

OFFICIAL DOCUMENT PACKAGE

Manufacturer's Manual

Amikon cover with selected official ABB technical pages

ABB AC500 communications

CM575-DN

DEVICENET MASTER COMMUNICATION MODULE

Selected official pages retain the original technical tables, ratings, notes and pagination.

OFFICIAL SOURCE

ABB AC500 Hardware V2, 03.2007, CM575-DN section 4-12 to 4-18

CM575-DN device, wiring, cable limits, diagnostics and ordering; original PDF pages 110-116

This technical extract does not replace the complete equipment and system manuals. Check the installed hardware and project before use.

CM575-DN Communication module DeviceNet

- DeviceNet Master 500 kbit/s

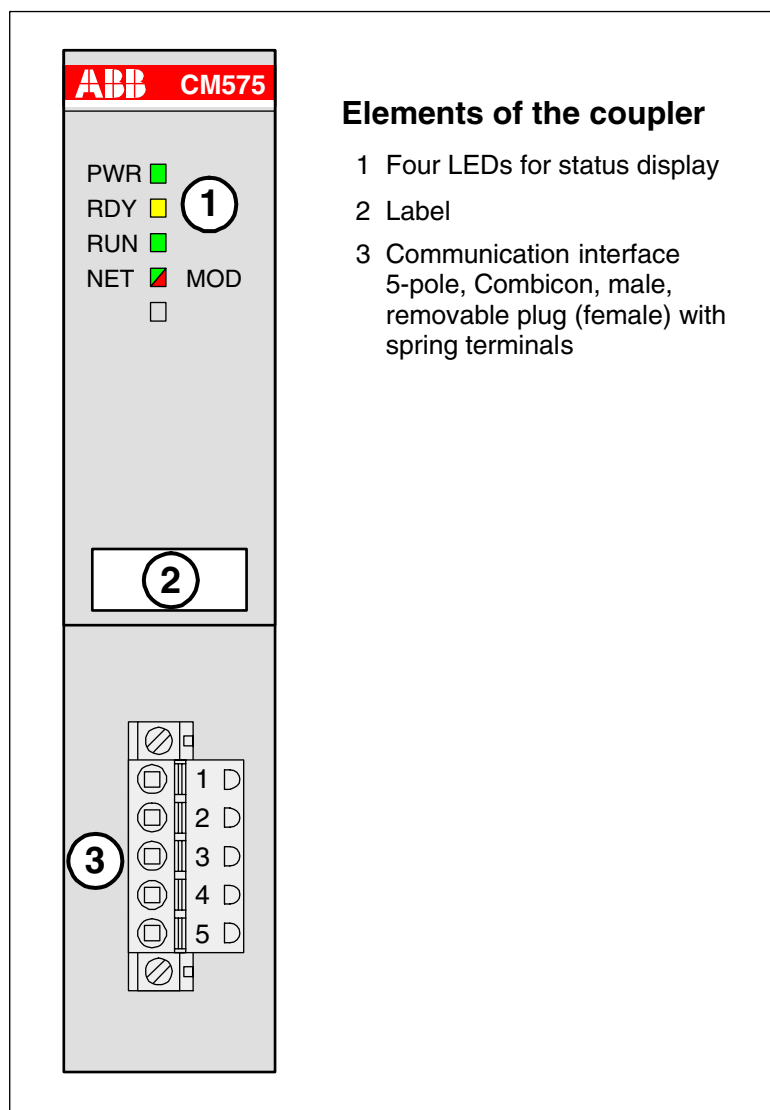


Figure: Communication module DeviceNet CM575-DN

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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:

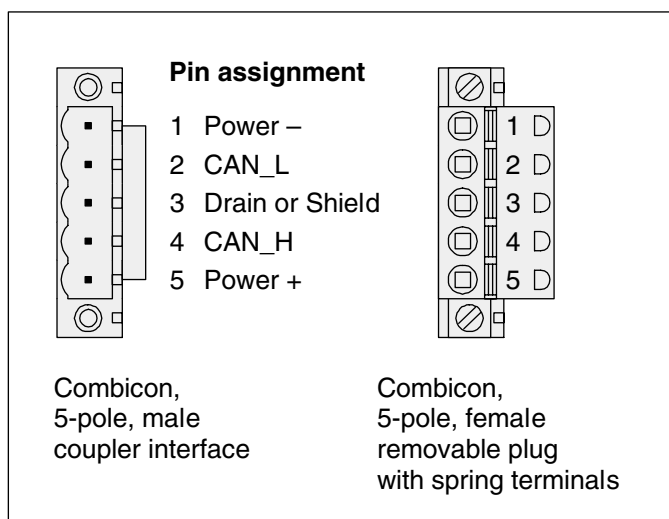


Figure: Pin assignment of the DeviceNet field bus interface

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.

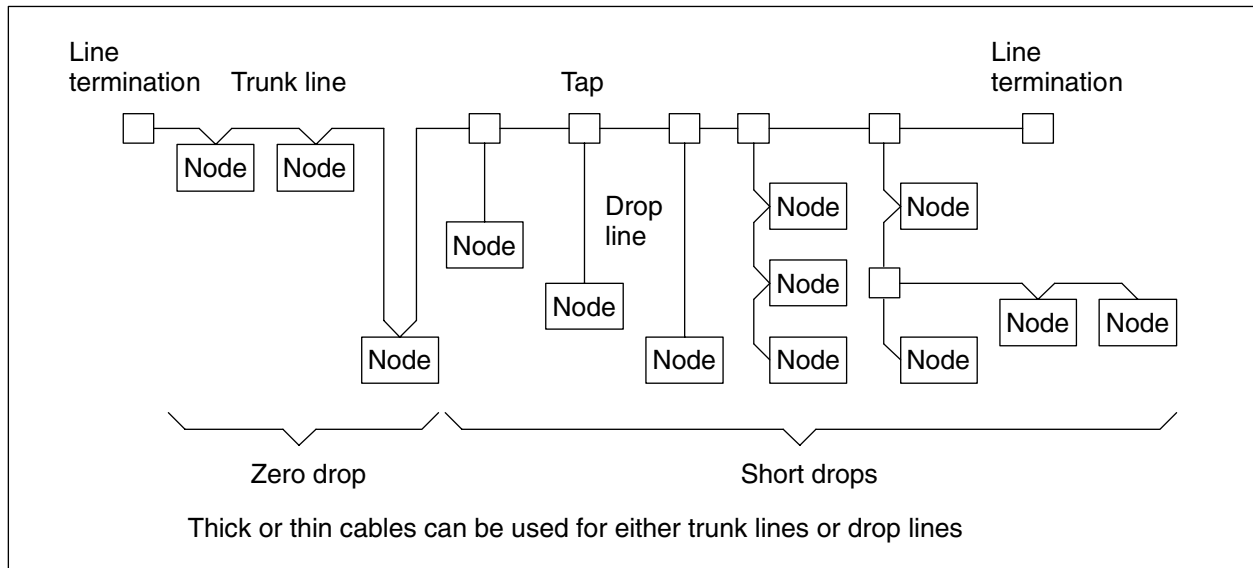


Figure: Variants of bus topology

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 mm ² 14 AWG = 2.080 mm ²	24 AWG = 0.205 mm ² 22 AWG = 0.324 mm ²
Individual screen	Aluminium/polyester tape	
Drain wire size	18 AWG = 0.823 mm ²	22 AWG = 0.324 mm ²
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.

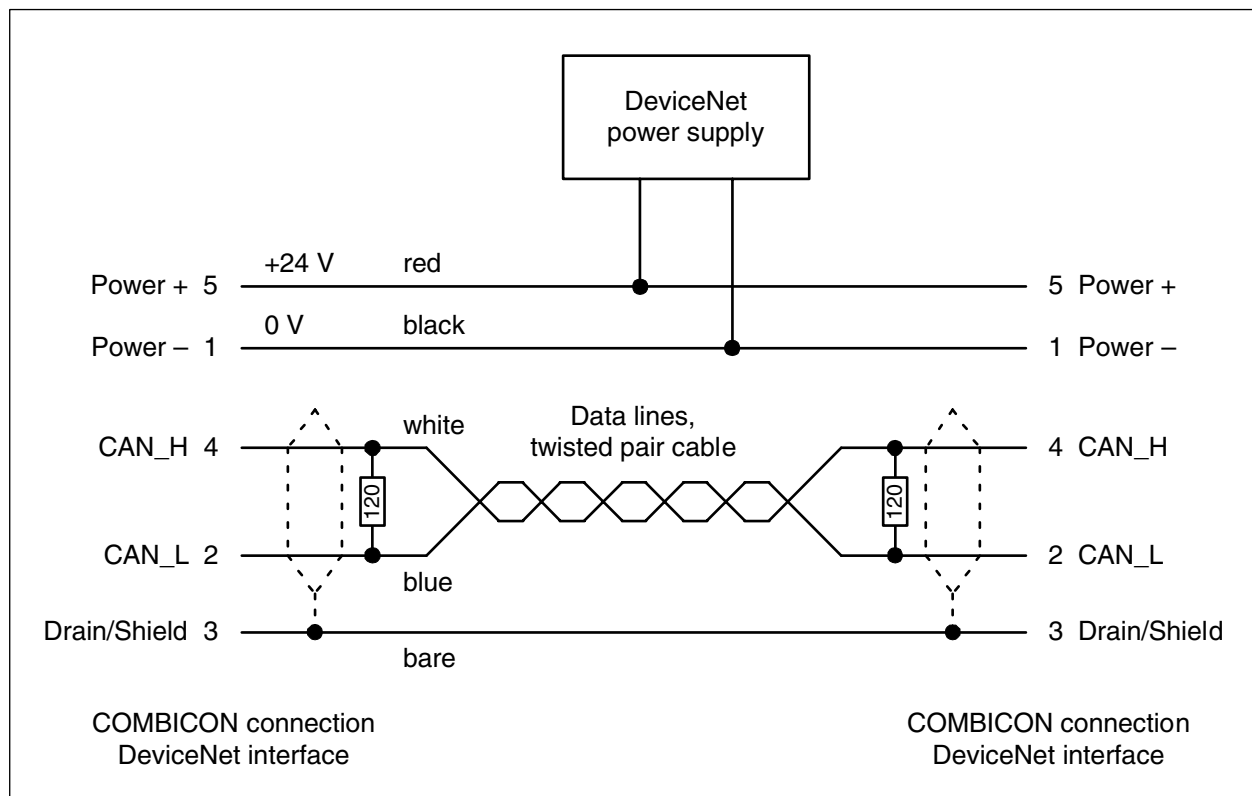


Figure: Connecting the power supply

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

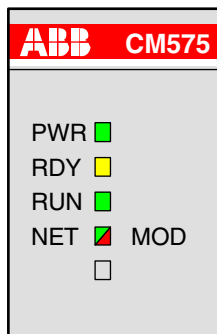
The status of the DeviceNet coupler is displayed by means of 4 status LEDs. After power ON, the coupler initializes a self-test. If this test was successful, the yellow RDY LED goes ON. Otherwise the LED starts flashing and aborts the further initialization. If the RDY LED remains OFF, the coupler is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