Contents

AC500 Communication Modules

Overview of the AC500 communication modules

Contents

Short description

AC500 communications modules (couplers) make communications on different field busses possible. The couplers are mounted on the left side of the CPU on the same Terminal Base. The communication between the CPU and the couplers take place through the coupler bus (coupler interface), which is integrated in the Terminal Base. The data interchange is realized by a dual-port RAM. Depending on the used Terminal Base, 1, 2 or 4 couplers can be employed (see also the description of the Terminal Bases).

There are no restrictions, which couplers can be arranged for a CPU, also not in connection with the CPU's internal coupler (Ethernet or ARCNET).

Assortment

Coupler	Protocol	Usable CPUs			Fieldbus connector	Usable Terminal Bases
		PM571-xxx	PM581-xxx	PM591-xxx		
CM572-DP	PROFIBUS DP Master V0 / V1	x	x	x	SUB-D, 9-pole, female	all
CM575-DN	DeviceNet	x	x	x	Pluggable terminal block, spring term.	all
CM577-ETH	Ethernet TCP/IP UDP/IP, Modbus TCP	x	x	x	2 x RJ45, with integrated switch	all
CM578-CN	CANopen	x	x	x	Pluggable terminal block, spring term.	all

Mounting of the couplers

The following figure shows a CPU with two couplers, put together on a Terminal Base TB521.

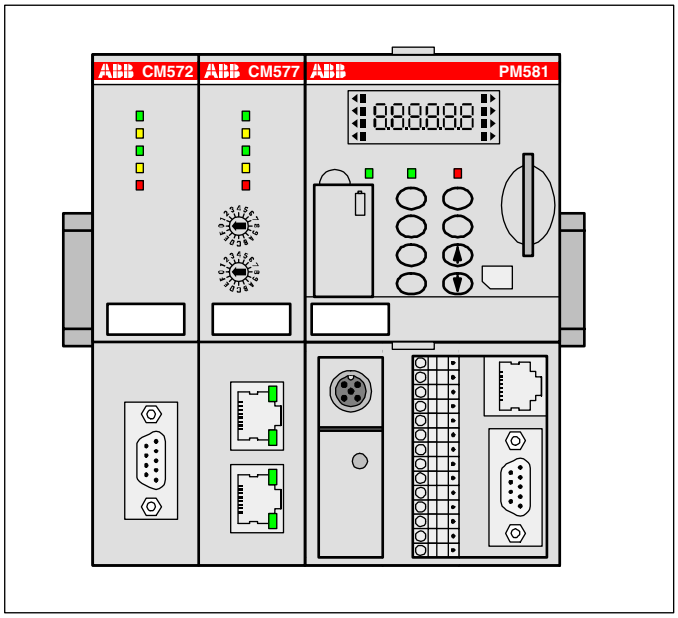


Figure: CPU with 2 couplers on a Terminal Base TB521

Note: Mounting, disassembling, electrical connection and dimensioned drawings for the Terminal Bases, CPUs, communication modules, I/O Terminal Units and the I/O expansion modules are described in detail in the AC500 system data chapters.

The following figures show how to mount and disassemble the couplers.

Mount the coupler (communication module)

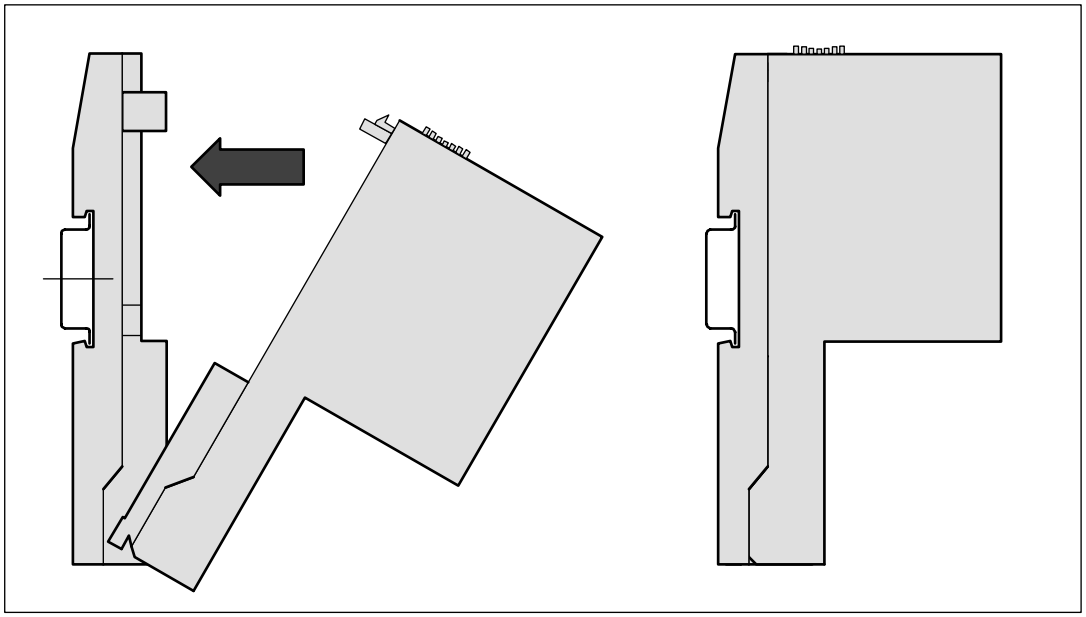


Figure: **Mounting** a coupler

The coupler is first inserted below, then clicked-in above.

The disassembly is carried out in a reversed order.

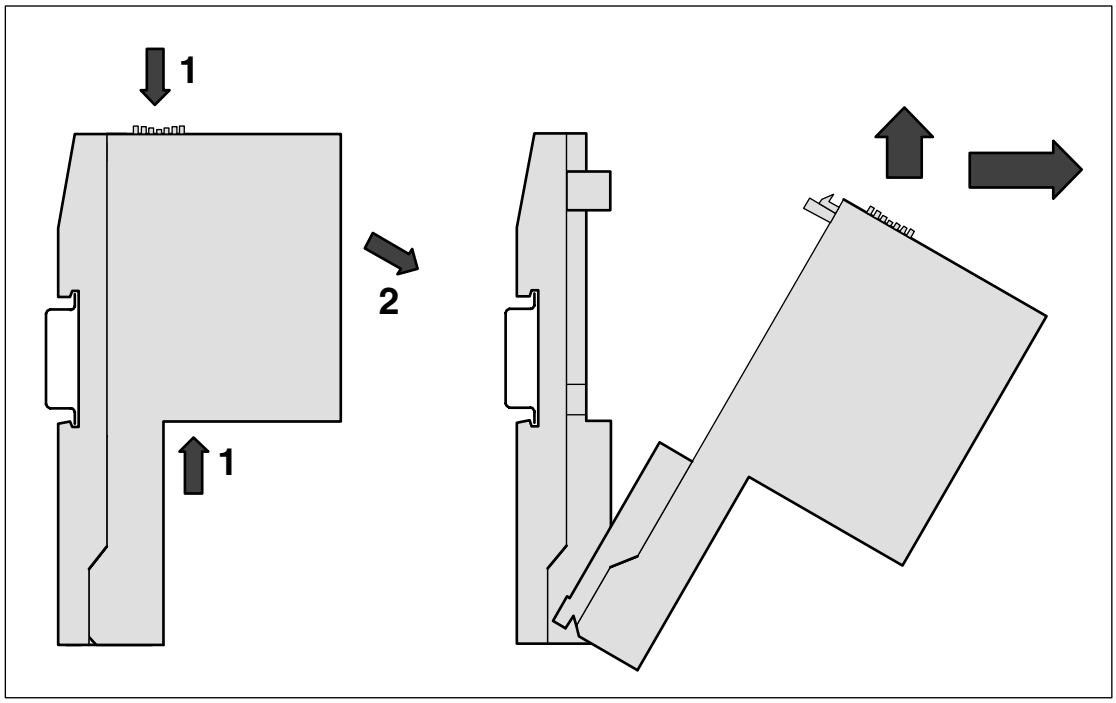


Figure: **Disassembly** of a coupler

Disassembly: (1) Press above and below, then (2) swing out the coupler and remove it.

Hardware configuration

Each CPU can operate up to 4 external couplers (in addition the internal coupler, if existing).

Depending on the selected communication protocol, each coupler can be used as

- Bus master within the AC500 control system together with several field busses and networks

The couplers are directly powered over the internal coupler bus of the Terminal Base. A separate voltage source is not required.

CAUTION: Removal of energized modules is not permitted. All power sources (supply and process voltages) must be switched off while working on any AC500 system.

Technical data (overview)

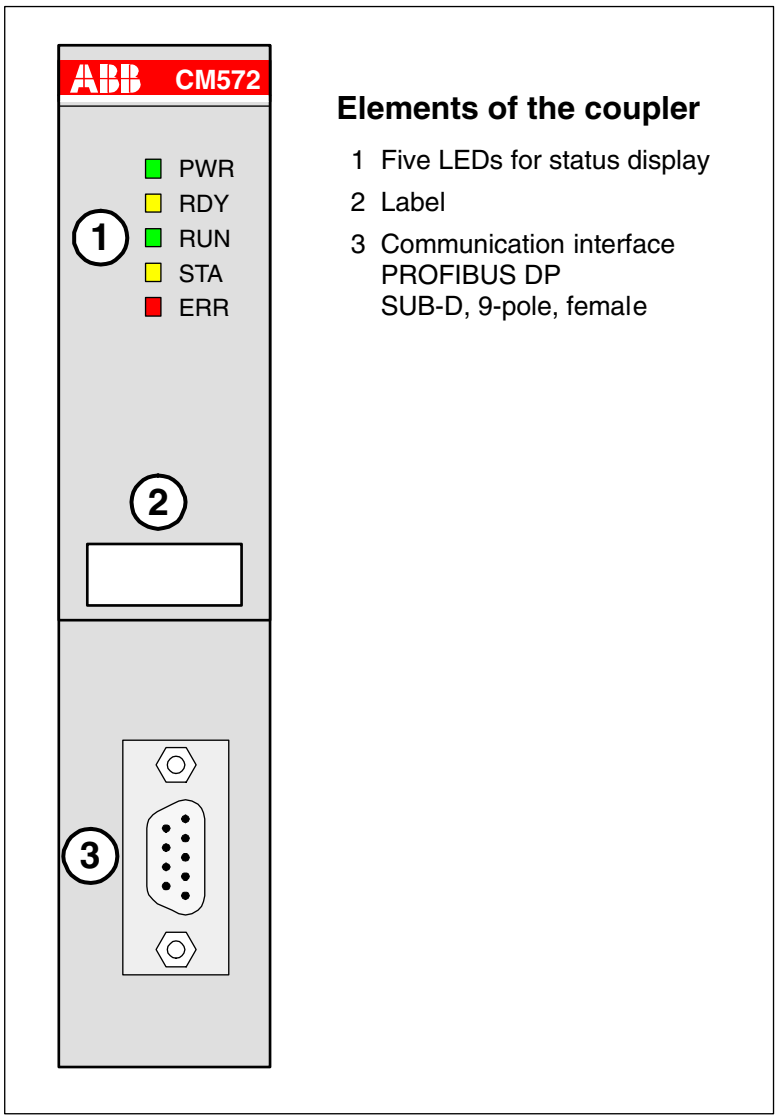
The system data of AC500 and S500 are valid here. Only additional details are therefore documented below.

	CM572-DP	CM577-ETH	CM575-DN	CM578-CN
Field bus	PROFIBUS DP	2 x Ethernet	DeviceNet	CANopen
Transmission rate	9.6 kBit/s to 12 MBit/s	10 MBit/s or 100 MBit/s	125 kBit/s 250 kBit/s 500 kBit/s	10 kBit/s to 1 MBit/s
Field bus connector	D-SUB, 9-pole, female, bended	2 x RJ45	COMBICON 5-pole, bended	COMBICON 5-pole, bended
Processor	EC1, 160 pins			
Clock frequency	48 MHz			
Ambient temperature	0 °C...60 °C			
Coupler interface	Dual-port memory, 8 kByte			
Current consumption over the coupler bus	typ. 330 mA	typ. 420 mA	typ. 180 mA	typ. 290 mA
internal RAM memory (EC1)	256 kByte	256 kByte	256 kByte	256 kByte
external RAM memory	-	2 x 128 kByte (for webserver option)	-	-
External Flash memory	512 kByte (firmware)	512 kByte (firmware) 2 MByte (for Webserver option)	512 kByte (firmware)	512 kByte (firmware)
Status display	PWR, RDY, RUN, STA, ERR	PWR, RDY, RUN, STA, ERR, 2 x LINK, 2 x ACT	PWR, RDY, RUN, NET, MOD	PWR, RDY, RUN, STA, ERR
Weight	150 g	150 g	150 g	150 g

Ordering data

Order No.	Scope of delivery
1SAP 170 200 R0001	CM572-DP, Communication module PROFIBUS DP Master, 12 MBit/s
1SAP 170 500 R0001	CM575-DN, Communication module DeviceNet Master
1SAP 170 700 R0001	CM577-ETH, Communication module Ethernet TCP/IP with integrated 2-port switch
1SAP 170 800 R0001	CM578-CN, Communication module CANopen Master
1SAP 130 100 R0100	PM571, CPU, memory 64 kB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display
1SAP 130 100 R0170	PM571-ETH, CPU, memory 64 kB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display, integrated coupler Ethernet TCP/IP
1SAP 140 100 R0100	PM581, CPU, memory 256 kB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display
1SAP 140 100 R0160	PM581-ARCNET, CPU, memory 256 kB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display, integrated coupler ARCNET
1SAP 140 100 R0170	PM581-ETH, CPU, memory 256 kB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display, integrated coupler Ethernet TCP/IP
1SAP 150 100 R0100	PM591, CPU, memory 4 MB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display
1SAP 150 100 R0160	PM591-ARCNET, CPU, memory 4 MB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display, integrated coupler ARCNET
1SAP 150 100 R0170	PM591-ETH, CPU, memory 4 MB, 24 V DC, Memory Card Slot, interfaces 2 x RS-232/485 (programming, Modbus/CS31), 1 x FBP, Display, integrated coupler Ethernet TCP/IP
1SAP 180 600 R0001	TA524, Dummy Coupler Module
1SAP 180 800 R0001	TA526, Wall Mounting Accessory
1SAP 111 100 R0170	TB511-ETH, CPU Terminal Base AC500, slots: 1 CPU, 1 communication module, Ethernet RJ45 connector
1SAP 112 100 R0160	TB521-ARCNET, CPU Terminal Base AC500, slots: 1 CPU, 2 communication modules, ARCNET COAX connector
1SAP 112 100 R0170	TB521-ETH, CPU Terminal Base AC500, slots: 1 CPU, 2 communication modules, Ethernet RJ45 connector
1SAP 114 100 R0170	TB541-ETH, CPU Terminal Base AC500, slots: 1 CPU, 4 communication modules, Ethernet RJ45 connector

Communication module PROFIBUS DP CM572-DP
- Master 12 MBit/s



Elements of the coupler

1 Five LEDs for status display
2 Label
3 Communication interface PROFIBUS DP SUB-D, 9-pole, female

Figure: Communication module PROFIBUS DP CM572-DP

Contents

Purpose

The AC500 communications module CM572-DP makes a communication over the PROFIBUS DP field bus possible. The coupler is mounted on the left side of the CPU on the same Terminal Base. The communication between the CPU and the coupler takes place through the coupler bus (coupler interface), which is integrated in the Terminal Base. The data interchange is realized by a dual-port RAM. Depending on the used Terminal Base, 1, 2 or 4 couplers (also different types) can be employed (see also the description of the Terminal Bases).

Functionality

Coupler CM572-DP	
Protocol	PROFIBUS DP Master V0 / V1
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all of the TB5xx
Field bus connector	D-SUB, 9-pole, female
Internal power supply	through the coupler interface of the Terminal Base

Mounting and electrical connection

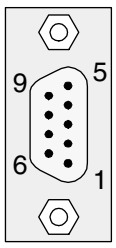
The coupler is mounted on the left side of the CPU on the same Terminal Base. The electrical connection is established automatically when mounting the coupler.

Note: Mounting, disassembling, electrical connection and dimensioned drawings for the Terminal Bases, CPUs, communication modules, I/O Terminal Units and the I/O expansion modules are described in detail in the AC500 system data chapters.

CAUTION: Removal of energized modules is not permitted. All power sources (supply and process voltages) must be switched off while working on any AC500 system.

Field bus interface

The PROFIBUS DP connector has the following pin assignment:



1	Shield	Shield, Functional Earth
2	NC	unused
3	RxD/TxD-P	Receive/Transmit Line, positive
4	CNTR-P	Control signal for repeater, positive
5	DGND	Reference potential for data exchange and +5 V
6	VP	+5 V (power supply for the bus terminating resistors)
7	NC	unused
8	RxD/TxD-N	Receive/Transmit Line, negative
9	CNTR-N	Control signal for repeater, negative

PROFIBUS DP

9-pole, female

Figure: Pin assignment of the field bus interface PROFIBUS DP

Bus cable

Type	twisted pair (shielded)
Characteristic impedance	135...165 Ω
Cable capacity	< 30 pF/m
Conductor diameter of the cores	≥ 0.64 mm
Conductor cross section of the cores	≥ 0.34 mm²
Cable resistance per core	≤ 55 Ω/km
Loop resistance (resistance of two cores)	≤ 110 Ω/km

Cable lengths

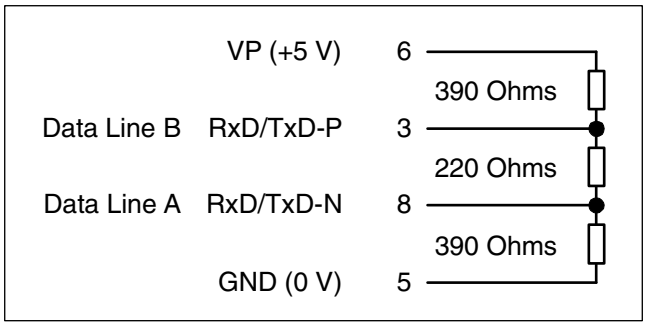
The maximum possible cable length of a PROFIBUS subnet within a segment depends on the baud rate (transmission rate).

Baud rate	maximum cable length
9.6 kBaud to 187.5 kBaud	1200 m
500 kBaud	400 m
1.5 MBaud	200 m
3 MBaud to 12 MBaud	100 m

Table: Maximum cable length within a segment in a PROFIBUS subnet

Bus termination

The line ends of the bus segment must be equipped with bus termination resistors. Normally, these resistors are integrated in the interface connectors.



LED status displays

The status of the PROFIBUS coupler is displayed by means of 5 status LEDs. After power ON, the coupler initializes a self-test. If this test was successful, the yellow RDY LED goen ON. Otherwise the LED starts flashing and aborts the further initialization. If the RDY LED remains OFF, the coupler is defective.

In the course of initialization, the RUN LED is OFF for the first time. The LED is only activated after configuration data has been sent to the coupler and the operating mode of the coupler was set. If the operating system of the coupler detects a parameterization or a a configuration error, the green RUN LED flashes non-cyclically. If this LED flashes cyclically, the coupler is ready for communication, but the communication is not active yet. In case of an active communication, the RUN LED lights continuously.

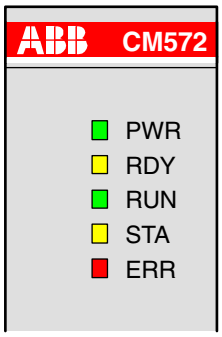
The red ERR LED indicates errors on the PROFIBUS interface.

In the "DP slave" operating mode, the yellow STA LED indicates the active I/O data exchange with the DP master. In the "DP master" operating mode, the STA LED indicates the ownership of the token and therefore the I/O data exchange with the involved DP slaves.

During the initialization procedure and also if the coupler is configured (anew) - in particular if the operating mode was changed - it can occur that all or some LEDs light up for a short period of time, before reaching a defined condition.

The green PWR LED indicates, that the supply voltage is present.

The following figure shows the positions of the LEDs. The table after that shows the LED statuses and their meanings.



LED	Color	Status	Meaning
PWR	green	ON (light)	Voltage is present
		OFF (dark)	Voltage is missing
RDY	yellow	ON	Coupler is ready
		flashes cyclic	Bootstrap Loader is active
		flashes non-cyclic	Hardware or system error
		OFF	Defective hardware
RUN	green	ON	Communication is running
		flashes cyclic	Ready for communication
		flashes non-cyclic	Parameterization error
		OFF	No communication
STA	yellow	ON	DP master: Transmits data or token on the network
		OFF	DP master: no token
ERR	red	ON	PROFIBUS error
		OFF	No error

Further important information

PROFIBUS basics

PROFIBUS DP is intended for fast data exchange in the field area. Here, central control units (e.g. PLC/PC) communicate with decentralized field devices like I/O, drives and valves via a fast serial connection. The data exchange with the decentralized modules is mainly performed cyclically.

The communication functions, required for data exchange, are defined by the PROFIBUS DP basic functions in accordance to EN 50170.

For parameterization, diagnosis and alarm handling during the running cyclic data exchange also non-cyclic communication functions are necessary for intelligent field devices.

Definitions, terms, abbreviations

PROFIBUS DP	**PRO**cess **FI**eld**BUS** - **D**ecentral **P**eriphery
DP master (class 1)	Normal bus master
DP master (class 2)	Commissioning device
DP slave (DPS)	I/O module
DPV1	Guideline for extended functions for PROFIBUS DP
PNO	**P**ROFIBUS **N**utzer-**O**rganisation (user organization)

Standardizations

EN 50170, DIN 19245 Part 1, DIN 19245 Part 3, DPV1

Important address

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Telefax: (+49) 721 9658 589
Internet: http://www.profibus.com

Technical data

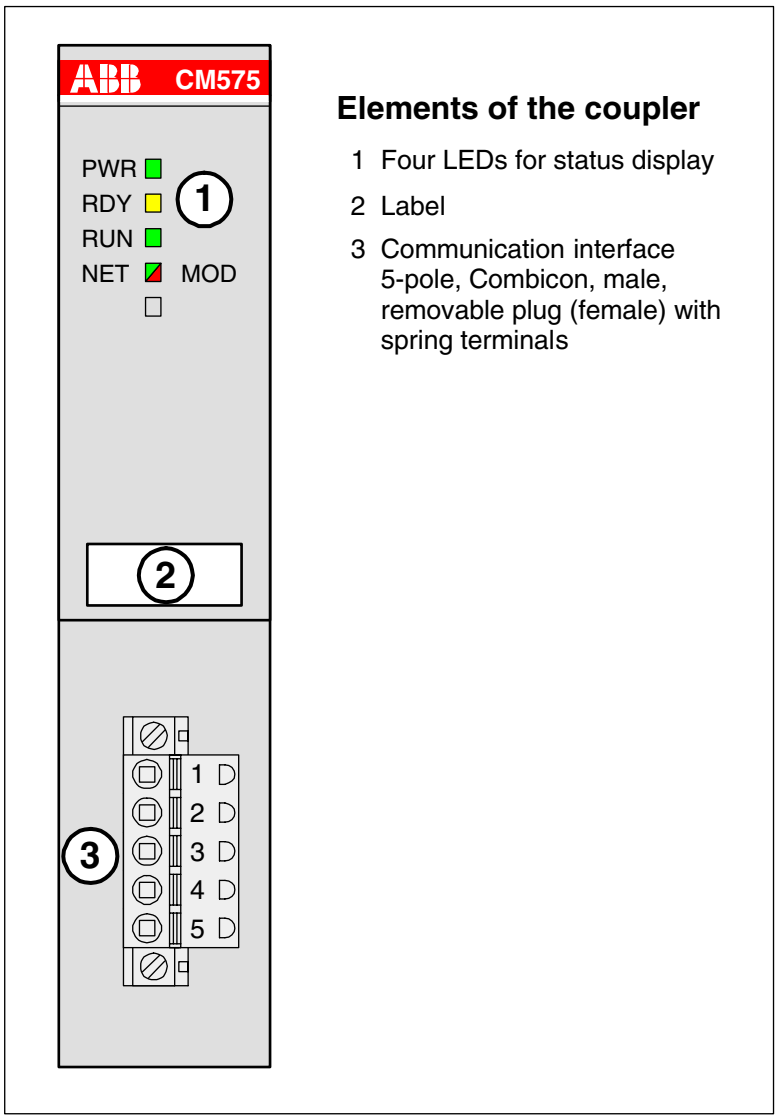
The system data of AC500 and S500 are valid here. Only additional details are therefore documented below.

Coupler CM572-DP	
Field bus	PROFIBUS DP
Transmission rate	9.6 kBit/s to 12 MBit/s
Protocol	PROFIBUS DP Master V0 /V1
Field bus connector	D-SUB, 9-pole, female
Processor	EC1, 160 pins
Clock frequency	48 MHz
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all
Ambient temperature	0 °C...60 °C
Coupler interface	Dual-port memory, 8 kByte
Current consumption over the coupler bus	typ. 330 mA
Internal RAM memory (EC1)	256 kByte
External RAM memory	-
External Flash memory	512 kByte (firmware)
Status display	PWR, RDY, RUN, STA, ERR
Weight	ca. 150 g

Ordering data

Order No.	**Scope of delivery**
1SAP 170 200 R0001	CM572-DP, Communication module PROFIBUS DP Master, 12 MBit/s
Link to other ordering data	see Overview of the AC500 communication modules

CM575-DN Communication module DeviceNet
- DeviceNet Master 500 kbit/s



Elements of the coupler

1 Four LEDs for status display

2 Label

3 Communication interface 5-pole, Combicon, male, removable plug (female) with spring terminals

Figure: Communication module DeviceNet CM575-DN

Contents

Purpose

The AC500 communications module CM575-DN makes a communication over the DeviceNet field bus possible. The coupler is mounted on the left side of the CPU on the same Terminal Base. The communication between the CPU and the coupler takes place through the coupler bus (coupler interface), which is integrated in the Terminal Base. The data interchange is realized by a dual-port RAM. Depending on the used Terminal Base, 1, 2 or 4 couplers (also different types) can be employed (see also the description of the Terminal Bases).

Functionality

Coupler CM575-DN	
Protocol	DeviceNet
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all of the TB5xx
Field bus connector	Pluggable connector COMBICON, 5-pole
Internal power supply	via the coupler interface of the Terminal Base

Mounting and electrical connection

The coupler is mounted on the left side of the CPU on the same Terminal Base. The electrical connection is established automatically when mounting the coupler.

Note: Mounting, disassembling, electrical connection and dimensioned drawings for the Terminal Bases, CPUs, communication modules, I/O Terminal Units and the I/O expansion modules are described in detail in the AC500 system data chapters.

Caution: Removal of energized modules is not permitted. All power sources (supply and process voltages) must be switched off while working on any AC500 system.

Field bus interface

The DeviceNet connector has the following pin assignment:

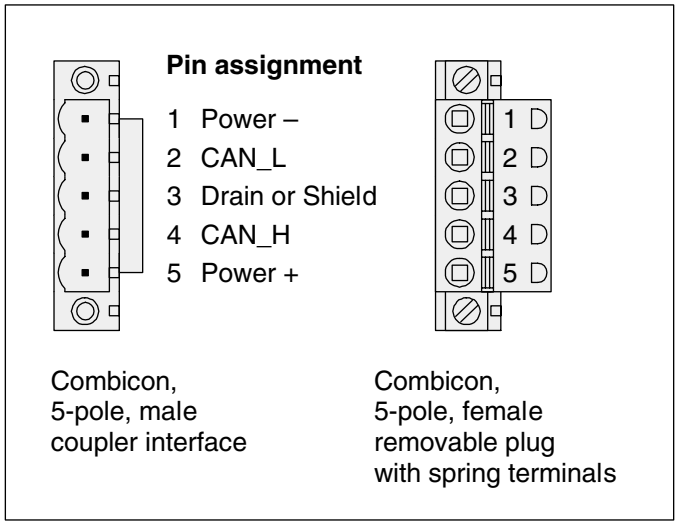


Figure: Pin assignment of the DeviceNet field bus interface

Bus cable

DeviceNet uses a trunk-line/drop-line topology that provides separate twisted pair busses for both signal and power distribution. The possible variants of this topology are shown in the next figure. Thick or thin cable can be used for either trunk lines or drop lines. End-to-end network length varies with data rate and cable thickness as shown in the next table.

DeviceNet supports both isolated and non-isolated physical layer design of devices. An opto-isolated design option allows externally powered devices (e.g. AC Drives starters and solenoid valves) to share the same bus cable. The DeviceNet Specifications contain additional information concerning component requirements, protection from mis-wiring, and examples.

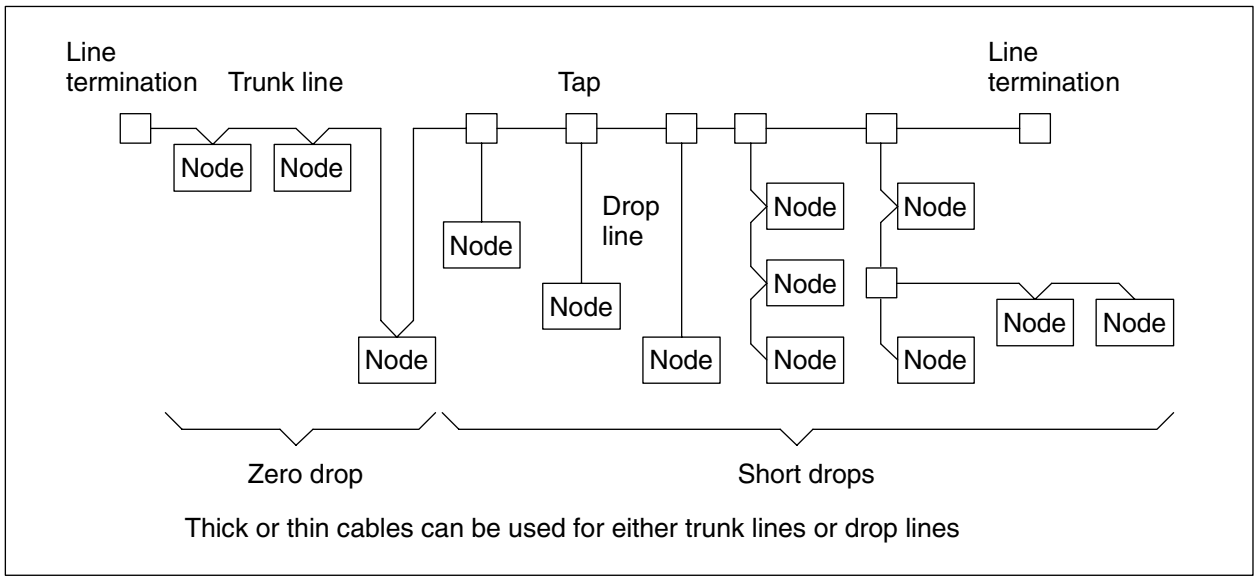


Figure: Variants of bus topology

DeviceNet supports both isolated and non-isolated physical layer design of devices. An opto-isolated design option allows externally powered devices (e.g. AC Drives starters and solenoid valves) to share the same bus cable.

Design characteristics		
Cable type	Thick	Thin
Data/power pair	Data/power	Data/power
Conductor size	18 AWG = 0.823 mm² 14 AWG = 2.080 mm²	24 AWG = 0.205 mm² 22 AWG = 0.324 mm²
Individual screen	Aluminium/polyester tape	
Drain wire size	18 AWG = 0.823 mm²	22 AWG = 0.324 mm²
Braided shield	Tin coated annealed copper wires	
Sheath	Oil resistant PVC	
Outer diameter	ca. 12 mm	ca. 7 mm
Electrical characteristics		
Conductor resistance	22.6 Ω/km 9.1 Ω/km	91.8 Ω/km 57.4 Ω/km
Impedance (@ 1 MHz)	120 ± 12 Ω	
Attenuation		
At 125 kHz	max. 1.426 dB/100 m	max. 0.951 dB/100 m
At 500 kHz	max. 0.820 dB/100 m	max. 1.64 dB/100 m
At 1 MHz	max. 1.31 dB/100 m	max. 2.29 dB/100 m
Propagation delay	max. 4.4 ns/m	max. 4.4 ns/m

Cable lengths

The maximum possible cable length of a DeviceNet network depends on the baud rate (transmission rate).

Network size	125 kbit/s	250 kbit/s	500 kbit/s
Thick trunk length	500 m (1640 ft)	250 m (820 ft)	100 m (328 ft)
Thin trunk length	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
Flat trunk length	380 m (1250 ft)	200 m (656 ft)	75 m (246 ft)
Maximum drop length	6 m (20 ft)	6 m (20 ft)	6 m (20 ft)
Cumulative drop length	156 m (512 ft)	78 m (256 ft)	39 m (128 ft)
The end-to-end network distance varies with data rate and cable thickness.			

Table: Maximum cable length within a DeviceNet field bus

Bus termination

Caution: A power supply voltage always comes together with the bus lines. This power supply should imperatively be connected, otherwise the DeviceNet drivers will not be powered and a coupler error will occur.

The following figure shows how to connect this power supply.

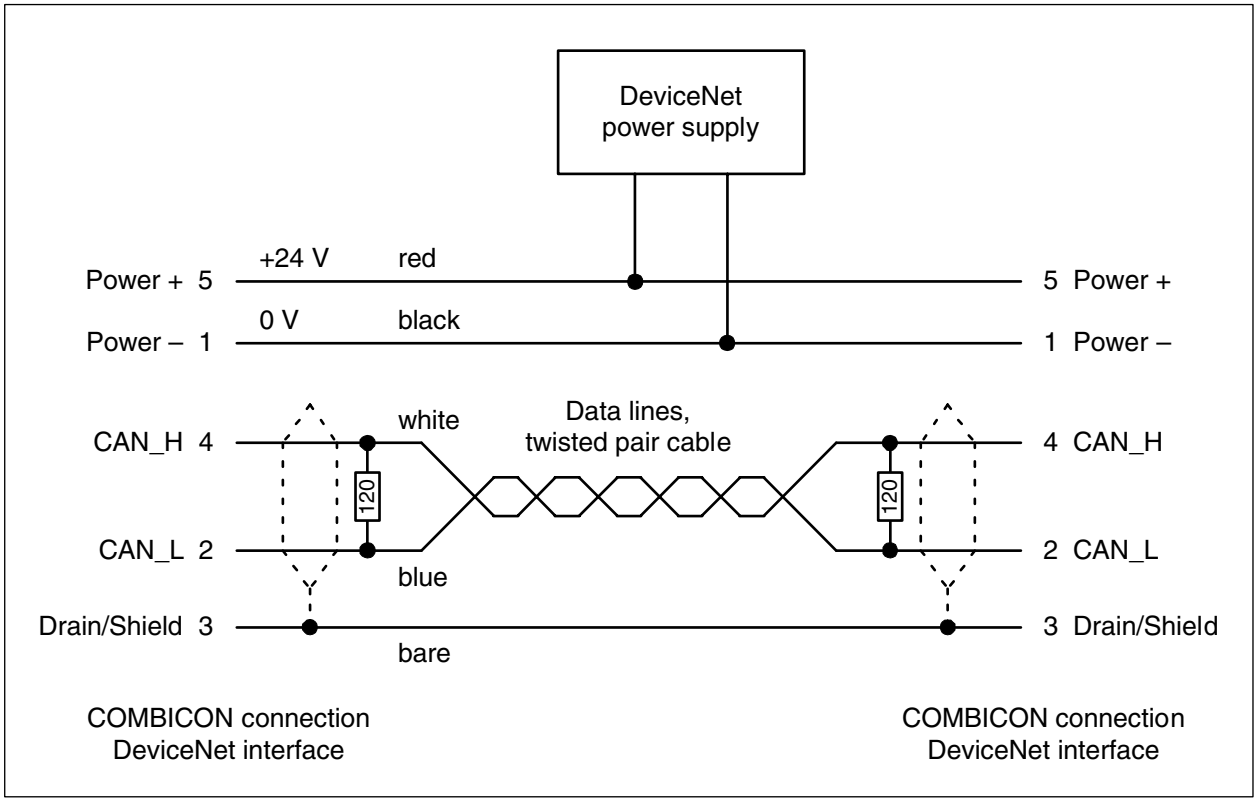


Figure: Connecting the power supply

The data line ends must be equipped with 120-Ohm bus terminating resistors. Normally, the resistors are integrated in the interface connectors.

The following table shows the correspondence between the cable colours and the wire identities and connections of the DeviceNet coupler.

Coupler connector pinout (top to bottom)	Wire identity	Cable wire colour	Used as
1	Power –	Black	Power V–
2	CAN_L	Blue	Signal
3	Drain	Bare	Shield
4	CAN_H	White	Signal
5	Power +	Red	Power V+

LED status displays

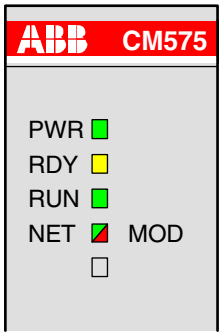
The status of the DeviceNet coupler is displayed by means of 4 status LEDs. After power ON, the coupler initializes a self-test. If this test was successful, the yellow RDY LED goes ON. Otherwise the LED starts flashing and aborts the further initialization. If the RDY LED remains OFF, the coupler is defective.

In the course of initialization, the RUN LED is OFF for the first time. The LED is only activated after configuration data has been sent to the coupler and the operating mode of the coupler was set. If the operating system of the coupler detects a parameterization or a configuration error, the green RUN LED flashes non-cyclically. If this LED flashes cyclically, the coupler is ready for communication, but the communication is not active yet. In case of an active communication, the RUN LED lights continuously.

During the initialization procedure and also if the coupler is configured (anew) - in particular if the operating mode was changed - it can occur that all or some LEDs light up for a short period of time, before reaching a defined condition.

The green PWR LED indicates, that the supply voltage is present.

The following figure shows the positions of the LEDs. The table after that shows the LED statuses and their meanings.



LED	Color	Status	Meaning
PWR	green	ON (light)	Voltage is present
		OFF (dark)	Voltage is missing
RDY	yellow	ON	Coupler is ready
		flashes cyclic	Bootstrap Loader is active
		flashes non-cyclic	Hardware or system error
		OFF	Defective hardware or no power supply
RUN	green	ON	Communication is running
		flashes cyclic	Ready for communication
		flashes non-cyclic	Parameterization error
		OFF	No communication or no power supply
NET/ MOD	green/ red	ON green	Device is online and has one or more connections in established state.
		Green flashes cyclic	Device is online and has no connection in the established state.
		Green/red flash cyclic	Communication failed
		ON red	Critical link failure; device has detected a network error (duplicate MAC-ID or bus off).
		Red flashes cyclic	Connection timeout
		OFF	After start of the device and during duplicate MAC-ID check

Further important information

DeviceNet basics

DeviceNet is a digital, multi-drop network that connects and serves as a communication network between industrial controllers and I/O devices. Each device and/or controller is a node on the network. DeviceNet is a producer-consumer network that supports multiple communication hierarchies and message prioritization.

DeviceNet systems can be configured to operate in a master-slave or a distributed control architecture using peer-to-peer communication. DeviceNet systems offer a single point of connection for configuration and control by supporting both I/O and explicit messaging. DeviceNet also has the unique feature of having power on the network. This allows devices with limited power requirements to be powered directly from the network, reducing connection points and physical size.

DeviceNet follows the Open Systems Interconnection (OSI) model, an ISO standard for network communications that is hierarchical in nature. Networks that follow this model define all necessary functions from the physical implementation up to the protocol and methodology to communicate control and information data within and across networks.

Network size	Up to 64 nodes
Network length	Selectable end-to-end network distance varies with speed. 125 kbit/s 500 m (1640 ft) 250 kbit/s 250 m (820 ft) 500 kbit/s 100 m (328 ft)
Data packets	0-8 bytes
Bus topology	Linear (trunk line/drop line); power and signal on the same network cable
Bus addressing	Peer-to-peer with Multi-Cast (one-to-many); Multi-Master and Multi-Slave special case; polled of change-of-state (exception-based)
System features	Selectable end-to-end network distance varies with speed

Important address

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Technical data

The system data of AC500 and S500 are valid here. Only additional details are therefore documented below.

Coupler CM575-DN	
Field bus	DeviceNet
Transmission rate	125 kBit/s to 500 kBit/s
Protocol	DeviceNet Master
Field bus connector	Pluggable connector COMBICON, 5-pole
Processor	EC1, 160 pins
Clock frequency	48 MHz
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all
Ambient temperature	0 °C...55 °C
Coupler interface	Dual-port memory, 8 kByte
Current consumption over the coupler bus	typ. 180 mA
Internal RAM memory (EC1)	256 kByte
External RAM memory	-
External Flash memory	512 kByte (firmware)
Status display	PWR, RDY, RUN, NET, MOD
Weight	ca. 150 g

Ordering data

Order No.	Scope of delivery
1SAP 170 500 R0001	CM575-DN, Communication module DeviceNet Master
Link to other ordering data	See Overview of the AC500 communication modules

Communication module Ethernet CM577-ETH
- TCP/IP with integrated 2-port switch

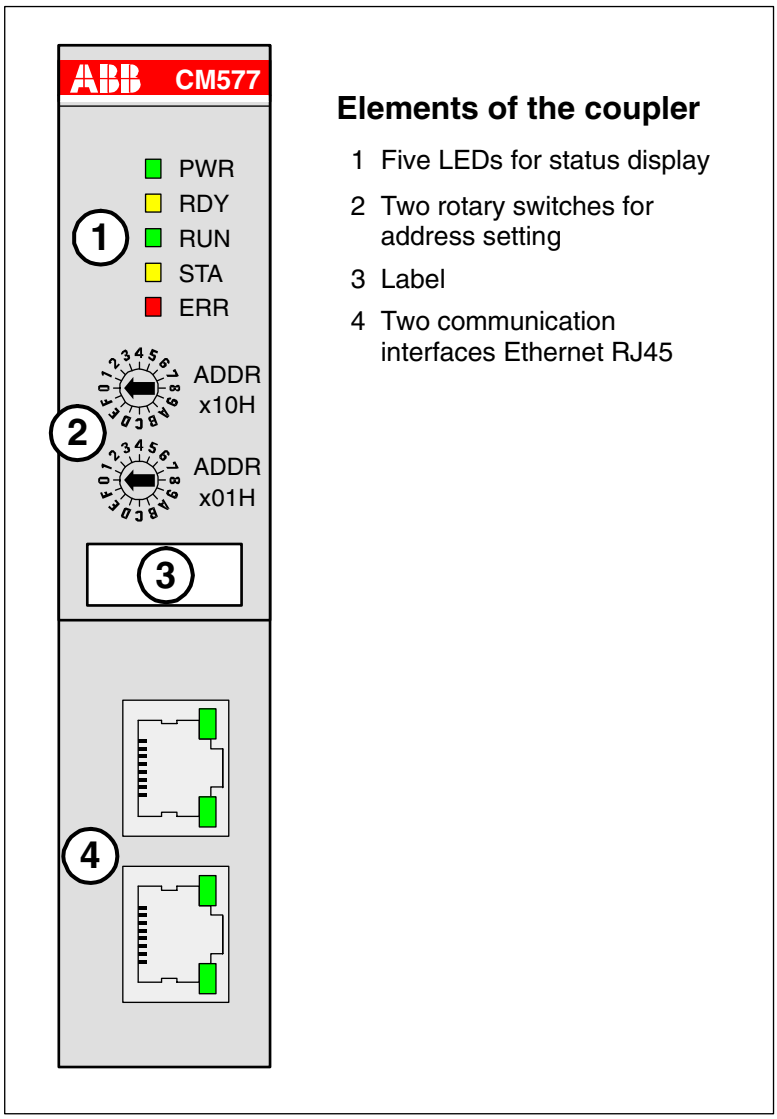


Figure: Communication module Ethernet CM577-ETH

Contents

Purpose

The AC500 communications module CM577-ETH makes a communication over the Ethernet bus possible. The coupler is mounted on the left side of the CPU on the same Terminal Base. The communication between the CPU and the coupler takes place through the coupler bus (coupler interface), which is integrated in the Terminal Base. The data interchange is realized by a dual-port RAM. Depending on the used Terminal Base, 1, 2 or 4 couplers (also different types) can be employed (see also the description of the Terminal Bases).

The Ethernet coupler includes an internal Ethernet switch. The connection to the Ethernet can be established directly to the coupler. An additional switch is not necessary.

The Ethernet coupler is an intelligent 100-Base-T-Ethernet communication interface based on the highly integrated EC1 micro-controller. The coupler supports the complete TCP/IP protocol and the application layers, too.

The user interface is based on a dual-port memory. The coupler meets the PC/104 standard. The Ethernet communication runs via RJ45 interfaces.

The coupler is configured via the dual-port memory, the diagnosis interface or a TCP/IP connection by means of a system configurator. The configuration is saved non-volatile in a Flash EPROM.

Applications:

- TCP/IP for PC/Control Builder (programming)
- UDP (communication via the function blocks ETH_UDP_SEND and ETH_UDP_REC)
- Modbus on TCP/IP (Modbus on TCP/IP, master and slave)

Functionality

Coupler CM577-ETH	
Protocol	Ethernet TCP/IP, UDP/IP, Modbus TCP
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all
Field bus connector	2 x RJ45, with integrated 2-port switch
Internal power supply	via the coupler interface of the Terminal Base

Mounting and electrical connection

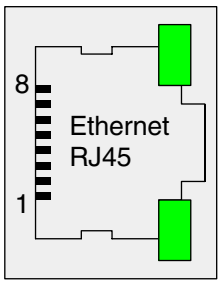
The coupler is mounted on the left side of the CPU on the same Terminal Base. The electrical connection is established automatically when mounting the coupler.

Note: Mounting, disassembling, electrical connection and dimensioned drawings for the Terminal Bases, CPUs, communication modules, I/O Terminal Units and the I/O expansion modules are described in detail in the AC500 system data chapters.

CAUTION: Removal of energized modules is not permitted. All power sources (supply and process voltages) must be switched off while working on any AC500 system.

Field bus interfaces

The Ethernet coupler has 2 RJ45 interfaces with the following pin assignment:



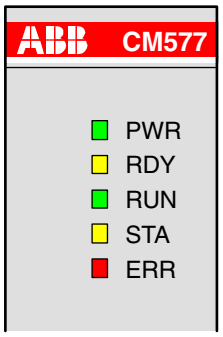
8	NC	unused
7	NC	unused
6	RxD–	Receive Data –
5	NC	unused
4	NC	unused
3	RxD+	Receive Data +
2	TxD–	Transmit Data –
1	TxD+	Transmit Data +
Shield	Cable shield + Signal Ground	

Ethernet RJ45

Figure: Pin assignment of the Ethernet interfaces RJ45

LED status displays

The status of the Ethernet coupler is displayed by means of 5 status LEDs. The following figure shows the positions of the LEDs. The table after that shows the LED statuses and their meanings.



LED	Color	Status	Meaning
PWR	green	ON (light)	Voltage is present
		OFF (dark)	Voltage is missing
RDY	yellow	ON	Coupler is ready
		flashes cyclic	Bootstrap Loader is active
		flashes non-cyclic	Hardware or system error
		OFF	defective hardware
RUN	green	ON	Communication is running
		flashes cyclic	Ready for communication
		flashes non-cyclic	Parameterization error
		OFF	No communication
STA	yellow	flashes	Ethernet Frame detected on the network
ERR	red	ON	Error
		OFF	No error

Technical data

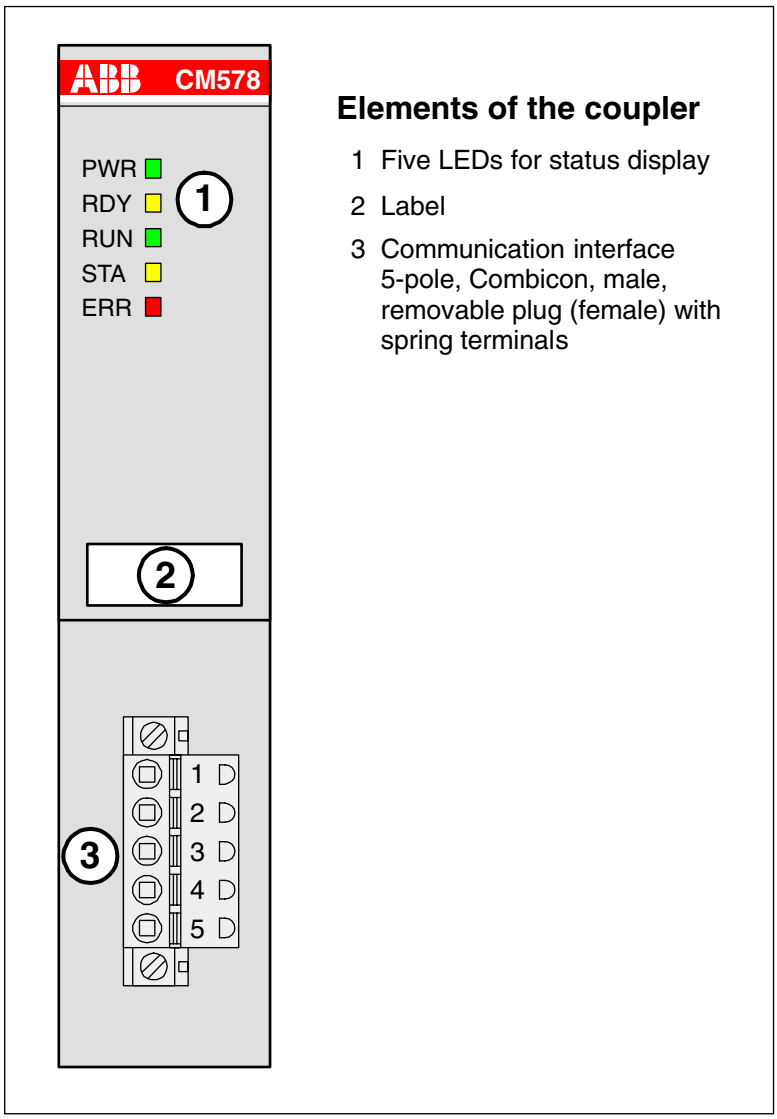
The system data of AC500 and S500 are valid here. Only additional details are therefore documented below.

Coupler CM577-ETH	
Field bus	2 x Ethernet
Transmission rate	10 MBit/s or 100 MBit/s
Protocol	Ethernet TCP/IP, UDP/IP, Modbus TCP
Field bus connectors	2 x RJ45, with integrated 2-port switch
Processor	EC1, 160 pins
Clock frequency	48 MHz
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all
Ambient temperature	0 °C...60 °C
Coupler interface	Dual-port memory, 8 kByte
Current consumption over the coupler bus	typ. 420 mA
Internal RAM memory (EC1)	256 kByte
External RAM memory	2 x 128 kByte (for webserver option)
External Flash memory	512 kByte (firmware), 2 MByte (for webserver option)
Status display	PWR, RDY, RUN, STA, ERR, 2 x LINK, 2 x ACT
Weight	ca. 150 g

Ordering data

Order No.	**Scope of delivery**
1SAP 170 700 R0001	CM577-ETH, Communication module Ethernet TCP/IP with integrated 2-port switch
Link to other ordering data	see Overview of the AC500 communication modules

CM578-CN Communication module CANopen
- CANopen Master 1 Mbit/s



Elements of the coupler

1 Five LEDs for status display

2 Label

3 Communication interface 5-pole, Combicon, male, removable plug (female) with spring terminals

Figure: Communication module CANopen CM578-CN

Contents

Purpose

The AC500 communications module CM578-CN makes a communication over the CANopen field bus possible. The coupler is mounted on the left side of the CPU on the same Terminal Base. The communication between the CPU and the coupler takes place through the coupler bus (coupler interface), which is integrated in the Terminal Base. The data interchange is realized by a dual-port RAM. Depending on the used Terminal Base, 1, 2 or 4 couplers (also different types) can be employed (see also the description of the Terminal Bases).

Functionality

Coupler CM578-CN	
Protocol	CANopen
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all of the TB5xx
Field bus connector	Pluggable connector COMBICON, 5-pole
Internal power supply	via the coupler interface of the Terminal Base

Mounting and electrical connection

The coupler is mounted on the left side of the CPU on the same Terminal Base. The electrical connection is established automatically when mounting the coupler.

Note: Mounting, disassembling, electrical connection and dimensioned drawings for the Terminal Bases, CPUs, communication modules, I/O Terminal Units and the I/O expansion modules are described in detail in the AC500 system data chapters.

Caution: Removal of energized modules is not permitted. All power sources (supply and process voltages) must be switched off while working on any AC500 system.

Field bus interface

The CANopen connector has the following pin assignment:

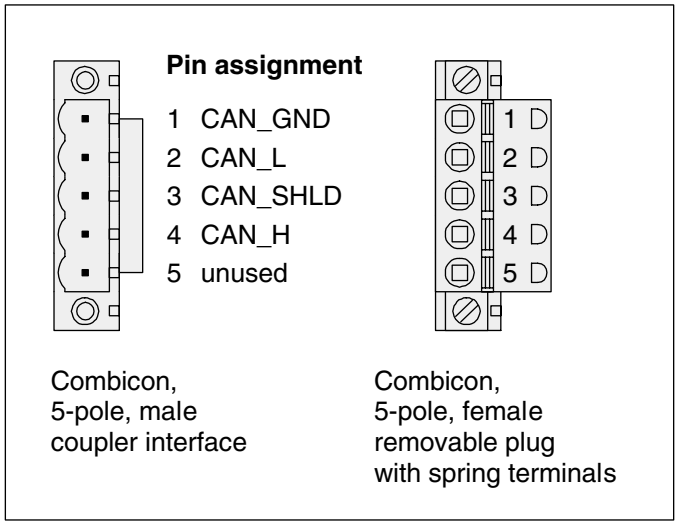


Figure: Pin assignment of the CANopen field bus interface

Cable lengths

The maximum possible cable length of a CANopen network depends on the baud rate (transmission rate).

Bit rate (speed)	Bus length
1 Mbit/s	30 m
800 bkit/s	50 m
500 bkit/s	100 m
250 bkit/s	250 m
125 bkit/s	500 m
62.5 bkit/s	1000 m
20 bkit/s	2500 m
10 bkit/s	5000 m

Table: Maximum cable length within a CANopen field bus

Bus termination

The data line ends must be equipped with 120-Ohm bus terminating resistors. Normally, the resistors are integrated in the interface connectors.

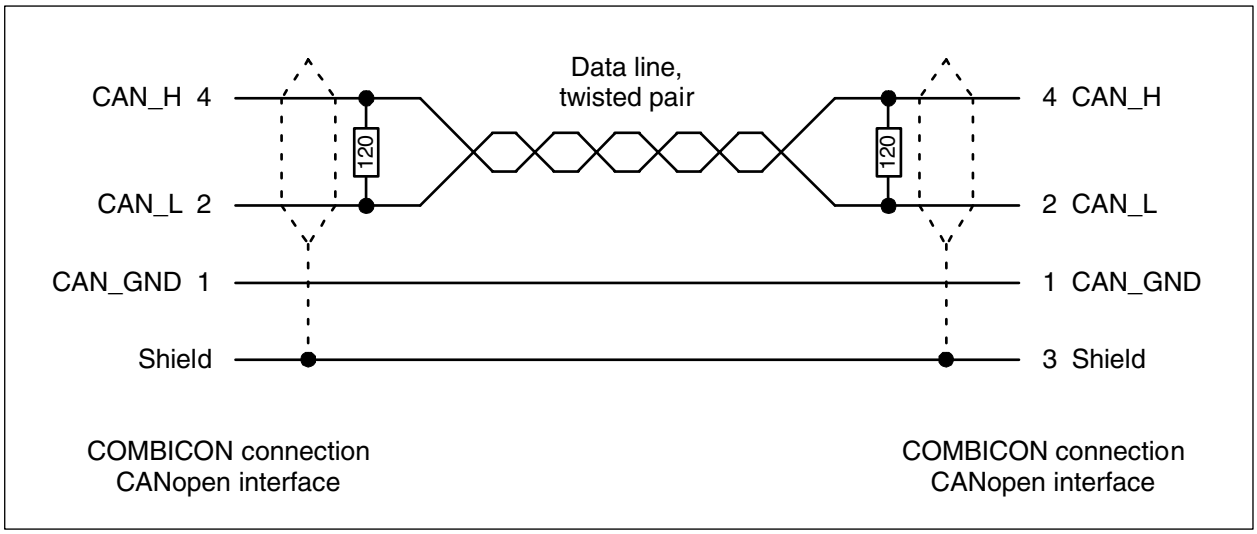


Figure: CANopen interface, bus terminating resistors at the line ends

LED status displays

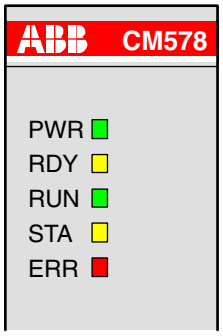
The status of the CANopen coupler is displayed by means of 5 status LEDs. After power ON, the coupler initializes a self-test. If this test was successful, the yellow RDY LED goes ON. Otherwise the LED starts flashing and aborts the further initialization. If the RDY LED remains OFF, the coupler is defective.

In the course of initialization, the RUN LED is OFF for the first time. The LED is only activated after configuration data has been sent to the coupler and the operating mode of the coupler was set. If the operating system of the coupler detects a parameterization or a configuration error, the green RUN LED flashes non-cyclically. If this LED flashes cyclically, the coupler is ready for communication, but the communication is not active yet. In case of an active communication, the RUN LED lights continuously.

During the initialization procedure and also if the coupler is configured (anew) - in particular if the operating mode was changed - it can occur that all or some LEDs light up for a short period of time, before reaching a defined condition.

The green PWR LED indicates, that the supply voltage is present.

The following figure shows the positions of the LEDs. The table after that shows the LED statuses and their meanings.



LED	Color	Status	Meaning
PWR	green	ON (light)	Voltage is present
		OFF (dark)	Voltage is missing
RDY	yellow	ON	Coupler is ready
		flashes cyclic	Bootstrap Loader is active
		flashes non-cyclic	Hardware or system error
		OFF	Defective hardware or no power supply
RUN	green	ON	Communication is running
		flashes cyclic	Ready for communication
		flashes non-cyclic	Parameterization error
		OFF	No communication or no power supply
STA	yellow	ON	CANopen master: transmits data
		OFF	CANopen master: no data
ERR	red	ON	CANopen error
		OFF	No error

Further important information

CANopen basics

CANopen is a standardized 7-layer protocol for decentralized industrial automation systems, based on the Controller Area Network (CAN) and the CAN Application Layer (CAL).

CANopen bases on a communication profile in which the basic communication mechanisms and their descriptions are defined, e.g. mechanisms for interchange of process data in real time or transmitting of alarm messages.

The different CANopen device profiles make use of this common communication profile. The device profiles describe the specific functionality of a device class or its parameters. For the most important device classes used in the industrial automation technology, such as digital and analog input/output modules, sensors, drives, operator panels, loop controllers, programmable control systems and encoders, suitable device profiles exist. Others are in preparation.

A central element of the CANopen standard is the description of the device functionality in an object directory. The object directory is subdivided into a general part and a device-specific part. The general part contains details on the device, such as device identification, name of manufacturer, communication parameters etc. The device specific part describes the specific functionality of the concerned device. These features of a CANopen device are described in a standardized Electronic Data Sheet (EDS).

A CANopen network consists of a maximum of 128 devices, one NMT master and a maximum of 127 NMT slaves. In contrast to other typical master-slave systems such as PROFIBUS, the CANopen terms Master and Slave have a different meaning.

In operational mode, all devices are able to transmit messages via the bus. In addition, the master can change the operating mode of the slaves.

Normally a CANopen master is realized by a PLC or a PC. The bus address of a CANopen slave can be set from 1 to 127. By the device address, a number of identifiers are created, which are then used by the device.

Important address

CAN in automation

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Fax +49-9131-69086-79
E-Mail headquarters@can-cia.org
Internet www.can-cia.org

Technical data

The system data of AC500 and S500 are valid here. Only additional details are therefore documented below.

Coupler CM578-CN	
Field bus	CANopen
Transmission rate	10 kBit/s to 1 MBit/s
Protocol	CANopen Master
Field bus connector	Pluggable connector COMBICON, 5-pole
Processor	EC1, 160 pins
Clock frequency	48 MHz
Usable CPUs	PM571-xxx, PM581-xxx, PM591-xxx
Usable Terminal Bases	all
Ambient temperature	0 °C...60 °C
Coupler interface	Dual-port memory, 8 kByte
Current consumption over the coupler bus	typ. 290 mA
Internal RAM memory (EC1)	256 kByte
External RAM memory	-
External Flash memory	512 kByte (firmware)
Status display	PWR, RDY, RUN, STA, ERR
Weight	ca. 150 g

Ordering data

Order No.	**Scope of delivery**
1SAP 170 800 R0001	CM578-CN, Communication module CANopen Master
Link to other ordering data	See Overview of the AC500 communication modules