# EtherNet/IP for Grundfos pumps

## CIM/CIU 500 Ethernet

Functional profile and user manual

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GRUNDFOS

**Original functional profile and user manual**

This functional profile describes Grundfos EtherNet/IP for pumps.

## CONTENTS



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

# 1. General information

## 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 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 500 Ethernet for EtherNet/IP.

This functional profile applies to the following Grundfos products:

- Grundfos CRE/CRNE/CRIE, MTRE, CHIE, CME
- Grundfos TPE, TPE Series 2000, TPE3, NBE/NKE
- Grundfos CUE drive
- Grundfos MAGNA3.

In the following, the supported products are referred to as "E-pump".

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

## 2.2 EDS file

For this product, an associated Electronic Data Sheet file (Grundfos_EIP_Pump_Adapter_EDS.eds) can be downloaded from the Grundfos Product Center.

## 2.3 Assumptions

This functional profile assumes that the reader is familiar with commissioning and programming of EtherNet/IP devices.

## 2.4 Definitions and abbreviations

| | |
|---|---|
| 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 type with four twisted pairs of wires. |
| CAT5e | Enhanced CAT5 cable with better performance. |
| CAT6 | Ethernet cable compatible with CAT5 and CAT5e, with very high performance. |
| CIM | Communication Interface Module. |
| CIU | Communication Interface Unit. |
| CRC | Cyclic Redundancy Check. A data error detection method. |
| 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. |
| Enumeration | List of values. |
| GENIbus | Proprietary Grundfos fieldbus standard. |
| GENIpro | Proprietary Grundfos fieldbus protocol. |
| Grundfos GO Remote | A Grundfos application designed to control Grundfos products via infrared or radio communication. Available for iOS and Android devices. |
| H | Head (pressure). |
| HTTP | Hyper Text Transfer Protocol. The protocol commonly used to navigate the world wide web. |
| IANA | Internet Assigned Numbers Authority. |
| IP | Internet Protocol. |
| LED | Light-Emitting Diode. |
| Local mode | The E-pump uses the setpoint, operating mode and control mode set with Grundfos GO Remote or by the use of buttons on the pump. |
| MAC | Media Access Control. Unique network address for a piece of hardware. |
| Ping | Packet InterNet Groper. A software utility that tests connectivity between two TCP/IP hosts. |
| Q | Flow rate |
| Remote mode | The E-pump uses the setpoint, operating mode and control mode set from EtherNet/IP. |
| SELV | Separated or Safety Extra-Low Voltage. |
| SELV-E | Separated or Safety Extra-Low Voltage with earth connection. |
| TCP/IP | Transmission Control Protocol/Internet Protocol. Protocol for Internet communication, and also used as middle-layer protocol for most Ethernet-based fieldbuses. |
| URL | Uniform Resource Locator. The address used to connect to a server. |
| UTC | Coordinated Universal Time. The primary time standard by which the world regulates clocks and time. |
| 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. |

# 3. System description

The system diagrams give an overview of how to connect CIM/CIU 500 to the Grundfos E-pump that is to be connected to a EtherNet/IP network.

**CIM solution**

The module is an add-on communication module that you install internally in a Grundfos E-pump, using a 10-pin connection. In this setup, the E-pump supplies power to the module. See fig. 1.

**CIU solution**

The unit is a box with power supply and a CIM 500 module. You can mount it either on a DIN rail or on a wall. See fig. 2.

You use it in conjunction with a Grundfos E-pump that does not support an internal, add-on communication module, CIM. The enclosure class is IP54.

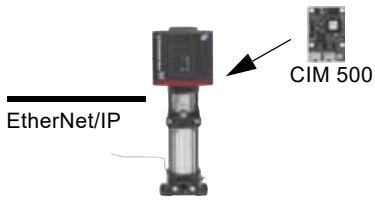


**Fig. 1** Example of a CIM 500 solution. The module is installed inside the pump. The figure shows a CRE pump.


**Fig. 2** Example of a CIU 500 solution. The figure shows a CUE drive for pumps.

# 4. Specifications

## 4.1 CIM module

| 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:<br>Off, permanently green, flashing red, permanently red.<br>See section *5.5 Status LEDs*. |
| Power supply (CIU) | 24-240 V | Integrated in the unit. |
| GENIbus connection type (CIU) | RS-485, 3-wire + screen | Conductors: A, B and Y. |
| CIU box enclosure class | IP54 | |
| CIU box dimensions (H × W × D) | 182 × 108 × 82 mm | |

## 4.2 CIM 500 Ethernet

| CIM 500 Ethernet specifications | Description | Comments |
|---|---|---|
| Application layer | DHCP, HTTP, Ping, FTP, fieldbus protocols | |
| Transport layer | TCP | |
| 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 fieldbus protocols | PROFINET IO, Modbus TCP, BACnet IP, EtherNet/IP, GRM IP, Grundfos iSolutions Cloud | Selected with rotary switch. See section *5.2 Selection of Industrial Ethernet protocol*. |

### 4.3 EtherNet/IP

| EtherNet/IP specifications | Description |
|---|---|
| Minimum requested packet interval | 15 ms |
| I/O data | 505 bytes output<br>509 bytes input<br>Maximum 255 bytes I/O data per assembly. |
| Number of IO connections | 10<br>Default; configurable depending on available socket resources. |
| Number of encapsulation sessions | 10<br>Default; configurable depending on available socket resources. |
| Number of explicit messaging connections | 2 explicit messaging connections per encapsulation session<br>20 explicit messaging connections in total, configurable. |
| User-specific objects | Object 100. Depending on the connected product.<br>• Grundfos pump<br>• Grundfos booster<br>• Grundfos dosing. |
| Maximum number of connections | 2 explicit messaging connections x 10 encapsulation sessions<br>Additional 10 I/O connections<br>Total: 30 connections. |
| Standard objects | • Identity object (class 0x01)<br>• Message Router object (class 0x02)<br>• Assembly object (class 0x04). Assembly: up to 32<br>• Connection Manager object (class 0x06)<br>• Device Level Ring (DLR) object (0x47)<br>• Quality of Service (QoS) object (0x48)<br>• TCP/IP Interface object (0xF5)<br>• Ethernet Link object (0xF6) |
| DHCP | Supported |
| Functional scope | • Adapter<br>• Support of 2 Ethernet Link objects for implementing ring and daisy chain topologies<br>• Device Level Ring (DLR) protocol (announce-based ring node)<br>• Quality of Service (QoS)<br>• IPv4 Address Conflict Detection (ACD) |
| Watchdog | Communication watchdog with fixed 5 seconds time-out. It can be enabled via the CIM 500 web page. |
| Certificate | Plugfest December 2018, Conformance July 2019. |

## 5. EtherNet/IP, CIM 500 setup

**WARNING**

**Electric shock**

Death or serious personal injury

- Connect CIM 500 only to SELV or SELV-E circuits.

### 5.1 Connecting the Ethernet cable

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

CIM 500 is designed for flexible network installation; the built-in two-port switch makes it possible to daisy chain from product to product without the need of 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.

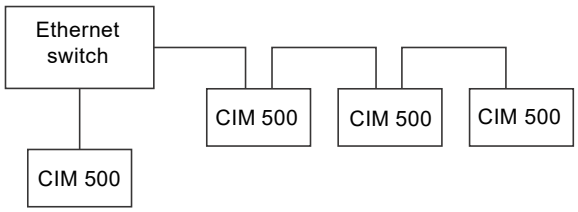


**Fig. 3** Example of Industrial Ethernet network with CIM 500

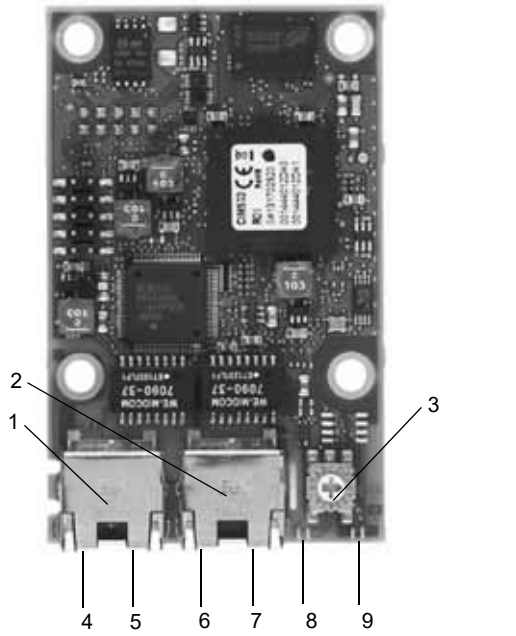


**Fig. 4** CIM 500 Ethernet module

| Pos. | Description | Designation |
|---|---|---|
| 1 | Industrial Ethernet RJ45 connector 1 | ETH1 |
| 2 | Industrial Ethernet RJ45 connector 2 | ETH2 |
| 3 | Rotary switch for protocol selection | SW1 |
| 4 | Data activity LED for connector 1 | DATA1 |
| 5 | Link LED for connector 1 | LINK1 |
| 6 | Data activity LED for connector 2 | DATA2 |
| 7 | Link LED for connector 2 | LINK2 |
| 8 | Green and red status LED for Ethernet communication | LED1 |
| 9 | Green and red status LED for internal communication between module and pump | LED2 |

### 5.2 Selection of Industrial Ethernet protocol

The module has a rotary switch for selection of the Industrial Ethernet protocol. See fig. 5.

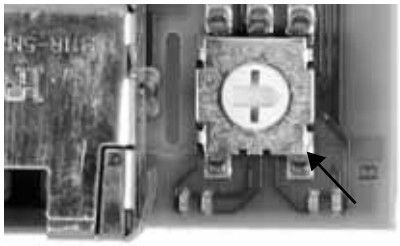


**Fig. 5** Selecting the Industrial Ethernet protocol

| Pos. | Description |
|---|---|
| 0 | PROFINET IO, default |
| 1 | Modbus TCP |
| 2 | BACnet IP |
| 3 | EtherNet/IP |
| 4 | GRM IP for Grundfos Remote Management, requires a contract with Grundfos. |
| 5 | Grundfos iSOLUTIONS Cloud (GiC) |
| 6...E | Reserved. LED1 is permanently red to indicate an invalid configuration. |
| F | Resetting to factory settings.<br>1. Set the rotary switch to this position<br>2. LED1 starts to flash red and green for 20 seconds to indicate that factory resetting is about to take place.<br>3. After 20 seconds, LED1 stops to flash and factory resetting is initiated.<br>4. When both LED1 and LED2 switch off, the resetting is completed. The rotary switch can be moved to another position. |

If the rotary switch position is changed when the module is powered on, the module will restart and use the protocol associated with the new position.

### 5.3 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:<br>Subnet mask:<br>Gateway: | 192.168.1.100<br>255.255.255.0<br>192.168.1.1 |
| IP settings for EtherNet/IP | Make the settings via the webserver | |

## 5.4 Establishing a connection to the webserver

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

- Connect the PC and CIM 500 using an Ethernet cable.
- Configure the PC Ethernet port to the same subnetwork as CIM 500, for example 192.168.1.101, and the subnet mask to 255.255.255.0. See section *A.2 Webserver configuration* on page 31.
- Open a standard Internet browser and type 192.168.1.100 in the URL field.
- Log in to the webserver using the following:

| | |
|---|---|
| User | admin (default) |
| Password | Grundfos (default) |

The first time you log in, you will be asked to change the password.

The username and password may have been changed from their default values.

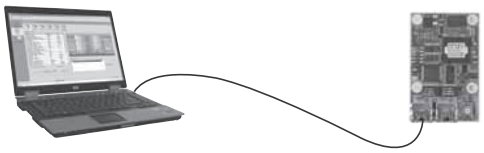

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**Fig. 6** CIM 500 connected to a PC

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

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

## 5.5 Status LEDs

The CIM 500 Ethernet module has two Status LEDs, LED1 and LED2. See fig. 4.

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

**LED1**

| Status | Description |
|---|---|
| Off | Ethernet Link is not active. |
| Permanently green | Ethernet Link is active, connection is established. |
| Flashing green | Ethernet Link is active, no connection is established. |
| Permanently red | Ethernet Link is active, IP address conflict is detected. |
| Flashing red | Ethernet Link is active, any connection is timed out. |

**LED2**

| Status | Description |
|---|---|
| Off | CIM 500 is switched off. |
| Flashing red | No internal communication between CIM 500 and the Grundfos product. |
| Permanently red | CIM 500 does not support the Grundfos product connected. |
| Permanently green | Internal communication between CIM 500 and the Grundfos product is OK. |
| Permanently red and green | Memory fault. |

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

## 5.6 DATA and LINK LEDs

The CIM 500 Ethernet module has two connectivity LEDs related to each RJ45 connector. See fig. 4.

**DATA1 and DATA2**

These yellow LEDs indicate data traffic activity.

| Status | Description |
|---|---|
| Yellow off | No data communication on the RJ45 connector. |
| Yellow flashing | Data communication is ongoing on the RJ45 connector. |
| Permanently yellow | Heavy network traffic on the RJ45 connector. |

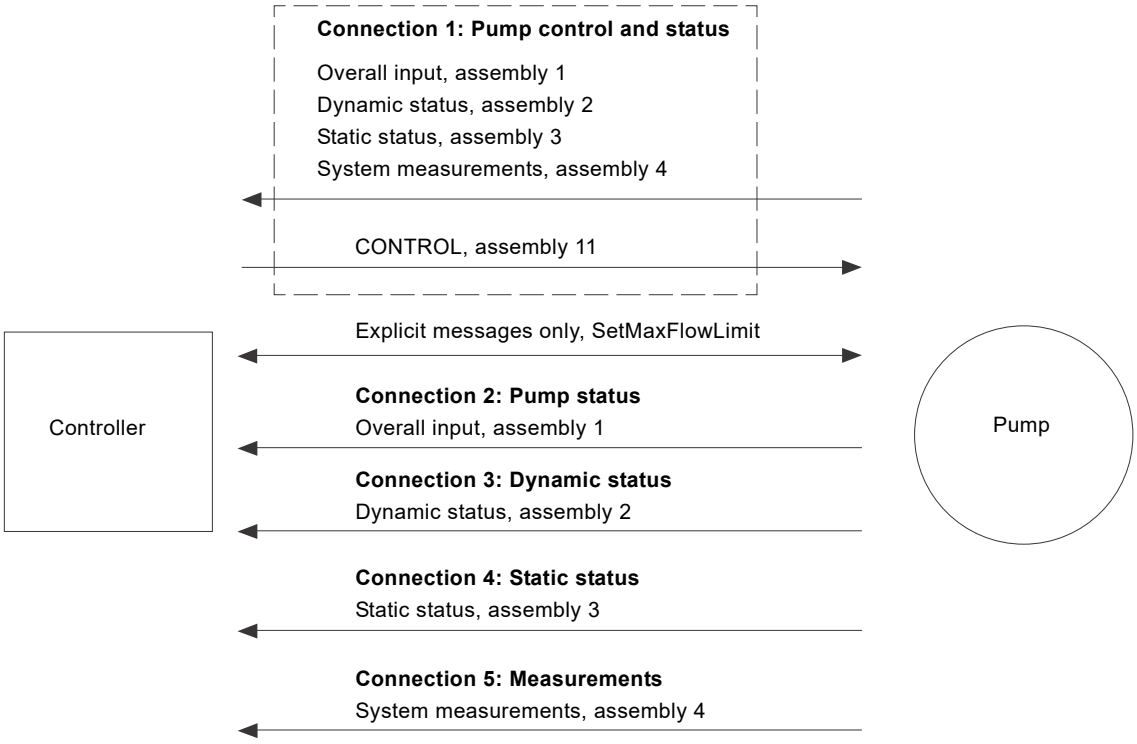
**LINK1 and LINK2**

These green LEDs show whether the Ethernet cable is properly connected.

| Status | Description |
|---|---|
| Green off | No Ethernet link on the RJ45 connector. |
| Green on | Ethernet link on the RJ45 connector is OK. |

# 6. Detailed description of data parameters

## 6.1 Connection and assembly overview




## 6.2 Pump input/output assembly details

| Connection No | Connection type | Connection name | Input assembly instance | Input assembly size | Output assembly instance | Output assembly size |
|---|---|---|---|---|---|---|
| 1 | Exclusive owner | Pump control and status | 1 | 156 | 11 | 20 |
| 2 | Input only | Pump status | 1 | 156 | 197 | 0 |
| 3 | Input only | Pump dynamic status | 2 | 28 | 197 | 0 |
| 4 | Input only | Pump static status | 3 | 8 | 197 | 0 |
| 5 | Input only | Pump measurements | 4 | 120 | 197 | 0 |

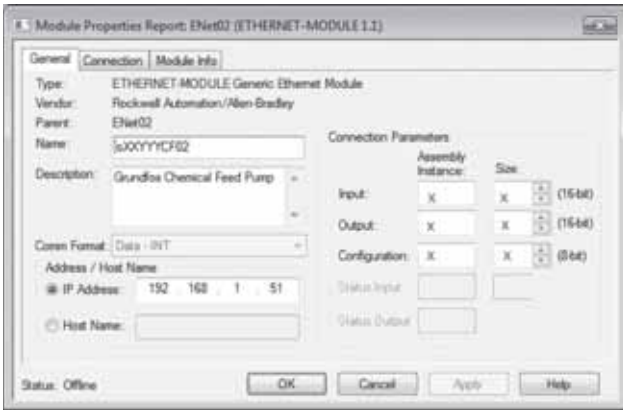



**Fig. 7** Rockwell PLC dialogue box for manual entering of information

### 6.3 Control parameters, output assembly 11

**Table legend**

CUE: Pumps with CUE drive only.

MGE: Pumps with MGE motor only.

H: Only available on model H and later versions.

S: Sensor required.

●: Always available.

*: If the E-pump is a TPE3 or a TPE Series 2000, the value is estimated and always available.

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 1 | SetRemoteLocal | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of Remote/Local state | ● | ● | ● |
| 2 | SetOnOff | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of On/Off state | ● | ● | ● |
| 3 | SetCopyToLocal | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of Copy to local state | H | CUE | ● |
| 4 | SetRelayOutput1 | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of Relay output 1 | ● | ● | - |
| 5 | SetRelayOutput2 | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of Relay output 2 | ● | ● | - |
| 6 | SetRelayOutput3 | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of Relay output 3 | H | - | - |
| 7 | SetRelayOutput4 | SINT8, 0xC2 | Bool (state) | 0, 1 | Setting of Relay output 4 | H | - | - |
| 8 | TrigResetAlarm | SINT8, 0xC2 | Bool (event) | ↑ 1 (edge) | Command: Triggers alarms reset | ● | ● | ● |
| 9 | SetReserved1 | SINT8, 0xC2 | Bool | 0, 1 | Reserved | - | - | - |
| 10 | SetReserved2 | SINT8, 0xC2 | Bool | 0, 1 | Reserved | - | - | - |
| 20 | SetControlMode | SINT16, 0xC3 | Enum | 0-255 | Select Control mode | | | |
| | | | | | 0: Constant Speed | ● | ● | ● |
| | | | | | 1: Constant Frequency | ● | ● | ● |
| | | | | | 3: Constant Head | S | S | ● |
| | | | | | 4: Constant Pressure | S | S | ● |
| | | | | | 5: Constant Diff. Pressure | H+S | - | - |
| | | | | | 6: Proportional Pressure | S | S | ● |
| | | | | | 7: Constant Flow | H+S* | - | ● |
| | | | | | 8: Constant Temperature | H+S | - | ● |
| | | | | | 9: Constant Temp. Difference | H+S | - | S |
| | | | | | 10: Constant Level | H+S | - | - |
| | | | | | 128: Auto-Adaption | S | MGE | ● |
| | | | | | 129: Flow Adaption | H+S | - | ● |
| | | | | | 130: Closed Loop Sensor Control | H+S | - | - |
| 21 | SetOperatingMode | SINT16, 0xC3 | Enum | 0-255 | Select Operating mode | | | |
| | | | | | 0: AutoControl | ● | ● | ● |
| | | | | | 4: Minimum | ● | ● | ● |
| | | | | | 6: Maximum | ● | ● | ● |
| 30 | SetSetpoint | SINT16, 0xC3 | 0.01 % | 0 - 327.67 % | Setting of SetSetpoint | ● | ● | ● |
| 40 | SetRTCValue | SINT32, 0xC4 | Unix time | 0 - ($2^{31}$-1) s | Setting of Real Time Clock | H | - | ● |

### 6.3.1 Explanation to event trigger

**Rising edge**

Control bits with a rising-edge event trigger behave like a command that is executed when a bit transition from "0" to "1" occurs. Each of them has a corresponding acknowledge bit in parameter 100, which is set when the command is executed, and cleared when the control bit is written back to "0".

**State**

Control bits with a state event trigger behave like a "state" that is forced upon the E-pump. In the CIM 500 module, the "actual state" of the E-pump is continuously compared with the "requested" state in the control bits, and the module writes the appropriate GENIbus command to the E-pump to make the two states correspond to each other. Due to state restrictions or priorities, this might not always be possible, see the explanation to the bit in question.

### 6.3.2 Explanation to control bits

**SetRemoteLocal**

Control bit for setting the E-pump in remote mode (controlled from the bus), or in local mode (controlled from the operating panel or Grundfos GO Remote):

| | |
|---|---|
| 0: | The E-pump is set to local mode and operates according to its local operating mode, setpoint and control mode. With this setting, the other control bits will have no influence. |
| 1: | The E-pump is set to remote mode and operates according to the operating mode, setpoint and control mode written to it. The other control bits will also be active. |

However, certain commands from other control sources, for example Stop or Max. from a local source or external Stop from a digital input, have a higher priority and overrule the control from the bus. The RemoteLocal status bit will have the value "0" if this is the case. See section *6.5.1 Explanation to the dynamic status parameters*.

**SetOnOff**

Control bit used to start and stop the E-pump:

| | |
|---|---|
| 0: | For stopping the E-pump remotely. |
| 1: | For starting the E-pump remotely. |

**SetCopyToLocal**

Control bit for making the E-pump copy its remote settings for the operating mode, setpoint and control mode to its local settings. Whenever this bit is set, switching the E-pump from remote to local, like the EtherNet/IP watchdog does, will not influence the behaviour of the E-pump.

Copy of Control Context, which is Control mode, Operating mode, On/Off and SetSetpoint, from the remote settings to the local settings 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 in the E-pump.

| | |
|---|---|
| 0: | Copy to local settings inactive. |
| 1: | Copy to local settings active. |

**SetRelayOutput 1-4**

This module can control the electromechanical relays in the E-pump if they are configured via a Grundfos PC Tool to be bus-controlled.

Only available for MGE and CUE based pumps.

| Bit | Name | Event trigger | Description |
|---|---|---|---|
| 0 | OutputRelay1Control | State | 0: Relay inactive.<br>1: Relay active. |
| 1 | OutputRelay2Control | State | |
| 2 | OutputRelay3Control | State | |
| 3 | OutputRelay4Control | State | |

Relay 3 and 4 are only available for MGE model H and later.

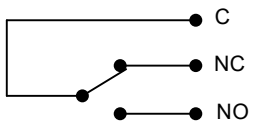



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**Fig. 8** Relay output shown in inactive state

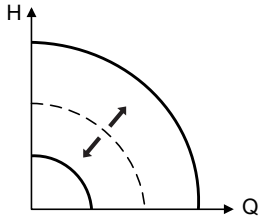
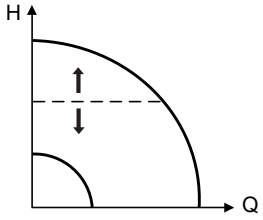
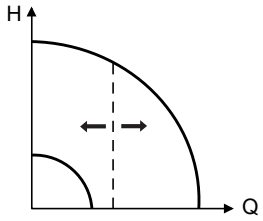
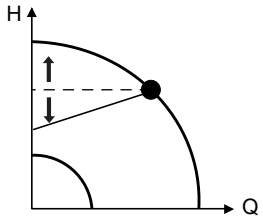
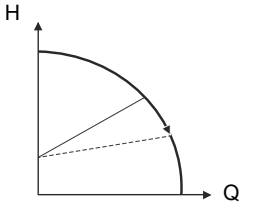
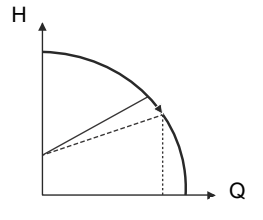
**TrigResetAlarm**

Control bit that resets alarms and warnings. During transitions from "0" to "1" (positive edge triggered).

### 6.3.3 Explanation to control mode

**SetControlMode**

Control enumeration for selection of the remote control mode.

| Control modes | Description | Illustration |
|---|---|---|
| > ConstSpeed (0)<br>> ConstFreq (1) | The setpoint of the E-pump is a percentage of the maximum performance.<br>No sensor is required, and in these modes the E-pump is operating in open-loop control. |  TM04 2289 2208 |
| > ConstHead (3)<br>> ConstPressure (4)<br>> ConstDiffPressure (5) | The setpoint of the E-pump is interpreted as the setpoint for the pressure.<br>In these modes, the E-pump operates in closed-loop control and adapts its speed so that the pressure is constant, regardless of the flow.<br>A pressure sensor is required, except for MAGNA3. |  TM04 2290 2208 |
| > ConstFlow (7)<br>> ConstTemp (8)<br>> ConstTempDiff (9)<br>> ConstLev (10) | The setpoint of the E-pump is interpreted as the setpoint for the flow, temperature or level. ConstFlow is indicated in the figure.<br>In these modes, the E-pump operates in closed-loop control, and a relevant sensor is required:<br>• a temperature sensor for temperature control<br>• a level sensor for level control<br>• a flow sensor for flow control.<br>MAGNA3 has a built-in sensor for ConstFlow and ConstTemp control. |  TM04 2288 2208 |
| > PropPress (6) | The setpoint of the E-pump is interpreted as a proportional-pressure setpoint as shown in the figure.<br>This is a closed-loop control mode, and a pressure sensor is required for all pump types, except MAGNA3. |  TM04 2291 2208 |
| > AUTO$_{ADAPT}$ (128) | In this control mode, the setpoint curve is a proportional-pressure curve where the setpoint has been set from factory. The AUTO$_{ADAPT}$ algorithm in the pump will over time optimise the setpoint value according to the pipe characteristics of the system. The setpoint curve will always be adjusted in a downward direction.<br>A pressure sensor is required for all pump types, except MAGNA3. |  TM05 3241 1012 |
| > FLOW$_{ADAPT}$ (129) | This control mode works similar to AUTO$_{ADAPT}$, except that the flow-limiting function, FLOW$_{LIMIT}$, is always active and limits the flow to the value of SetMaxFlowLimit (parameter 50).<br>A pressure sensor is required for all pump types, except MAGNA3. |  TM05 3242 1012 |
| > ClosedLoopSensor (130) | This is a general purpose closed-loop control mode, that you can use in cases where the pump is used for a type of control not covered by one of the other control modes.<br>A relevant sensor is required. | |

H = Pressure (head)

Q = Flow

**Important notes to control mode**

Only valid control modes are accepted. Not all control modes are supported for all E-pump types. If not supported, the resulting control mode, as read from ControlMode (parameter 103) will remain equal to the last valid control mode set via EtherNet/IP.

### 6.3.4 Explanation to operating mode

Control enumeration for selection of the remote operating mode.

| | |
|---|---|
| 0: | AutoControl<br>This is the normal mode. The E-pump is controlled according to the selected control mode and setpoint.<br>See section *6.3.3 Explanation to control mode*. |
| 4: | Minimum<br>The E-pump operates at a fixed minimum frequency. |
| 6: | Maximum<br>The E-pump operates at a fixed maximum frequency. |

### 6.3.5 Setpoint in closed-loop control

The setpoint is written to SetSetpoint (parameter 30) as a percentage value scaled in 0.01 % of the setpoint range. The selected setpoint is reflected in UserSetpoint (parameter 300).

The actual setpoint, whether it has been set via Grundfos GO Remote, the pump display, the pump buttons or the fieldbus, can be read from ActualSetpoint (parameter 301). It is a percentage value of FeedbackSensorMax (parameter 114).

Generally, the actual setpoint value represents head, pressure, flow, temperature and so on, depending on what the feedback sensor has been set to measure. The unit of measure can be read from FeedbackSensorUnit (parameter 112).

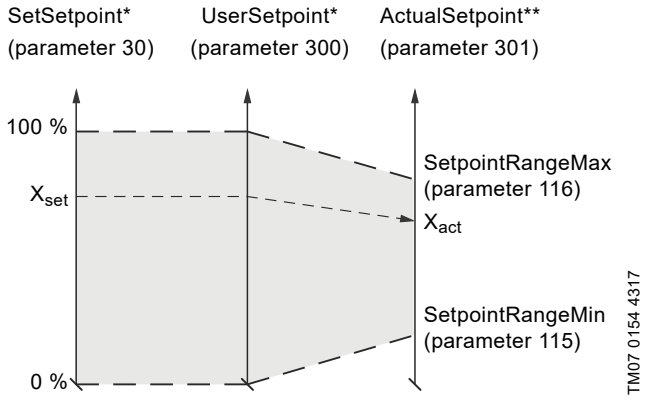
It is possible to calculate back and forth between the setpoint in percentage and its scaled value:

$X_{act}[unit] = X_{set}[\%] \times (r_{max} - r_{min}) + r_{min}$

Where:

$r_{max}$ =
SetpointRangeMax × FeedbackSensorMax × FeedbackSensorUnit

$r_{min}$ =
SetpointRangeMin × FeedbackSensorMax × FeedbackSensorUnit




* Percentage of setpoint range.

** Percentage of sensor maximum.

**Fig. 9** Setpoint in closed-loop control

**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

$X_{act}[unit] = X_{set}[\%] \times (r_{max} - r_{min}) + r_{min}$

$X_{set}[\%] \times (10\ m + 1\ m) + 1\ m$

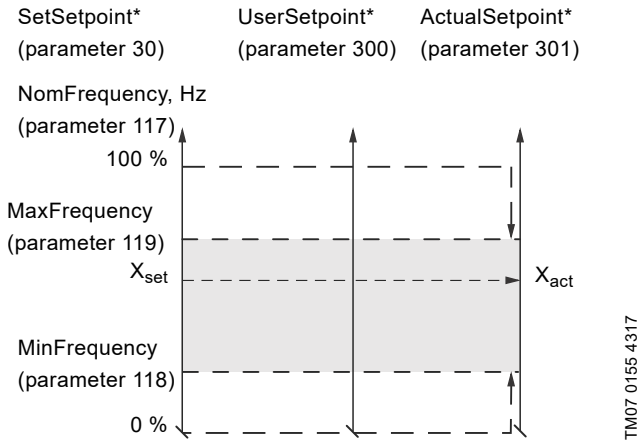
$X_{set}[\%] \times 9\ m + 1\ m$

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

### 6.3.6 Setpoint in open-loop control

The setpoint is written to SetSetpoint (parameter 30) as a percentage value scaled in 0.01 % of the nominal frequency $f_{nom}$ represented by NomFrequency (parameter 117). The selected setpoint is reflected in UserSetpoint (parameter 300) with the same scaling. From the fieldbus, it gets the value written to SetSetpoint, but from the pump display and Grundfos GO Remote, it is truncated to range [$f_{min}$; $f_{max}$], represented by MaxFrequency (parameter 119) and MinFrequency (parameter 118).

The actual setpoint, whether it has been set via Grundfos GO Remote, the pump display, the pump buttons or the fieldbus, can be read from ActualSetpoint (parameter 301), and it always reflects the frequency limitations. It equals the value that the pump actually uses.




* Percentage of $f_{nom}$.

**Fig. 10** Setpoint in open-loop control

### 6.3.7 Set RTC value

Use this output to set the internal real-time clock of the pump. The format of the clock value is Unix Time format. It is not possible to read the actual value of the real-time clock.

Only E-pumps with a graphical display support a built-in real-time clock. The real-time clock is used for time stamping of alarms, warnings and internal data logging. It has a built-in battery backup. If the power supply to the pump is switched off, the real-time clock will keep running and a new setting is not required.

### 6.4 Configuration parameters, Input/Output explicit messaging

Use this output parameter to adjust the maximum flow limit of the pump.

The pump flow will be limited by the maximum flow limit in any control mode if the $FLOW_{LIMIT}$ function has been enabled on the pump.

Only MAGNA3, TPE series 2000 and TPE3 support the $FLOW_{LIMIT}$ function.

**Table legend**

H: Only available on model H and later versions.

●: Always available.

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 50 | SetMaxFlowLimit | SINT16, 0xC3 | 0.1 $m^3/h$ | 0 - 3276.7 $m^3/h$ | Max flow limit of pump | H | - | ● |

### 6.5 Dynamic status parameters, input assembly 2

Dynamic status parameters are parameters that describe the actual modes and states of the E-pump. They are variables that can often change during operation of the E-pump.

This assembly is included in assembly 1.

**Table legend**

H: Only available on model H and later versions.

●: Always available.

CUE: Pumps with CUE drive only.

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 100 | PumpStatus | WORD, 0xD2 | Array of Bools | | Miscellaneous states/modes | | | |
| | 0: RemoteLocal | | Bool (state) | 0, 1 | Present status of Remote/Local state | ● | ● | ● |
| | 1: OnOff | | | | Present status of On/Off state | ● | ● | ● |
| | 2: CopyToLocal | | | | Present status of Copy to local state | H | CUE | ● |
| | 3: AtMinSpeed | | | | Speed at Min status | ● | ● | ● |
| | 4: AtMaxSpeed | | | | Speed at Max status | ● | ● | ● |
| | 5: AtMaxPower | | | | Power at Max status | H | - | ● |
| | 6: Rotation | | | | Rotation | ● | ● | ● |
| | 7: Direction | | | | Direction of rotation | ● | ● | ● |
| | 8: SetpointInfluence | | | | Setpoint influence is active | H | - | ● |
| | 9: ResetAlarmAck | | | | Set when ØResetAlarmØ is triggered | ● | ● | ● |
| | 10: SetRTCAck | | | | Set when SetRTC is triggered | ● | - | ● |
| | 11: ForcedToLocal | | | | Forced to local activated at pump | H | - | ● |
| | 12: LowFlowStop | | | | Pump stopped due to low flow | H | - | ● |
| | 13: FlowEstBelowRange | | | | Estimated flow is below range | H | - | ● |
| | 14: FlowEstAboveRange | | | | Estimated flow is above range | H | - | ● |
| 101 | Digital Outputs | BYTE, 0xD1 | Array of Bools | | Digital outputs | | | |
| | 0: DO1 | | Bool (state) | 0, 1 | Status of Digital Output 1 | ● | ● | ● |
| | 1: DO2 | | | | Status of Digital Output 2 | ● | ● | ● |
| | 2: DO3 | | | | Status of Digital Output 3 | H | - | - |
| | 3: DO4 | | | | Status of Digital Output 4 | H | - | - |
| 102 | Digital Inputs | BYTE, 0xD1 | Array of Bools | | Digital inputs | | | |
| | 0: DI1 | | Bool (state) | 0, 1 | Status of Digital Input 1 | ● | ● | ● |
| | 1: DI2 | | | | Status of Digital Input 2 | ● | ● | ● |
| | 2: DI3 | | | | Status of Digital Input 3 | ● | ● | ● |
| | 3: DI4 | | | | Status of Digital Input 4 | ● | ● | - |

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 103 | ControlMode | SINT16, 0xC3 | Enum | 0-255 | Present status of Control mode | ● | ● | ● |
| 104 | OperatingMode | | | | Present status of Operating mode | ● | ● | ● |
| 110 | AlarmCode | | | | Alarm code | ● | ● | ● |
| 111 | WarningCode | | | | Warning code | ● | ● | ● |
| 112 | FeedbackSensorUnit | | | | Feedback sensor unit<br>0: bar 1: mbar 2: m<br>3: kPa 4: psi 5: ft.<br>6: $m^3/h$ 7: $m^3/s$ 8: l/s<br>9: gpm 10: °C 11: °F<br>12: % 13: kelvin 14: l/h | ● | ● | ● |
| 113 | FeedbackSensorMin | | 1 | 0 - 32767 | Feedback sensor minimum value | ● | ● | ● |
| 114 | FeedbackSensorMax | | | | Feedback sensor maximum value | ● | ● | ● |
| 115 | SetpointRangeMin | | 0.01 % | 0 - 327.67 % | Minimum setpoint in % of sensor maximum | H | - | ● |
| 116 | SetpointRangeMax | | | | Maximum setpoint in % of sensor maximum | H | - | ● |
| 117 | NomFrequency | | 0.1 Hz | 0 - 3276.7 Hz | Nominal pump frequency | H | - | ● |
| 118 | MinFrequency | | 0.01 % | 0 - 327.67 % | Minimum frequency in % of nom. frequency | H | - | ● |
| 119 | MaxFrequency | | | | Maximum frequency in % of nom. frequency | H | - | ● |

### 6.5.1 Explanation to the dynamic status parameters

**RemoteLocal**

Status bit indicating whether the E-pump is controlled from the bus or from some other control source.

| | |
|---|---|
| 0: | The E-pump is controlled from a local source, buttons or Grundfos GO Remote or from an external digital input |
| 1: | The E-pump is controlled from EtherNet/IP, remotely |

To allow the E-pump to be controlled from the bus, the SetRemoteLocal control bit must be set to "1". However, certain commands from other control sources, for example Stop or Max. from a local source or external Stop from a digital input, have a higher priority. If active RemoteLocal bit reads "0", it indicates that the actual control source is not the bus.

**OnOff**

Status bit indicating whether the E-pump is started or stopped.

| | |
|---|---|
| 0: | The E-pump is stopped |
| 1: | The E-pump is started |

The E-pump can be started and stopped from the bus by using the OnOff control bit SetOnOff.

"Started" does not necessarily indicate that the E-pump is pumping as it might be in a "low-flow stop" condition.

**CopyToLocal**

Indicates if the remote settings of setpoint operating mode, control mode and OnOff state must be automatically copied to local settings.

| | |
|---|---|
| 0: | Copying disabled |
| 1: | Copying enabled |

**AtMinSpeed**

Status bit indicating that the E-pump is running at minimum speed.

| | |
|---|---|
| 0: | The E-pump is not running at minimum speed |
| 1: | The E-pump is running at minimum speed |

**AtMaxSpeed**

Status bit indicating that the E-pump is running at maximum speed.

| | |
|---|---|
| 0: | The E-pump is not running at maximum speed |
| 1: | The E-pump is running at maximum speed |

Only available on MAGNA3 and MGE model H and later.

**AtMaxPower**

Status bit indicating that the E-pump is running at maximum power limit.

Only available on MAGNA3 and MGE model H and later.

| | |
|---|---|
| 0: | The E-pump is not running at maximum power limit |
| 1: | The E-pump is running at maximum power limit |

**Rotation**

Status bit indicating that the motor is rotating (consuming power).

| | |
|---|---|
| 0: | No rotation |
| 1: | Rotation |

**Direction**

Status bit indicating the direction of rotation of the E-pump as seen from ventilator side.

| | |
|---|---|
| 0: | Clockwise (CW) |
| 1: | Counterclockwise (CCW) |

**SetPointInfluence**

Status bit indicating if the setpoint is influenced, for example by analog input or by temperature. If influenced, the ActualSetpoint (parameter 301) will differ from the UserSetpoint (parameter 300).

Only available on MAGNA3 and MGE model H and later.

| | |
|---|---|
| 0: | No setpoint influence |
| 1: | The setpoint is influenced |

**ResetAlarmAck**

Acknowledge bit belonging to the ResetAlarm control bit. It will be set when the control bit is set and the command has been executed. It will be cleared when the control bit is cleared.

**SetRTCAck**

Acknowledge bit belonging to the SetRTCValue. It is set when the real-time clock is updated.

**ForcedToLocal**

Status bit indicating that the E-pump has been "Forced to local mode" from display or from Grundfos GO Remote.

Only available on MAGNA3 and MGE model H and later.

| | |
|---|---|
| 0: | The E-pump has not been "forced to local" |
| 1: | The E-pump has been "forced to local" |

**LowFlowStop**

Status bit indicating that the E-pump has stopped due to low flow.

Only available on MAGNA3 and MGE model H and later.

| | |
|---|---|
| 0: | Low Flow Stop not activated |
| 1: | Low Flow Stop activated |

**FlowEstimateBelowRange**

The flow estimation is below its normal minimum range and a higher inaccuracy can be expected.

Only available on MAGNA3 and MGE model H and later.

| | |
|---|---|
| 0: | The flow estimation is not below its normal range |
| 1: | The flow estimation is below its normal range |

**FlowEstimateAboveRange**

The flow estimation is above its normal maximum range and a higher inaccuracy can be expected.

Only available on MAGNA3 and MGE model H and later.

| | |
|---|---|
| 0: | The flow estimation is not above its normal range |
| 1: | The flow estimation is above its normal range |

**ControlMode**

Status enumeration showing the actual E-pump control mode.

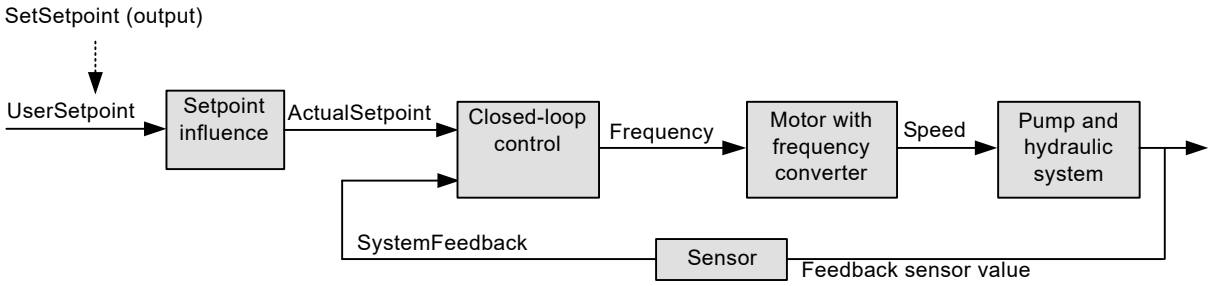
See section *6.3.3 Explanation to control mode* for detailed explanation to the various control modes.

**OperatingMode**

Status enumeration showing the actual E-pump operating mode.

See section *6.3.4 Explanation to operating mode* for detailed explanation to the various operating modes.

## 6.6 Illustration of closed-loop control




TM04 9677 4910

**Fig. 11** Illustration of closed-loop control and the associated data parameters

**SystemFeedback**

In closed-loop control, this is the value of the controlled system variable (feedback/primary sensor). The system variable can always be compared directly with the ActualSetpoint variable. If no setpoint influence is active, it can also be compared with the SetSetpoint parameter.

In open-loop control, SetSetpoint is mapped to SystemFeedback. The value of the feedback sensor can be read in the corresponding measurement parameter. See section *6.9 Measured parameters, input assembly 4*.

### 6.7 Alarms and warnings

| Parameter | Name | Description |
|---|---|---|
| 110 | AlarmCode | Code for E-pump alarm. |
| 111 | WarningCode | Code for E-pump warning. |

In the AlarmCode parameter, the cause of an E-pump alarm can be read. An E-pump alarm always leads to a reaction in the E-pump operation, usually the E-pump is stopped, but some alarms in some E-pump types have programmable alarm action types.

In the WarningCode parameter, the cause of an E-pump warning can be read. A warning has no influence on the E-pump operation.

The complete list of possible alarm and warning codes is shown below.

| Code | Alarm and warning description |
|---|---|
| 1 | Leakage current |
| 2 | Missing phase |
| 3 | External fault signal |
| 4 | Too many restarts |
| 7 | Too many hardware shutdowns |
| 14 | Electronic DC-link protection activated (ERP) |
| 16 | Other |
| 29 | Turbine operation, impellers forced backwards |
| 30 | Change bearings (specific service information) |
| 31 | Change varistor(s) (specific service information) |
| 32 | Overvoltage |
| 40 | Undervoltage |
| 41 | Undervoltage transient |
| 42 | Cut-in fault (dV/dt) |
| 45 | Voltage asymmetry |
| 48 | Overload |
| 49 | Overcurrent (i_line, i_dc, i_mo) |
| 50 | Motor protection function, general shutdown (MPF) |
| 51 | Blocked motor or pump |
| 54 | Motor protection function, 3 sec. limit |
| 55 | Motor current protection activated (MCP) |
| 56 | Underload |
| 57 | Dry running |
| 60 | Low input power |
| 64 | Overtemperature |
| 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/water temperature (t_w) |
| 70 | Thermal relay 2 in motor, for example thermistor |
| 72 | Hardware fault, type 1 |
| 73 | Hardware shutdown (HSD) |
| 76 | Internal communication fault |
| 77 | Communication fault, twin-head pump |
| 80 | Hardware fault, type 2 |
| 83 | Verification error, FE parameter area (EEPROM) |
| 84 | Memory access error |
| 85 | Verification error, BE parameter area (EEPROM) |
| 88 | Sensor fault |
| 89 | Signal fault, (feedback) sensor 1 |
| 91 | Signal fault, temperature 1 sensor |
| 93 | Signal fault, sensor 2 |
| 96 | Setpoint signal outside range |
| 105 | Electronic rectifier protection activated (ERP) |
| 106 | Electronic inverter protection activated (EIP) |
| 148 | Motor bearing temperature high (Pt100) in drive end (DE) |
| 149 | Motor bearing temperature high (Pt100) in non-drive end (NDE) |
| 155 | Inrush fault |
| 156 | Communication fault, internal frequency converter module |
| 157 | Real-time clock out of order |
| 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 |
| 175 | Signal fault, temperature 2 sensor (t_mo2) |
| 176 | Signal fault, temperature 3 sensor (t_mo3) |
| 190 | Limit exceeded, sensor 1 |
| 191 | Limit exceeded, sensor 2 |
| 215 | Soft pressure buildup timeout |
| 240 | Lubricate bearings (specific service information) |
| 241 | Motor phase failure |
| 242 | Automatic motor model recognition failed |

### 6.8 Static status parameters, input assembly 3

Static status parameters are parameters that describe characteristics of the E-pump. They are constants unable to change.
This assembly is included in assembly 1.

**Table legend**

●: Always available.

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 200 | UnitFamily | SINT8, 0xC2 | Enum | 0 - 127 | Unit family | ● | ● | ● |
| 201 | UnitType | | | | Unit type | ● | ● | ● |
| 202 | UnitVersion | | | | Unit version | ● | ● | ● |
| 203 | CIMSoftwareVersion | | 1 | | CIM 500 software version | ● | ● | ● |
| 204 | CIMSoftwareRevision | | | | CIM 500 software revision | ● | ● | ● |
| 205 | CIMSoftwareFix | | | | CIM 500 software fix | ● | ● | ● |
| 206 | StatusReserved1 | | | | Reserved | - | - | - |
| 207 | StatusReserved2 | | | | Reserved | - | - | - |

#### 6.8.1 Device identification

The UnitFamily and the UnitType parameters identify what E-pump product EtherNet/IP is connected to.

| UnitFamily [enumeration] | UnitType [enumeration] |
|---|---|
| 1: UPE/MAGNA/MAGNA3 circulator pump | 5: UPE, 3-phase<br>7: MAGNA, 1-phase<br>9: MAGNA, 1-phase, small<br>10: MAGNA3 |
| 2: E-pump, 1-phase/3-phase, based on MGE motor or CUE frequency converter | 2: MGE, 1-phase, model F or earlier<br>3: MGE, 3-phase, model F or earlier<br>4: MGE, 3-phase, large<br>5: CUE frequency converter<br>6: MGE, 3-phase, model G<br>7: MGE, 3-phase, model H and later<br>8: CUE II, frequency converter |

### 6.9 Measured parameters, input assembly 4

Measured parameters are physical values measured by internal and external sensors and values calculated by the E-pump itself based on measured values and its state/mode behaviour.

This assembly is included in assembly 1.

**Table legend**

3-ph: 3-phase only.

CUE: Pumps with CUE drive only.

MGE: Pumps with MGE motor only.

G: Only available on model G and later versions.

H: Only available on model H and later versions.

S: Sensor required.

●: Always available.

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 300 | UserSetpoint | SINT16, 0xC3 | 0.01 % | 0 - 327.67 % | User setpoint (0-100 % of range) | ● | ● | ● |
| 301 | ActualSetpoint | | | | Actual setpoint, % of max value | ● | ● | ● |
| 302 | SystemFeedback | | | | Status of closed loop feedback | S[1] | S[1] | ● |
| 303 | Head | | 0.001 bar | 0 - 32.767 bar | Head value | S | S | ● |
| 304 | OutletPressure | | | | Pump outlet pressure | H+S | - | - |
| 305 | DiffOutletPressure | | | | Pump differential outlet pressure | H+S | - | - |
| 306 | InletPressure | | | -1.000 to +32.767 bar | Pump inlet pressure | G+S | S | - |
| 307 | DiffInletPressure | | | 0 - 32.767 bar | Pump differential inlet pressure | H+S | - | - |
| 308 | DiffPressure | | | | Pump differential pressure | H+S | - | ● |
| 309 | RemotePressure1 | | | | Remotely measured pressure 1 | G+S | S | S |
| 310 | RemotePressure2 | | | | Remotely measured pressure 2 | H+S | - | - |
| 311 | RemoteDiffPressure | | | | Remotely meas. diff. pressure | H+S | - | - |
| 312 | Flow | | 0.1 $m^3/h$ | 0 - 3276.7 $m^3/h$ | Pump flow | S[2] | S[2] | ● |
| 313 | RemoteFlow | | | | Remotely measured flow | G+S | S | - |
| 314 | RemoteTemperature1 | | 0.01 °C | -273.15 to +327.67 °C | Remotely measured temp 1 | S | S | - |
| 315 | RemoteTemperature2 | | | | Remotely measured temp 2 | H+S | - | S |
| 316 | RemoteDiffTemperature | | | | Remotely meas. diff. temp. | H+S | - | - |
| 317 | AmbientTemperature | | | | Ambient temperature | H+S | - | - |
| 318 | FluidTemperature | | | | Fluid temperature | G+S | S | ● |
| 319 | HeatDiffTemperature | | | | Heat metering diff. temp. | H+S | - | S |
| 320 | StorageTankLevel | | 0.01 m | -10.00 to +327.67 m | Storage tank level | H+S | - | - |
| 321 | FeedTankLevel | | | | Feed tank level | H+S | S | - |
| 322 | AuxSensorInput | | 0.01 % | 0 - 327.67 % | Auxiliary sensor input | S | S | - |
| 323 | MotorTemperature | | 0.01 °C | -273.15 to +327.67 °C | Motor temperature | G+S +3-ph | S | - |
| 324 | ElectrTemperature | | | | Electronics temperature | H | MGE | ● |
| 325 | PowerElectrTemperature | | | | Power electronics (drive) temp. | ● | ● | ● |
| 326 | BearingsTemperatureDE | | | | Pump bearings temp. drive end | S | CUE+ S | - |
| 327 | BearingsTemperatureNDE | | | | Pump bearings temp. non-drive end | S | CUE+ S | - |
| 328 | LoadPct | | 0.01 % | 0 - 327.67 % | Load percentage | H | - | - |
| 329 | RelativePerformance | | | | Relative performance | ● | ● | ● |
| 330 | Frequency | | 0.01 Hz | | Motor frequency | ● | ● | ● |
| 331 | Speed | | 1 rpm | 0 - 32767 rpm | Motor speed | ● | ● | ● |
| 332 | SpecificEnergy | | 1 $Wh/m^3$ | 0 - 32767 $Wh/m^3$ | Specific energy | H+S | CUE+ S | ● |
| 333 | DCLinkVoltage | | 0.1 V | 0 - 3276.7 V | DC link voltage (drive) | ● | ● | ● |
| 334 | MotorVoltage | | | | Motor voltage | G only | ● | - |
| 335 | MotorCurrent | | 0.1 A | 0 - 3276.7 A | Motor current | ● | ● | ● |
| 336 | MotorTorque | | 0.1 Nm | 0 - 3276.7 Nm | Motor torque | - | ● | - |
| 337 | MeasReserved1 | | - | -32767 to +32767 | Reserved for future use | - | - | - |

| Parameter | Name | Data type | Scaling | Range/Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 338 | NoOfStarts | SINT32, 0xC4 | 1 | 0 - ($2^{31}$-1) | Number of starts | ● | ● | ● |
| 350 | Volume1 | | 1 $m^3$ | 0 - ($2^{31}$-1) $m^3$ | Pumped volume (direction 1) | H+S[2] | CUE+ S[2] | ● |
| 351 | Power | | 1 W | 0 - ($2^{31}$-1) W | Pump power | ● | ● | ● |
| 352 | Energy | | 1 Wh | 0 - ($2^{31}$-1) Wh | Pump energy consumption | ● | ● | ● |
| 353 | OperatingTime | | h | 0 - ($2^{31}$-1) h | Pump operating time | ● | ● | ● |
| 354 | TotalPoweredTime | | | | Total powered time | ● | ● | ● |
| 355 | HeatPower | | 1 W | 0 - ($2^{31}$-1) W | Heat metering power | H+S | - | S |
| 356 | HeatEnergy1 | | 1 Wh | 0 - ($2^{31}$-1) Wh | Heat metering energy (direction 1) | H+S | - | S |
| 357 | RealTimeClock | | Unix time | 0 - ($2^{31}$-1) s | Present value of Real Time Clock | ● | - | ● |
| 358 | HeatEnergy2 | | 1 Wh | 0 - ($2^{31}$-1) Wh | Heat metering energy (direction 2) | S | - | S |
| 359 | Volume2 | | 1 $m^3$ | 0 - ($2^{31}$-1) $m^3$ | Pumped volume (direction 2) | S | - | ● |
| 500 | RPILimits | UINT32, 0xC8 | 1 ms | 10000 - 200000 ms | Requested Packet Interval | ● | ● | ● |
| 600 | TCPIPCapability | DWORD32, 0xD3 | - | - | For Logix EDS AOP integration | ● | ● | ● |

[1] If the E-pump is in an open-loop control mode, this parameter will read the open-loop setpoint.

[2] If the E-pump is a TPE3 or a TPE Series 2000, the value is estimated and always available.

►: The availability of these measurements requires that the parameter VolumeFlow (parameter 312) is available, and a differential temperature measurement is established by one of the below means:

**MGE model H and later**

- Direct measurement, where an analog or temperature input has been configured to Remote differential temperature RemoteDiffTemp (parameter 316).
- FluidTemperature (parameter 318) measured by a built-in Grundfos sensor and RemoteTemperature2 (parameter 315) measured by an analog or temperature input.
- RemoteTemperature1 (parameter 314) and RemoteTemperature2 (parameter 315) measured by an analog or temperature input.

**MAGNA3**

For the calculation, an estimated flow value and measurement of the liquid temperature by the built-in temperature sensor is used. Connection of an external temperature sensor is needed for the pump to calculate the needed differential temperature.

A data value of 0xFFFF indicates "not available".

An estimated flow can be used for monitoring purposes only. We do not recommend it for controlling purposes.

### 6.10 Sensor-dependent measurements

As appears from the table, many of the measurement parameters require a particular sensor to be present.

Because a limited number of sensors are available, only a few of the "S" marked data parameters are available simultaneously.

The sections following describe the relation between the available EtherNet/IP measurement parameters and the setup of sensors. The description is split in sections for different pump types, because the approach varies.

**Old MAGNA and UPE pump types**

- No connection of external sensor possible.

**MAGNA3**

- Connection of a temperature sensor and selection of the analog input function "Constant temperature control" will make RemoteTemp2 measurement available.
- Connection of a pressure sensor and selection of the analog input function "Constant pressure control" will make RemotePressure1 measurement available.

**CUE and all E-pump types except model H and later.**

| Sensor unit configuration with Grundfos GO Remote | EtherNet/IP data parameter generated from sensor measurement | | |
|---|---|---|---|
| | **Feedback sensor (AI1)** | **Measuring sensor* (AI2)** | **Measuring sensor** (AI3)** |
| bar | Head (303) FeedTankLevel (321)+) | Head (303) and FeedTankLevel (321)+) or InletPressure (306) | Head (303) and FeedTankLevel (321)+) or RemotePressure1 (309) |
| mbar | | | |
| m | | | |
| kPa | | | |
| psi | | | |
| ft | | | |
| $m^3/h$ | Flow (312) | Flow (312) or RemoteFlow (313) | Flow (312) or RemoteFlow (313) |
| $m^3/s$ | | | |
| l/s | | | |
| gpm | | | |
| °C | RemoteTemperature1 (314) | FluidTemperature (318) | FluidTemperature (318) or RemoteTemperature1 (314) |
| °F | | | |
| % | AuxSensorInput (322) | AuxSensorInput (322) | AuxSensorInput (322) |

* CUE and 11-22 kW E-pumps only.

** CUE, 11-22 kW E-pumps and model G only.

+) Only if "m" or "ft" is selected.

**E-pump model H and later**

| Measured parameters Selected from Grundfos GO Remote display | Analog input AI1, AI2, AI3 | Temperature Pt100 input T1, T2 | Grundfos built-in sensor | Grundfos LiqTec sensor | Mapped to EtherNet/IP data parameter |
|---|---|---|---|---|---|
| Pump inlet pressure | ● | | | | InletPressure (306) |
| Pump inlet diff. press. | ● | | | | DiffInletPressure (307) |
| Pump outlet pressure | ● | | | | OutletPressure (304) |
| Pump outlet diff. press. | ● | | | | DiffOutletPressure (305) |
| Pump diff. pressure | ● | | ● | | DiffPressure (308) |
| Remote pressure 1 | ● | | | | RemotePressure1 (309) |
| Remote pressure 2 | ● | | | | RemotePressure2 (310) |
| Remote diff. pressure | ● | | | | RemoteDiffPressure (311) |
| Feed tank level | ● | | | | FeedTankLevel (321) |
| Storage tank level | ● | | | | StorageTankLevel (320) |
| Pump flow | ● | | | | Flow (312) |
| Remote flow | ● | | | | RemoteFlow (313) |
| Pumped liquid temp | ● | ● | ● | ● | FluidTemp (318) |
| Temperature 1 | ● | ● | | | RemoteTemperature1 (314) |
| Temperature 2 | ● | ● | | | RemoteTemperature2 (315) |
| Remote diff. temp | ● | | | | RemoteDiffTemp (316) |
| Ambient temperature | ● | ● | | | AmbientTemperature (317) |
| Motor bearing temp. BE | | ● | | | BearingsTemperatureDE (326) |
| Motor bearing temp. NDE | | ● | | | BearingsTemperatureNDE (327) |
| Other parameter | ● | | | | AuxSensorInput (322) |

### 6.11 Special parameter, input explicit messaging

| Parameter | Name | Data type | Scaling | Range/ Resolution | Description | MGE 0.25 - 7.5 kW | MGE 11-22 kW + CUE | MAGNA3 |
|---|---|---|---|---|---|---|---|---|
| 500 | RPILimits | UINT32, 0xC8 | 1 µs | 15000 - 200000 µs | Requested Packet Interval | ● | ● | ● |
| 500 | TCPIPCapability | DWORD32, 0xD3 | - | - | For Logix EDS AOP integration | ● | ● | ● |

## 7. Product simulation

The CIM module can be put in product simulation mode in which case it will generate life-like simulated values of all the EtherNet/IP input data parameters.

It will thus be possible to connect an EtherNet/IP master to CIU 500 without this device being connected to a real pump in a real-life system. In an office environment, it can then be verified that communication works and data is being received and handled correctly by the master application program, for example PLC program, before the equipment is installed under real-life conditions.

Product simulation mode is entered via the webserver. See section *Webserver configuration* on page 27.

The below functional profiles can be selected from the webserver.

| Simulated product |
|---|
| Pump profile |
| Booster system profile |
| Digital Dosing DDA profile |

Only input parameters are simulated. The data read has dummy values and no real product functionality is simulated.

## 8. Fault finding the product

### 8.1 EtherNet/IP

You can detect faults in a module by observing the status of the two status LEDs. See the table below.

**CIM 500 fitted in a Grundfos product or CIM 500 fitted in a CIU 500**

Ensure that SW1 is in position "3".

| Fault (LED status) | Possible cause | Remedy |
|---|---|---|
| 1. Both LEDs remain off when the power supply is connected. | a) The module is fitted incorrectly in the Grundfos product. | Check that the module is fitted and connected correctly. |
| | b) The module is defective. | Replace the module. |
| | c) CIU 500 is defective. | Replace CIU 500. |
| 2. LED1 remains off. | a) SW1 is not set correctly. | Set the switch to "3". |
| 3. LED2 is flashing red. | a) No internal communication between the module and the Grundfos product. | Check that the module is fitted correctly. |
| | b) No internal communication between the CIU 500 and the Grundfos product. | • Check the cable connection between the Grundfos product and CIU 500.<br>• Check that the individual conductors have been connected correctly, for example not reversed.<br>• Check the power supply to the Grundfos product. |
| 4. LED2 is permanently red. | a) The module does not support the connected Grundfos product. | Contact the nearest Grundfos company. |
| 5. LED1 is permanently red. | a) IP address conflict. | Check the IP address configuration. |
| | b) SW1 is in illegal position | Check that SW1 is set to "3". |
| 6. LED1 is flashing red. | a) Connection time-out. | Verify the connection and communication between PLC and CIM 500. |
| 7. LED1 is permanently red and green at the same time. | a) Error in firmware download. | Use the webserver to download the firmware again. See section *Update* in the appendix. |
| 8. LED2 is permanently red and green at the same time. | a) Memory fault. | Replace the module. |

## 9. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

The crossed-out wheelie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

## 10. Grundfos alarm and warning codes

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

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

| Code | Description | Code | Description | Code | Description |
|---|---|---|---|---|---|
| 106 | Electronic inverter protection activated (EIP) | 141 | - | 176 | Signal fault, temperature sensor 3 (t_mo3) |
| 107 | - | 142 | - | 177 | Signal fault, Smart trim gap sensor |
| 108 | - | 143 | - | 178 | Signal fault, vibration sensor |
| 109 | - | 144 | Motor temperature 3 (Pt100, t_mo3) | 179 | Signal fault, bearing temperature sensor (Pt100), general or top bearing |
| 110 | Skew load, electrical asymmetry | 145 | Bearing temperature high (Pt100), in general or top bearing | 180 | Signal fault, bearing temperature sensor (Pt100), middle bearing |
| 111 | Current asymmetry | 146 | Bearing temperature high (Pt100), middle bearing | 181 | Signal fault, PTC sensor (short-circuited) |
| 112 | Cosφ too high | 147 | Bearing temperature high (Pt100), bottom bearing | 182 | Signal fault, bearing temperature sensor (Pt100), bottom bearing |
| 113 | Cosφ too low | 148 | Motor bearing temperature high (Pt100) in drive end (DE) | 183 | Signal fault, extra temperature sensor |
| 114 | Motor heater function activated (frost protection) | 149 | Motor bearing temperature high (Pt100) in non-drive end (NDE) | 184 | Signal fault, general-purpose sensor |
| 115 | Too many grinder reversals or grinder reversal attempt failed | 150 | Fault (add-on) pump module | 185 | Unknown sensor type |
| 116 | Grinder motor overtemperature | 151 | Fault, display (HMI) | 186 | Signal fault, power meter sensor |
| 117 | Intrusion (door opened) | 152 | Communication fault, add-on module | 187 | Signal fault, energy meter |
| 118 | Signal fault, hydrogen sulfide H2S sensor | 153 | Fault, analog output | 188 | Signal fault, user-defined sensor |
| 119 | Signal fault, analog input AI4 | 154 | Communication fault, display | 189 | Signal fault, level sensor |
| 120 | Auxiliary winding fault (single phase motors) | 155 | Inrush fault | 190 | Limit exceeded, sensor 1 (for example alarm level in WW application) |
| 121 | Auxiliary winding current too high (single-phase motors) | 156 | Communication fault, internal frequency converter module | 191 | Limit exceeded, sensor 2 (for example high level in WW application) |
| 122 | Auxiliary winding current too low (single-phase motors) | 157 | Real-time clock out of order | 192 | Limit exceeded, sensor 3 (for example overflow level in WW application) |
| 123 | Start capacitor, low (single-phase motors) | 158 | Hardware circuit measurement fault | 193 | Limit exceeded, sensor 4 (for example low level in WW/tank filling application) |
| 124 | Run capacitor, low (single-phase motors) | 159 | CIM fault (Communication Interface Module) | 194 | Limit exceeded, sensor 5 |
| 125 | Signal fault, outdoor temperature sensor | 160 | Cellular modem, SIM card fault | 195 | Limit exceeded, sensor 6 |
| 126 | Signal fault, air temperature sensor | 161 | Sensor supply fault, 5 V | 196 | Operation with reduced efficiency |
| 127 | Signal fault, shunt relative pressure sensor | 162 | Sensor supply fault, 24 V | 197 | Operation with reduced pressure |
| 128 | Strainer clogged | 163 | Measurement fault, motor protection | 198 | Operation with increased power consumption |
| 129 | - | 164 | Signal fault, LiqTec sensor | 199 | Process out of range (monitoring, estimation, calculation, control) |
| 130 | - | 165 | Signal fault, analog input 1 | 200 | Application alarm |
| 131 | - | 166 | Signal fault, analog input 2 | 201 | External sensor input high |
| 132 | - | 167 | Signal fault, analog input 3 | 202 | External sensor input low |
| 133 | - | 168 | Signal fault, pressure sensor | 203 | Alarm on all pumps |
| 134 | - | 169 | Signal fault, flow sensor | 204 | Inconsistency between sensors |
| 135 | - | 170 | Signal fault, water-in-oil (WIO) sensor | 205 | Level float switch sequence inconsistency |
| 136 | - | 171 | Signal fault, moisture sensor | 206 | Water shortage, level 1 |
| 137 | - | 172 | Signal fault, atmospheric pressure sensor | 207 | Water leakage |
| 138 | - | 173 | Signal fault, rotor position sensor (Hall sensor) | 208 | Cavitation |
| 139 | - | 174 | Signal fault, rotor origo sensor | 209 | Non-return valve fault |
| 140 | - | 175 | Signal fault, temperature sensor 2 (t_mo2) | 210 | High pressure |

| Code | Description | Code | Description | Code | Description |
|---|---|---|---|---|---|
| 211 | Low pressure | 226 | Communication fault, I/O module | 241 | Motor phase failure |
| 212 | Diaphragm tank precharge pressure out of range | 227 | Combi event | 242 | Automatic motor model recognition failed |
| 213 | VFD not ready | 228 | Night flow max. limit exceeded | 243 | Motor relay has been forced (manually operated or commanded) |
| 214 | Water shortage, level 2 | 229 | Water on floor | 244 | Fault, On/Off/Auto switch |
| 215 | Soft pressure buildup time-out | 230 | Network alarm | 245 | Pump continuous runtime too long |
| 216 | Pilot pump alarm | 231 | Ethernet: No IP address from DHCP server | 246 | User-defined relay has been forced (manually operated or commanded) |
| 217 | Alarm, general-purpose sensor high | 232 | Ethernet: Auto-disabled due to misuse | 247 | Power-on notice, (device or system has been switched off) |
| 218 | Alarm, general-purpose sensor low | 233 | Ethernet: IP address conflict | 248 | Fault, battery/UPS |
| 219 | Pressure relief not adequate | 234 | Backup pump alarm | 249 | User-defined event 1 |
| 220 | Fault, motor contactor feedback | 235 | Gas detected | 250 | User-defined event 2 |
| 221 | Fault, mixer contactor feedback | 236 | Pump 1 fault | 251 | User-defined event 3 |
| 222 | Time for service, mixer | 237 | Pump 2 fault | 252 | User-defined event 4 |
| 223 | Time for service, mixer | 238 | Pump 3 fault | 253 | SMS data from DDD sensor not received within time limit |
| 224 | Pump fault, due to auxiliary component or general fault | 239 | Pump 4 fault | 254 | Inconsistent data model |
| 225 | Communication fault, pump module | 240 | Lubricate bearings (specific service information) | | |

## 1. Webserver configuration

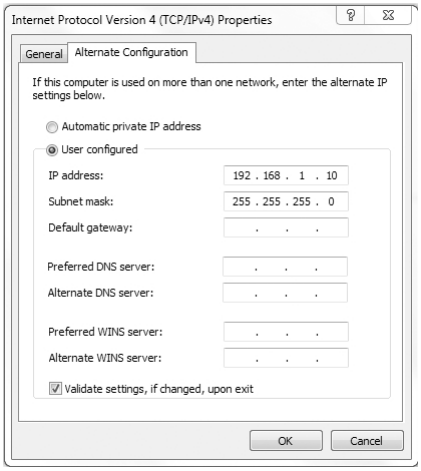
The built-in webserver offers easy monitoring of the CIM 500 module, and makes it possible to configure the selected Industrial Ethernet protocol. Using the webserver, you can also update the firmware of the CIM 500 module and store or restore settings, among other functions.

To connect a PC to CIM 500, proceed as follows:

1. Connect the PC and the module using an Ethernet cable.
2. Configure the Ethernet port of the PC to the same subnetwork as CIM 500, for example 192.168.1.101. See section *How to configure an IP address on your PC using Windows 7* or *1.2 How to configure an IP address on your PC using Windows 10*.
3. Open a standard Internet browser and type 192.168.1.100 in the URL field.

### 1.1 How to configure an IP address on your PC using Windows 7

1. Open "Control Panel".
2. Select "Network and Sharing Center".
3. Click [Change adapter settings].
4. Right-click and select "Properties" for the Ethernet adapter. Typically "Local Area Connection".
5. Select properties for "Internet Protocol Version 4 (TCP/IPv4)".
6. Select the "Alternate Configuration" tab and enter the user-configured IP address and the subnet mask you would like to assign to your PC. See fig. 1.




TM05 7422 1814

**Fig. 1** Example from Windows 7

### 1.2 How to configure an IP address on your PC using Windows 10

1. Search for "Ethernet" in Windows.
2. Select "Change Ethernet setting".
3. Select "Change adapter options".
4. Right-click "Ethernet" and select "Properties".
5. Select properties for "Internet Protocol Version 4 (TCP/IPv4)".
6. Select the "Alternate Configuration" tab and enter the user-configured IP address and subnet mask you would like to assign to your PC.

### 1.3 Login

For administration of username and password, see also *User Management*.

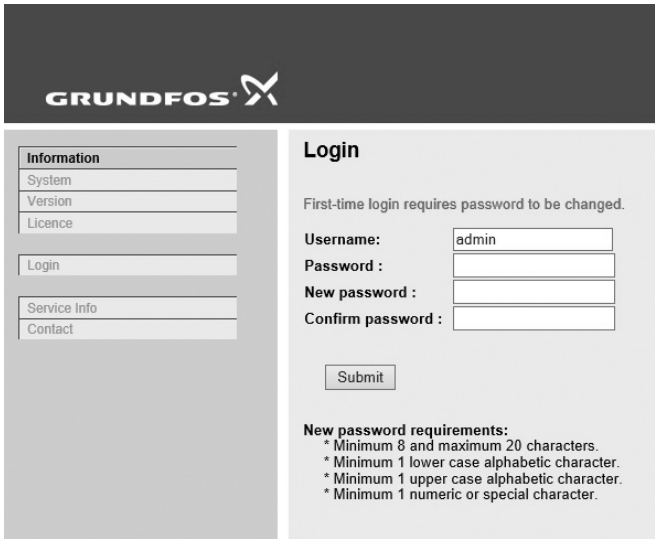



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**Fig. 2** Login

| Object | Description |
|---|---|
| **Username** | Enter username.<br>Default: admin. |
| **Password** | Enter password. Default: Grundfos.<br>After the first login, you are forced to change the password. The password must contain:<br>• at least 8 and maximum 20 characters<br>• at least one lower case letter<br>• at least one upper case letter<br>• at least one numeric or special character.<br>When logging in, you have four attempts before a back-off algorithm starts an exponentially increasing time delay between each attempt. Power cycling CIM 500 resets the back-off algorithm. |

### 1.4 EtherNet/IP configuration

This web page is used to configure all the parameters relevant to the EtherNet/IP protocol standard.

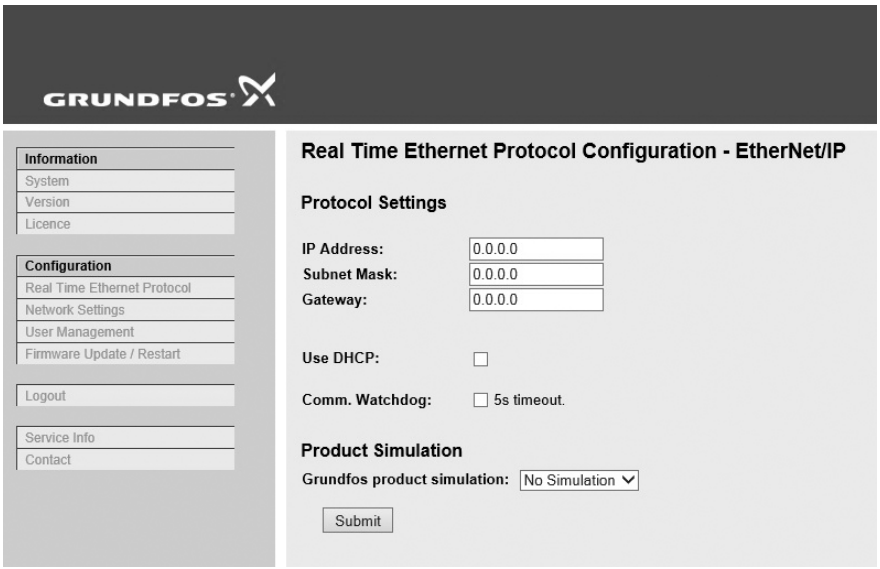


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**Fig. 3** Real Time Ethernet Protocol Configuration - EtherNet/IP

| Object | Description |
|---|---|
| **IP Address** | Configuration of the static IP address if a DHCP server is not used. EtherNet/IP is not allowed to share the IP address with a CIM 500 webserver. |
| **Subnet Mask** | Configuration of the subnet mask if a DHCP server is not used. |
| **Gateway** | Configuration of the gateway address if a DHCP server is not used. |
| **Use DHCP** | The CIM 500 module can be configured to automatically obtain its EtherNet/IP network settings from a DHCP server, if available on the network. Default: No use of DHCP. |
| **Communication Watchdog** | For enabling of a 5 seconds communication watchdog timer. Only active for pump or booster products.<br>Unchecked: Watchdog is disabled (default).<br>Checked: Watchdog is enabled, time-out is 5 seconds.<br>Watchdog action: The pump or the booster is set to local mode. |
| **Grundfos product simulation** | The module can be put in product simulation mode to generate realistic simulated values of all the EtherNet/IP input data. It will thus be possible to connect an EtherNet/IP master to a module fitted in a CIU or an E-box without installing this device in a real industrial process system. In an office environment, it can then be verified that communication works, and data is received and handled correctly by the EtherNet/IP master application program (for example PLC program) before installing the device.<br>To enable product simulation, select a product type from the dropdown list.<br>To terminate product simulation, select "No Simulation". |

You need a contract with Grundfos and an external router with Internet connection to gain access to the GRM server.

### 1.5 Network settings

This web page is used to configure the network settings of the webserver and of the GENIpro TCP protocol. The network settings here are also used for BACnet IP. Additional configuration of BACnet IP is done in the Real Time Ethernet Protocol menu. See *EtherNet/IP configuration*.

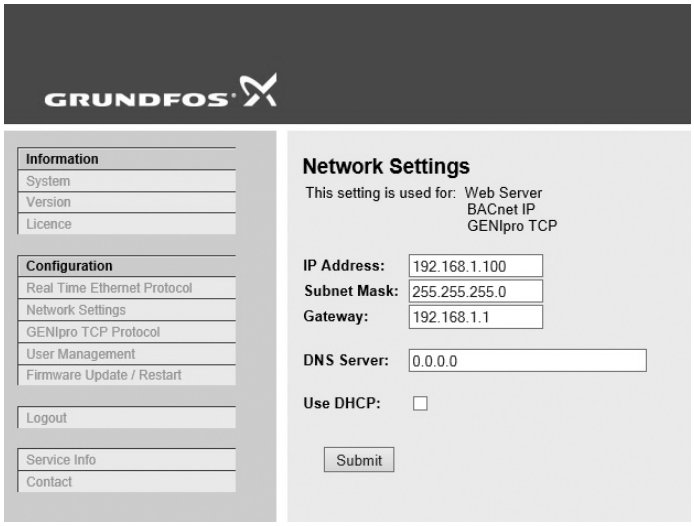


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**Fig. 4** Network settings

| Object | Description |
|---|---|
| **IP Address** | Configuration of the static IP address if a DHCP server is not used.<br>Default: 192.168.1.100. |
| **Subnet Mask** | Configuration of the subnet mask if a DHCP server is not used.<br>Default: 255.255.255.0. |
| **Gateway** | Configuration of the gateway address if a DHCP server is not used.<br>Default: 192.168.1.1. |
| **DNS Server** | The module can be configured to use a specific domain name server, if available on the network.<br>Default: 0.0.0.0. |
| **Use DHCP** | The module can be configured to automatically obtain the IP address from a DHCP server, if available on the network.<br>Default: Do not use DHCP. |

### 1.6 User Management

A login is required for any change of the CIM 500 settings, and this web page is used to configure the username and password. See *Login*.

It is only possible to configure one user.

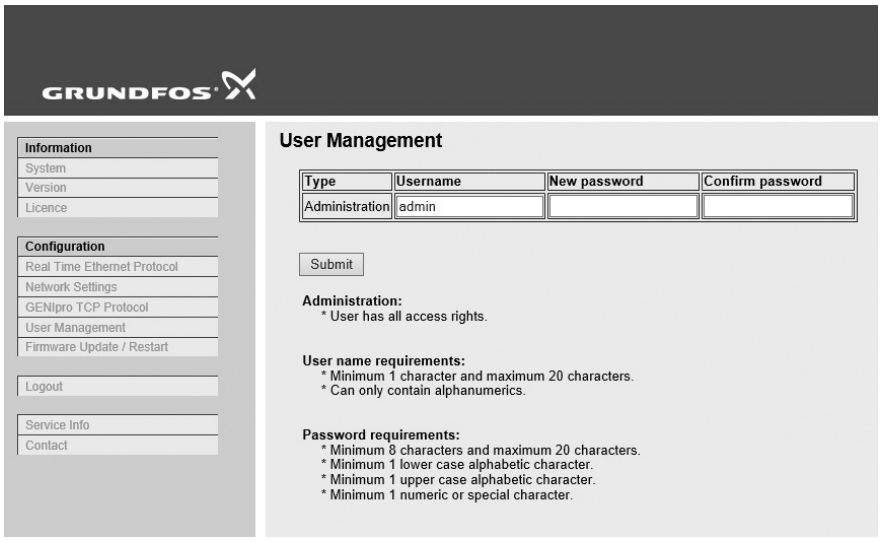


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**Fig. 5** User management

### 1.7 Update

You can update the firmware by means of the built-in webserver. The binary file is supplied by Grundfos.

To make installation and configuration easier, you can upload the configuration to a PC for backup or distribution to multiple modules.

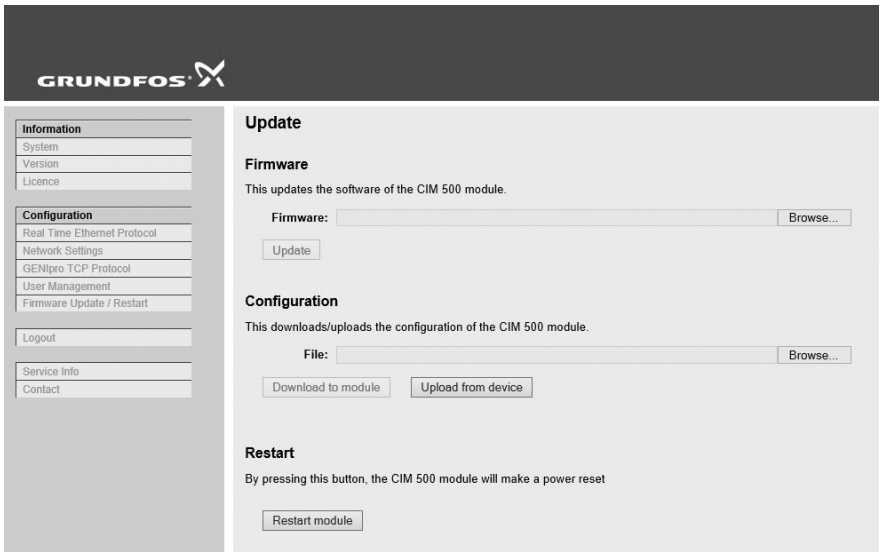


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**Fig. 6** Update

| Object | Description |
|---|---|
| **Firmware** | Path to binary firmware image that can be used for updating the module. |
| **Update** | Click [Update] to start the update. The procedure takes approximately one minute. |
| **File** | Path to the configuration file. |
| **Download to module** | Click here to transfer the configuration file to the module. |
| **Upload from device** | Click here to upload the configuration of the module to a file on your PC. |
| **Restart module** | By pressing this button, the CIM 500 module performs a power-up reset. |

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