

# EtherNet/IP for Digital Dosing

**CIM 500 Ethernet for EtherNet/IP**

Functional profile and user manual



**Original functional profile and user manual**

This functional profile describes Grundfos EtherNet/IP for DDA digital dosing pumps.

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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/units:

- CIM 500 Ethernet for EtherNet/IP.

It is for EtherNet/IP communication with the Smart Digital Dosing pump type DDA and DDA XL, referred to as 'DDA pump' in this document.

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\_Dosing\_Adapter\_EDS.eds) can be downloaded from the Grundfos Product Center.

### 2.3 Assumptions

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

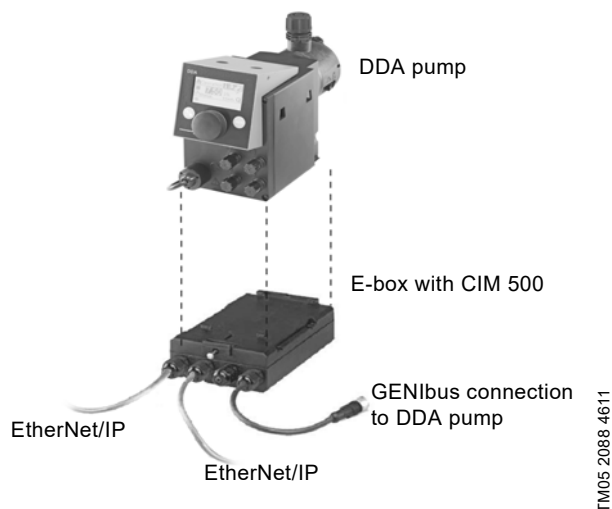
## 2.4 Definitions and abbreviations

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.
BCD	Binary coded decimal.
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.
DDA	Digital Dosing Advanced.
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.
E-box	The Grundfos E-box (extension box) contains the CIM module and is mounted underneath the small DDA pump.
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. Often used as abbreviation for water head (pressure in metres).
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.
MAC	Media Access Control. Unique network address for a piece of hardware.
Ping	Packet InterNet Groper. A software utility that tests the connectivity between two TCP/IP hosts.
Q	Often used as abbreviation for water flow rate.
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.
PLC	Programmable Logic Controller.

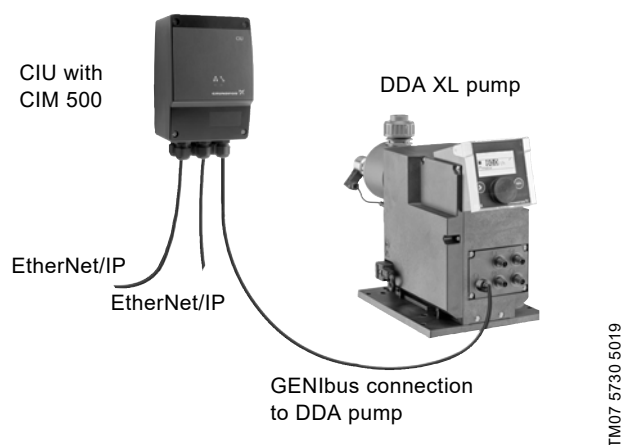
### 3. System description

The system diagram provides an overview of the two different connection types using either the E-box (small DDA) or the CIU box (DDA XL).

E-box comes with the CIM 500 module mounted inside, whereas the CIU box must have the CIM 500 module mounted upon installation. See fig. 1 and 2.



**Fig. 1** DDA pump with E-box connected to a daisy-chained EtherNet/IP network. E-box is powered from the DDA pump via the GENIbus cable



**Fig. 2** DDA XL pump with a CIU box connected to a daisy-chained EtherNet/IP network. The CIU box must be connected to an external power supply.

## 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: Off, permanently green, flashing red, permanently red. See section <a href="#">5.5 Status LEDs</a> .
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 x W x D)	182 x 108 x 82 mm	

### 4.2 CIM 500 Ethernet

CIM 500 Ethernet specifications	Description	Comments
Application layer	DHCP, HTTP, Ping, FTP, SMTP, SNMP, 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 Mbits/s	Corresponds to 328 feet.
Transmission speed	10 Mbits/s, 100 Mbits/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 <a href="#">5.2 Selection of Industrial Ethernet protocol</a> .

### 4.3 EtherNet/IP

EtherNet/IP specifications	Description
Minimum requested packet interval	15 ms
I/O data	505 bytes output 509 bytes input Maximum 255 bytes I/O data per assembly.
Number of IO connections	10 Default; configurable depending on available socket resources.
Number of encapsulation sessions	10 Default; configurable depending on available socket resources.
Number of explicit messaging connections	2 explicit messaging connections per encapsulation session 20 explicit messaging connections in total, configurable.
User-specific objects	Object 100. Depending on the connected product. <ul style="list-style-type: none"> <li>• Grundfos pump</li> <li>• Grundfos booster</li> <li>• Grundfos dosing.</li> </ul>
Maximum number of connections	2 explicit messaging connections x 10 encapsulation sessions Additional 10 I/O connections Total: 30 connections.
Standard objects	<ul style="list-style-type: none"> <li>• Identity object (class 0x01)</li> <li>• Message Router object (class 0x02)</li> <li>• Assembly object (class 0x04). Assembly: up to 32</li> <li>• Connection Manager object (class 0x06)</li> <li>• Device Level Ring (DLR) object (0x47)</li> <li>• Quality of Service (QoS) object (0x48)</li> <li>• TCP/IP Interface object (0xF5)</li> <li>• Ethernet Link object (0xF6)</li> </ul>
DHCP	Supported
Functional scope	<ul style="list-style-type: none"> <li>• Adapter</li> <li>• Support of 2 Ethernet Link objects for implementing ring and daisy chain topologies</li> <li>• Device Level Ring (DLR) protocol (announce-based ring node)</li> <li>• Quality of Service (QoS)</li> <li>• IPv4 Address Conflict Detection (ACD)</li> </ul>
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

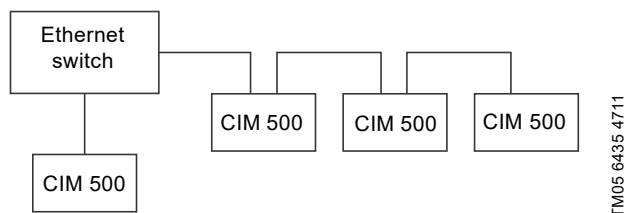
#### Electric shock

- Death or serious personal injury
- Connect CIM 500 only to SELV or SELV-E circuits.

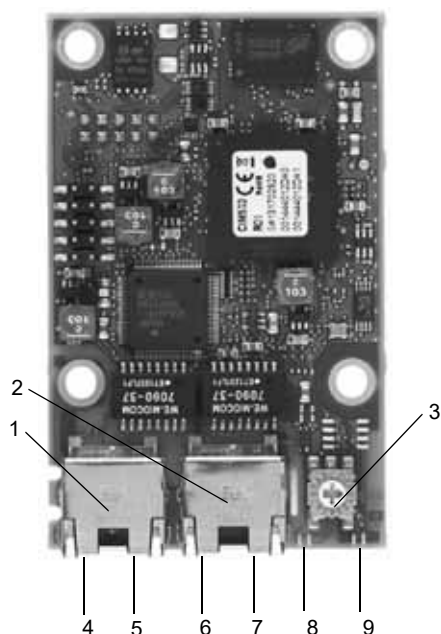
### 5.1 Connecting the Ethernet cable

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 an Industrial Ethernet network with CIM 500

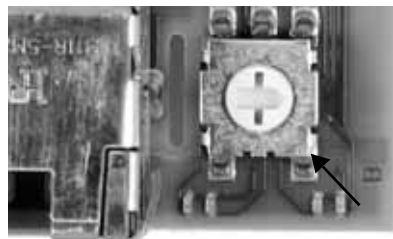


**Fig. 4** CIM 500 Ethernet module

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.
Resetting to 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 resetting is about to take place.	
F 3. After 20 seconds, LED1 stops to flash and factory resetting is initiated.	
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: 192.168.1.100 Subnet mask: 255.255.255.0 Gateway: 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 29.
- Open a standard Internet browser and type 192.168.1.100 in the URL field.
- Log in to the webserver using the following:

Username	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.

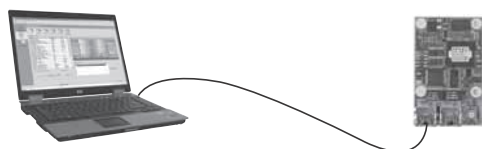


Fig. 6 CIM 500 connected to a PC

TM05 6436 4712



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

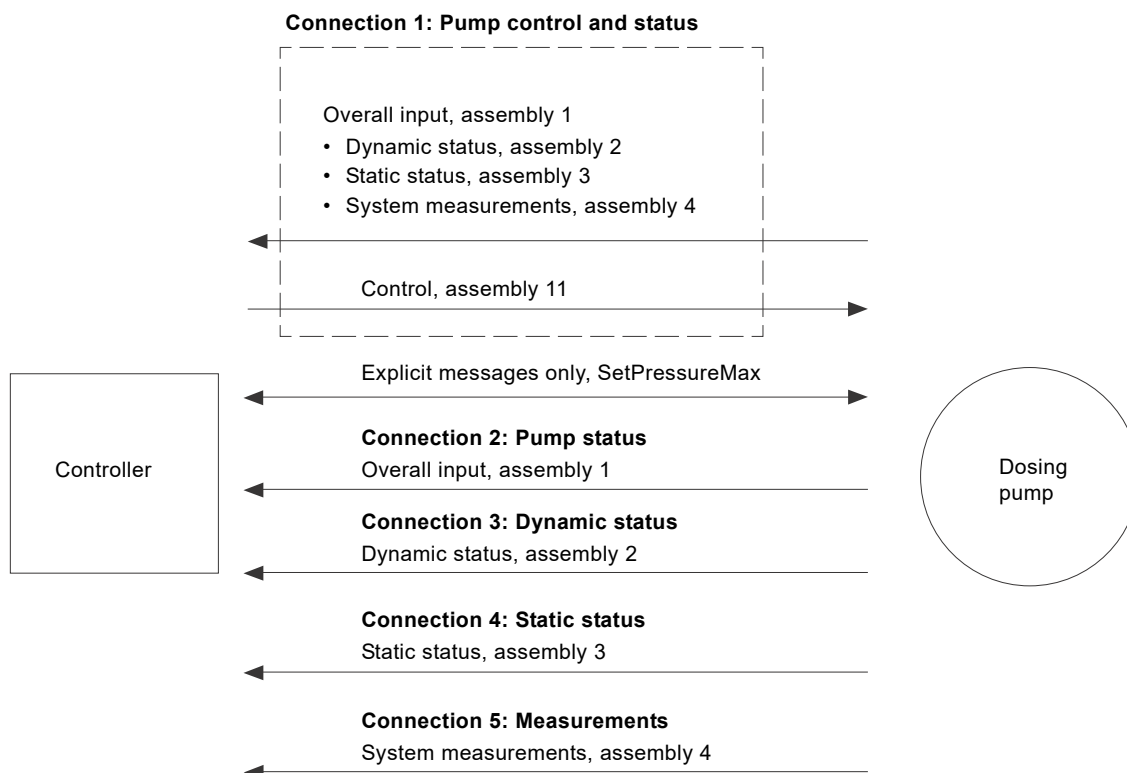
These green LEDs show whether the Ethernet cable is properly connected.

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



TN07 5213 3419

## 6.2 Control parameters, output assembly 1

The control parameters are output parameters for controlling the digital dosing pump. All the settings and control actions represented by the EtherNet/IP control parameters below can also be done from the operating panel, unless otherwise stated.

The present status of each parameter can be read from the associated Dynamic status parameter. See section [6.6 Dynamic status parameters, input assembly 2](#).



Note that to enable any control from bus, the bus control must be activated in the Setup menu via the operating panel of the DDA pump.

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
1	SetRemoteLocal	SINT8, 0xC2	Bool (state)	0, 1	Setting of Remote/Local state. 0: Local (outputs disabled) 1: Remote
2	SetStartStop				Setting of pump Start/Stop state. 0: Stop pump 1: Start pump
3	SetStopKeyOn				Setting of the operating panel Stop key On/Off. 0: Local start 1: Local stop
4	SetDeaeratingOnOff				Setting of Deaerating On/Off state. 0: Deaerating off 1: Deaerating on
5	SetAnalogMode				Setting of Analog Mode: 0: 0-20 mA 1: 4-20 mA (default)
6	SetTimerMode				Setting of Timer Mode (Opr. mode Timer). 0: Cycle timer 1: Week timer
7	SetSlowModeVelocity				Setting of Slow Mode velocity. 0: 50 % (default) 1: 25 %
8	SetSlowModeEnable				Enabling of Slow Mode (Anti-cavitation). 0: Disable 1: Enable
9	SetAutoDeaeratingEnable				Enabling of the Auto-deaerating function. 0: Disable 1: Enable
10	SetFlowControlEnable	SINT8, 0xC2	Bool (state)	0, 1	Enabling of the Flow Control function. 0: Disable 1: Enable
11	SetWatchdogEnable				Enabling of the fieldbus watchdog. Done automatically when bus control is selected from the operating panel. 0: Disable 1: Enable
12	SetAutoFlowAdaptEnable				Enabling of the Auto Flow Adapt function. 0: Disable 1: Enable
13	SetPulseMemoryEnable				Enabling of the Pulse Memory function. 0: Disable 1: Enable
14	SetOutputRelay1				Control of output relay 1. Not possible from the operating panel. 0: Inactive 1: Active
15	SetOutputRelay2				Control of output relay 2. Not possible from the operating panel. 0: Inactive 1: Active

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
16	TrigResetAlarm	SINT8, 0xC2	Bool (event)	↑ 1 (edge)	Command: Triggers resetting of alarms.
17	TrigPulse				Command: Triggers a pulse input. Not possible from the operating panel.
18	TrigResetVolumeCnt				Command: Triggers resetting of volume counter.
19	TrigSetRTC				Command: Triggers updating of RTC.
20	SetOperatingMode	SINT8, 0xC2	Enum	0-4	Select Operating mode 0: Manual 1: Pulse 2: Analog 3: Timer 4: Batch
30	SetpointManual	SINT32, 0xC4	0.1 ml/h	0 - Nameplate max.	Setting the Setpoint in Manual mode operation.
31	SetPulseVolume		1 nl	0 - Max. for pump type	Setting the pulse volume for Pulse mode operation.
32	SetBatchDosingVolume		0.001 ml	0 - Max. for pump type	Setting the batch dosing volume for Batch mode operation.
33	SetBatchDosingTime		0.1 s	0 - Max. for pump type	Setting the batch dosing time for Batch mode operation.
34	SetAnalogOutput	SINT16, 0xC3	0.001 mA	0 - 20 mA	Setting the analog output value. Not possible from the operating panel.
35	SetRTCYear	SINT8, 0xC2	1 year	0-127 year	Setting of the Real Time Clock years (after 2000). BCD-coded value.
36	SetRTCMonth		1 month	1-12 month	Setting of the Real Time Clock months. BCD-coded value.
37	SetRTCDay		1 day	1-31 day	Setting of the Real Time Clock days. BCD-coded value.
38	SetRTCHour		1 h	0-23 h	Setting of the Real Time Clock hours. BCD-coded value.
39	SetRTCMinute		1 min	0-59 min	Setting of the Real Time Clock minutes. BCD-coded value.
40	SetRTCSecond		1 s	0-59 s	Setting of the Real Time Clock seconds. BCD-coded value.

### 6.2.1 Explanation of event trigger

#### State

Control bits with a state event trigger behave like a "state" that is forced upon the DDA pump. CIM 500 attempts to make the pump operate according to the "requested" state. Due to certain state/mode restrictions, this might not always be possible (see explanation of the bit in question). The 'actual state' of the pump can be read from the belonging dynamic status parameters.

#### 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 PumpStatus (parameter 100), which is set when the command is executed and cleared when the control bit is written back to "0".

#### Value change

Control parameters with a value-change trigger behave like a value update that is executed when the parameter changes its value. CIM 500 attempts to make the DDA pump operate according to the "requested" value. The change is reflected in the corresponding parameter in the dynamic status parameters or in the measured parameters. Parameters that are controlled by a "value-change trigger" can be controlled from both EtherNet/IP and the operating panel. The last value change, no matter from which source it comes, becomes active, if not prevented by other conditions (see explanation of the parameter in question).

### 6.2.2 Explanation of control bits

#### RemoteAccessReq

Control bit used by CIM 500 to activate control from the bus.


0: The pump can only be controlled via the operating panel and from its external signal inputs. With this setting, all control bits and writings to any output parameter have no influence.


1: CIM 500 can control the pump according to the settings of control bits and the writing to the other output parameters. The pump can also be controlled from its external signal inputs and stopped from the operating panel.



#### SetDeaeratingOnOff

Control bit used to start and stop deaerating the pump.

0: Stops deaerating the pump.

1: Starts deaerating the pump.  
Equivalent to keep pressing  on the operating panel.

If the pump has been stopped via the operating panel (symbol ) , it is still possible to start and stop deaerating the pump from the bus.

If deaerating of the pump has been started from the bus, it can be stopped by pressing  or  on the pump.

**SetAnalogMode**

Control bit used to select the type of the analog input signal.

- |    |          |
|----|----------|
| 0: | 0-20 mA. |
| 1: | 4-20 mA. |

Toggleing this bit has no effect unless the pump is in operating mode "Analog". The actual state (readable from PumpStatus) is reset to 4-20 mA whenever another operating mode is selected.

**SetTimerMode**

Control bit used to select timer mode.

- |    |  |
|----|--|
| 0: | <p>Cycle timer mode.</p> <p>The pump repeats a cyclical dosing of the batch volume which can be programmed from EtherNet/IP with parameters SetBatchDosingVolume and SetBatchDosingTime.</p> |
| 1: | <p>Week timer mode.</p> <p>Up to 16 time-controlled dosing procedures are defined for a week. These procedures have to be programmed via the operating panel.</p>                            |

**SetSlowModeEnable**

Control bit used to slow down the suction stroke velocity.

- |    |   |
|----|---|
| 0: | <p>SlowMode disabled.</p> <p>No slow-down of suction stroke velocity.</p>   |
| 1: | <p>SlowMode enabled.</p> <p>Slows down the suction stroke velocity to the velocity selected with control parameter SetSlowModeVelocity.</p> |

**SetSlowModeVelocity**

Control bit used to select SlowMode suction stroke velocity.

- |    |                                 |
|----|---------------------------------|
| 0: | Selects SlowMode velocity 50 %. |
| 1: | Selects SlowMode velocity 25 %. |

Toggleing this bit has no effect unless the pump operates in SlowMode. Suction stroke is reset to 50 % velocity whenever SlowMode is disabled.

**SetAutoDeaeratingEnable**

- |    |  |
|----|--|
| 0: | Automatic pump deaeration disabled.                                  |
| 1: | Automatic pump deaeration enabled.                                   |
| 1: | The pump is automatically deaerated (degassed) at regular intervals. |

DigitalOutputs (parameter 101), bit 4, signals whenever automatic pump deaeration is active.

**SetFlowControlEnable**

When the FlowControl function is enabled, various faults and deviations related to the dosing process are detected and indicated.

- |    |                                |
|----|--------------------------------|
| 0: | FlowControl function disabled. |
| 1: | FlowControl function enabled.  |

The enabling/disabling of FlowControl means the enabling/disabling of all alarms/warnings that are associated with flow measurement. See section [6.7 Static status parameters, input assembly 3](#).

If the FlowControl function is disabled, the AutoFlowAdapt function (see control bit SetAutoFlowAdaptEnable) cannot be enabled.

**SetWatchdogEnable**

The EtherNet/IP software watchdog is used to monitor the EtherNet/IP connection. If the connection is broken, the DDA pump stops dosing and indicates a bus communication fault. See section [6.9 Special parameters, input explicit messaging](#).

- |    |   |
|----|---|
| 0: | EtherNet/IP software watchdog disabled. |
| 1: | EtherNet/IP software watchdog enabled.  |

When "Bus control" is selected via the operating panel, the EtherNet/IP watchdog is automatically enabled every time the pump is powered on. If the bus communication is somehow interrupted (no communication with an EtherNet/IP master), this is detected, and the DDA pump stops with an alarm indicating "bus error" (event code 15).

Enabling of EtherNet/IP at the same time automatically enables the monitoring of the cable connection from the E-box or CIU to the DDA pump (event code 152).

After power-on, the EtherNet/IP master can at any time control the enabling and disabling of the EtherNet/IP software watchdog. The monitoring of the E-box cable connection follows this choice.

When "Bus control" is disabled via the operating panel, the EtherNet/IP software watchdog is also automatically disabled and so is the monitoring of the E-box connection.

**SetAutoFlowAdaptEnable**

The AutoFlowAdapt function detects changes in various parameters and responds accordingly to keep the flow constant. Dosing accuracy is increased when this function is enabled.

- |    |                                  |
|----|----------------------------------|
| 0: | AutoFlowAdapt function disabled. |
| 1: | AutoFlowAdapt function enabled.  |

The AutoFlowAdapt function can only be enabled if the FlowControl function is also enabled.

**SetPulseMemoryEnable**

The Pulse memory function can be used in operating mode "Pulse". When it is enabled, up to 65000 unprocessed pulses can be saved for subsequent processing.

- |    |                                 |
|----|---------------------------------|
| 0: | Pulse memory function disabled. |
| 1: | Pulse memory function enabled.  |

**TrigResetAlarm**

When this control bit is toggled 0 → 1, the pump attempts to reset pending alarms and warnings and to restart the pump if it was stopped due to an alarm.

**TrigPulse**

When this control bit is toggled 0 → 1, a pulse signal is sent to the pump. This can be used in operating modes "Pulse" and "Batch" and is equivalent to a pulse signal from the signal inputs.

**TrigResetVolumeCnt**




When this control bit is toggled 0 → 1, VolumeTripCounter (parameter 313) is reset to "0".

**TrigSetRTC**

When this control bit is toggled 0 → 1, the internal Real Time Clock (RTC) in the DDA pump is updated. The values must have been previously written to the SetRTC parameters 35-40.


**SetStartStop**



Control bit for remote start/stop of the pump.

Value	Name
0	<p>Stop</p> <p>If the pump is ready to be controlled from EtherNet/IP (parameter 100, PumpStatus.RemoteLocal = "1"), this value stops the pump and the operating panel shows . If the pump is stopped from the bus, it cannot be started via the operating panel (unless "Bus control" is deselected).</p> <p>Stop cannot stop the pump when it is deaerating. Only SetDeaeratingOnOff can do that.</p>
1	<p>Start</p> <p>If the pump is ready to be controlled from EtherNet/IP (parameter 100, PumpStatus.RemoteLocal = "1"), this value starts the pump and it starts dosing according to the selected operating mode. If the pump is stopped via the  button, it restarts when  is pressed again.</p>

PumpStatus.StopFromBus (parameter 100) reflects the setting.

**SetStopKeyOn**

Control bit corresponding to pressing the start/stop button  on the pump.

Value	Name
0	Pump is set to local start. If not stopped from the bus via SetStartStop, the pump runs, otherwise the display shows the  symbol.
1	Pump is set to local stop and the display shows the  symbol.

PumpStatus.StopFromHMI (parameter 100) reflects the settings.

**SetOperatingMode**

Control enumeration for selection of operating mode.

Value	Name
0	<b>Manual</b> In this operating mode, the pump permanently doses the dosing flow set via SetpointManual (parameter 30) or the operating panel.
1	<b>Pulse</b> In this operating mode, the pump doses the volume set via SetPulseVolume (parameter 31) or the operating panel for each incoming pulse. Reception of the Pulse command from EtherNet/IP has the same effect as an incoming contact pulse signal. If the pump receives more pulses than it can process at the maximum dosing flow, excess pulses are ignored if the Memory function (PumpStatusPumpMemoryED bit) is not enabled.
2	<b>Analog</b> In this operating mode, the pump doses according to the external analog signal. It can operate according to a 4-20 mA or 0-20 mA signal selected via the SetAnalogMode bit or the operating panel. If the input value in Analog mode 4-20 mA falls below 2 mA, an alarm is displayed and the pump stops. The relation between the analog signal and the dosing value is called analog scaling and must be set via the operating panel.
3	<b>Timer</b> The time the dosing should take place is controlled by a cyclic timer or by week timers. The selection is done via the SetTimerMode bit or the operating panel. Some other parameters are related to timer dosing. They can only be programmed via the operating panel.
4	<b>Batch</b> In this operating mode, the pump doses the volume set via SetBatchDosingVolume (parameter 32) over a time period of SetBatchDosingTime (parameter 33) for each incoming pulse or EtherNet/IP Pulse command. The remaining batch volume during dosing can be read from RemainingDosingVolume (parameter 311).

**6.3 Other settings****SetOutputRelays**

SetOutputRelay1 (parameter 14) and SetOutputRelay2 (parameter 15) are used to control the output relays 1 and 2. A relay has to be set to "Bus control" via the operating panel if it should be controllable from the bus. Via the operating panel, the relays can also be individually configured to be of type NO or NC.

Value	Name
0	Not active
1	Active.

The present status of the output relays can always be read from DigitalOutputs (parameter 101).

**SetAnalogOutput**

Used to control the analog output signal.

The type of signal (4-20 mA or 0-20 mA) is selected with the SetAnalogMode parameter.

The analog output has to be set to "Bus control" via the operating panel if it should be controllable from the bus.

The present value of the analog output signal can always be read from AnalogOutput (parameter 320).

**Setting of the Real Time Clock**

The below control parameters are used to set the internal Real Time Clock (RTC).

SetRCTYear (parameter 35): Year (from year 2000)  
 SetRCTMonth (parameter 36): Month [1-12]  
 SetRCTDay (parameter 37): Day [1-31]  
 SetRCTHour (parameter 38): Hour [0-23]  
 SetRCTMinute (parameter 39): Minute [0-59]  
 SetRCTSecond (parameter 40): Second [0-59].

Each parameter is a binary-coded decimal (BCD) value. Sending the TrigSetRTC (parameter 19) command will execute the update.

**Example**

15:38:00, April 24 2011, is coded with hexadecimal numbers as:  
 Year = 11h, Month = 04h, Day = 24h, Hour = 15h, Minute = 38h, Second = 00h.

Can also be set via the operating panel.

The present value of the Real Time Clock can always be read from the RTC status parameters 108-113.



## 6.4 Bus settings compared to the operating panel settings

Parameter	Name	Selectable from the operating panel	Setting preserved during power-off
<b>Mode/state settings</b>			
1	SetRemoteLocal	No	Yes <sup>1</sup>
4	SetDeaeratingOnOff	Yes	Yes/No <sup>2</sup>
5	SetAnalogMode	Yes	Yes
6	SetTimerMode	Yes	Yes
7	SetSlowModeVelocity	Yes	Yes
<b>Enable/disable function</b>			
8	SetSlowModeEnable	Yes	Yes
9	SetAutoDeaeratingEnable	Yes	Yes
10	SetFlowControlEnable	Yes	Yes
11	SetWatchdogEnable	Yes <sup>3</sup>	Yes
12	SetAutoFlowAdaptEnable	Yes	Yes
13	SetPulseMemoryEnable	Yes	Yes
<b>Action commands</b>			
16	TrigResetAlarm	Yes	-
17	TrigPulse	No	-
18	TrigResetVolumeCnt	Yes	-
19	TrigSetRTC	Yes	-
<b>Operation control</b>			
2	SetStartStop	No <sup>4</sup>	Yes
3	SetStopKeyOn	Yes	Yes
20	SetOperatingMode	Yes	Yes
<b>Dosing settings</b>			
30	SetpointManual	Yes	Yes
31	SetPulseVolume	Yes	Yes
32	SetBatchDosingVolume	Yes	Yes
33	SetBatchDosingTime	Yes	Yes
50	SetPressureMax	Yes	Yes
<b>Output signal control</b>			
14	SetOutputRelay1	No	Yes
15	SetOutputRelay2	No	Yes
34	SetAnalogOutput	No	Yes
35	SetRCTYear	Yes	Yes
36	SetRCTMonth	Yes	Yes
37	SetRCTWeek	Yes	Yes
38	SetRCTDay	Yes	Yes
39	SetRCTMinute	Yes	Yes
40	SetRCTSecond	Yes	Yes

<sup>1</sup> Only preserved if the CIM module is not powered off.

<sup>2</sup> Deaerating is preserved if commanded from bus.

<sup>3</sup> Selecting and deselecting "Bus control" on the operating panel implicitly enables and disables the EtherNet/IP watchdog and the monitoring of the E-box connection to the DDA pump.

<sup>4</sup> Stopping from bus is indicated with the  symbol on the display. Stopping via the operating panel is equivalent to using the SetStopKeyOn parameter and is indicated with the  symbol on the display.

## 6.5 Configuration parameters, Input/Output explicit messaging

Configuration parameters are parameters that can be used to program selected settings of the digital dosing pump.

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
50	SetPressureMax	SINT16, 0xC3	0.1 bar	0 - 3276.7 bar	Setting the pressure max. alarm limit

## 6.6 Dynamic status parameters, input assembly 2

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

This assembly is included in assembly 1.

Parameter	Name	Data type	Scaling	Range/ Resolution	Description
100	PumpStatus	DWORD, 0xD3	Array of Bools		Miscellaneous states/modes.
	0. RemoteLocal		Bool (state)	0, 1	Status of Remote/Local state. 0: Local. The pump can only be controlled from the operating panel and its external signal inputs. In this state writing to any control parameter will have no influence. 1: Remote. In this state the pump can be controlled by the control parameters as well as from the Start/Stop button and from the external signal inputs. To enter this state bus control must be selected from the operating panel, the SetRemoteLocal bit (parameter 1) must be set and the pump must be started from the Start/Stop button.
	1. Dosing				Status of Dosing State. 0: Pump is not dosing (pump is not running). 1: Pump is dosing (pump is running).
	2. Warning				Status of Warning State. 0: No warnings are present. 1: One or more warnings are present, see parameter 107 WarningBits and parameter 106 WarningCode. The pump continues dosing if no alarm appears.
	3. Alarm				Status of Alarm State. 0: No alarm is present. 1: An alarm is present, see parameter 105 AlarmCode. Pump has stopped dosing and remains stopped as long as the alarm is present. See section <a href="#">6.6.1 Alarms and warnings</a>
	4. Deaerating				Status of Deaerating State. 0: The pump is not deaerating. 1: The pump is deaerating. This is the result of pressing the deaerating button on the operating panel or using SetDeaeratingOnOff (parameter 4).
	5. AnalogMode				Status of the selected type of the Analog Mode input signal. 0: 0-20 mA. 1: 4-20 mA (default if not in Analog Mode).
	6. TimerMode				Status of the selected Timer Mode. 0: Cyclic Timer. 1: Week Timer.
	7. SlowMode				Status of Slow Mode (Anti-cavitation). Slows down suction stroke velocity according to velocity selection. 0: Slow Mode disabled. 1: Slow Mode enabled.
	8. SlowModeVelocity				Status of the selected Slow Mode suction stroke velocity. 0: 50 % velocity (default if Slow Mode is disabled). 1: 25 % velocity.
	9. StopFromHMI				Status of Stop from the operating panel. 0: Not stopped from the operating panel start/stop button. 1: Stopped from the operating panel start/stop button. Can be released by SetStopKeyOn (parameter 3).



Parameter	Name	Data type	Scaling	Range/ Resolution	Description
100	10. StopFromExternal	DWORD, 0xD3	Bool (state)	0, 1	Status of Stop from external digital input DI3. 0: Stop signal from external digital input DI3 is not active. 1: Stop signal from external digital input DI3 is active.
	11. StopFromBus				Status of Stop from bus. 0: Stop command from bus is not active. 1: Stopped from bus with SetStartStop command (parameter 2).
	12. AutoDeaeratingED				Status of Auto Deaerating E/D. 0: Auto Deaerating disabled. 1: Auto Deaerating enabled. The digital output, DO5, goes high if Auto Deaerating becomes active.
	13. FlowControlED				Status of Flow Control E/D. 0: Flow Control function disabled. 1: Flow Control function enabled.
	14. WatchdogED				Status of EtherNet/IP Watchdog E/D. 0: EtherNet/IP watchdog disabled. 1: EtherNet/IP watchdog enabled. The watchdog is automatically enabled/disabled when “Bus control” is selected/deselected on the operating panel. The software watchdog can be enabled/disabled independently via SetWatchdogEnable (parameter 11).
	15. AutoFlowAdaptED				Status of Auto Flow Adapt E/D. 0: Auto Flow Adapt function disabled. (Default if Flow Control function is disabled). 1: Auto Flow Adapt function enabled.
	16. PulseMemoryED				Status of Pulse Memory E/D. 0: Pulse Memory function disabled. 1: Pulse Memory function enabled.
	17. BusControlLocallyED				Status of Bus Control Locally E/D. This indicates whether “Bus control” has been enabled in the Settings menu on the operating panel. 0: Bus control not enabled from the operating panel. The setting of the SetRemoteLocal control bit has no effect. 1: Bus control enabled from the operating panel. The setting of the SetRemoteLocal control bit transfers control of all settings to the bus.
	18. ResetAlarmAck				Status of TrigResetAlarm command. 0: TrigResetAlarm ready to execute. 1: TrigResetAlarm execution acknowledge. The bit is cleared when TrigResetAlarm is set to 0.
	19. PulseAck				Status of TrigPulse command. 0: TrigPulse ready to execute. 1: TrigPulse execution acknowledge. The bit is cleared when TrigPulse is set to 0.
	20. ResetVolumeCntAck				Status of TrigResetVolumeCnt command. 0: TrigResetVolumeCnt ready to execute. 1: TrigResetVolumeCnt execution acknowledge. The bit is cleared when TrigResetVolume is set to 0.
	21. SetRTCAck				Status of TrigSetRTC command. 0: TrigSetRTC ready to execute. 1: TrigSetRTC execution acknowledge. The bit is cleared when TrigResetAlarm is set to 0.
101	Digital Outputs	BYTE, 0xD1	Array of Bools		Digital outputs
	0. DO1		Bool (state)	0, 1	Status of DO1 – Relay 1
	1. DO2				Status of DO2 – Relay 2
	2. DO3				Status of DO3
	3. DO4				Status of DO4
	4. DO5				Status of DO5 – Auto Deaerating

Parameter	Name	Data type	Scaling	Range/ Resolution	Description
102	Digital Inputs	BYTE, 0xD1	Array of Booleans		Digital inputs
	0. DI1		Bool (state)	0, 1	Status of DI1 – Level low
	1. DI2				Status of DI2 – Level empty
	2. DI3				Status of DI3 – Extern stop
	3. DI4				Status of DI4
103	ActualStartStop	SINT8, 0xC2	Enum	0-3	Actual Start Stop mode 0: Requested Stop 1: Requested Start 2: Calibrating 3: Service Mode
104	ActualOperatingMode	SINT8, 0xC2	Enum	0-4	Actual Operating Mode 0: Manual 1: Pulse 2: Analog 3: Timer 4: Batch
105	AlarmCode	SINT16, 0xC3	Enum	0-255	Alarm code. An alarm event makes the pump stop. Some require an acknowledge before the pump can be restarted. See section <a href="#">6.6.1 Alarms and warnings</a> . An acknowledge can come from the operating panel or from EtherNet/IP by using the TrigResetAlarm command (parameter 16). EtherNet/IP can only indicate one active alarm at a time.
106	WarningCode	SINT16, 0xC3	Enum	0-255	Warning code. A warning does not stop the pump.
107	WarningBits	WORD, 0xD2	Bits	Bits	Warning bits. More bits can be present simultaneously.
	0. Underpressure		Bool (state)	0, 1	Underpressure (code 211)
	1. GasInPumpHead				Gas in pump head, deaerate (code 35)
	2. Cavitation				Cavitation (code 208)
	3. PressureValveLeakage				Pressure valve leakage (code 36)
	4. SuctionValveLeakage				Suction valve leakage (code 37)
	5. VentingValveDefect				Venting valve defect (code 38)
	6. TimeForService				Time for service (code 12)
	7. SoonTimeForService				Soon time for service (code 33)
	8. PreEmptyTank				Pre empty tank, Water shortage (code 206)
	9. PowerFailure				Power failure (Mains Fault) (code 6)
	10. CableBreakFlowMon				Cable break on Flow Monitor (code 169)
	11. BatteryLow				Battery low (code 28)
	12. PressureTooLow				Mean pressure too low (code 211)
	13. CapacityTooLow				Pumping capacity too low (code 17)
108	RTCYear	SINT8, 0xC2	1 year	0-127 years	Status of the Real Time Clock years (after 2000). BCD-coded value.
109	RTCMonth		1 month	1-12 months	Status of the Real Time Clock months. BCD-coded value.
110	RTCDay		1 day	1-31 days	Status of the Real Time Clock days. BCD-coded value.
111	RTCHour		1 hour	0-23 h	Status of the Real Time Clock hours. BCD-coded value.
112	RTCMinute		1 minute	0-59 min	Status of the Real Time Clock minutes. BCD-coded value.
113	RTCSecond		1 second	0-59 s	Status of the Real Time Clock seconds. BCD-coded value.

## 6.6.1 Alarms and warnings



Event code	Event group	Event description	Depends on FlowControl enabled	Event action	Auto-acknowledge
12	Pump head	Service now (time for service exceeded).	No	Warning	No
17		Flow deviation (performance requirement not met).	Yes	Warning <sup>2)</sup>	Yes
33		Soon time for service (general service information).	No	Warning	No
35		Air bubbles, gas in pump head, deaerating problem.	Yes	Warning <sup>2)</sup>	Yes
36		Discharge (pressure) valve leakage.	Yes	Warning <sup>2)</sup>	Yes
37		Suction valve leakage.	Yes	Warning <sup>2)</sup>	Yes
51		Blocked motor/pump.	No	Alarm	No
208		Cavitation.	Yes	Warning <sup>2)</sup>	Yes
210		Maximum pressure limit exceeded. ActualPressureMax (parameter 304).	Yes	Alarm	Yes
211	Tank	Back pressure too low. Fixed low-pressure limit (1.5 bar).	Yes	Alarm/ Warning <sup>1, 2)</sup>	Yes
57		Empty tank (dry running).	No	Alarm	Yes
206		Low level in tank.	No	Warning	Yes
97	Input signals	Defective analog 4-20 mA cable.	No	Alarm	Yes
169		Cable breakdown on FlowControl.	Yes	Warning <sup>2)</sup>	Yes
15	Communication	EtherNet/IP communication fault (main network communication fault).	No	Alarm	No
152		Extension box communication fault (GENIbus communication fault). Defective cable between E-box and DDA pump.	No	Alarm	No

<sup>1)</sup> Warning or alarm is selected in the Settings menu via the operating panel.

<sup>2)</sup> Requires SetFlowControlEnable (parameter 10) to be set.

### Explanation of ActualStartStop

Status enumeration for reading whether the pump is started, stopped, calibrating or in service mode:

Value	Name
0	<p><b>Started</b></p> <p>This has the following meaning for the different operating modes:</p> <ul style="list-style-type: none"> <li>• "Manual": The pump is dosing according to ActualSetpointManual (parameter 300).</li> <li>• "Analog": The pump is dosing according to the analog input signal and the analog scaling.</li> <li>• "Pulse": The pump is dosing according to the reception of pulses and the value of ActualPulseVolume (parameter 301). Pulses can be generated via the external pulse input signal or can come from the TrigPulse (parameter 17) command.</li> <li>• "Batch": The pump is dosing according to the reception of pulses and the values of ActualBatchDosingVolume (parameter 302) and ActualBatchDosingTime (parameter 303).</li> <li>• "Timer": The pump is dosing according to the timer functions using the batch dosing settings.</li> </ul>
1	<p><b>Stopped</b></p> <p>The pump has been stopped by one of the control sources. The state of the control sources can be read from PumpStatus.StopFromHMI, StopFromExternal and StopFromBus (bits 9, 10 and 11).</p>
2	<p><b>Calibrating</b></p> <p>The pump is calibrating the dosing accuracy. This is only possible via the operating panel by selecting Calibration in the Setup menu.</p>
3	<p><b>Service</b></p> <p>The pump has stopped and has been brought into Service mode. The display shows "-". This is only possible via the operating panel and can be done by pressing  and  simultaneously.</p>

### 6.6.2 Explanation of ActualOperatingMode

Status enumeration for reading the actual operating mode. For an explanation of these modes and the belonging enumeration, see section [SetOperatingMode](#).

## 6.7 Static status parameters, input assembly 3

Static status parameters are parameters that describe characteristics of the digital dosing pump. They are constants whose values cannot change.

This assembly is included in assembly 1.

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
200	UnitFamily	SINT8, 0xC2	Enum	0-127	Unit Family
201	UnitType				Unit Type
202	UnitVersion				Unit Version
203	CIMSoftwareVersion		1		CIM Software Version
204	CIMSoftwareRevision				CIM Software Revision
205	CIMSoftwareFix				CIM Software Fix
206	StatusReserved1				Reserved for future use
207	StatusReserved2				Reserved for future use

### 6.7.1 Device identification

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

UnitFamily [enumeration]	UnitType [enumeration]
30: Smart Digital Dosing, DDA	1: Smart Digital Dosing, DDA 2: Smart Digital Dosing, DDC 2: Smart Digital Dosing, DDA XL

## 6.8 Measured parameters, input assembly 4

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

This assembly is included in assembly 1.

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
300	ActualSetpointManual	SINT32, 0xC4	0.1 ml/h	0 - Max. for pump type	Actual value of Setpoint used in operating mode "Manual". Can be set via SetpointManual (parameter 30) or at the operating panel.
301	ActualPulseVolume		1 nl		Actual value of Pulse Volume used in operating mode "Pulse". Can be set via SetPulseVolume (parameter 31) or at the operating panel.
302	ActualBatchDosingVolume		0.001 ml		Actual value of Batch Dosing Volume used in operating mode "Batch". Can be set via SetBatchDosingVolume (parameter 32) or at the operating panel.
303	ActualBatchDosingTime		0.1 s		Actual value of Batch Dosing Time used in operating mode "Batch". Can be set via SetBatchDosingTime (parameter 33) or at the operating panel.
304	ActualPressureMax	SINT16, 0xC3	0.1 bar	0 - Max. for pump type	Actual value of max. pressure alarm limit setting. Can be set via SetPressureMax (parameter 50) or at the operating panel.
305	DosingPressureMax				Dosing pressure max., fixed for this pump type from factory.
306	DosingCapacityMax	SINT32, 0xC4	0.1 ml/h	0 - Max. for pump type	Dosing capacity max., fixed for this pump type from factory.
307	DosingCapacityReference		0.1 ml/h		Dosing capacity setpoint shown in the display. Represents the actual setpoint belonging to the actual operating mode and dosing state.
308	MeasuredDosingCapacity		0.1 ml/h		Measured actual dosing capacity. The SetFlowControlEnable bit (parameter 10) must be set for this value to be available.

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
309	MeasuredPressure	SINT16, 0xC3	0.1 bar	0 - 3276.7 bar	Measured absolute pressure. The SetFlowControlEnable bit (parameter 10) must be set for this value to be available. Except for the atmospheric pressure, it corresponds to the "Backpressure" reading on the display.
310	PulseInputFrequency		1 Hz	0 - 32767 Hz	Frequency of pulse input. Can be an external pulse input signal or pulses coming via the TrigPulse (parameter 17) command.
311	RemainingDosingVolume	SINT32, 0xC4	0.001 ml	0 - 2147.5 l	Remaining volume to be dosed. Used in "Batch" mode.
312	VolumeTotal		0.001 l	0 - 2147.5 m <sup>3</sup>	Total volume dosed (non-resettable).
313	VolumeTripCounter		0.001 l	0 - 2147.5 m <sup>3</sup>	Volume trip counter. Can be reset with TrigResetVolumeCnt (parameter 18) command.
314	NoOfPowerOns		1	0 - (2 <sup>31</sup> -1)	The number of times the pump has been powered on (non-resettable).
315	RunTime		1 min	0 - (2 <sup>31</sup> -1) min	The amount of time the pump has been dosing (non-resettable).
316	OperatingTime		1 min	0 - (2 <sup>31</sup> -1) min	The amount of time the pump has been powered on (non-resettable).
317	StrokeCounter		1	0 - (2 <sup>31</sup> -1)	Total number of strokes (non-resettable).
318	TimeToNextDosing		1 s	0 - (2 <sup>31</sup> -1) s	Time to next dosing. Only available in operating mode "Timer".
319	AnalogInput	SINT16, 0xC3	0.001 mA	0 - 20.000 mA	Analog input value. The value is used as setpoint in operating mode "Analog".
320	AnalogOutput		0.001 mA	0 - 20.000 mA	Analog output value. The parameter to map to the output is selected via the operating panel. If controlled from bus is selected, the analog output signal can be controlled from SetAnalogOutput (parameter 34).

## 6.9 Special parameters, input explicit messaging

Special parameters are parameters that might be used by the PLC, but bear no relation to the operation of the digital dosing pump.

Parameters	Name	Data type	Scaling	Range/ Resolution	Description
500	RPILimits	UINT32, 0xC8	1 µs	15000 - 200000 µs	Requested Packet Interval
600	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 generates 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 29.

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 booster system 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.	<ul style="list-style-type: none"> <li>• Check the cable connection between the Grundfos product and CIU 500.</li> <li>• Check that the individual conductors have been connected correctly, for example not reversed.</li> <li>• Check the power supply to the Grundfos product.</li> </ul>
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 <a href="#">Update</a> 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 wheellie 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 H <sub>2</sub> S 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

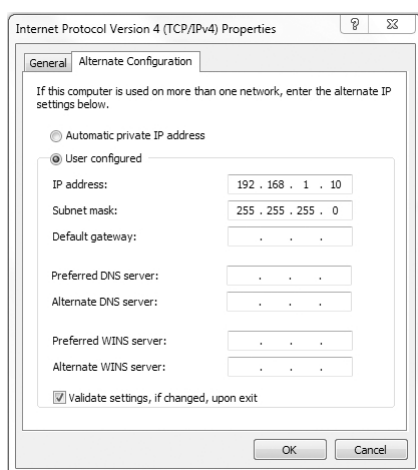
The built-in webserver offers easy monitoring of the CIM 500 module, and makes it possible to configure the selected Industrial Ethernet protocol. Using the webserver, you can also update the firmware of the CIM 500 module and store or restore settings, among other functions.

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.



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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](#).

GRUNDFOS

Information

System

Version

Licence

Login

Service Info

Contact

Login

First-time login requires password to be changed.

Username:

admin

Password :

New password :

Confirm password :

Submit

New password requirements:

\* Minimum 8 and maximum 20 characters.

\* Minimum 1 lower case alphabetic character.

\* Minimum 1 upper case alphabetic character.

\* Minimum 1 numeric or special character.

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Fig. 2 Login

Object	Description
Username	Enter username. Default: admin.
Password	Enter password. Default: Grundfos. After the first login, you are forced to change the password. The password must contain: <ul style="list-style-type: none"><li>• at least 8 and maximum 20 characters</li><li>• at least one lower case letter</li><li>• at least one upper case letter</li><li>• at least one numeric or special character.</li></ul> 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.

**GRUNDFOS**

**Information**

- System
- Version
- Licence

**Configuration**

- Real Time Ethernet Protocol
- Network Settings
- User Management
- Firmware Update / Restart

**Logout**

**Service Info**

- Contact

**Real Time Ethernet Protocol Configuration - EtherNet/IP**

**Protocol Settings**

IP Address:

Subnet Mask:

Gateway:

Use DHCP: ☐

Comm. Watchdog: ☐ 5s timeout.

**Product Simulation**

Grundfos product simulation:

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

Object	Description
<b>IP Address</b>	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.
<b>Subnet Mask</b>	Configuration of the subnet mask if a DHCP server is not used.
<b>Gateway</b>	Configuration of the gateway address if a DHCP server is not used.
<b>Use DHCP</b>	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.
<b>Communication Watchdog</b>	For enabling of a 5 seconds communication watchdog timer. Only active for pump or booster products. Unchecked: Watchdog is disabled (default). Checked: Watchdog is enabled, time-out is 5 seconds. Watchdog action: The pump or the booster is set to local mode.
<b>Grundfos product simulation</b>	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. To enable product simulation, select a product type from the dropdown list. To terminate product simulation, select "No Simulation".

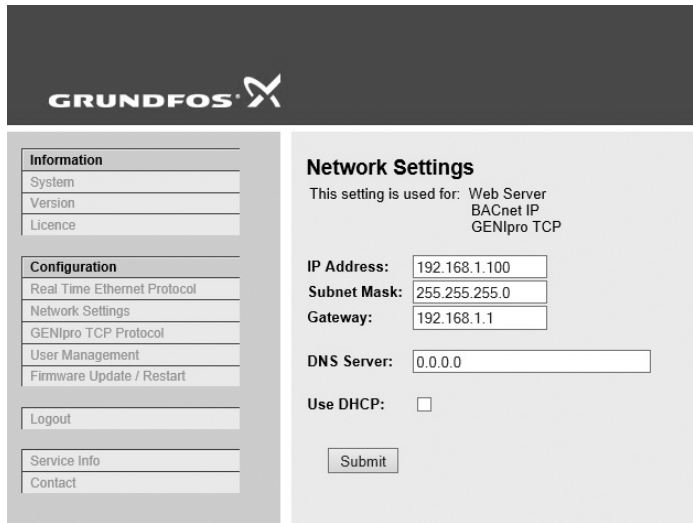


You need a contract with Grundfos and an external router with Internet connection to gain access to the GRM server.

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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. Default: 192.168.1.100.
Subnet Mask	Configuration of the subnet mask if a DHCP server is not used. Default: 255.255.255.0.
Gateway	Configuration of the gateway address if a DHCP server is not used. Default: 192.168.1.1.
DNS Server	The module can be configured to use a specific domain name server, if available on the network. 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. 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.

Type	Username	New password	Confirm password
Administration	admin		

Submit

**Administration:**  
 \* User has all access rights.

**User name requirements:**  
 \* Minimum 1 character and maximum 20 characters.  
 \* Can only contain alphanumerics.

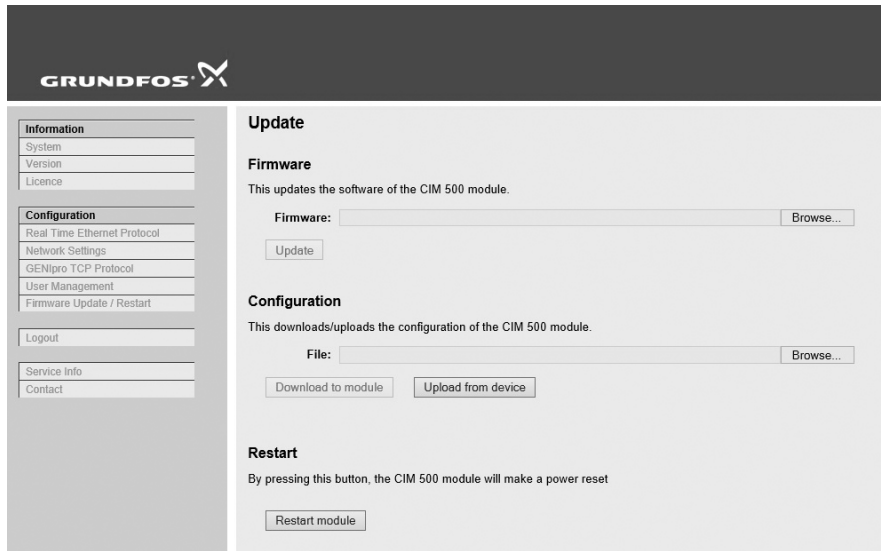
**Password requirements:**  
 \* Minimum 8 characters and maximum 20 characters.  
 \* Minimum 1 lower case alphabetic character.  
 \* Minimum 1 upper case alphabetic character.  
 \* Minimum 1 numeric or special character.

Fig. 5 User management

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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.



TM07 4526 1919

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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<b>99804403</b> 1219
ECM: 1275138

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