modu720: Communication module with EIA-485 interface

Areas of application

Automation-level integration of non-Sauter systems and third-party products on the basis of field bus protocols with EIA-485 such as Modbus/RTU and others. Integration of third-party products with the AS modu525 for integrated control and optimised regulation and optional BACnet/IP communication with the management level.

Features

- Communication module with EIA-485 interface
- Pluggable element for extending the modu525 automation station
- Connectable to non-Sauter systems (SPS, refrigerators, compact controllers…)
- Connection for field bus protocols based on EIA-485
- Direct inscription on front
- Part of the SAUTER EY-modulo system family

Technical description

- Power supply from modu525 automation station
- 1 COM module per AS modu525
- up to 512 non-Sauter system data points
- 0.3 to 57.6 kBit/s
- Two-wire EIA-485 (half-duplex)
- Electrical separation up to 300 V maximum
- Four-pin plug for (D+, D-, GND, NC)
- Jumper for EIA-485 bus voltage and bus termination
- Supported protocols: Modbus/RTU (Master), others on request

Products

Type	Description
EY-CM720F010	Communication module for Modbus/RTU (Master)

Technical data

Electrical supply

Power supply	from modu525
per AS on position 1	up to 1 COM module
Power consumption	up to 80 mA
Dissipated power	up to 1.12 W

Interfaces, communication

COM interface (EIA-485)	4-pin plug (NC, C, D+, D-)
Baud rate	0.3…57.6 kBit/s
Data bits	5, 6, 7, 8
Stop bits	1, 1.5, 2
Parity	non, even, odd
Connection, I/O bus	12-pole, integrated in plinth
Protocol	Modbus/RTU (Master)

Architecture

Protocol processor	FPGA
COM processor	UART
Memory	Flash memory (user and protocol data)
Number of data points	up to 512

Permitted ambient conditions

Operating temperature	0…45 °C
Storage and transport temperature	-25…70 °C
Humidity	10…85% rh
	no condensation

Installation

Fitting	on top-hat rail
Dimensions W x H x D (mm)	42 x 170 x 115
Weight (kg)	0.8

Standards, guidelines and directives

Type of protection	IP 20 (EN 60529)
Protection class	III (EN 60730-1)
Environmental class	3K3 (IEC 60721)
CE conformity as per	
EMC Directive 2004/108/EC	EN 61000-6-1: 2007 [1]
	EN 61000-6-2: 2005 [1]
	EN 61000-6-3: 2007
	EN 61000-6-4: 2007

Additional information

Fitting instructions	P100002328
Product documentation	7010037
Material declaration	MD 97.011
Dimension drawing	M11417
Wiring diagram	A10579

1) EIA-485: screened cable 2*2 cores twisted in pairs -> see fitting instructions P100002328 (Fig. 5)

Engineering notes

General notes for moduCom

The COM modules, the protocol system parameters and user-specific data point parameters are configured using the SAUTER CASE Suite software tools. Details on exact configuration and functionality are described in the user manuals for CASE Suite and moduCom.

In general, reading and writing data pints is supported by field bus devices. In this case the current values ("Present Value") are written by BACnet to the data values of the non-Sauter system or they are read from the data point values of the non-Sauter system. The following functions apply to "mapping" from the viewpoint of the automation station (BACnet object):

AS (BACnet object)	Function	CM (FS data point)
BI (PresentValue)	read	Bit data point
AI (PresentValue)	read	Float data point
		Unsigned data point
		Signed data point
MI (PresentValue)	read	Unsigned data point
BO (PresentValue)	write	Bit data point
BO (FeedbackValue)	(read)	(Feedback)
AO (PresentValue)	write	Float data point
		Unsigned data point
		Signed data point
MO (PresentValue)	write	Unsigned data point
MO (FeedbackValue)	(read)	(Feedback)
PC (Count)	read	Unsigned data point

Faulty reading or writing can be supported using the BACnet property "Reliability". Under certain circumstances the value may lose a certain amount of accuracy and resolution when converting Unsigned/Signed values in or from analogue objects.

Listening function for commissioning, monitoring, analysis etc.:
The AS has a TELNET interface (via a special TELNET/TCP port) for recording data. This enables the data monitored in readable text format to be recorded (TELNET client, etc.).

EY-CM710F010: modu710-Modbus/RTU (Master)

The following Modbus "Function Codes" (fc) are supported for implementation of the Modbus/RTU (Master) protocol:
  (R/W: Read/Write = R/W: Read/Write)

fc 1:	Read Coils (R/W)	Read 1-bit values (R/W)
fc 2:	Read Discrete Inputs (R)	Read 1-bit values (R)
fc 3:	Read Holding Registers (R/W)	Read 16-bit values (R/W)
fc 4:	Read Input Registers (R)	Read 16-bit values (R)
fc 5:	Write Single Coil (R/W)	Write 1-bit value
fc 6:	Write Single Register (R/W)	Write 16-bit value
fc15:	Write Multiple Coils (R/W)	Write 1-bit values
fc16:	Write Multiple Registers (R/W)	Write 16-bit values

Telegram transmission is supported only with the RTU Frame (Remote Terminal Unit Frame).

Restrictions – the following functions are not supported:
Function codes other than those mentioned and telegram transmission via Modbus/ASCII are not supported. Exception Codes are not evaluated.

The following data types can be used for master functionality:
1-bit coil, 1-bit discrete input, 16-bit holding register, 16-bit input register, "32-bit formats" with 2x16-bit registers ("double register"), 1-bit of a 16-bit register. Data from the Modbus data model can be read and overwritten. The Modbus master's protocol implementation is able to interpret data in various data formats and connect it to BACnet data objects. The following data types are supported on the Modbus master side:
- 1-bit Boolean
- (8-bit Signed / Unsigned Integer)
- 16-bit Signed / Unsigned Integer
- 32-bit Signed / Unsigned Integer
- 32-bit IEEE-Float

Special Modbus master functionality:
32-bit data formats can be interpreted in a reverse 16-bit register sequence using the data point parameter "byte order". This parameter can be defined individually for each data point.
Each individual bit of a 16-bit register can also be assigned to a binary data object (BACnet BI, BO) (data point parameter: "BitNo at BitField"). N.B.: When more than one BO is applied to a register, only the last bit that is written will affect the entire register.
The data point parameter "Function Code" can be used to force Single Write for coils with fc15, whilst Single Write for registers is executed using fc16
JBUS addressing (i.e. from 0 to 65535) is supported for all data model ranges (x, 1x, 3x, 4x) so that Modbus addresses are used with an offset of -1.

Further details can be referenced from the user manual for function components and the moduCom user manual.

General notes for modu720

The COM module has 6 or 7 LEDs with the following functions.

LED name	Condition	Frequency *)	Description
I/O bus			
(no name)	green continuous	———————	moduCom operation OK ('running')
	green pulsating	• • • •	no channel configuration
	green pulsating fast	••••••••••••••••	device in configuration
	red pulsating	• • • •	no protocol loaded in device
	red pulsating fast	••••••••••••••••	no communication with AS
	red flashing	— — — —	internal error
	green - red – alternating	—— ——	lamp test active (display type has priority)
LED No.			
1	green continuous	———————	voltage 1 available on moduCom
2	green continuous	———————	voltage 2 available on moduCom
3			not used
4			not used
5	green	•• •• •• ••	protocol-specific, in general request (SEND)
	red	• • or ————	protocol-specific, in general defective request (Tg error)
6	green	•• •• •• ••	protocol-specific, in general response (RECEIVE)
	red	• •	protocol-specific, in general defective response (timeout, Tg error)

*) pulsating: 0.1s / 10% duty cycle   pulsating fast: 0.1s / 50%   duty cycle 0.1s / 50%   duty cycle every 1s

The COM module has the following pin assignment for pin strip and plug terminal (pursuant to EIA-485, half-duplex):

PIN	Direction	Designation	Long designation
1	-	NC	not used
2	Common	C	EIA-485 Common (earth GND2, electrically separated from system earth)
3	Output	D+	EIA-485 data line (+)
4	Input	D-	EIA-485 data line (-)

The COM module has the following jumpers for bus termination and bus voltage (pursuant to EIA-485, half-duplex):

JUMPER	Resistance	Designation	Long designation
1	511 Ohm	X21	Pull-down jumper (D- to GND2 (earth EIA-485) with 511 Ohm)
2	121 Ohm	X20	Line termination jumper (D+ to D- with 121 Ohm)
3	511 Ohm	X19	Pull-up jumper (D+ to VPP2 (supply EIA-485) with 511 Ohm)

The correct direct connection to non-Sauter devices or a further bus coupler (EIA-485<>EIA-485/422) for greater insulation protection against extraneous voltage (electrical or optical separation) must be implemented in compliance with EIA-485 standards.
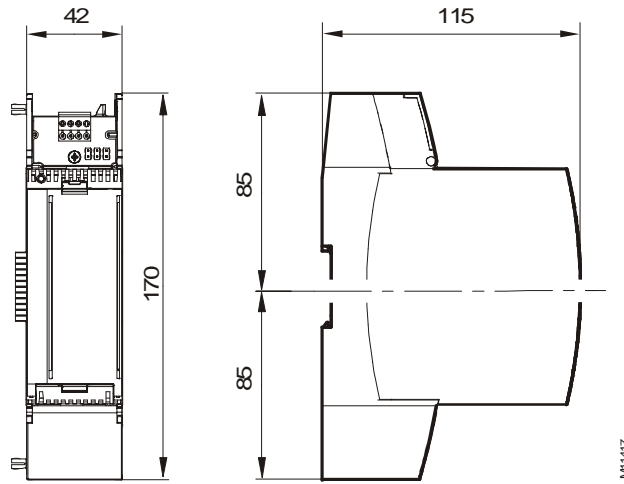
Line termination resistors (121 Ohm) and pull-up/pull-down resistors (511 Ohm) are available on the COM module for EIA-485 half-duplex (2-wire) wiring. These resistors are switched on or off via jumpers. The "common line" should be used. The 3 wires for the bus (C, D+, D-) should have a maximum expansion of 1.2 km (depending on the baud rate) when twisted (cabling recommendation: 2*2-core, twisted in pairs with screen, whereby 1 pair with screen can go to common). The EIA-485 bus should not have any "stub lines". The bus must be implemented as a line topology. A maximum of 31 EIA-485 devices can be connected to the bus.

Various topologies can be considered and referenced from the documentation for the non-Sauter device or optional bus coupler:
- 2-wire EIA-485 bus topology connected to modu720
- 4-wire (full-duplex) EIA-485 devices connected to modu720 with 2-wire bus topology
- 4-wire (full-duplex) EIA-485 bus topology with additional bus coupler for modu720
- EIA-485 bus topology with more than 31 EIA-485 devices with additional bus amplifier

Notes on these topologies are documented in the moduCom user manual.

Dimension drawing

42

115

85

170

85

M11417

Wiring diagram

EIA 485
4 pol.

NC C D+ D−

X19 X20
X21

A10579