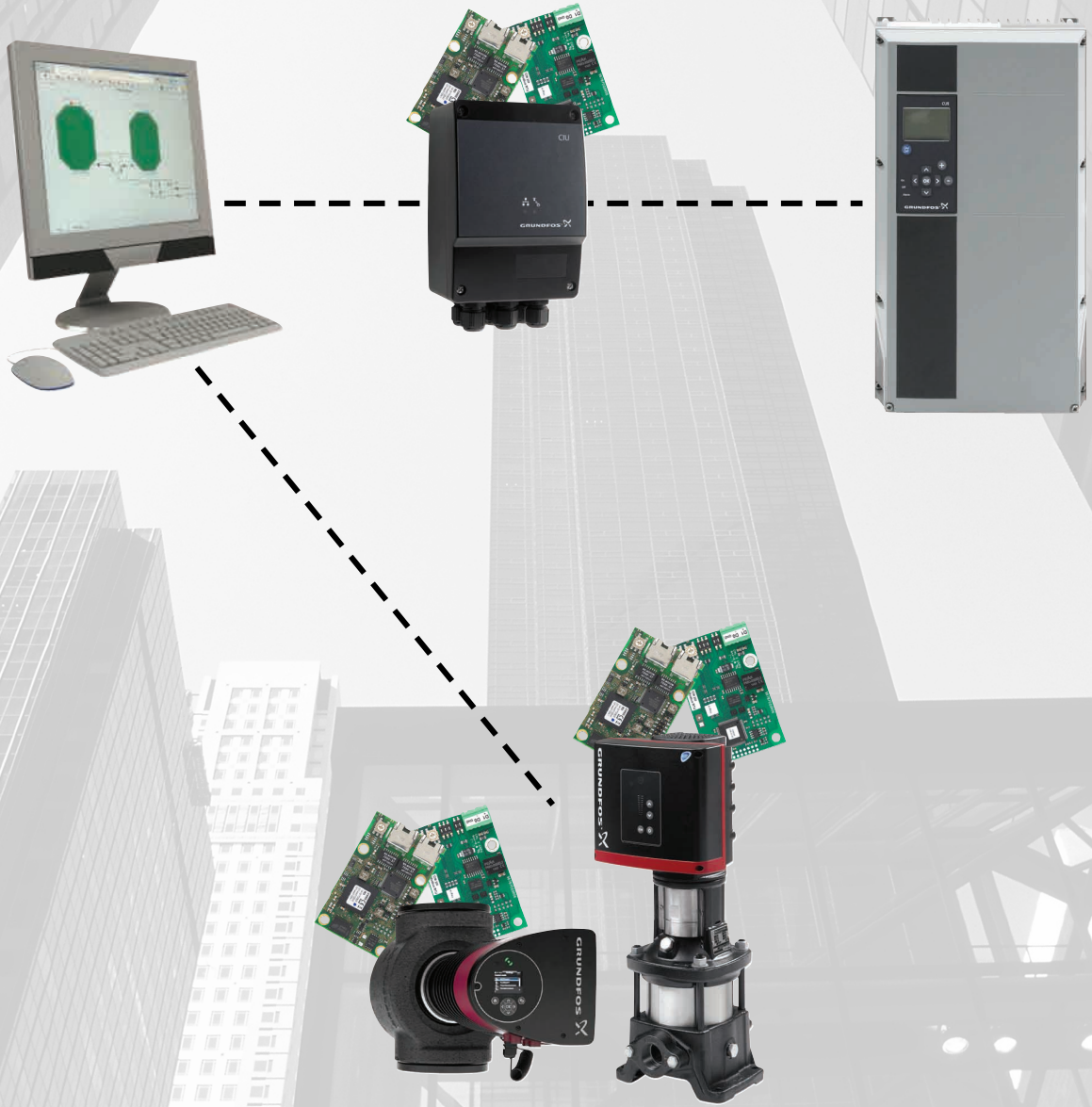
BACnet for Grundfos pumps

CIM/CIU 300 BACnet MS/TP
CIM/CIU 500 Ethernet for BACnet IP

Functional profile and user manual



GRUNDFOS

BACnet for Grundfos pumps

English (GB)

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Original functional profile and user manual

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1. General information

Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

DANGER
Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.

WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

CAUTION
Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

SIGNAL WORD
Description of the hazard
Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

Observe these instructions for explosion-proof products.

A blue or grey circle with a white graphical symbol indicates that an action must be taken.

A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.

If these instructions are not observed, it may result in malfunction or damage to the equipment.

Tips and advice that make the work easier.

2. Introduction

2.1 About this functional profile

This functional profile describes the following modules and units:

- CIM/CIU 300 BACnet MS/TP
- CIM/CIU 500 Ethernet for BACnet IP

For the following Grundfos pumps:

- Grundfos MAGNA3 (with add-on CIM)
- Grundfos CRE, CRNE, CRIE, MTRE, CME Grundfos TPE, TPE Series 2000, NBE, NKE Grundfos CUE frequency converter.

Grundfos cannot be held responsible for any problems caused directly or indirectly by using information in this functional profile.

2.2 Assumptions

This functional profile assumes that the reader is familiar with commissioning and programming BACnet devices. The reader should have some basic knowledge of the BACnet protocol and technical specifications. It is also assumed that an existing BACnet MS/TP or BACnet IP network is present.

2.3 Definitions and abbreviations

APDU	Application Protocol Data Unit.
ARP	Address Resolution Protocol. Translates IP addresses into MAC addresses.
Auto-MDIX	Ensures that both crossover cable types and non-crossover cable types can be used.
CAT5	Ethernet cable with four twisted pairs of wires.
CAT5e	Enhanced CAT5 cable with better performance.
CAT6	Ethernet cable compatible with CAT5 and CAT5e and with very high performance.
CIM	Communication Interface Module. A Grundfos add-on module.
CIU	Communication Interface Unit. Grundfos box for CIM modules.
CRC	Cyclic Redundancy Check. A data error detection method.
Device	A node on the BACnet MS/TP network.
DHCP	Dynamic Host Configuration Protocol. Used to configure network devices so that they can communicate on an IP network.
DNS	Domain Name System. Used to resolve host names to IP addresses.
GENIbus	Proprietary Grundfos fieldbus standard.
GENIpro	Proprietary Grundfos fieldbus protocol.
Grundfos GO	A Grundfos application designed to control Grundfos products via infrared or radio communication. Available for iOS and Android devices.
HTTP	Hyper Text Transfer Protocol. The protocol commonly used to navigate the world wide web.
IANA	Internet Assigned Numbers Authority.
Inter-network	A set of two or more BACnet networks interconnected by routers.
IP	Internet Protocol.
LED	Light-Emitting Diode.
MAC	Unique network address for a piece of hardware.
MS/TP	Master-Slave / Token-Passing. A data protocol used for BACnet RS-485.
Ping	Packet InterNet Groper. A software utility that tests the connectivity between two TCP/IP hosts.
Router	A device that connects two or more networks at the network layer.
SELV	Separated or Safety Extra-Low Voltage.
SELV-E	Separated or Safety Extra-Low Voltage with earth connection.
SMTP	Simple Mail Transfer Protocol.
SNTP	Simple Network Time Protocol. Used for clock synchronisation between computer systems.
TCP	Transmission Control Protocol. Protocol for Internet communication and Industrial Ethernet communication.
TCP/IP	Transmission Control Protocol/Internet Protocol. Protocol for Internet communication.
Transmission speed	Bits transferred per second, bit/s.
Trunk cable	Main RS-485 cable on a BACnet MS/TP network.
URL	Uniform Resource Locator. The IP address used to connect to a server.
UTC	Coordinated Universal Time. The primary time standard by which the world regulates clocks and time.
UTF-8	Unicode Transformation Format. Character encoding.
VPN	Virtual Private Network. A network using the Internet to connect nodes. These systems use encryption and other security mechanisms to ensure that only authorised users can access the network and that the data cannot be intercepted.

2.4 System diagrams

The system diagrams give an overview of how to connect the module or unit to the Grundfos pump that is to be connected to a BACnet network.

CIM solution

The Communication Interface Module (CIM) is an add-on communication module thatyou install internally in a Grundfos pump, using a 10-pin connection. In this setup, the pump will supply power to the module. See image below. This installation option is currently available for Grundfos MGE models H, I J and K based E-pumps and Grundfos MAGNA3 pumps.

! TPED twin-head pump with MGE motors model H, I J and K in multipump mode and MAGNA3 twin-head pump in multipump mode, requires a CIM module installed in the master pump and uses the functional profile for boosters.

CIU solution

The Communication Interface Unit (CIU) unit is a box with a power supply module and a CIM BACnet module. You can mount it either on a DIN rail or on a wall. See image below.

You use it in conjunction with Grundfos E-pumps that do not support an internal, add-on communication module CIM.

TM079766

Pump with built-in CIM 300

TM079767

Pump with built-in CIM 500

TM045804_3909

Pump connected to CIU 300 via GENIbus

TM080195

Pump connected to CIU 500 via GENIbus

2.5 Specifications

General data	Description	Comments
Ambient humidity	30-95 %	Relative, non-condensing.
Operating temperature	-20 to +45 °C	
Storage temperature	-25 to +70 °C	
GENIbus visual diagnostics	LED2	The LED will be in one of these states: Off, permanently green, flashing red, permanently red.

BACnet MS/TP	Description	Comments
BACnet connector	Screw-type terminal	3 pins.
BACnet connection type	RS-485	
BACnet wire configuration	Two-wire + ground	Conductors: Plus, Minus and Ground.
Maximum cable length	1200 m	Equals 4000 ft
Recommended cross-section of BACnet cable	0.20 - 0.25 mm^2	AWG24 or AWG23
MAC address	0-127	Set via rotary switches SW6 and SW7.
Line termination	On or Off	Set via DIP switches SW1 and SW2.
Supported transmission speeds [bit/s]	9600, 19200, 38400, 76800	Set via DIP switches SW4 and SW5.
Data bits	8	Fixed value
Stop bits	1	Fixed value
Parity	None	Fixed value
BACnet visual diagnostics	LED1	Red and green status LED.
Maximum number of BACnet devices	32	Using repeaters, this number can be increased.
Grundfos BACnet vendor ID	227	
BACnet segmentation support	No	
Character set support	ANSI X3.4	Base definition for the widely used character code known as ASCII.
BACnet device profile	B-ASC	BACnet Application-Specific controller
BACnet MS/TP master	Yes	CIM/CIU 300 and 500 are BACnet MS/TP master devices.
Manual slave address binding	No	
BACnet protocol revision	For hardware version R4: 4 For hardware version R8: 9	

BACnet IP	Description	Comments
Application layer	DHCP, HTTP, Ping, FTP, SMTP, SNTP, BACnet IP	Rotary switch in position 2.
Transport layer	UDP	
Internet layer	Internet protocol V4 (IPv4)	
Link layer	ARP, media access control (Ethernet)	
Ethernet cable	CAT5, CAT5e or CAT6	Supports auto cable-crossover detecting (Auto-MDIX)
Maximum cable length	100 metres at 10/100 Mbit/s	Corresponds to 328 feet.
Transmission speed	10 Mbit/s, 100 Mbit/s	Auto-detected
Industrial Ethernet protocols	PROFINET IO, BACnet IP etc.	Selected with rotary switch
BACnet protocol revision	9	

CIM 300 and 500		
Dimensions [w x h x d] [mm]	50 x 19 x 80	
Power supply		Supplied by the booster system.
Connection to booster system	10-pin connection	

CIU 300 and 500	Description	Comments
Power supply (CIU)	24-240 V	Located in the CIU.
GENIbus connection type (CIU)	RS-485, 3-wire + screen	Conductors: A, B and Y.
CIU box enclosure class	IP54	
CIU box dimensions (H x W x D)	182 x 108 x 82 mm	

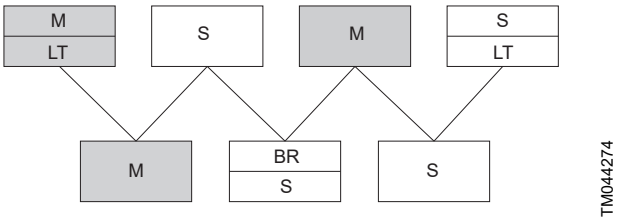
Related information

3.2 CIM 300 BACnet module
3.3 Connecting to the BACnet network
3.4 Setting the BACnet transmission speed
3.7 Selecting the BACnet MAC address
3.8 Termination resistor
3.10 LEDs
3.10.1 LED1, BACnet MS/TP communication
4.2 Selection of industrial Ethernet protocol

3. BACnet MS/TP, CIM 300 setup

3.1 BACnet bus topology

The Grundfos CIM/CIU 300 is connected as a BACnet MS/TP master directly to the BACnet MS/TP network.



Example of BACnet MS/TP network

Pos.	Description
M	Master
S	Slave
LT	Line Termination
BR	Bias Resistors

The BACnet MS/TP is a multi-master system which means that there can be more than one master on the network. It uses a token to control access to the bus network. A master node may initiate the transmission of a data telegram when it holds the token. Both master and slave nodes may transmit data telegrams in response to requests from master nodes, but slaves never hold the token. Master nodes pass the token between them.

A BACnet MS/TP segment is a single contiguous medium to which BACnet nodes are attached. Segments can be connected by use of repeaters or bridges, thus forming networks.

Multiple networks may be interconnected by BACnet routers to form a BACnet inter-network.

3.1.1 Line termination resistors

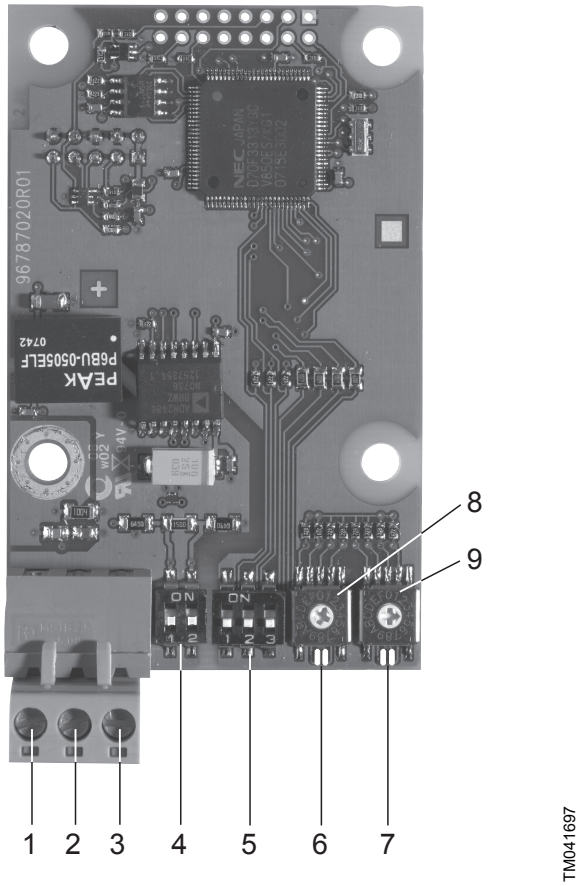
Line termination must be connected at each of the two ends of the segment medium. The CIM/CIU 300 has optional line termination resistor on board.

3.1.2 Bias resistors

At least one set, and no more than two sets, of network bias resistors must exist for each segment so that an undriven communications line is held in a guaranteed logical one state. The bias provides a reliable way for stations to detect the presence or absence of signals on the line. An unbiased line takes an indeterminate state in the absence of any driving node.

The CIM/CIU 300 has no bias resistors.

3.2 CIM 300 BACnet module



CIM 300 BACnet module

Pos.	Designation	Description
1	Plus	BACnet Plus terminal, RS-485 positive data signal
2	Minus	BACnet Minus terminal, RS-485 negative data signal
3	Ground	BACnet ground terminal
4	SW1/SW2	On and off switches for termination resistor
5	SW3/SW4/SW5	Switches for selecting the BACnet transmission speed and the default or custom Device Object Instance Number
6	LED1	Red and green status LED for BACnet communication
7	LED2	Red and green status LED for internal communication between CIM 300 and the booster system
8	SW6	Hexadecimal rotary switch for setting the BACnet MAC address (four most significant bits)
9	SW7	Hexadecimal rotary switch for setting the BACnet MAC address (four least significant bits)

3.3 Connecting to the BACnet network

Use a screened, twisted-pair cable.

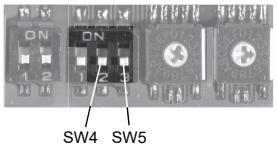
BACnet terminal	Recommended colour	Data signal
Plus	Red	Positive
Minus	Green	Negative
Ground	Grey	Ground

The ANSI/ASHRAE BACnet standard states that the cable screen must only be earthed at one end of the segment to prevent earth fault currents.

3.4 Setting the BACnet transmission speed

Set the transmission speed correctly before the CIM 300 is ready to communicate on the BACnet MS/TP network. Use the DIP switches SW4 and SW5 to set the transmission speed.

The default transmission speed is 9600 bit/s, but we recommend higher speeds for better data throughput. All devices on the BACnet MS/TP network must communicate at the same transmission speed.



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BACnet transmission speed settings

3.4.1 DIP switch settings

Available transmission speeds in bit/s: 9600, 19200, 38400 and 76800.

Use the DIP switches SW4 and SW5 to select the desired speed.

Transmission speed [bit/s]	SW4	SW5
9600	OFF	OFF
19200	OFF	ON
38400	ON	OFF
76800	ON	ON

The default transmission speed is 9600 bit/s, as per the BACnet MS/TP standard. The transmission speed is effective immediately after setting the values of the DIP switch.

3.5 Selecting the Device Object Instance Number

The Device Object Identifier value consists of two components:

- a 10-bit Object Type (bits 22 to 31)
- a 22-bit Instance Number (bits 0 to 21).

31 … 22	21 … 0
Object type 10 bits	**Instance Number** 22 bits

TM045977

Bit numbers

The Object Type is fixed and determines that it is a Device Object. The Instance Number is a numeric code that is used to identify the device. It must be unique inter-network-wide, that is, on all interconnected networks.

The CIM 300 offers two different approaches to setting the BACnet Device Object Instance Number: default and custom, both described in the following subsections.

3.5.1 Default Instance Number

By default, the CIM 300 uses a pre-defined Device Object Instance Number which is 227XXX where XXX is the BACnet MAC address. This gives an Instance Number range of 227000 to 227127.

Example

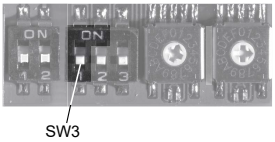
The BACnet MAC address is set to 20 via the hexadecimal rotary switches, so the Device Object Instance Number is 227020.

Related information

3.7 Selecting the BACnet MAC address

3.5.2 Custom Instance Number

To use the complete Instance Number range, set the new Instance Number with the BACnet object Custom Device Object Instance Number (AV, 0), and set SW3 to ON. This immediately sets the new Device Object Instance Number.



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Device Object Instance Number

Device Object Instance Number	SW3
Default (227000 + BACnet MAC address)	OFF
Custom, set with object (AV, 0)	ON

The default Present_Value of the Custom Device Object Instance Number is 231.

Example

The Present_Value of the Custom Device Object Instance Number (AV, 0) is 231, so the Device Object Instance Number is 231.

! The Present_Value of the Custom Device Object Instance Number cannot be 4194303 as this is a reserved value.

3.6 Selecting the Device Object Name

The property Device_Name is a character string that must be unique inter-network-wide. By default, the name is constructed as "Grundfos - XXXXXX" where XXXXXX is the current Device Object Instance Number as described in the section Selecting the Device Object Instance Number.

Example

The Device Object Instance Number is 227001, so the Device Object Name is "Grundfos - 227001".

If a new name is selected, it is stored in the device and replaces the default naming scheme.

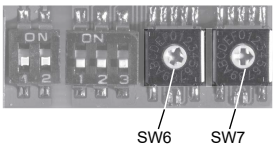
Related information

3.5 Selecting the Device Object Instance Number

3.7 Selecting the BACnet MAC address

To set the BACnet MAC address, use the two hexadecimal rotary switches, SW6 and SW7.

The value must be within the range of 0 to 127. An illegal value results in a MAC address of 0.



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Setting the BACnet MAC address

For a complete overview of BACnet addresses, see section BACnet MAC address, CIM 300.

! You must set the BACnet MAC address decimally from 0 to 127 and it must be unique on the BACnet MS/TP segment.

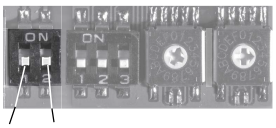
Related information

11. BACnet MAC address, CIM 300

3.8 Termination resistor

A termination resistor for line termination is fitted on the CIM 300 and has a value of 120 Ω. It is to be cut in if the CIM 300 is set as the last station on the network.

The CIM 300 has two DIP switches, SW1 and SW2, for cutting the termination resistor in and out.



TM041701

Cutting the termination resistor in and out

Status	SW1	SW2
Cut in	ON	ON
Cut out	OFF	OFF
	ON	OFF
	OFF	ON

Default setting: The termination resistor is cut out.

3.9 Cable length

The recommended maximum cable length within a BACnet MS/TP segment is 1200 metres (4000 ft) with 0.82 mm^2 (AWG 18) cable.

The connection between the BACnet modules must be made by a screened, twisted-pair cable with a characteristic impedance between 100 and 130 Ω.

3.10 LEDs

The CIM 300 BACnet has two LEDs:

- red and green status LED (LED1) for BACnet MS/TP communication
- red and green status LED (LED2) for internal communication between the CIM 300 and the Grundfos pump.

3.10.1 LED1, BACnet MS/TP communication

Status	Description
Off	No communication
Flashing green	Communication active
Flashing red	Fault in the BACnet communication
Permanently red	Fault in the CIM 300 BACnet configuration

3.10.2 LED2, internal communication

Status	Description
Off	CIM 300 has been switched off or is starting up.
Flashing red	No internal communication between CIM 300 and the pump.
Permanently red	CIM 300 does not support the specific pump version.
Permanently green	Internal communication between CIM 300 and the pump is OK.

! During startup, there may be a delay of up to 5 seconds before the LED status is updated.

4. BACnet IP, CIM 500 setup

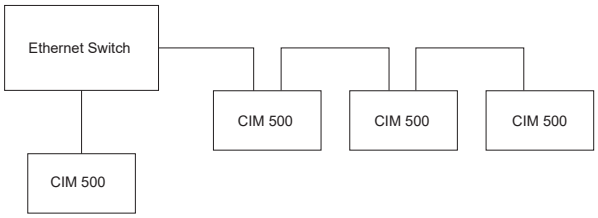
WARNING
Electric shock
Death or serious personal injury
- Connect the CIM 500 only to SELV circuit.

4.1 Connecting the Ethernet cable

Use RJ45 plugs and Ethernet cable. Connect the cable shield to protective earth at both ends.

It is important to connect the cable shield to earth through an earth clamp or in the connector.

The CIM 500 is designed for flexible network installation: the built-in 2-port switch makes it possible to daisy chain from product to product without additional Ethernet switches. The last product in the chain is only connected to one of the Ethernet ports. Each Ethernet port has its own MAC address.



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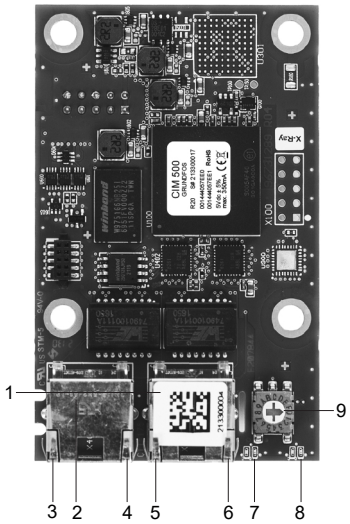
Example of industrial Ethernet network



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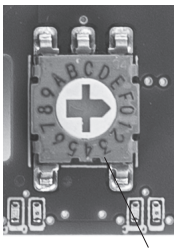
Example of Ethernet connection

Pos.	Description	Designation
1	Industrial Ethernet RJ45 connector 1	ETH1
2	Industrial Ethernet RJ45 connector 2	ETH2
3	Data LED for Connector 1, 10/100 Mbits/s speed	DATA1
4	Link LED for connector 1	LINK1
5	Data LED Connector 2, 10/100 Mbits/s speed	DATA2
6	Link LED for connector 2	LINK2
7	Green and red status LED for Ethernet communication	LED1
8	Green and red status LED for internal communication between module and pump	LED2
9	Rotary switch for protocol selection	SW1

4.2 Selection of industrial Ethernet protocol

The module has a rotary switch for selection of the industrial Ethernet protocol. See the figure below.



TM081367

Selecting the industrial Ethernet protocol

Pos.	Description
0	PROFINET IO, default
1	Modbus TCP
2	BACnet IP
3	EtherNet/IP
4...E	Reserved LED1 is permanently red to indicate an invalid configuration.
F	Resetting to the factory settings: 1. Set the rotary switch to this position. 2. LED1 starts to flash red and green for 20 seconds to indicate that factory reset is about to take place. 3. After 20 seconds, LED1 stops to flash and factory reset is initiated. 4. When both LED1 and LED2 switch off, the reset is completed. The rotary switch can be moved to another position.

If the position of the rotary switch is changed when the module is powered on, the module restarts and uses the protocol associated with the new position.

4.3 Setting the IP addresses

The CIM 500 Ethernet module is by default set to a fixed IP address. It is possible to change the IP address settings from the built-in webserver.

Default IP settings used by the webserver	IP address:192.168.1.100 Subnet mask: 255.255.255.0 Gateway: 192.168.1.1
IP settings for Modbus TCP	This must be set via the webserver and it must be different from the webserver address.

4.4 Establishing a connection to the webserver

You can configure the CIM 500 using the built-in webserver. To establish a connection from a PC to the CIM 500, the following steps are required:

1. Connect the PC and the CIM 500 using an Ethernet cable.
2. Configure the PC Ethernet port to the same subnetwork as the CIM 500, for example, 192.168.1.101, and the subnet mask to 255.255.255.0.
3. Open a standard internet browser and type 192.168.1.100 in the URL field.
4. The browser shows one or more security warnings, depending on which browser is used. Ignore these and proceed until you see the CIM 500 home page main menu.
5. Log in to the webserver using the following:

User name (default)	admin
Password (default)	Grundfos

The user name and password may have been changed from their default values and if you cannot remember them, the CIM 500 must be reset to factory settings.

If the password has not been changed, you are prompted to change it to a new and stronger password.

TM056436

CIM 500 connected to a PC via Ethernet cable

You can use both the ETH1 and ETH2 to establish a connection to the webserver.

You can access the webserver while the selected industrial Ethernet protocol is active.

4.5 Status LEDs

The CIM 500 Ethernet module has two status LEDs:.

- red and green status LED1 for Ethernet communication
- red and green status LED2 for internal communication between the CIM 500 and the Grundfos product.

See section Connecting the Ethernet cable.

LED1

Status	Description
Off	No Modbus TCP communication or switched off
Flashing green	Modbus TCP communication active
Permanent red	CIM 500 module configuration fault
Permanent red and green	Error in the firmware download
Flashing red and green	Resetting to factory default After 20 seconds, the CIM 500 restarts.

LED2

Status	Description
Off	CIM 500 switched off
Flashing red	No internal communication between the CIM 500 and the Grundfos product
Permanent red	CIM 500 not supporting the Grundfos product connected
Permanent green	Internal communication between the CIM 500 and the Grundfos product OK
Permanent red and green	Memory fault

During startup, there is a delay of up to 5 seconds before the LED1 and LED2 status is updated.

4.6 Data activity and link LEDs

The module has two connectivity LEDs related to each RJ45 connector.

DATA1 and DATA2

These yellow LEDs indicate the speed of the data connection.

Status	Description
Off	The RJ45 connection speed is 10 Mbits/s or there is no link.
On	The RJ45 connection speed is 100 Mbits/s.

LINK1 and LINK2

These green LEDs show whether the Ethernet cable is properly connected to the RJ45 connector in question.

Status	Description
Off	There is no link connection on the RJ45 connector.
On	There is link connection on the RJ45 connector without data traffic.
Flashing	There is link connection on the RJ45 connector with data traffic.

5. Supported services

BACnet Interoperability Building Blocks (BIBBs) are collections of one or more BACnet services. These are described in terms of an "A" and a "B" device. Both devices are nodes on a BACnet inter-network. In most cases, the "A" device acts as the user of data (client), and the "B" device is the provider of this data (server).

The CIM/CIU 300 and 500 are BACnet Application-Specific Controllers (B-ASC) with a few additional services.

5.1 Data-sharing services

Name	BACnet BIBB code	Notes	Initiate	Execute
ReadProperty	DS-RP-B	The CIM 300 and 500 can be provider of data.	-	●
ReadPropertyMultiple	DS-RPM-B	The CIM 300 and 500 can be provider of data and return multiple values at one time.	-	●
WriteProperty	DS-WP-B	The CIM 300 and 500 allow a value to be changed over the network.	-	●
WritePropertyMultiple	DS-WPM-B	The CIM 300 and 500 allow multiple values to be changed over the network.	-	●
SubscribeCOV	DS-COV-B	The CIM 300 and 500 can be provider of "Change Of Value" data. Both support up to 10 simultaneous COV subscriptions. Subscription lifetime can be limited or unlimited.	-	●
ConfirmedCOVNotification			●	-
UnconfirmedCOVNotification			●	-

5.2 Device management services

Name	BACnet BIBB code	Notes	Initiate	Execute
Who-Is	DM-DDB-A	The CIM 300 and 500 can seek information about device attributes of other devices and interpret device announcements.	●	-
I-Am			-	●
Who-Is	DM-DDB-B	The CIM 300 and 500 can provide information about their device attributes and respond to requests to identify themselves.	-	●
I-Am			●	
Who-Has	DM-DOB-B	The CIM 300 and 500 can provide address information about their objects upon request.	-	●
I-Have			●	-
DeviceCommunicationControl	DM-DCC-B	The CIM 300 and 500 can respond to communication control requests. They support both limited and unlimited duration. The password, if required, is "Grundfos".	-	●

6. Object overview

6.1 Device Object

The following properties are supported in the Device Object (available for all pump types).

Property identifier	Data type	Notes	Access
Object_Identifier	BACnetObjectIdentifier	See section Selecting the Device Object Instance Number.	R
Object_Name	CharacterString	See section Selecting the Device Object Name for details on object name.	W
Object_Type	BACnetObjectType	DEVICE	R
System_Status	BACnetDeviceStatus	OPERATIONAL	R
Vendor_Name	CharacterString	Grundfos	R
Vendor_Identifier	Unsigned16	227	R
Model_Name	CharacterString	It shows the Grundfos pump model to which the CIM/CIU is connected.	R
Firmware_Revision	CharacterString	It shows the revision of the firmware in the CIM/CIU.	R
Application_Software_Version	CharacterString	It displays the software build date, DD-MM-YYYY.	R
Location	CharacterString	The user can enter a location here (maximum 200 characters).	W
Description	CharacterString	The user can enter a description here (maximum 200 characters).	W
Protocol_Version	Unsigned	It is the actual version of the BACnet protocol.	R
Protocol_Revision	Unsigned	It is the actual revision of the BACnet protocol.	R
Protocol_Services_Supported	BACnetServicesSupported	It shows the supported standardised protocol services.	R
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	It shows the supported standardised protocol object types.	R
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	It shows the array of objects available.	R
Max_APDU_Length_Accepted	Unsigned	CIM 300: The maximum number of bytes that may be contained in a single APDU is fixed to 480. CIM 500: The maximum number is 1476.	R
Segmentation_Supported	BACnetSegmentation	It indicates if segmentation of messages is possible. It always reads NO_SEGMENTATION to indicate that segmentation is not possible.	R
APDU_Timeout	Unsigned	It shows the amount of time in ms before time-out.	R
Number_Of_APDU_Retries	Unsigned	It is the maximum number of times an APDU is to be retransmitted.	R
Max_Master	Unsigned	The default value is 127, but this value can be lowered by the user to reduce transmission overhead. The Max_Master value must be higher than or equal to the highest MAC address used by a master node in an MS/TP network.	W
Max_Info_Frames	Unsigned	It shows the maximum number of information frames sent before the token is passed on (fixed to 1).	R
Device_Address_Binding	List of BACnetAddressBindings	It holds address bindings to other devices, if any.	R
Database_Revision	Unsigned	Logical revision number for the device database.	R

Related information

3.5 Selecting the Device Object Instance Number
3.6 Selecting the Device Object Name

6.2 Binary inputs

Binary objects that provide information from the Grundfos pump.

ID	Object name	R/W	Notes	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
BI, 0	Control source status	R	Status of the actual control source. 0: Local control 1: Bus control.	●	●	●
BI, 1	Actual direction	R	Rotational direction of the pump impeller. 0: Clockwise 1: Counterclockwise.	●	●	●
BI, 2	Rotation status	R	Rotation status. 0: No rotation 1: Rotation (pump running).	●	●	●
BI, 3	At minimum speed	R	0: Not running at minimum speed 1: Running at minimum speed.	●	●	●
BI, 4	At maximum speed	R	0: Not running at maximum speed 1: Running at maximum speed.	●	●	●
BI, 9	Low Flow stop active	R	0: Not active 1: Active.	-	H	-
BI, 11	Digital input 1 status	R	0: Not active 1: Active.	●	●	●
BI, 12	Digital input 2 status	R	0: Not active 1: Active.	●	●	●
BI, 13	Digital input 3 status	R	0: Not active 1: Active.	-	●	●
BI, 14	Digital output 1 status	R	0: Not active 1: Active.	●	●	●
BI, 15	Digital output 2 status	R	0: Not active 1: Active.	●	●	●
BI, 28	Fault simulation status	R	Fault simulation status. 0: Fault simulation not active 1: Fault simulation active.	●	H	●
BI, 31	At power limit	R	0: Not running at power limit 1: Running at power limit.	●	H	-
BI, 38	Setpoint influence	R	0: Not active 1: Active.	●	H	-
BI, 39	Max. flow limit	R	0: Not active 1: Active.	●	H	-
BI, 62	Flow estimation below range	R	0: Flow estimation inside range 1: Flow estimation below range	●	H	●
BI, 63	Flow estimation above range	R	0: Flow estimation not above range 1: Flow estimation above range	●	-	-
BI, 64	Forced to local	R	0: Not forced to local 1: Forced to local	●	H	-
BI, 86	Status direct control (Positive K_p)	R	0: Disabled 1: Enabled (Positive K_p).	●	H	-

H: Only available on MGE model H and later.

6.3 Binary outputs

Binary objects for control of the Grundfos pump.

ID	Object name	R/W	Notes	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
BO, 0	Set control source	W	Sets the control source. Set to 1 to enable pump control via BACnet. 0: Local control (default) 1: Bus control.	●	●	●
BO, 1	Relay 1 control	W	Controls relay 1 if bus control is enabled and relay 1 is set to be controlled via bus. 0: Closed (default) 1: Open.	-	●	●
BO, 2	Relay 2 control	W	Controls relay 2 if bus control is enabled and relay 2 is set to be controlled via bus. 0: Closed (default) 1: Open.	-	H	●
BO, 4	Reset fault	W	Resets fault if bus control is enabled. (Triggered on rising edge). 0: No resetting (default) 1: Resetting.	●	●	●
BO, 5	Fault simulation	W	Enables simulated fault if bus control is enabled. 0: Disabled (default) 1: Enabled.	●	●	●
BO, 6	Copy settings to local	W	Copies remote settings to local pump settings. 0: Disabled 1: Enabled. **NOTE** Copy of the Control Context, which is Control mode, Operating mode, On/off and Setpoint, from the remote setting to the local setting takes place when CopyToLocal has been enabled, but only during a Remote->Local transition. It is necessary to introduce such a transition whenever the user wants the local setting to be updated and stored in the EEPROM.	●	H	-
BO, 9	Enable max. flow limit	W	0: Disabled 1: Enabled.	●	H	-
BO, 21	Set direct control	W	0: Disabled (negative Kp) 1: Enabled (positive K_p).	●	H	-

H: Only available on MGE model H and later.

6.4 Multistate inputs

Objects that contain an enumeration value from the pump.

ID	Object name	R/W	Notes	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
MI, 0	Actual control mode	R	Reads the current control mode. 1: Constant speed 2: Constant pressure 3: Proportional pressure 4: Automatic / AUTOADAPT 5: Constant flow 6: Constant temperature 7: Constant level 8: Constant percentage 9: FLOWADAPT 10: Closed-loop sensor control 11: Constant diff. pressure 12: Constant diff. temperature. See section Control modes for details on the control modes.	•	•	•
MI, 1	Actual operating mode	R	Reads the current operating mode. 1: Start (normal) 2: Stop 3: Minimum 4: Maximum 5: User curve.	•	•	•
MI, 2	Next bearing-service type	R	Type of next bearing service. 1: Service type unknown 2: Lubricate bearings 3: Change bearings.	-	H	•
MI, 3	CIM status	R	Reads the status of the CIM module, useful for fault finding. 1: OK 2: EEPROM fault 3: Memory fault.	•	•	•
MI, 11	Feedback sensor unit	R	Unit of the feedback sensor. 1: Unknown 2: bar 3: mbar 4: m 5: kPa 6: psi 7: ft 8: m^3/h 9: m^3/s 10: l/s 11: gpm 12: °C 13: °F 14: % 15: K 16: l/h.	•	•	•
MI, 14	Control Source	R	1: Display 2: Bus 3: Handheld 4: Digital in 5: ON/OFF button	•	•	-

H: Only available on MGE model H and later.

Related information

7.1 Control modes

6.5 Multistate outputs

Objects that set an enumeration value in the pump.

ID	Object name	R/W	Notes	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
MO, 0	Set control mode	W	Sets the control mode if bus control is enabled. 1: Constant speed (default) 2: Constant pressure 3: Proportional pressure 4: Automatic / AUTOADAPT 5: Constant flow 6: Constant temperature 7: Constant level 8: Constant percentage (not for MAGNA and MGE) 9: FLOWADAPT 10: Closed-loop sensor control (not for MAGNA and MGE) 11: Constant diff. pressure 12: Constant diff. temperature. See section Control modes for details on the control modes.	•	•	•
MO, 1	Set operating mode	W	Sets the operating mode if bus control is enabled. 1: Start (normal) 2: Stop (default) 3: Minimum 4: Maximum.	•	•	•
MO, 2	Product simulation	W	Enables product simulation (for commissioning and testing purposes, can only be enabled when no physical pump is present). 1: Disabled (default) 2: MAGNA 3: E-pumps 0.25 - 7.5 kW 4: E-pumps 11-22 kW / CUE 8: MAGNA3 9: E-pumps based on MGE model H. See section Product simulation for details.	•	•	•

H: Only available on MGE model H and later.

Related information

7.1 Control modes
7.6 Product simulation

6.6 Analog inputs

Objects with measured values and status information from the pump.

ID	Object name	R/W	Notes	Unit	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
AI, 0	Fault code	R	Grundfos fault code. See section BACnet MAC address (CIM 300) .	-	●	●	●
AI, 1	Warning code	R		-	●	●	●
AI, 2	Time to bearing service	R	Time to bearing service in months. A value of 24 means "24 or more".	month	-	H	●
AI, 3	Capacity	R	Actual capacity value (process feedback).	%	●	●	●
AI, 4	Head	R	Actual system head/pressure.	bar	S	S	S
AI, 5	Flow	R	Actual system flow rate.	m^3/h	S *	S *	S *
AI, 6	Relative performance	R	Performance relative to maximum performance.	%	●	●	●
AI, 7	Speed	R	Motor speed.	rpm	●	●	●
AI, 8	Frequency	R	Actual control signal applied to motor.	Hz	●	●	●
AI, 9	Actual setpoint	R	Actual setpoint. Open loop: % of nominal frequency. Closed loop: % of sensor maximum.	%	●	●	●
AI, 10	Motor current	R	Actual motor current.	A	●	●	●
AI, 11	DC link voltage	R	Frequency converter DC Link voltage.	V	●	●	●
AI, 12	Motor voltage	R	Motor voltage.	V	-	Model G only	●
AI, 13	Power	R	Total power consumption of the pump.	W	●	●	●
AI, 14	Remote flow	R	Measured flow at external sensor.	m^3/h	S	G + S	S
AI, 15	Inlet pressure	R	System inlet pressure.	bar	-	G + S	S
AI, 16	Remote pressure	R	Measured pressure at external sensor.	bar	S	G + S	S
AI, 17	Level	R	Tank level.	m	-	S	S
AI, 18	Power electronic temp.	R	Temperature in frequency converter.	°C	●	●	●
AI, 19	Motor temperature	R	Motor winding temperature.	°C	-	-	CUE + S
AI, 20	Remote temperature	R	Temperature at external sensor.	°C	-	S	S
AI, 21	Electronic temperature	R	Pump electronics temperature.	°C	-	H + S	S
AI, 22	Fluid temperature	R	Pumped-liquid temperature.	°C	●	G	S
AI, 23	Bearing temperature DE	R	Bearing temperature, drive end.	°C	-	-	CUE + S
AI, 24	Bearing temp. NDE	R	Bearing temperature, non-drive end.	°C	-	-	CUE + S
AI, 25	Auxiliary sensor input	R	Auxiliary sensor input.	%	-	S	S
AI, 26	Specific energy	R	Specific energy consumption.	kWh/m^3	●	H + S	CUE
AI, 27	Runtime	R	Total operating time of the pump.	h	●	●	●
AI, 28	Total on time	R	Total power-on time of the pump.	h	●	●	●
AI, 29	Torque	R	Motor torque.	Nm	-	-	●
AI, 30	Energy consumption	R	Total energy consumption of the pump.	kWh	●	●	●
AI, 31	Number of starts	R	Number of times the pump has started.	-	●	●	●
AI, 32	Volume	R	Total pumped volume.	m^3	●	H + S	CUE
AI, 37	Outlet pressure	R	System outlet pressure.	bar	-	H	-
AI, 57	Remote temperature 2	R	Temperature at external temperature sensor 2.	°C	S	H + S	-
AI, 58	User setpoint	R	User-selected setpoint. Open loop: % of nominal frequency. Closed loop: % of setpoint range.	%	●	●	●
AI, 85	Min. of feedback sensor	R	Minimum value of feedback sensor.	-	●	●	●
AI, 86	Max. of feedback sensor	R	Maximum value of feedback sensor.	-	●	●	●
AI, 92	Load percent	R	Motor current in percent of rated motor current.	%	-	H	-
AI, 93	Differential pressure	R	Pressure between pump flanges.	bar	●	H + S	-
AI, 95	Actual flow limit	R	Actual maximum flow limit.	m^3/h	●	H	-
AI, 114	Remote diff. temperature	R	Differential temperature at remote sensor.	°C	-	H + S	-
AI, 115	Inlet diff. pressure	R	Differential pressure at the inlet pipe.	bar	-	H + S	-
AI, 116	Outlet diff. pressure	R	Differential pressure at the outlet pipe.	bar	-	H + S	-
AI, 117	Remote diff. pressure	R	Differential pressure at remote sensor.	bar	-	H + S	-
AI, 118	Storage tank Level	R	Water level in the storage tank.	m	-	H + S	-
AI, 119	Heat energy counter	R	Accumulated heat energy in pump life.	kWh	S	H + S	-
AI, 120	Heat power	R	Actual heat power.	W	S	H + S	-
AI, 121	Heat diff. temperature	R	Differential temperature (heat).	K	S	H + S	-

ID	Object name	R/W	Notes	Unit	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
AI, 130	Nominal frequency	R	Nominal pump frequency.	Hz	●	H	-
AI, 131	Minimum frequency	R	Minimum frequency in % of nominal frequency.	%	●	H	-
AI, 132	Maximum frequency	R	Maximum frequency in % of nominal frequency.	%	●	H	-
AI, 133	Setpoint range minimum	R	Minimum value of setpoint range in % of sensor maximum value.	%	●	H	-
AI, 134	Setpoint range maximum	R	Maximum value of setpoint range in % of sensor maximum value	%	●	H	-
AI, 135	Heat energy counter 2	R	Heat energy counter 2 (Cooling)	kWh	S	-	-
AI, 136	Volume counter 2	R	Volume counter 2	m^3	●	-	-
AI, 145	Conductivity	R	DATA_CONDUCTIVITY reported with 1 S/m resolution	S/m	-	J	-
AI, 146	PhMeasure	R	DATA_PH_MEASURE reported with 0.1 pH resolution	pH	-	K	-
AI, 147	Turbidity	R	DATA_TURBIDITY reported with 0.1 NTU resolution	NTU	-	K	-

G: Only available on MGE model G and later versions.

●: Always available.

S: Sensor required.

H: Only available on MGE model H and later.

S*: On TPE Series 2000 and MAGNA/UPE, the flow is estimated and is only to be used for monitoring, not for control purposes. On all other pump types, a flow sensor is required.

CUE: Only available on CUE (with sensor).

3-ph: Only available on three-phase E-pumps.

Related information

11. BACnet MAC address, CIM 300

6.7 Analog outputs

Object for setting a new setpoint in the pump.

ID	Object name	R/W	Notes	Unit	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
AO, 0	Set setpoint	W	Sets the pump setpoint if bus control is enabled. Closed loop: % of setpoint range. Open loop: % of nominal frequency. A value of 0 does not imply a stop. See section Setpoint.	%	●	●	●
AO, 5	Set max. flow limit	W	Sets the maximum flow limit value.	m^3/h	●	H	-

H: Only available on MGE model H and later.

Related information

7.2 Setpoint

6.8 Analog values

Objects for configuration of the module,the unit and the pump.

ID	Object name	R/W	Notes	Unit	MAGNA3	E-pumps 0.25 - 7.5 kW	CUE/ E-pumps 11-22 kW
AV, 0	Custom Device Object Instance Number	R/W	Value for Custom Device Object Instance Number. Used in conjunction with DIP switch SW3 only for CIM 300. See section Selecting the Device Object Instance Number. Present_Value range: 0-0x3FFFFE. Default Present_Value: 0xE7.	-	●	●	●
AV, 1	BACnet watchdog	R/W	Time in seconds before BACnet communication watchdog times out, and sets the pump to local control mode. See section BACnet communication watchdog. 0: Disabled (default). Set to a value between 5 and 3600 to enable.	s	●	H	●
AV, 2	Simulation fault code	R/W	Fault code to simulate. See section BACnet MAC address (CIM 300). Can be cleared by writing a value of 0.	-	●	H	●
AV, 3	Simulation warning code	R/W	Warning code to simulate. See section BACnet MAC address (CIM 300). Can be cleared by writing a value of 0.	-	S	H	●
AV, 9	Product time and date	R/W	Pump time and date in UNIX format (seconds since 00:00 01-01-1970).	s	S	H	-
AV, 12	Remote sensor feedback	R/W	Sensor value via fieldbus	%	●	H	-
AV, 19	Set Kp	R/W	Set proportional gain K_p	0.1	●	H	-
AV, 20	Set Ti	R/W	Set integral action time T_i	0.1 s	●	H	-

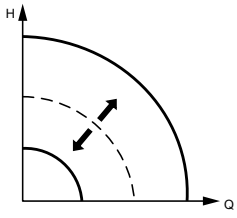
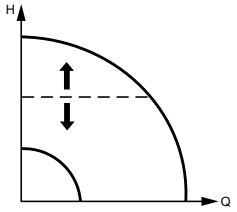
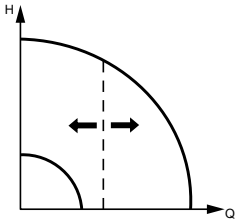
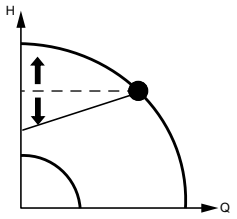
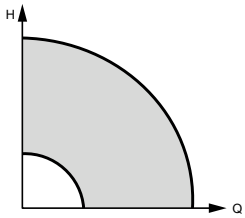
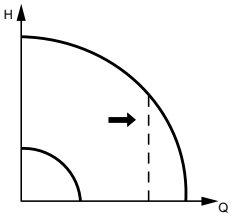
H: Only available on MGE model H and later.

Related information

3.5 Selecting the Device Object Instance Number
7.3 BACnet communication watchdog
11. BACnet MAC address, CIM 300

7. Detailed descriptions

7.1 Control modes

Control modes	Description	Illustration
Constant speed	Open loop The setpoint of the pump is interpreted as the setpoint for the pump speed in %. The setpoint value is a percentage of the maximum speed of the pump. No sensor is required.	 TM079755
Constant pressure Constant diff. pressure	Closed loop The setpoint of the pump is interpreted as the setpoint for the pressure. The controller inside the pump adapts the pump speed so that the pressure is constant, regardless of the flow. A pressure sensor is required.	 TM079756
Constant flow Constant level Constant temperature Constant diff. temperature Constant percentage Closed loop sensor control	Closed loop You can obtain a constant flow, constant level, constant temperature or constant percentage by replacing the main pressure sensor with another sensor. For example a flow sensor is needed for flow control, a level sensor is needed for level control and a temperature sensor is needed for temperature control. Closed loop sensor control is not available for the current pump. Constant flow is illustrated to the right.	 TM079754
Proportional pressure	Closed loop The setpoint of the pump is interpreted as the basic setpoint for the proportional-pressure mode (the black dot in the illustration). This control mode is only available on GRUNDFOS MAGNA series and TPE Series 2000 pumps.	 TM079757
AUTOADAPT	AUTOADAPT For this control mode, the optimum setpoint is automatically estimated and used. This also means that any setpoint value is ignored. Only available on GRUNDFOS MAGNA Series and some three-phase motors of 0.55 to 7.5 kW. A pressure sensor is required.	 TM079753
FLOWADAPT	AUTOADAPT with flow limitation For this control mode, the optimum setpoint is automatically estimated and used, but the flow is limited by the maximum flow limit value set by the user. Set the value with AO, 5.	 TM079758

H: Pressure (Head)
Q: Flow

Important notes to control modes

Only valid control modes are accepted.

Example: If the pump is a TPE Series 2000, with an MGE motor model G, and the control mode is changed to Constant temperature, the pump will not change its control mode because it is not possible for a TPE Series 2000 to run in this mode. The mode will then be the last valid control mode.

7.2 Setpoint

This object accepts values ranging from 0 to 100 (0 % to 100 %).

The setpoint value can represent for example, speed, pressure, flow, depending on the selected control mode.

A setpoint of 0 does not imply a stop.

7.2.1 Setpoint in closed-loop control

The setpoint is written to AO, 0 Setpoint as a percentage value of the setpoint range. The selected setpoint is reflected in object AI, 58 UserSetpoint with the same scaling.

The actual setpoint, whether it has been set with Grundfos GO Remote, the pump display, the pump buttons or the fieldbus, can be read from AI, 9 ActualSetpoint. It is a percentage value of FeedbackSensorMax.

Generally, the actual setpoint value represents head, pressure, flow, temperature and so on depending on how the feedback sensor has been set to measure. The unit of measure can be read from MI,11 FeedbackSensorUnit.

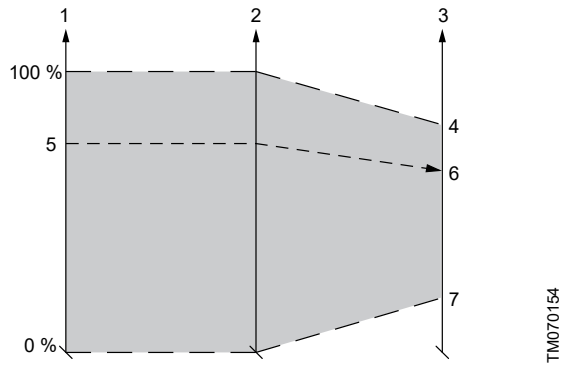
It is possible to calculate back and forth between the setpoint in percent and its scaled value:

X_{act}[unit] =

X_{set}[%] × (r_{max} - r_{min}) + r_{min}

Where:

- r_{max} = SetpointRangeMax × FeedbackSensorMax × FeedbackSensorUnit
- r_{min} = SetpointRangeMin × FeedbackSensorMax × FeedbackSensorUnit



Setpoint in closed-loop control

Pos.	Description
1	Setpoint* (AO, 0)
2	100 %
3	X_{set}
4	0 %
5	UserSetpoint* (AI, 58)
6	ActualSetpoint** (AI, 9)
7	SetpointRangeMax (AI, 134)
8	X_{act}
9	SetpointRangeMin (AI, 133)

* Percentage of setpoint range.

** Percentage of sensor maximum.

MAGNA3 40-100 example:

SetpointRangeMin: 5 %

SetpointRangeMax: 50 %

FeedbackSensorMax: 20

FeedbackSensorUnit: m

r_{max} =

SetpointRangeMax × FeedbackSensorMax × FeedbackSensorUnit = 50 % × 20 × m = 10 m

r_{min} =

SetpointRangeMin × FeedbackSensorMax × FeedbackSensorUnit = 5 % × 20 × m = 1 m

X_{act}[unit] =

X_{set}[%] × (r_{max}- r_{min}) + r_{min}

X_{set}[%] × (10 m - 1 m) + 1 m

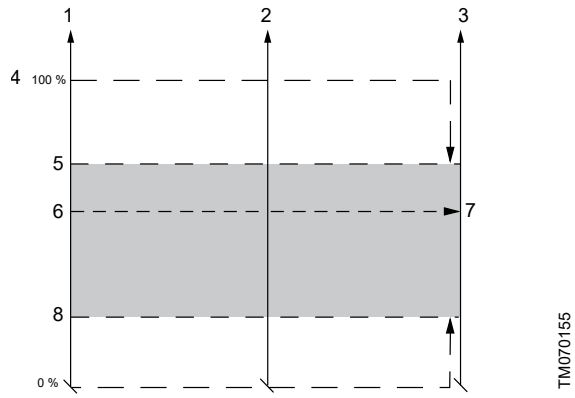
X_{set}[%] × 9 m + 1 m

If X_{set}[%] has value 40 %, the pump will have an actual setpoint of 40 % × 9 m + 1 m = 4.6 m.

7.2.2 Setpoint in open-loop control

The setpoint is written to AO, 0 Setpoint as a percentage value of the nominal frequency, fnom, represented by AI, 130 NomFrequency. The selected setpoint is reflected in AI, 58 UserSetpoint with the same scaling. From the fieldbus, it will get whatever value written to Setpoint, but from the display and Grundfos GO Remote, it is truncated to range [f_{min}; f_{max}], represented by AI, 132 MaxFrequency and AI, 131 MinFrequency.

The actual setpoint, whether it has been set with Grundfos GO Remote, the pump display, the pump buttons or the fieldbus, can be read from AI, 9 ActualSetpoint, and it always reflects the frequency limitations. It equals the value that the pump actually uses.



Setpoint in open-loop control

Pos.	Description
1	Setpoint* (AO, 0)
2	NomFrequency, Hz (AI, 130)
3	100 %
4	MaxFrequency (AI, 132)
5	X_{set}
6	MinFrequency (AI, 131)
7	0 %
8	UserSetpoint* (AI, 58)
9	ActualSetpoint* (AI, 9)
10	X_{act}

* Percentage of f_{nom}.

For MGE motors and the CUE drive:

- [f_{min}; f_{max}] can be adjusted from the display and Grundfos GO Remote.
- With f_{max} greater than f_{nom}, a setpoint above 100 % is possible (over synchronous).

For MAGNA3:

- [f_{min}; f_{max}] are fixed.
- f_{max} = f_{nom} always.

7.3 BACnet communication watchdog

A BACnet communication watchdog is implemented in CIM/CIU 300 and CIM/CIU 500.

If no BACnet communication is detected for the time period defined by the BACnet watchdog object (AV, 1) and the pump is set to Bus control mode (BO, 0), the pump is automatically switched to local control mode, and its local settings will be used.

This functionality can be used to define the pump behaviour in case of a BACnet communication breakdown. Before enabling the watchdog, the local pump settings must be made with either a Grundfos PC Tool or Grundfos GO Remote. This ensures that the pump behaves as expected if the BACnet communication breaks down.

When BACnet communication is re-established after a watchdog time-out, the user must manually set the pump back to Bus control mode (BO, 0).

When the Present_Value of the AV, 1 object is set to 0, the watchdog is disabled (default). To enable the watchdog, set the Present_Value to [5-3600] seconds.

7.4 Fault monitoring and resetting

This example shows how to monitor faults or warnings in the Grundfos pump and how to manually reset a fault.

The Fault code object (AV, 0) and the Warning code object (AV, 1) can both hold a Grundfos-specific fault code. See section BACnet MAC address (CIM 300) for code interpretation.

Warnings are notifications only and will not stop the pump, whereas faults will stop the pump. Most pumps can be configured to either automatically reset the fault when the fault condition disappears or to require manual resetting.

If a fault is to be manually reset, use the Reset fault object (BO, 4). When the Present_Value of this object is set to 1, a Reset fault command is sent to the device.

Example of fault simulation

Fault simulation can be helpful for testing alarm behaviour of a pump. The pump will behave exactly as if a real alarm was on.

This example shows how to simulate "undervoltage".

- Set "B0, 0 to value 1 (control source = remote).
- Set "Simulation fault code" (AV, 2) to 40 (undervoltage).
- Set "Fault simulation" (BO, 5) to 1 (enabled).
- Read "Fault code" (AI, 0), and check if it is set to 40.
- The red LED on the pump will indicate an alarm.
- Remove the simulated alarm settings by setting "Fault simulation" (BO, 5) to 0 (disabled).
- Reset the alarm via the pump display or via the BACnet object. "Reset fault" (BO, 4) and the pump will return to normal operation.

Related information

11. BACnet MAC address, CIM 300

7.5 Pump control via BACnet

This example shows how to set a GRUNDFOS MAGNA to 50 % setpoint, in proportional-pressure mode.

- Before enabling pump control via BACnet, values for setpoint, control mode and operating mode must be set.
- Set operating mode with Multistate output 1. In this example, the value for operating mode must be 1 (Start).
- Set control mode with Multistate output 0. A value of 3 corresponds to Proportional pressure.
- Set the setpoint to a value of 50 % in Analog output 0. See section Setpoint for details on setpoint.
- To enable bus control, set Binary output 0 to a value of 1.

Now the GRUNDFOS MAGNA pump should be running at 50 % in proportional-pressure mode with bus control enabled.

Related information

7.2 Setpoint

7.6 Product simulation

Product profile simulation or pump simulation can be useful for testing and pre-commissioning purposes. It is possible to simulate a pump profile when using a CIU 300 that is not connected to a pump. CIU 300 will behave as if a pump was connected on the GENIbus, even if that is not the case. The objects supported by the simulated product will be available, although the data will only be dummy values that do not simulate real pump behaviour.

Product simulation is enabled by setting the Multistate output object "Product simulation" (MO, 2):

Product to simulate	Value
Disabled (no simulation)	1
MAGNA/UPE	2
E-pumps 0.25 - 7.5 kW	3
E-pumps 11-22 kW / CUE	4
MAGNA3	8
E-pumps based on MGE model H	9

Product simulation will always be disabled on power-up.

If a physical pump is detected on GENIbus during power-up, it will not be possible to enable product simulation.

7.7 Remote sensor feedback

Product	Sensor reading [%]	Value communicated via fieldbus to the pump
MAGNA3	0-100	0-100
MGE model H and later	0-100	0-100

8. Commissioning

8.1 Step-by-step guide to hardware setup, CIU 300

Step	Action
1	Complete the pump configuration, for example sensor configuration.
2	Select the BACnet MAC address (0-127) on CIM 300.
3	Select the transmission speed of CIM 300.
4	Select Device Object Instance Number.
5	If necessary, set line termination.
6	Connect the GENIbus cable from CIU 300 to the pump.
7	Connect the necessary cables from CIU 300 to the BACnet network.
8	Connect the power cable to CIU 300, and switch it on.
9	Confirm that the GENIbus LED is permanently green and that the BACnet LED is either off or flashing green, indicating communication.
CIU 300 is now configured and ready.	

Related information

3.3 Connecting to the BACnet network
3.4 Setting the BACnet transmission speed
3.5 Selecting the Device Object Instance Number
3.7 Selecting the BACnet MAC address
3.8 Termination resistor
3.10 LEDs

8.2 Step-by-step guide to hardware setup, CIM 300

Step	Action
1	Complete the pump configuration, for example, sensor configuration.
2	Select the BACnet MAC address (0-127) on the CIM 300.
3	Select the transmission speed of the CIM 300.
4	Select the Device Object Instance Number.
5	If necessary, set line termination.
6	Connect the necessary cables from the CIM 300 to the BACnet network.
7	Confirm that the GENIbus LED is permanently green and the BACnet LED is either off or flashing green, indicating communication.
The CIM 300 is now configured and ready.	

Related information

3.3 Connecting to the BACnet network
3.4 Setting the BACnet transmission speed
3.5 Selecting the Device Object Instance Number
3.7 Selecting the BACnet MAC address
3.8 Termination resistor
3.10 LEDs

8.3 BACnet IP communication setup, CIM 500

Step	Action
1	Install the CIM 500 in the Grundfos E-pump according to the pump documentation.
2	Select position 2 at the protocol rotary switch.
3	Power on the E-pump and observe LED2 turn permanently green and LED1 remaining off.
4	Complete the pump configuration, for example, sensor configuration and selection of local Operating mode, local Control mode and local Setpoint, for example, with the Grundfos GO.
5	Connect one of the CIM 500 Ethernet ports (RJ45) to a PC using an Ethernet cable.
6	Configure the PC Ethernet port to the same subnetwork as that of the CIM 500, for example 192.168.1.1, and the subnet mask to 255.255.255.0.
7	Open your internet browser and make contact to the CIM 500 webserver. Default: 192.168.1.100
8	Log in to the webserver. Default user: admin Default password: Grundfos
9	In the menu column to the left, select Configuration > Real time Ethernet protocol.

Step	Action
10	Type in the required settings for the BACnet IP.
11	Click [Submit] to transfer the new settings, and close the web browser.

The CIM 500 is now ready to be accessed from a BACnet IP master via one of its Ethernet ports. Use the IP address selected under step 9.

- The CIM 500 LED1 is flashing green when BACnet IP communication takes place.
- You can use the two Ethernet ports for daisy chaining of the CIM 500 modules.
- It is possible to have connection to the webserver simultaneously with a connection to a BACnet IP master.
- It is possible to have connection to more BACnet IP masters simultaneously, for example, to have connection to the PC Tool CIM/CIU while connected to another BACnet IP master.

Related information

A.1.1. How to configure an IP address on your PC

A.1.2. Webserver configuration

4.2 Selection of industrial Ethernet protocol

8.4 BACnet IP communication setup, CIU 500 (CIU 900 with a CIM 500 mounted inside)

Step	Action
1	Check that both CIU 500 and the E-pump are powered off.
2	Remove the front cover of CIU 500.
3	Select position 2 at the CIM 500 module protocol rotary switch.
4	Connect the GENIbus cable from CIU 500 to the E-pump. See the CIU quick guide.
5	Power on CIU 500 and the E-pump, and observe LED2 turn permanently green and LED1 remaining off.
6	Connect one of the CIU 500 Ethernet ports (RJ45) to a PC using an Ethernet cable.
7	Configure the PC Ethernet port to the same subnetwork as CIM 500, for example 192.168.1.1, and the subnet mask to 255.255.255.0. See section How to configure an IP address on your PC.
8	Open your internet browser and make contact to the CIM 500 webserver. Default: 192.168.1.100.
9	Log in to the webserver. Default: User: admin Password: Grundfos.
10	In the menu column to the left select: Configuration > Real time Ethernet protocol
11	Type in the required settings for BACnet IP. See section Webserver configuration.
12	Click [Submit] to transfer the new settings and close the web browser.

CIM 500 is now ready to be accessed from a BACnet IP master via one of its Ethernet ports. Use the IP address selected under step 10.

- The CIU 500 LED1 will be flashing green when BACnet IP communication takes place.
- You can use the two Ethernet ports for daisy chaining of CIM 500 modules.
- It is possible to have connection to the webserver simultaneously with a connection to a BACnet IP master.
- It is possible to have connection to more BACnet IP masters simultaneously, for example to have connection to PC Tool CIM/CIU while connected to another BACnet IP master.

Related information

4.2 Selection of industrial Ethernet protocol

9. Fault finding the product

9.1 CIM/CIU 300 BACnet IP

9.1.1 LED status

You can detect faults in a CIM/CIU by observing the status of the two communication LEDs.

9.1.1.1 Both LED1 and LED2 remain off when the power supply is connected, and 5 seconds have passed.

Cause	Remedy
The CIM module is defective	• Replace the CIM module.

9.1.1.2 LED2 for internal communication is flashing red.

Cause	Remedy
There is no internal communication between the CIM module and the Grundfos pump.	• Make sure that the individual conductors are fitted correctly. • Check the power supply to the pump.

9.1.1.3 LED2 for internal communication is permanently red

Cause	Remedy
The CIM module does not support the connected Grundfos product connected.	• Contact the nearest Grundfos company.

9.1.1.4 The LED1 for BACnet communication is permanently red.

Cause	Remedy
There is fault in the CIM/CIU BACnet configuration.	• Make sure that the BACnet MAC address has a valid setting. • Make sure that the Device Object Instance Number is within the allowed range.

9.1.1.5 The LED1 for BACnet communication is flashing red.

Cause	Remedy
There is a fault in the BACnet communication (cyclic redundancy check).	• Check the transmission speed via switches SW4 and SW5. • Check the cable connection between the CIM 300 and the BACnet network. • Check the termination resistor settings via switches SW1 and SW2.

9.1.2 BACnet faults

9.1.2.1 The CIM/CIU does not communicate on the BACnet MS/TP network.

Cause	Remedy
An error occurred in the configuration or wiring.	• Make sure that the cable between the BACnet MS/TP devices is connected correctly. • Make sure that the BACnet MAC address and Device Object Instance Number are configured correctly and are unique on the network. • Make sure that the transmission speed is configured correctly. • Make sure that each end of the BACnet MS/TP trunk cable is terminated, if necessary. • Make sure that the bus topology for the BACnet MS/TP network is correct.
The CIM/CIU is instructed not to communicate on the BACnet network via the DeviceCommunicationControl service.	• Use the DeviceCommunicationControl service to enable communication from the device.

9.1.2.2 The pump does not react to control commands from the bus.

Cause	Remedy
The pump is running in local mode.	• Set the pump to bus control by setting the Present_Value of BO, 0 to 1.

9.1.2.3 There are only a few BACnet objects available, and the GENIbus LED flashes red.

Cause	Remedy
There is no communication between the CIM module and the pump.	• Make sure that the GENIbus cable between the CIM/CIU 300 and the pump is connected correctly.

Cause	Remedy
	• Make sure that the pump is switched on and able to communicate on the GENIbus.

9.2 CIM/CIU 500 BACnet IP

9.2.1 LED status

You can detect faults in a CIM/CIU by observing the status of the two communication LEDs.

9.2.1.1 CIU 500 connected to an E-pump

9.2.1.2 Both LED1 and LED2 remain off when the power supply is connected

Cause	Remedy
The module is fitted incorrectly in the Grundfos product.	• Make sure the module is fitted and connected correctly.
The module is defective.	• Make sure that module is fitted and connected correctly.
The CIU 500 is defective.	• Replace the CIU 500.

9.2.1.3 LED2 for internal communication is flashing red

Cause	Remedy
There is no internal communication between the CIM and the Grundfos product.	• Check if the CIM is fitted correctly in the Grundfos product.

9.2.1.4 LED2 for internal communication is permanently red

Cause	Remedy
The CIM does not support the dosing pump connected.	• Contact the nearest Grundfos company.

9.2.1.5 LED1 for BACnet communication is permanently red.

Cause	Remedy
There is fault in the CIM 500 BACnet IP configuration.	• Make sure that the rotary switch SW1 is set to 2. • Make sure that BACnet IP address configuration is correct.

9.2.1.6 LED1 is permanently red and green at the same time

Cause	Remedy
There is an error in the firmware download.	• Use the webserver to download the firmware again.

9.2.1.7 LED2 is permanently red and green at the same time

Cause	Remedy
There is a memory fault.	• Replace the CIM.

9.2.1.8 CIM 500 fitted in CIU 500

9.2.1.9 Both LEDs remain off when the power supply is connected.

Cause	Remedy
The CIM/CIU is defective.	• Replace the CIM/CIU.

9.2.1.10 LED2 for internal communication is flashing red

Cause	Remedy
There is no internal communication between the CIM/CIU and the connected Grundfos product.	• Check the cable connection between the CIM/CIU and the connected Grundfos product. • Check if the individual conductors are fitted correctly, for example, not reversed. • Check the power supply to the connected Grundfos product.

9.2.1.11 LED2 for internal communication is permanently red

Cause	Remedy
The CIM module does not support the connected Grundfos product connected.	• Contact the nearest Grundfos company.

9.2.1.12 LED1 for Ethernet is permanently red

Cause	Remedy
There is a fault in the CIM 500 BACnet IP configuration.	• Confirm that the rotary switch SW1 is set to 2. • Check if the BACnet IP address configuration is correct.

9.2.1.13 LED1 is permanently red and green at the same time

Cause	Remedy
There is an error in the firmware download.	• Use the webserver to download the firmware again.

9.2.1.14 LED2 is permanently red and green at the same time

Cause	Remedy
There is a memory fault.	• Replace the CIM.

9.2.2 CIM/CIU 500 BACnet IP communication faults

9.2.2.1 The slave does not respond to telegrams.

Cause	Remedy
There is error in the configuration or wiring.	• Check the visual diagnostics on the BACnet slave. Normal conditions are that the Grundfos GENIbus LED (LED2) is permanently green and that the BACnet IP LED (LED1) is off or flashing green. • Make sure that the cable between the BACnet IP master and the BACnet slave is connected correctly. See section Connecting the Ethernet cable.

9.2.2.2 The slave returns data value 0xFFFF (65535).

Cause	Remedy
The value is unavailable. A data value of 0xFFFF does not necessarily indicate an error condition. It means that the value is unavailable from the connected Grundfos product.	• See section Object overview for available data.
The connected Grundfos product is not configured to show the value, or it lacks a sensor to read the value.	• See section Analog inputs for data values that require a sensor.

9.2.2.3 The slave does not react to control actions or to writing of settings

Cause	Remedy
The E-pump might be in "Local" mode, in which case Operating mode, Control mode and Setpoint cannot be changed from bus.	• Set the E-pump in "Remote mode" by setting binary output BO, = "Set control source" to value 1 (=Remote). The E-pump should show "Controlled from bus" when status is read in Grundfos GO.

10. BACnet telegrams

10.1 BACnet MS/TP telegram overview

All BACnet MS/TP telegrams have the following format:

Preamble	Telegram type	Destination	Source	Length	Header CRC	Data	Data CRC	Pad
2 bytes: 0x55 0xFF	1 byte	1 byte	1 byte	2 bytes, MSB first	1 byte	Variable, [0-501] bytes	2 bytes, LSB first	At most 1 byte 0xFF

For BACnet MS/TP, the destination address and source address are MAC addresses. A destination address of 255 (0xFF) denotes broadcast. The length field specifies the length in bytes of the data field which must be between 0 and 501 bytes long.

Related information

3.7 Selecting the BACnet MAC address

10.2 Telegram types

The available telegram types are listed below.

Type	Name	Description
00	Token	It is used to pass network mastership to the destination device.
01	Poll for master	It discovers the presence of other master devices on the network.
02	Reply to poll for master	It is used by a master to indicate a wish to enter the token ring.
03	Test request	It is used to initiate a loopback test.
04	Test response	It is a reply to a test request telegram.
05	BACnet data, expecting reply	It is used for data transmission where a reply is expected.
06	BACnet data, not expecting reply	It is used for data transmission where no reply is expected.
07	Reply postponed	It is used by master devices to defer sending a BACnet data reply.

11. BACnet MAC address, CIM 300

BACnet address	SW6	SW7	BACnet address	SW6	SW7	BACnet address	SW6	SW7
0	0	0	45	2	D	90	5	A
1	0	1	46	2	E	91	5	B
2	0	2	47	2	F	92	5	C
3	0	3	48	3	0	93	5	D
4	0	4	49	3	1	94	5	E
5	0	5	50	3	2	95	5	F
6	0	6	51	3	3	96	6	0
7	0	7	52	3	4	97	6	1
8	0	8	53	3	5	98	6	2
9	0	9	54	3	6	99	6	3
10	0	A	55	3	7	100	6	4
11	0	B	56	3	8	101	6	5
12	0	C	57	3	9	102	6	6
13	0	D	58	3	A	103	6	7
14	0	E	59	3	B	104	6	8
15	0	F	60	3	C	105	6	9
16	1	0	61	3	D	106	6	A
17	1	1	62	3	E	107	6	B
18	1	2	63	3	F	108	6	C
19	1	3	64	4	0	109	6	D
20	1	4	65	4	1	110	6	E
21	1	5	66	4	2	111	6	F
22	1	6	67	4	3	112	7	0
23	1	7	68	4	4	113	7	1
24	1	8	69	4	5	114	7	2
25	1	9	70	4	6	115	7	3
26	1	A	71	4	7	116	7	4
27	1	B	72	4	8	117	7	5
28	1	C	73	4	9	118	7	6
29	1	D	74	4	A	119	7	7
30	1	E	75	4	B	120	7	8
31	1	F	76	4	C	121	7	9
32	2	0	77	4	D	122	7	A
33	2	1	78	4	E	123	7	B
34	2	2	79	4	F	124	7	C
35	2	3	80	5	0	125	7	D
36	2	4	81	5	1	126	7	E
37	2	5	82	5	2	127	7	F
38	2	6	83	5	3			
39	2	7	84	5	4			
40	2	8	85	5	5			
41	2	9	86	5	6			
42	2	A	87	5	7			
43	2	B	88	5	8			
44	2	C	89	5	9			

If the MAC address switches are set to an invalid MAC address value, a MAC address of 0 is used.

12. Grundfos alarm and warning codes

This is a complete list of the alarm and warning codes for Grundfos products. For the codes supported by this product, see sections Alarms and warnings.

Code	Description	Code	Description	Code	Description
1	Leakage current	2	Missing phase	3	External fault signal
4	Too many restarts	5	Regenerative braking	6	Mains fault
7	Too many hardware shutdowns	8	PWM switching frequency reduced	9	Phase sequence reversal
10	Communication fault, pump	11	Water-in-oil fault (motor oil)	12	Time for service (general service information)
13	Moisture alarm, analog	14	Electronic DC-link protection activated (ERP)	15	Communication fault, main system (SCADA)
16	Other	17	Performance requirement cannot be met	18	Commanded alarm standby (trip)
19	Diaphragm break (dosing pump)	20	Insulation resistance low	21	Too many starts per hour
22	Moisture switch alarm, digital	23	Smart trim gap alarm	24	Vibration
25	Setup conflict	26	Load continues even when motor switched off	27	External motor protector activated (for example MP 204)
28	Battery low	29	Turbine operation (impellers forced backwards)	30	Change bearings (specific service information)
31	Change varistor(s) (specific service information)	32	Overvoltage	33	Soon time for service (general service information)
34	No priming water	35	Gas in pump head, de-aerating problem	36	Outlet valve leakage
37	Inlet valve leakage	38	Vent valve defective	39	Valve stuck or defective
40	Undervoltage	41	Undervoltage transient	42	Cut-in fault (dV/dt)
43	-	44	-	45	Voltage asymmetry
46	-	47	-	48	Overload
49	Overcurrent (i_line, i_dc, i_mo)	50	Motor-protection function, general shutdown (MPF)	51	Blocked motor or pump
52	Motor slip high	53	Stalled motor	54	Motor-protection function, 3-second limit
55	Motor current protection activated (MCP)	56	Underload	57	Dry running
58	Low flow	59	No flow	60	Low input power
61	-	62	Safe Torque Off activated	63	-
64	-	65	Motor temperature 1 (t_m or t_mo or t_mo1)	66	Temperature, control electronics (t_e)
67	Temperature too high, internal frequency converter module (t_m)	68	External temperature or water temperature (t_w)	69	Thermal relay 1 in motor, for example, Klixon
70	Thermal relay 2 in motor, for example, thermistor	71	Motor temperature 2 (Pt100, t_mo2)	72	Hardware fault, type 1
73	Hardware shutdown (HSD)	74	Internal supply voltage too high	75	Internal supply voltage too low
76	Internal communication fault	77	Communication fault, twin-head pump	78	Fault, speed plug
79	Functional fault, add-on module	80	Hardware fault, type 2	81	Verification error, data area (RAM)
82	Verification error, code area (ROM, FLASH)	83	Verification error, FE parameter area (EEPROM)	84	Memory access error
85	Verification error, BE parameter area (EEPROM)	86	Fault (add-on) I/O module	87	-
88	Sensor fault	89	Signal fault, (feedback) sensor 1	90	Signal fault, speed sensor
91	Signal fault, temperature sensor 1	92	Calibration fault, (feedback) sensor	93	Signal fault, sensor 2
94	Limit exceeded, sensor 1	95	Limit exceeded, sensor 2	96	Setpoint signal outside range
97	Signal fault, setpoint input	98	Signal fault, input for setpoint influence	99	Signal fault, input for analog setpoint
100	RTC time synchronisation with cellular network occurred	101	-	102	Dosing pump not ready
103	Emergency stop	104	Software shutdown	105	Electronic rectifier protection activated (ERP)
106	Electronic inverter protection activated (EIP)	107	-	108	-
109	-	110	Skew load, electrical asymmetry	111	Current asymmetry
112	Cosφ too high	113	Cosφ too low	114	Motor heater function activated (frost protection)
115	Too many grinder reversals or grinder reversal attempt failed	116	Grinder motor overtemperature	117	Intrusion (door opened)
118	Signal fault, hydrogen sulfide H2S sensor	119	Signal fault, analog input AI4	120	Auxiliary winding fault (single phase motors)
121	Auxiliary winding current too high (single-phase motors)	122	Auxiliary winding current too low (single-phase motors)	123	Start capacitor, low (single-phase motors)

Code	Description	Code	Description	Code	Description
124	Run capacitor, low (single-phase motors)	125	Signal fault, outdoor temperature sensor	126	Signal fault, air temperature sensor
127	Signal fault, shunt relative pressure sensor	128	Strainer clogged	129	-
130	-	131	-	132	-
133	-	134	-	135	GDS sensor signal fault
136	-	137	-	138	-
139	-	140	-	141	-
142	-	143	-	144	Motor temperature 3 (Pt100, t_mo3)
145	Bearing temperature high (Pt100), in general or top bearing	146	Bearing temperature high (Pt100), middle bearing	147	Bearing temperature high (Pt100), bottom bearing
148	Motor bearing temperature high (Pt100) in drive end (DE)	149	Motor bearing temperature high (Pt100) in non-drive end (NDE)	150	Fault (add-on) pump module
151	Fault, display (HMI)	152	Communication fault, add-on module	153	Fault, analog output
154	Communication fault, display	155	Inrush fault	156	Communication fault, internal frequency converter module
157	Real-time clock out of order	158	Hardware circuit measurement fault	159	CIM module has lost the connection to the product.
160	Cellular modem, SIM card fault	161	Sensor supply fault, 5 V	162	Sensor supply fault, 24 V
163	Measurement fault, motor protection	164	Signal fault, LiqTec sensor	165	Signal fault, analog input 1
166	Signal fault, analog input 2	167	Signal fault, analog input 3	168	Signal fault, pressure sensor
169	Signal fault, flow sensor	170	Signal fault, water-in-oil (WIO) sensor	171	Signal fault, moisture sensor
172	Signal fault, atmospheric pressure sensor	173	Signal fault, rotor position sensor (Hall sensor)	174	Signal fault, rotor origo sensor
175	Signal fault, temperature sensor 2 (t_mo2)	176	Signal fault, temperature sensor 3 (t_mo3)	177	Signal fault, Smart trim gap sensor
178	Signal fault, vibration sensor	179	Signal fault, bearing temperature sensor (Pt100), general or top bearing	180	Signal fault, bearing temperature sensor (Pt100), middle bearing
181	Signal fault, PTC sensor (short-circuited)	182	Signal fault, bearing temperature sensor (Pt100), bottom bearing	183	Signal fault, extra temperature sensor
184	Signal fault, general-purpose sensor	185	Unknown sensor type	186	Signal fault, power meter sensor
187	Signal fault, energy meter	188	Signal fault, user-defined sensor	189	Signal fault, level sensor
190	Limit exceeded, sensor 1 (for example, alarm level in WW application)	191	Limit exceeded, sensor 2 (for example, high level in WW application)	192	Limit exceeded, sensor 3 (for example, overflow level in WW application)
193	Limit exceeded, sensor 4 (for example, low level in WW/tank filling application)	194	Limit exceeded, sensor 5	195	Limit exceeded, sensor 6
196	Operation with reduced efficiency	197	Operation with reduced pressure	198	Operation with increased power consumption
199	Process out of range (monitoring, estimation, calculation, control)	200	Application alarm	201	External sensor input high
202	External sensor input low	203	Alarm on all pumps	204	Inconsistency between sensors
205	Level float switch sequence inconsistency	206	Water shortage, level 1	207	Water leakage
208	Cavitation	209	Non-return valve fault	210	High pressure
211	Low pressure	212	Diaphragm tank precharge pressure out of range	213	VFD not ready
214	Water shortage, level 2	215	Soft pressure buildup time-out	216	Pilot pump alarm
217	Alarm, general-purpose sensor high	218	Alarm, general-purpose sensor low	219	Pressure relief not adequate
220	Fault, motor contactor feedback	221	Fault, mixer contactor feedback	222	Time for service, mixer
223	Time for service, mixer	224	Pump fault due to auxiliary component or general fault	225	Communication fault, pump module
226	Communication fault, I/O module	227	Combi event	228	Night flow max. limit exceeded
229	Water on floor	230	Network alarm	231	Ethernet: no IP address from the DHCP server
232	Ethernet: auto-disabled due to misuse	233	Ethernet: IP address conflict	234	Backup pump alarm
235	Gas detected	236	Pump 1 fault	237	Pump 2 fault
238	Pump 3 fault	239	Pump 4 fault	240	Lubricate bearings (specific service information)
241	Motor phase failure	242	Automatic motor model recognition failed	243	Motor relay is forced (manually operated or commanded)
244	Fault, On/Off/Auto switch	245	Pump continuous runtime too long	246	User-defined relay is forced (manually operated or commanded)

Code	Description	Code	Description	Code	Description
247	Power-on notice (device or system is switched off)	248	Fault, battery/UPS	249	User-defined event 1
250	User-defined event 2	251	User-defined event 3	252	User-defined event 4
253	SMS data from DDD sensor not received within time limit	254	Inconsistent data model		

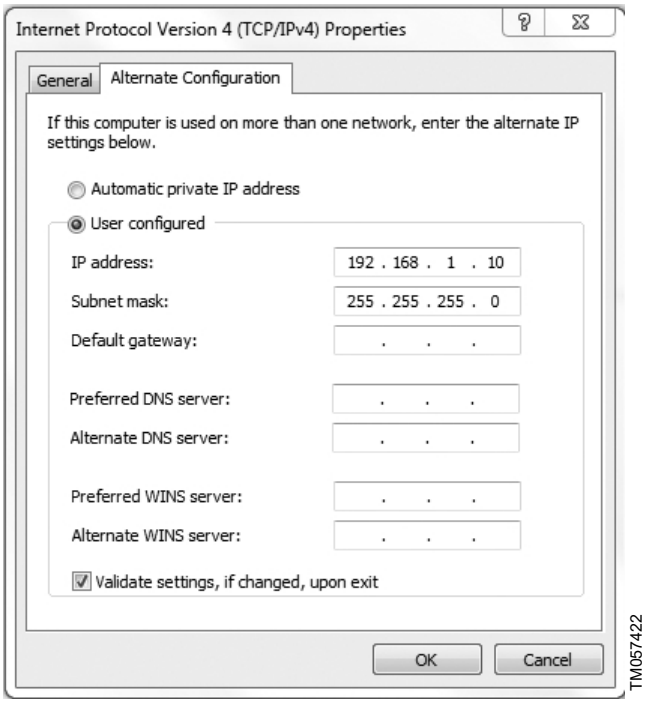
A.1. Appendix

The appendix describes the parts of the CIM 500 webserver needed for the configuration of a BACnet IP Ethernet connection. For other CIM 500 webserver features, not specifically related to BACnet IP, see the installation and operating instructions for the CIM 500.

A.1.1. How to configure an IP address on your PC

For connecting a PC to CIM 500 via Ethernet, the PC must be set to use a fixed (static) IP address belonging to the same subnetwork as CIM 500.

1. Open "Control Panel".
2. Enter "Network and Sharing Center".
3. Click "Change adapter settings".
4. Right-click and select "Properties" for Ethernet adapter. Typically "Local Area Connection".
5. Select properties for "Internet Protocol Version 4 (TCP/IPv4)".
6. Select the "Alternate Configuration" tab.
7. Configure an IP address and subnet mask to be used by your PC. See fig. Example from Windows 10.



Example from Windows 10

A.1.2. Webserver configuration

The built-in webserver is an easy and effective way to monitor the status of the CIM 500 and configure the available functions and industrial Ethernet protocols. The webserver also makes it possible to update the firmware of the CIM 500, and store or restore settings.

To establish a connection from a PC to the CIM 500, proceed as follows:

Before configuration

- Make sure that the PC and the CIM 500 are connected via an Ethernet cable.
- Make sure that the PC Ethernet port is set to the same network as the CIM 500. For network configuration, see section How to configure an IP address on your PC.

To establish a connection from a PC to the CIM 500 for the first time, the following steps are required:

1. Open a standard internet browser and type 192.168.1.100 in the URL address field.
2. The browser shows one or more security warnings, depending on which browser is used. Ignore these and proceed until you see the CIM 500 home page main menu.
3. Log in to the webserver.

Related information

A.1.1. How to configure an IP address on your PC

A.1.3. Login

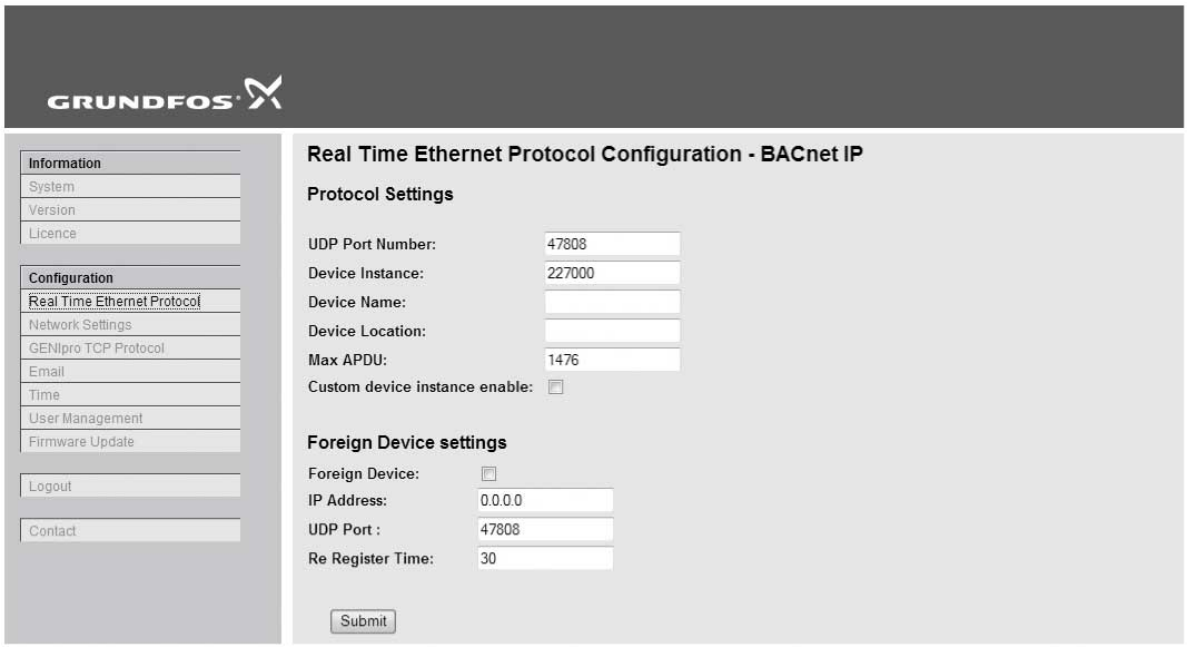
TM061159

Login

User name	Enter user name. Default: admin.
Password	Enter password. Default: Grundfos.

User name and password can be changed on the webserver under "User Management".

A.1.4. BACnet IP configuration



TM060817

Real Time Ethernet Protocol Configuration - BACnet IP

Object	Description
UDP Port Number	Select the UDP port number. The default number is 47808, the standard UDP port number for BACnet IP.
Device Instance	Select the Device Instance. The default number is 227000. The Device Instance must be unique in the BACnet network.
Device Name	You can name the device. The device name must be unique in the BACnet network (optional).
Device Location	You can name the device location for local identification (optional).
Max APDU	Select the maximum Application Protocol Data Unit, between 50 and 1476. By default it is 1476 bytes.
Custom device instance enable	If ticked, the CIM 500 is configured to use a BACnet custom device instance number.
Foreign Device	If ticked, the CIM 500 is configured as a foreign device.
IP Address	Enter the foreign IP address.
UDP Port	Select the UDP port number. The default number is 47808.
Re Register Time	Select the time period during which the foreign device must re-register on the BACnet network.

The IP address and subnet mask can be defined under "Network Settings".

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