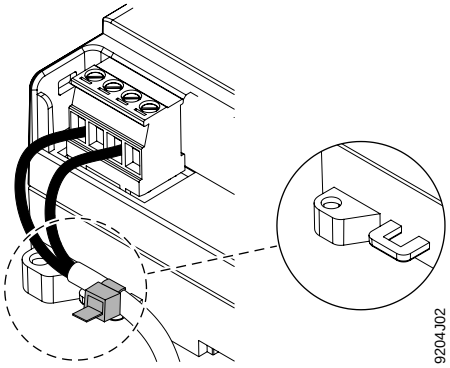
To take off the terminal cover:



Strain relief

Strain relief protects flexible electrical wiring against mechanical stress. Cable strain relief is required for wires to terminals 51…64 (AC 230 V).

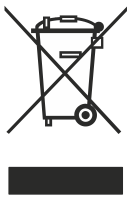
The wiring must be fixed using cable binders to the tabs on the housing base.



Operation

The outputs have no electricity when power fails.

Disposal



The device is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications is only valid on Siemens products. Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

Housing

Color	RAL 7035 (light-gray)
Dimensions	See Dimensions
Weight Automation station Terminal cover Packaging	 ca. 310 g ca. 60 g ca. 30 g

Function data

Processor	Texas Instruments AM3352, 300 MHz
RAM	128 MByte SDRAM (DDR3) 512 MByte NAND Flash
Communication A/D Resolution (analog in) D/A Resolution (analog out)	 14 Bit 12 Bit

Power data

Power supply	
Operating voltage	AC 230 V
Frequency	50/60 Hz
Power consumption including connected field devices	Max. 18 VA
Internal fuse	0.5 A irreversible
Transit power	Max. 6 A

Apparent power at 230 V (VA)				
	Basic load including I/O without Triacs and field supply	**Max. load to supply Triacs and field supply at 167 mA**	**Max. load KNX PL-Link**	**Power consumption including connected field devices**
DXR2.M09..	6	8	4	18
DXR2.M09T..				
DXR2.M10..				

Inputs

The inputs are protected against incorrect wiring AC 24 V.

Inputs: Overview	
Type	**Inputs**
DXR2.M09..	1 DI, 2 UI
DXR2.M09T..	1 DI, 2 UI
DXR2.M10..	1 DI, 2 UI

Resistance sensor, analog (inputs X...)		
Type	**Range (over range)**	**Resolution**
AI 1000 Ohm *)	1 kΩ (0...1.05 kΩ)	1 Ω
AI 2500 Ohm *)	2.5 kΩ (0...2625 kΩ)	2.5 Ω
AI 10 kOhm *)	10 kΩ (0...10.5 kΩ)	10 Ω
AI 100 kOhm *)	100 kΩ (0...105 kΩ)	100 Ω

Temperature measurement, analog (inputs X...)		
Type	**Range (over range)**	**Resolution**
AI PT1K 375 (NA) *)	-40...70 °C (-45...75 °C) -40...158 °F (-49...167 °F)	25 mK 0.045 °F
AI PT1K 385 (EU) *)	-40...70 °C (-45...75 °C) -40...158 °F (-49...167 °F)	25 mK 0.045 °F
AI (LG-)Ni1000 *)	-40...70 °C (-45...75 °C) -40...158 °F (-49...167 °F)	25 mK 0.045 °F
AI Ni1000 DIN *)	-40...70 °C (-45...75 °C) -40...158 °F (-49...167 °F)	25 mK 0.045 °F
AI T1 (PTC) *)	-40...70 °C (-45...75 °C) -40...158 °F (-49...167 °F)	100 mK 0.18 °F
AI NTC10K	-40...70 °C (-45...75 °C) -40...158 °F (-49...167 °F)	25 mK (25 °C) 0.045 °F (77 °F)
AI NTC100K	-10...70 °C (-15...75 °C) 14...158 °F (5...167 °F)	25 mK (25 °C) 0.045 °F (77 °F)

*) A fixed value of 1 Ω is calibrated to correct line resistance.

Voltage measurement, analog (inputs X...)		
Type	**Range (over range)**	**Resolution**
AI 0...10 V	0...10 V (-1...11 V)	2 mV
AI 0...10 V standard	0...100% (-10...110%)	2 mV
Open connection: Negative voltage -1.5 V, 8 µA (line failure detection)		

Digital input (inputs X... or D...)	
Contact query voltage	Universal input: 18 V Digital input: 21 V
Contact query current	Universal input: 1.2 mA, 7.4 mA initial current Digital input: 1.6 mA, 9.4 mA initial current
Contact resistance for closed contacts	Max. 100 Ω
Contact resistance for open contacts	Min. 50 kΩ

Outputs

The outputs are protected against short circuiting and incorrect wiring AC 24 V.

Outputs: Overview	
Type	**Outputs**
DXR2.M09..	3 relays, 3 AO
DXR2.M09T..	4 Triacs, 1 AO, 1 relay
DXR2.M10..	4 Triacs, 3 relays

Analog (outputs Y10...Y40)			
Type	**Range (over range)**	**Resolution**	**Output current**
AO 0-10 V	0...10 V (0…10.5 V)	2 mV	Max. 1 mA
AO 0-10 V standard	0...100% 0% = 0 V, 100% = 10 V (0...10.5 V)	2 mV	Max. 1 mA

Relay outputs (outputs Q...)	
External supply line fusing Non-renewable fuse Circuit breakers	 max. 10 A, slow max. 13 A, characteristic B, C, D per EN 60898
Switching voltage AC/DC	max. AC 250 V / DC 30 V min. AC/DC 12 V
Current load AC	max. 4 A resistive, 3 A inductive (cos phi 0.6) min. 1 mA at AC 250 V min. 10 mA at AC 12 V
Current load DC	max. 3 A resistive at DC 30 V min. 10 mA resistive at DC 12 V
Switch-on current	Max. 10 A (1 s)
Response/release time	7 ms/3 ms typical
Contact life at AC 250 V (reference values) at 0.1 A resistive at 0.5 A resistive at 4 A resistive Reduction factor at ind. load (cos phi = 0.6)	 5 x 10^6 switching cycles 1 x 10^6 switching cycles 1 x 10^5 switching cycles 0.6
Insulating strength between relay contacts and system electronics (reinforced insulation).	AC 3750 V, as per EN 60730-1

Switching outputs Triac *) (outputs Y1...Y4)	
Type	Low side The Triac closes the contact to system neutral
Switching voltage	AC 24 V
Permissible load (continuous)	167 mA / 4 VA overall and per output
Permissible load (<300 s)	250 mA / 6 VA overall and per output
Protection against overload	Power limitation internal, max. 250 mA, resetting

Supply for field devices *) (outputs V~)	
Output voltage	AC 24 V
Permissible load (continuous)	Max. 4 VA
Permissible load (<300 s)	Max. 6 VA
Protection against overload	Power limitation internal, max. 250 mA, resetting Switch-on current max. 1 A, resetting

*) The maximum common load of the Triacs and field supply is 4 VA (continuous).

Connections

Interfaces	
MS/TP	Interface type: RS485 Galvanic isolation: Yes Baud rates: 9600, 19200, 38400, 57600, 115200 Protocol: BACnet over MS/TP Short-circuit proof Protection against faulty wiring at max. AC 24 V
USB (2.0)	Plug: Type B Data rate: 12 Mbps
KNX	Type: KNX TP1 PL-Link, galvanic isolation Baud rate: 9.6 kbps Bus power: 50 mA Short-circuit proof Protection against faulty wiring at max. AC 24 V

Wiring connections	
Pluggable screw terminals	Copper wire or copper stranded wire with connector sleeves 1 x 0.6 mm ø to 2.5 mm² (22 to 14 AWG) or 2 x 0.6 mm ø to 1 mm² (22 to 18 AWG) Copper stranded wire without connector sleeves 1 x 0.6 mm ø to 2.5 mm² (22 to 14 AWG) or 2 x 0.6 mm ø to 1.5 mm² (22 to 16 AWG)
Stripping length	6...7.5 mm (0.24...0.29 in)
Slotted screws	Size 1, tightening torque 0.6 Nm (0.44 lb-ft)
Wiring lengths for signals	KNX PL-Link 80 m (260 ft) with internal bus power or 300 m (990 ft) with external power supply MS/TP 1,000 m (3,290 ft) Signal lines 80 m (260 ft) For inputs AI 100 kOhm, AI NTC10K, AI NTC100K: 30 m (100 ft) or 80 m (260 ft), if shielded.

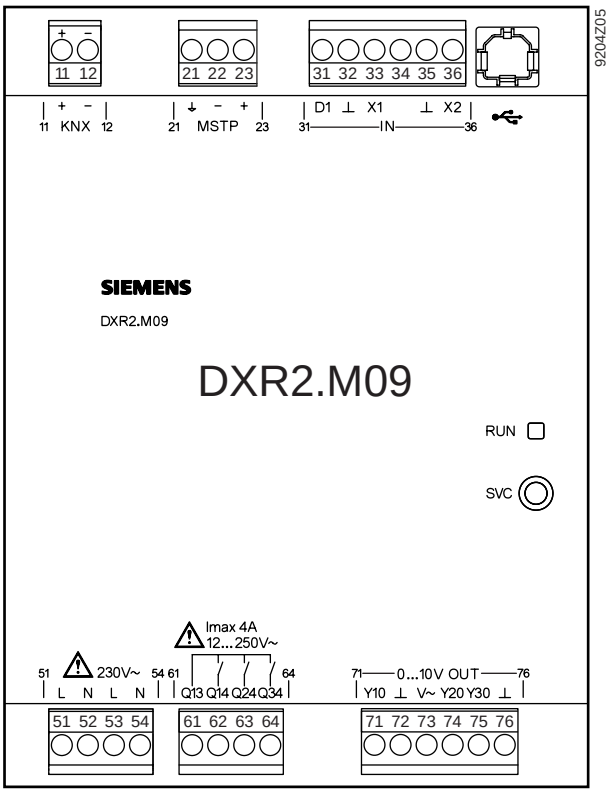
Conformity

Ambient conditions and protection classification	
Classification per IEC/EN 60730 Function of automatic control devices Pollution degree Overvoltage category	 Type 1 2 III
Design type	Device suited for use with equipment of safety classes I and II
Degree of protection of housing to IEC EN 60529 Room automation station With terminal cover	 IP20 IP30
Climatic ambient conditions • Transport (packaged for transport) as per IEC EN 60721-3-2 • Operation as per IEC/EN 60721-3-3	 • Class 2K3 Temperature -25...70 °C (-13... 158 °F) Air humidity 5...95% (non-condensing) • Class 3K5 Temperature -5...45 °C (23... 113 °F)/ -5...50 °C (23... 122 °F) See Mounting Air humidity 5...95% (non-condensing)
Mechanical ambient conditions Transport as per IEC/EN 60721-3-2 Operation as per IEC/EN 60721-3-3	 Class 2M2 Class 3M2

Standards, directives and approvals	
Product standard	IEC/EN 60730-1 Automatic electronic controls for household and similar use
Product family standard	EN 50491-2, EN 50491-3, EN 50491-5 General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS)
Electromagnetic compatibility	For residential, commercial, and industrial environments
EU conformity (CE)	EU declaration of conformance DXR2.. AC 230 V, see CM1T9204xx_1 EU declaration of conformance DXR2.. AC 24 V, see CM1T9204xx_2
RCM conformity	RCM declaration of conformance DXR2.. see CM1T9204xx_C1
EAC compliance	Eurasien compliance for all DXR2.xxx-xxxA variants
UL Approbation Federal Communications Commission	UL as per UL916, http://ul.com/database cUL as per CSA – C22.2 No. 205 FCC CFR 47 Part 15 Class B
BACnet	BTL listed, BACnet Application Specific Controller (B-ASC) BACnet Protocol Revision 13
Environmental compatibility	The product environmental declaration () contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal). See Section **Product documentation**.
Quality	ISO 9001 (Quality)

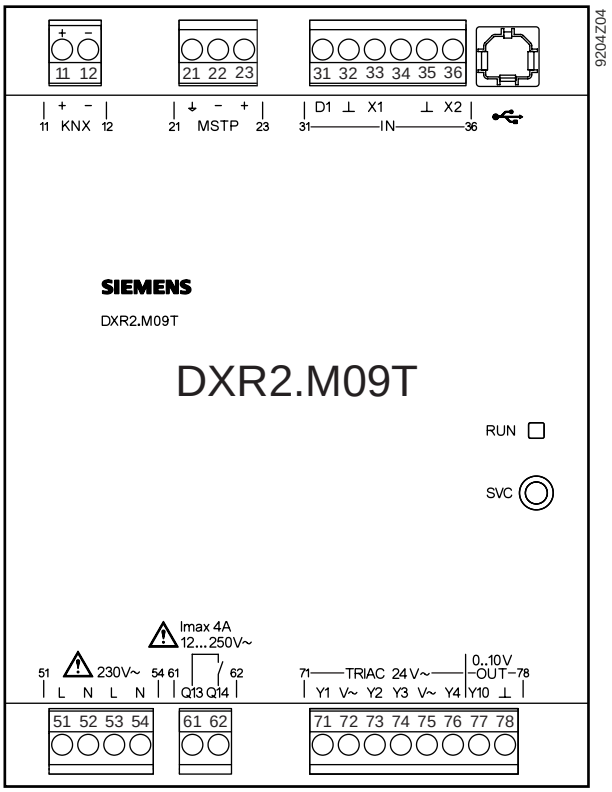
Connection terminals

DXR2.M09



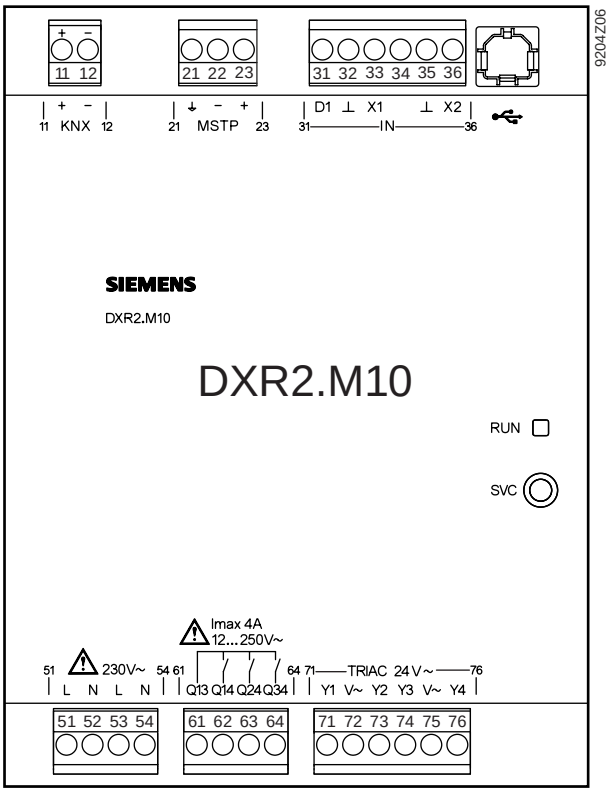
Pin	Description	Terminal	Module	Channel
21...23 MS/TP	MS/TP connection	⏚, +, -		
11, 12 KNX	KNX connection	+, -		
31...36 inputs	Digital input	D1	1	1
	Universal input	X1, X2	1	5...6
	System neutral	⊥		
USB	USB interface			
51...54 feed	Neutral conductor	N		
	Phase wire AC 230 V	L		
61...64 relays	Common wiring for Q14, Q24 and Q34	Q13		
	NO contact	Q14, Q24, Q34	11	9...11
71...76 analog outputs	Positioning output DC 0...10 V	Y10, Y20, Y30	21	1...3
	System neutral	⊥		
	Field supply AC 24 V	V~		
Service	Service button	SVC		
Display	Operation LED	RUN		

DXR2.M09T



Pin	Description	Terminal	Module	Channel
21...23 MS/TP	MS/TP connection	⏚ , +, -		
11, 12 KNX	KNX connection	+, -		
31...36 inputs	Digital input	D1	1	1
	Universal input	X1, X2	1	5, 6
	System neutral	⊥		
USB	USB interface	⇻		
51...54 feed	Neutral conductor	N		
	Phase wire AC 230 V	L		
61...62 relays	Wiring for Q14	Q13		
	NO contact	Q14	11	9
71...76 Triacs	Switching output AC 24 V, 0.15 A	Y1...Y4	11	1...4
	Actuator voltage AC 24 V	V~		
77...78 analog outputs	Positioning output DC 0...10 V	Y10	21	1
	System neutral	⊥		
Service	Service button	SVC		
Display	Operation LED	RUN		

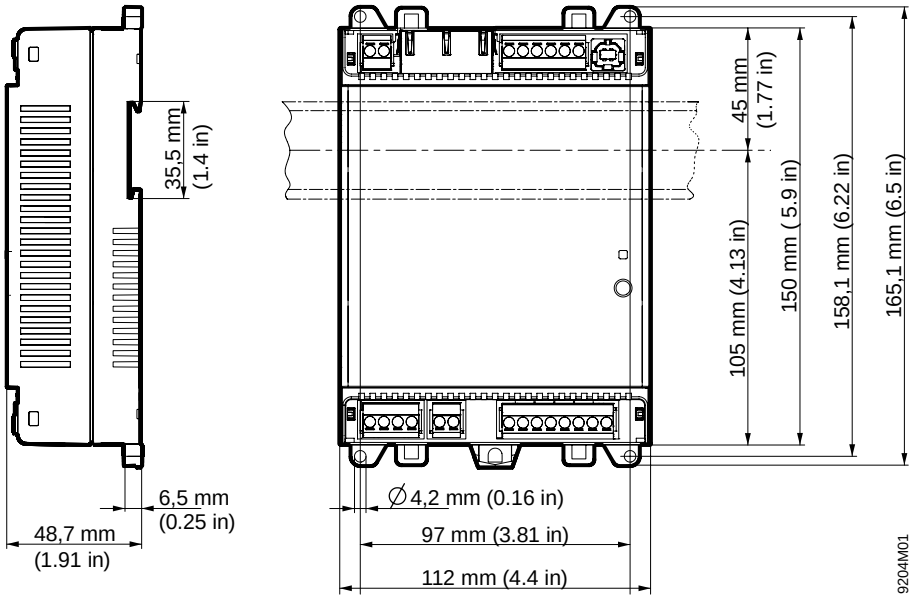
DXR2.M10



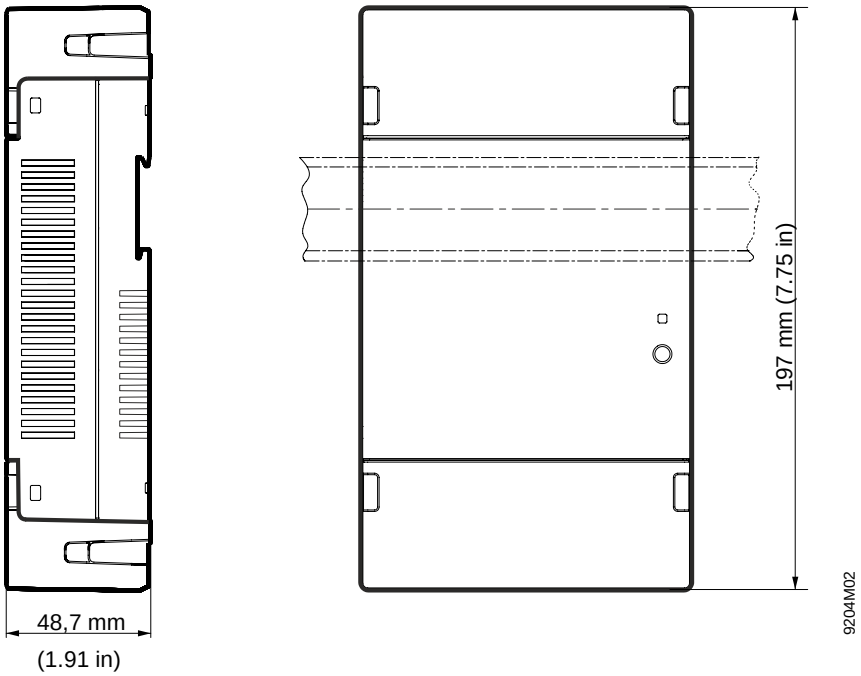
Pin	Description	Terminal	Module	Channel
21...23 MS/TP	MS/TP connection	⏚, +, -		
11, 12 KNX	KNX connection	+, -		
31...36 inputs	Digital input	D1	1	1
	Universal input	X1, X2	1	5, 6
	System neutral	⊥		
USB	USB interface			
51...54 feed	Neutral conductor	N		
	Phase wire AC 230 V	L		
61...64 relays	Common wiring for Q14, Q24 and Q34	Q13		
	NO contact	Q14, Q24, Q34	11	9...11
71...76 Triacs	Switching output AC 24 V	Y1...Y4	11	1...4
	Actuator feed AC 24 V	V~		
Service	Service button	SVC		
Display	Operation LED	RUN		

Dimensions

Without terminal cover



With terminal cover



Issued by
Siemens Switzerland Ltd
Building Technologies Division
International Headquarters
Gubelstrasse 22
CH-6301 Zug
Tel. +41 41-724 24 24
www.siemens.com/buildingtechnologies

© Siemens Switzerland Ltd, 2013
Technical specifications and availability subject to change without notice.

Document ID CM1N9206en
Edition 2017-03-10