PROFIBUS and PROFINET for Digital Dosing

CIM 150 PROFIBUS DP CIM 500 Ethernet for PROFINET IO

Functional profile and user manual





PROFIBUS and PROFINET for Digital Dosing

English (GB)
Functional profile and user manual
Appendix A

English (GB) Functional profile and user manual

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1. General information



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

1.1 Hazard statements

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



DANGER



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

WARNING

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



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

The hazard statements are structured in the following way:

SIGNAL WORD

Description of the hazard
Consequence of ignoring the warning
Action to avoid the hazard.

1.2 Notes

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



Observe these instructions for explosion-proof products.



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



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



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



Tips and advice that make the work easier.

2. Introduction

2.1 About this functional profile

This functional profile describes the following modules or units:

- CIM 150 PROFIBUS DP
- CIM 500 Ethernet for PROFINET IO.

They are for PROFIBUS DP and PROFINET IO communication with the Smart Digital Dosing pump, type DDA, 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 PROFIBUS DP-V0

The PROFIBUS DP interface conforms to the PROFIBUS DP-V0 standard for cyclic data transmission.

The option of setting the PROFIBUS DP address via bus is not supported as the CIM 150 has two switches for setting the address.

2.3 PROFIBUS DP-V1

Only the diagnostic part and the extra three bytes of parameterisation data are supported. Acyclic data transmission is not supported.

2.4 Assumptions

This functional profile assumes that the reader is familiar with the commissioning and programming of PROFIBUS and PROFINET devices.

2.5 Definitions and abbreviations

ARP	Address Resolution Protocol: translating IP addresses into MAC addresses	
Auto-MDIX	Interface insuring 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	High performance Ethernet cable compatible with CAT5 and CAT5e	
CIM	Communication Interface Module	
CRC	Cyclic Redundancy Check: data error detection method	
DHCP	Dynamic Host Configuration Protocol: used for configuring network devices so that they can communicate on an IP network	
DNS	Domain Name System: used for resolving host names to IP addresses	
Enumeration	List of values	
GENIbus	Proprietary Grundfos fieldbus standard	
GENIpro	Proprietary Grundfos fieldbus protocol	
Grundfos GO	Grundfos application designed to control Grundfos products via infrared or radio communication available for iOS and Android devices	
Н	Head (pressure)	
HTTP	Hyper Text Transfer Protocol: protocol commonly used for navigating the world wide web	
IANA	Internet Assigned Numbers Authority	
IP	Internet Protocol	
LED	Light-emitting Diode	
Local settings	Settings done via the pump HMI or via the Grundfos GO app	
MAC	Media Access Control: unique network address for a piece of hardware	
Ping	Packet InterNet Groper: software utility testing connectivity between two TCP/IP hosts	
Q	Flow rate	
Remote settings	Settings done via the fieldbus	
SELV	Separated or Safety Extra-Low Voltage	
SELV-E	Separated or Safety Extra-Low Voltage with earth connection	
SMA	SubMiniature version A: coaxial radio signal cable connection standard	
SMTP	Simple Mail Transfer Protocol	
ТСР	Transmission Control Protocol: protocol for Internet communication and Industrial Ethernet communication	
TCP/IP	Transmission Control Protocol/Internet Protocol: protocol for Internet communication	
Transmission speed	Bits transferred per second, bits/s	
URL	Uniform Resource Locator: address used for connecting to a server	
UTC	Coordinated Universal Time: the primary time standard by which the world regulates clocks and time	
UTF-8	Unicode Transformation Format: character encoding	
DDA	Digital Dosing Advanced	
HMI	Human Machine Interface: display and buttons on the DDA pump	
PLC	Programmable Logic Controller	

3. System description

The system diagrams provide an overview of the two different technologies and how to connect a CIM to a CIU 900 that you connect to a PROFIBUS DP or PROFINET IO network.

The CIM 150/500 is a communication module installed internally in a CIU 900 using a 10-pin connection. In this setup, the CIM module is powered by the CIU unit.

For mounting of the CIM module, see the installation and operating instructions for the CIU.



DDA model C pump connected to a PROFIBUS network via a CIM 150

Connect the small DDA model C to the CIU 900 with the CIM150 module inside using the RS485 A, Y, B terminals. The CIU 900 must have its own 24-240V AC/DC supply.

The A,Y, B protocol should be set to GENIbus, 9600 bits/s via the pump HMI or the GO app.



DDA model C pump connected to a PROFINET network via a CIM 500 communication module

Connect the small DDA model C pump to the CIU 900 with a CIM 500 module installed in it using the RS485 A, Y, B terminals. The CIU 900 must have its own 24-240V AC/DC supply.

The A,Y, B protocol should be set to GENIbus, 9600 bits/s via the pump HMI or the GO app.



DDA XL pump connected to a PROFIBUS network via a CIM 150

Connect the DDA XL pump to the CIU 900 with a CIM 150 module installed in it using the RS485 A, Y, B terminals. The CIU 900 has its own 24-240V AC/DC supply.

The A,Y, B protocol always GENIbus in the DDA XL pump.



DDA XL pump connected to a PROFINET network via a CIM 500 communication module

Connect the DDA XL pump to the CIU 900 with a CIM 500 module installed in it using the RS485 A, Y, B terminals. The CIU 900 has its own 24-240V AC/DC supply.

The A,Y, B protocol is always GENIbus in the DDA XL pump.

4. Specifications

4.1 CIM

General data	Description	Comments
Ambient humidity	30 % to 95 %	Relative, non-condensing
Operating temperature	-20 °C to +45 °C	
Storage temperature	-25 °C to +70 °C	
Fieldhue vieuel diagnostice		Four possible states:
	LEDI	Off, flashing green, permanently red, flashing red
GENIbus visual diagnostics		Four possible states:
	LLDZ	Off, permanently green, flashing red, permanently red

4.2 CIM 150 PROFIBUS DP

The table below provides an overview of the specifications for the Grundfos CIM 150. For further details, refer to the specific sections of this functional profile.

PROFIBUS DP specifications	Description	Comments
PROFIBUS implementation class	DP-V0	Intelligent pump profile
PROFIBUS connector	Screw-type terminal	A, B, DGND, VP (+5 V)
PROFIBUS connection type	RS-485, two-wire	Conductors: A, B
Maximum cable length	100 metres at 12 Mbits/s	It equals to 328 feet.
Slave address	1-126	For DDA dosing pumps, the address is selected on the pump display in the Settings menu, not via the CIM150 rotary switches.
		Address 126 is reserved for special purposes.
Line termination	On or off	It is set via the DIP switches SW1 and SW2.
Recommended cable cross-section	0.20 - 0.25 mm ²	AWG24 or AWG23
Supported transmission speed	9.6 Kbits/s to 12 Mbits/s	It is configured from PROFIBUS master.
PROFIBUS visual diagnostics LED1 rec		It has four possible states: off, permanently green, flashing red, permanently red.
Maximum number of PROFIBUS devices at a physical network segment	32	Up to 125 devices can be connected if repeaters are used (physically segmented network).
		This is only active if the DDA bus/cloud control has been enabled.
Watchdog timeout	10 s	This must be enabled from a PROFIBUS commissioning tool. It can be enabled/disabled from PROFIBUS and GO app.

Related information

5.3.1 Data transmission rates and cable length

5.4 Setting the PROFIBUS address

5.5 Termination resistors

5.6 Status LEDs

4.3 CIM 500 PROFINET IO

The table below provides an overview of the specifications for the Grundfos CIM/CIU 500 Ethernet for the PROFINET IO. For further details, refer to the specific sections of this functional profile.

PROFINET IO specifications	Description	Comments	
Application layer	DHCP, HTTP, Ping, FTP, PROFINET IO	Rotary switch in position 0.	
Transport layer	ТСР	CP	
Internet layer	Internet protocol V4 (IPv4)		
Link layer	ARP, Media Access Control (Ethernet)	RP, Media Access Control (Ethernet)	
Ethernet cable	CAT5, CAT5e or CAT6	Auto cable-crossover detecting (Auto-MDIX) supported	
Maximum cable length	100 metres at 10/100 Mbit/s	328 feet	
Transmission speed	10 Mbit/s, 100 Mbit/s	Auto-detected	
Industrial Ethernet protocols	PROFINET IO, Modbus TCP, Ethernet/IP	Selected with rotary switch.	
Watabaar timoout	10 -	This is only active if the DDA bus/cloud control has been enabled.	
watchdog timeout	10 S	This must be enabled from a PROFIBUS commissioning tool. It can be enabled/disabled from PROFIBUS and GO app.	

Related information

6.2 Setting the industrial Ethernet protocol

5. PROFIBUS DP, CIM 150 setup

5.1 PROFIBUS bus topology

The PROFIBUS-preferred bus topology is daisy chaining as illustrated in the figure below. The end devices of a physical bus segment must be terminated (LT = Line Termination). Each device must have a unique physical address [1-126]. Up to 32 PROFIBUS devices can be connected to a bus segment, and another 32 by using a repeater. This can be repeated until the maximum number of addresses are used. Make sure that each device is connected to a proper earth potential.



Example of PROFIBUS bus segment with line termination

Pos.	Description	
1	LT, line termination at daisy chain end device	
М	Master	
S	Slave	

5.2 CIM 150 PROFIBUS module



CIM 150 PROFIBUS module

Pos.	Designation	Description
1	B (RxD/TxD-P)	PROFIBUS terminal B (positive data signal)
2	A (RxD/TxD-N)	PROFIBUS terminal A (negative data signal)
3	DGND	PROFIBUS terminal DGND (only for external termination)

Pos.	Designation	Description
4	VP	+5 VDC (only for external termination)
5	SW1/SW2	On and off switches for termination resistors
6	LED1	Red and green status LED for PROFIBUS communication
7	LED2	Red and green status LED for GENIbus communication between the CIM 150 and the DDA pump
8	SW3	Not used for DDA
9	SW4	Not used for DDA



The power supply (position 4) must only be used for external termination.

5.3 Connecting the PROFIBUS

5.3.1 Data transmission rates and cable length

We recommend using a cable according to the IEC 61158.

Example

Siemens, 6XV1 830-0EH10

Khito/o	Maximum cable length
KDII5/5	[m/ft]
9.6	1200/4000
19.2	1200/4000
45.45	1200/4000
93.75	1000/3300
187.5	1000/3300
500	400/1300
1500	200/660
3000	100/330
6000	100/330
12000	100/330

Fitting the cable

- 1. Connect the red conductor(s) to terminal B (pos. 1).
- 2. Connect the green conductor(s) to terminal A (pos. 2).
- 3. Connect the cable screens to earth via the earth clamp (pos. 3).



TM041699

For maximum safety and reliability, connect the cable screen to earth via the earth clamp, and make sure all CIU 150 units are properly earthed via the mains supply earth-wire.



Connecting the PROFIBUS

Pos.	Description
1	PROFIBUS terminal B
2	PROFIBUS terminal A
3	Earth clamp
4	+5 VDC
5	DGND

5.4 Setting the PROFIBUS address

Select the PROFIBUS address via the menu system in the pump display.



Set the PROFIBUS address decimally from 1 to 126. The address 126 is normally used for special purposes and should not be used.

A restart of the CIM 150 has to be performed for a PROFIBUS address change to take effect.

For complete overview of the PROFIBUS addresses, see section PROFIBUS address.

5.5 Termination resistors

The termination resistors are fitted on the CIM 150 $\ensuremath{\mathsf{PROFIBUS}}$ module.



Internal termination resistors

The CIM 150 has a DIP switch with two switches, SW1 and SW2, for cutting the termination resistors in and out.



Cutting termination resistors in and out

DIP switch settings

Status	SW1	SW2
Cut in	ON	ON
Cut out	OFF	OFF
Lindofined state	ON	OFF
Undenned state	OFF	ON

To ensure stable and reliable communication, it is important that only the termination resistors of the first and last units in the PROFIBUS network are cut in.

5.6 Status LEDs

The CIM 150 PROFIBUS module has two LEDs:

- red and green status LED1 for PROFIBUS communication
- red and green status LED2 for GENIbus communication between the CIM 150 and the connected DDA pump.

LED1

Status	Description
Off	CIM 150 switched off
Permanent green	CIM 150 ready for PROFIBUS data transmission (Data Exchange State)
Permanent red	CIM 150 module fault CIM 150 not supporting the connected DDA pump
Flashing red	Wrong or missing PROFIBUS configuration or no contact to the PROFIBUS master
LED2	

Status	Description
Off	CIM 150 switched off
Permanent green	GENIbus communication between the CIM 150 and the DDA pump OK
Permanent red	CIM 150 not supporting the connected DDA pump
Flashing red	No GENIbus communication between the CIM 150 and the DDA pump



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

Related information

5.2 CIM 150 PROFIBUS module

5.7 Communication watchdogs



Although they are enabled, none of the communication watchdogs are active if "Control from Cloud/bus" has not been enabled from HMI or the GO app.

Related information

7.2 Control module (ControlModule, module 1)

7.2.1 Explanation of control bits in ControlModule

5.7.1 PROFIBUS communication watchdog, CIM 150

The watchdog feature of the VPC3+C ProfiChip on CIM 150 is enabled during PLC parametrization. This enabling will make LED1 flash red if connection is broken.

Once this feature is enabled, the watchdog enabling/disabling can be controlled from output data module M1 byte 2, and for DDA model C also from the GO app **Settings > Communication** menu (E/D setting is not available from pump HMI).

The actual E/D status of the watchdog can be read from input data module M11, byte 2, bit 2.

The PROFIBUS watchdog action is triggered if "Control from bus/ cloud" is enabled and PROFIBUS communication is lost for more than 10 s. The dosing pump stops with a red display backlight and an alarm description "Communication with main network lost" (code 15) in the event log. If for DDA model C the GO app connection is active, the backlight remains blue and the event log can be accessed via the GO app.

When PROFIBUS communication is reestablished, the pump resumes dosing and returns to the normal display backlight.

5.7.2 PROFINET communication watchdog, CIM 500

The watchdog enabling/disabling can be controlled from output data module M1 byte 2, and for DDA model C also from GO app **Settings > Communication** menu (E/D setting is not available from pump HMI).

The actual E/D status of the watchdog can be read from input data module M11, byte 2, bit 2.

The PROFINET watchdog action is triggered if "Control from bus/ cloud" is enabled and PROFINET communication is lost for more than 10 s. The dosing pump stops with a red display backlight and an alarm description "Communication with main network lost" (code 15) in the event log. If for DDA model C the GO app connection is active, the backlight remains blue and the event log can be accessed via the GO app.

When PROFINET communication is reestablished, the pump resumes dosing and returns to the normal display backlight.

5.7.3 GENIbus communication watchdog

The GENIbus communication watchdog with a fixed 10 s timeout, which monitors the connection between CIU 900 and the DDA pump, is enabled for the first when time bus/cloud control has been selected. For DDA model C, it can be enabled/disabled with the GO app. For DDA XL, it is always enabled.

The GENIbus watchdog is triggered only if "Control from bus/cloud" is enabled and communication is lost between CIU 900 and the pump for more than 10 s. Dosing stops with a red display backlight and an alarm description "Communication with CIM module lost" (code 159) in the event log. This alarm is also readable from PROFIBUS/PROFINET via data module M18 FaultCode.

When GENIbus communication is reestablished, the pump resumes dosing and returns to the normal display backlight.

5.8 Reaction to PLC Stop button

If the PLC is stopped by the operator, all output registers will be set to 0.

As a result, the control bit RemoteAccessReq is cleared, and the DDA pump is set to local mode and then operates according to the local operating mode, local setpoint and local control mode.

6. PROFINET IO, CIM 500 setup



WARNING Electric shock

Death or serious personal injury

Connect the CIM 500 only to SELV or PELV circuits.

6.1 Connecting the Ethernet cable

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



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

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



Example of industrial Ethernet network



Example of Ethernet connection

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

English (GB)

6.2 Setting the industrial Ethernet protocol

The CIM 500 Ethernet module has a rotary switch for selecting the industrial Ethernet protocol.



Selecting the industrial Ethernet protocol

Pos.	Description
0	PROFINET IO (default)
1	Modbus TCP
2	BACnet IP, not supporting DDA pumps
3	Ethernet/IP
4E	Reserved, LED1 permanently red to indicate an invalid switch position

When the module is powered on, every change of the rotary switch setting causes the module to restart and prepare for the selected protocol.

6.3 Setting the IP addresses

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

Default IP settings used by the webserver	IP address: 192.168.1.100 Subnet mask: 255.255.255.0 Gateway: 192.168.1.1
IP settings for Modbus TCP	Settings to be made via the webserver
Device name and IP settings for PROFINET IO	Static configuration from the webserver or configuration from the PROFINET IO configuration tool

6.4 Establishing a connection to the webserver

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

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

User name (default)	admin
Password (default)	Grundfos

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



FM079843

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





CIM 500 connected to a PC via Ethernet cable

password.



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



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

Related information

A.2. Webserver configuration

6.5 Status LEDs

The CIM 500 Ethernet module has two Status LEDs:

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

LED1

Status	Description
Off	The CIM 500 is switched off.
Flashing green	Wink function: the LED flashes 10 times when activated from the master.
Permanent green	The CIM 500 is ready for data transmission (data exchange state).
Flashing red (3 Hz, duty cycle 50 %)	The PROFINET IO configuration is wrong or missing.
Pulsing red (0.3 Hz, duty cycle 10 %)	It is configured, but the connection to the master is lost.
Permanent red	The product is not supported.
Permanent red and green	There is an error in the firmware download.
Flashing red and green	After 20 seconds in this state, the CIM 500 factory settings are restored and the device is restarted.

Status	Description
Off	The CIM 500 is switched off.
Flashing red	There is no internal communication between the CIM 500 and the Grundfos product.
Permanent red	The CIM 500 does not support the Grundfos product connected.
Permanent green	The internal communication between the CIM 500 and the Grundfos product is OK.
Permanent red and green	There is a memory fault.

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

Related information

9.2 CIM 500

6.6 Data activity and link LEDs

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

DATA1 and DATA2

These yellow LEDs indicate the speed of the data connection.

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

LINK1 and LINK2

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

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

Related information

6.1 Connecting the Ethernet cable

7. Detailed description of data modules

7.1 Data types

The Grundfos CIU 150 and CIU 500 support the following data types.

All data types, except for data type 10, comply with the specification IEC 61158-6 standard data types for the PROFIBUS/PROFINET profiles.

Data type	Description
1	Boolean
2	Integer 8
3	Integer 16
4	Integer 32
5	Unsigned 8
6	Unsigned 16
7	Unsigned 32
8	Floating point
9	Visible string
10	Non-standard

All multi-byte data types are transmitted with MSB (Most Significant Byte) first.

7.1.1 Explanation of event trigger

State

Control bits with a state event trigger behave as a state that is forced upon the DDA pump. The CIM 150/500 attempts to make the pump operate according to the requested state in the ControlModule. Due to certain state or mode restrictions, this may not always be possible (see explanation about the bit in question). The actual state of the pump can be read from the corresponding bit in the StatusModule (module 11).

Value change

Control bits/bytes with a value-change event trigger behave as a command that is executed when the bit/byte changes its value. The CIM 150/500 attempts to make the DDA pump operate according to the requested value in the ControlModule. The change is reflected in the corresponding bit/byte in the StatusModule (module 11). Bits/ bytes that are controlled by a value-change event trigger can be controlled from both the PROFIBUS/PROFINET and the pump HMI. The last value change, no matter from which source, becomes active if not prevented by other conditions (see explanation about the bit/byte in question).

Rising edge

Control bits with a rising-edge event trigger behave as a command that is executed when a bit transition from 0 to 1 occurs. Each of them has a corresponding acknowledge bit in the StatusModule (module 11) that is set when the command is executed and cleared when the control bit is written back to 0.

7.2 Control module (ControlModule, module 1)

This is a PROFIBUS/PROFINET output module used for the control of the DDA pump. Its data type is 10, non-standard.

	Mode/sta	ate settings	
	Bit	Name	Event trigger
	0	RemoteAccessReq	State
	1	De-aerating (100 %)	Value change
Byte 1	2	AnalogMode	Value change
(data type 5)	3	TimerMode	Value change
	4	SlowMode	Value change
	5	Velocity	Value change
	6-7	-	-
	Enable/d	lisable function	
	Bit	Name	Event trigger
	0	AutoDeaeratingEnable	Value change
Byte 2	1	FlowControlEnable	Value change
(data type 5)	2	ProfiWatchdogEnable	Value change
	3	AutoFlowAdaptEnable	Value change
	4	PulseMemoryEnable	Value change
	5-7	-	-
	Action c	ommands	
	Bit	Name	Event trigger
Dute 2	0	ResetFault	Rising edge
(data type 5)	1	Pulse	Rising edge
(aata type o)	2	ResetVolumeCounter	Rising edge
	3	SetRTC	Rising edge
	4-7	-	-
	ReqStart Triggere	tStop [enumeration] d by value change	
Byte 4	Value	Name	
(data type 5)	0	ReqStart	
	1	ReqStop	
	2-255	-	
	Operatin Triggere	gMode [enumeration] d by value change	
	Value	Name	
Byte 5 (data type 5)	0	Manual	
	1	Pulse	
	2	Analog	
	3	Timer	
	4	Batch	
	5-255	-	

7.2.1 Explanation of control bits in ControlModule

RemoteAccessReq

It is a control bit used by the CIM 150/500 to activate control from the bus.

0:	The pump can only be controlled via the pump HMI or the GO app, and via its external signal inputs. With this setting, all control bits in ControlModule and writing to any output module will have no influence.
1:	The CIM 150/500 can control the pump according to the settings in the ControlModule and the writing to the other output modules. The pump can also be controlled via the pump HMI or the GO app, and via its external signal inputs.

De-aerating

It is a control bit used for de-aerating the pump.

0:	Stop de-aerating the pump.	
1:	Start de-aerating the pump.	
	It is the same as pressing 100% .	

If the pump is stopped via the pump HMI or the GO app (symbol ■), it is not possible to start and stop the de-aeration from the bus. If the de-aeration of the pump is started from the bus, it can be stopped by pressing 100% or ▶/■ on the pump.

AnalogMode

It is a control bit used for selecting the type of analog input signal.

0:	0-20 mA
1:	4-20 mA

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

TimerMode

It is a control bit used for selecting the timer mode.

0:	Cycle timer mode: The pump repeats a cyclical dosing of the batch volume that can be programmed from the PROFIBUS/PROFINET with data modules SetBatchDosingVolume and SetBatchDosingTime.
1:	Week timer mode: Up to 16 time-controlled dosing procedures are defined for a week. These procedures have to be programmed via the pump HMI or the GO app.
Slow	/Mode
	SlowMode disabled:

0:	There is no slow-down of the suction stroke velocity.
	SlowMode enabled:
1:	It slows down the suction stroke velocity to the velocity selected with the control bit velocity.

Velocity

It is a control bit used for selecting SlowMode suction stroke velocity.

0:	Select SlowMode velocity 50 %
1:	Select SlowMode velocity 25 %

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

AutoDeaeratingEnable

0:	Automatic pump de-aeration disabled
4.	Automatic pump de-aeration enabled:

The pump is automatically de-aerated (degassed) at regular intervals.

Data module 34 DigitalOutputs, bit 2, signals whenever automatic pump de-aeration is active.

FlowControlEnable

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 or disabling of the FlowControl means the enabling or disabling of all alarms or warnings that are associated with flow measurement. See section Measurement data modules. If the FlowControl function is disabled, the AutoFlowAdapt function (see control bits AutoFlowAdaptEnable) cannot be enabled.

ProfiWatchdogEnable

The PROFIBUS/PROFINET software watchdog is used for monitoring the PROFIBUS/PROFINET connection if control from the bus/cloud has been selected from at HMI or the GO app. If the connection is broken for more than 10 s, the DDA pump stops dosing and indicates a bus communication fault. See section Alarms and warnings.

0:	PROFIBUS/PROFINET watchdog disabled
1:	PROFIBUS/PROFINET watchdog enabled

See section PROFIBUS communication watchdog, CIM 150 or PROFINET communication watchdog, CIM 500 for a description of how to use the watchdog features.

AutoFlowAdaptEnable

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.

PulseMemoryEnable

The Pulse memory function can be used in the 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

ResetFault

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

Pulse

When this control bit is toggled $0 \rightarrow 1$, 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.

ResetVolumeCounter

When this control bit is toggled $0\rightarrow 1$, the VolumeTripCounter (module 30) is reset to 0.

SetRTC

When this control bit is toggled $0\rightarrow 1$, the internal real-time clock (RTC) in the DDA pump is updated. The values must be previously written to the SetDataTime (module 9).

Related information

- 5.7.1 PROFIBUS communication watchdog, CIM 150
- 5.7.2 PROFINET communication watchdog, CIM 500
- 7.7 Measurement data modules
- 7.8 Alarms and warning

7.2.2 Explanation of control mode

It is a control enumeration for remote start/stop of the pump.

Value	Name
	ReqStart
0	If the pump is ready to be controlled from the PROFIBUS/ PROFINET (StatusModule:ActRemoteAccess = "1"), this value starts the pump and it starts dosing according to the selected operating mode. If the pump is stopped via the pump HMI or the GO app, it restarts when > / = is pressed.
	ReqStop
1	If the pump is ready to be controlled from the PROFIBUS/ PROFINET (StatusModule:ActRemoteAccess = "1"), this value stops the pump and the pump HMI or the GO app shows II . If the pump is stopped from the bus, it cannot be started via the pump HMI or the GO app (unless Bus control is deselected). The ReqStop cannot stop the pump when it is de-aerating.

7.2.3 Explanation of operating mode

It is the control enumeration for selecting the operating mode.

Value	Name
	Manual
0	In this operating mode, the pump constantly doses the dosing flow set via the SetpointManual (register 00106-00107), the GO app, or the pump HMI.
	Pulse
1	In this operating mode, the pump doses the volume set via the SetPulseVolume (register 00108-00109), the GO app or the pump HMI for each incoming pulse. Reception of the pulse command from the Modbus 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 (PulseMemoryEnable bit) is not enabled.
	Analog
2	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 AnalogMode bit, the GO app, or the pump HMI. 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 analog signal and dosing value is called analog scaling and must be set via the pump HMI or the GO app.
	Timer
3	The time the dosing should take place is controlled by a cyclic timer or by week timers. The selection is done via the TimerMode bit, the pump HMI, or the GO app. Some other parameters are related to timer dosing. They can only be programmed via the pump HMI or the GO app.
	Batch
4	In this operating mode, the pump doses the volume set via the SetBatchDosingVolume (register 00110-00111) over a time period of the SetBatchDosingTime (register 00112-00113) for each incoming pulse (or Modbus Pulse command). These settings can also be done via the pump HMI or the GO app. The remaining batch volume during dosing can be read from the RemainingDosingVolume (register 00310-00311). The batch trigger source and the timer settings related to Timer
	cycle trigger source can only be programmed via the pump HMI

7.3 Dosing settings

Module	Name	Data type	Unit	Description
				It is for setting the setpoint used in the operating mode Manual.
2	SetSetpointManual	8	l/h	It can also be set via the pump HMI or the GO app.
				The present value can always be read from the ActSetpointManual (module 12).
				It is for setting the pulse volume used in the operating mode Pulse.
3	SetPulseVolume	8	I	It can also be set via the pump HMI or the GO app.
				The present value can always be read from the ActPulseVolume (module 13).
				It is for setting the batch dosing volume used in the operating mode Batch.
4	SetBatchDosingVolume	8	I	It can also be set via the pump HMI or the GO app.
				The present value can always be read from the ActBatchDosingVolume (module 14).
				It is for setting of the batch dosing time used in operating mode Batch.
5	SetBatchDosingTime	7	0.1 s	It can also be set via the pump HMI or the GO app.
				The present value can always be read from the ActBatchDosingTime (module 15).
				It is for setting the pressure alarm limit.
6	SetPressureMax	8	bar	It can also be set via the pump HMI or the GO app.
				The present value can always be read from the ActPressureMax (module 16).

7.4 Other settings

Module	Name	Data type	Unit	Description
				It is used for enabling and disabling the output relays 1 and 2.
				A relay has to be set to Bus control via the pump HMI or the GO app if it should be controllable from the bus via the SetOutputRelays module. Via the pump HMI or the GO app, the relays can also be individually configured to be of type NO or NC.
				Bit 0:Relay 1 control:
7	SetOutputRelays	5	Bits	0: Not active
				1: Active.
				Bit 1:Relay 2 control:
				0: Not active
				1: Active.
				The present status of the output relays can always be read from the OutputRelays (module 34).
	SetAnalogOutput	8		It is used for controlling the analog output signal.
				The type of signal (4-20 mA or 0-20 mA) follows the setting of the AnalogMode bit.
8			А	The analog output has to be set to Bus control via the pump HMI or the GO app if it should be controllable from the bus.
				The present value of the analog output signal can always be read from the AnalogOutput (module 32).
				It is used for setting the internal real-time clock (RTC).
				Byte 1: Year (from year 2000)
				Byte 2: Month [1-12]
				Byte 3: Day [1-31]
				Byte 4: Hour [0-23]
				Byte 5: Minute [0-59]
9	SetDateTime	10	string	Byte 6: Second [0-59].
			ounig	Each byte is a binary-coded decimal (BCD) value.
				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.
				It can also be set via the pump HMI or the GO app.
				The present value of the real-time clock can always be read from the DateTime (module 21).

7.5 Overview of DDA settings and controls

	Selectable from bus	Selectable from HMI/GO app	Preserved after power cycling	DDA Model C	DDA XL
General dosing settings					
Main network watchdog (enable, disable)	1	√ ¹⁾	✓ ²⁾	1	1
Bus control (enable, disable)		1	1	1	1
Stop after power failure (enable, disable)		1	1	1	1
Auto de-aerating (enable, disable)	1	1	1	1	1
Flow control (enable, disable)	1	1	1	1	1
Delay (short, medium, long)		1	1	1	1
Sensitivity (low, medium, high)		1	1	1	1
Auto FlowAdapt (enable, disable)	1	1	1	1	1
Pressure monitor					
Min. pressure		1	1	1	
Max. pressure	1	1	1	1	1
Min. pressure alarm (On, Off)		1	1	1	1
Max. capacity		1	1	1	
Slow mode (enable, disable)	1	1	1	1	1
Velocity (25 %, 50 %)	1	1	1	1	1
Action commands					
Reset fault	1	1	1	1	1
Generate single pulse 3)	1	1		1	1
De-aerating (100 %)	1	1		1	1
Reset volume counter	1	1	1	1	1
Set Real Time Clock	1	1	1	1	✓
Reset Statistics counters		1	1	1	
Reset service		1	1	1	1
Operation control					
Requested start	1	1	1	1	✓
Requested stop	1	1	1	1	1
Operating mode					
Manual	1	1	1	1	1
Manual setpoint	1	1	1	1	1
Pulse	1	1	1	1	1
Pulse volume	1	1	1	1	1
Pulse memory enable	1	1	1	1	1
Analog	1	1	1	1	1
Analog mode (0-20 mA, 4-20 mA)	1	1	1	1	1
Analog scaling		1	1	1	1
Timer	1	1	1		1
Timer mode (cycle, week)	1	1	1		1
Batch	1	1	1	1	1
Batch dosing volume	1	1	1	1	1
Batch dosing time	1	1	1	1	1
Batch priority (volume, time)		1	1	1	
Batch trigger		1	1	1	
Batch cycle time		1	1	1	
Batch week procedures	-	1	1	1	
Batch start delay		1	1	1	
Output signal control/setting		-			
Control output relay (On/off)	1	4)	1	1	1
Control analog output value	1	√ ⁵⁾	1	1	1
Relay function selection		1	1	1	1
Digital input (NO, NC)		1	1	1	1
Debounce of pulse input (enable, disable)		1	1	1	
HMI/Display/bus settings					
Key lock		1	1	1	1
Display settings		1	1	1	1

	Selectable from bus	Selectable from HMI/GO app	Preserved after power cycling	DDA Model C	DDA XL
Bluetooth (enable, disable)		1	1	1	
CIM 150 PROFIBUS address		1	1	1	1
RS485, AYB (GENIbus protocol settings)	1	1	1	1	
Ethernet (protocol settings) ⁶⁾		1	1	1	
Advanced functions					
Condition check		1	1	1	
Sensor calibration		1	1	1	1
Analog border input/output		√ 1)	1	1	
Analog calibration input/output		√ 1)	1	1	

1) It is only possible with the DDA model C and only from the GO app.

2) It is only possible with the DDA model C.

3) In Pulse or Batch mode, a pulse command from the bus can trigger dosing. In Batch mode on model C, only a batch can be triggered from the HMI.

4) It can be done by toggling the NO/NC setting via the HMI or the GO just for test purposes.

5) Only the pump flow, back pressure and analog input can be set.

6) It is for the built-in Ethernet port.

7.6 Status module (StatusModule, module 11)

This is a PROFIBUS/PROFINET input module used for the status of the DDA pump settings. Its data type is 10, non-standard. The actual status of all the pump modes and states are reflected, no matter if it is a result of a pump HMI setting, or a GO app setting, or a setting written from the PROFIBUS/PROFINET via the ControlModule (module 1).

	Actual mode/st	tate settings [bits]
	Bit	Name
	0	ActRemoteAccess
	1	ActDeaerating (100 %)
Byte 1 (data type 5)	2	ActAnalogMode
(data type o)	3	ActTimerMode
	4	ActSlowMode
	5	ActVelocity
	6-7	-
	Actual enable/	disable function [bits]
	Bit	Name
	0	ActAutoDeaeratingEnable
Byte 2	1	ActFlowControlEnable
(data type 5)	2	ActProfiWatchdogEnable
	3	ActAutoFlowAdaptEnable
	4	ActPulseMemoryEnable
	5-7	-
	Action comma	nd acknowledgement [bits]
	Bit	Name
	0	ResetFaultAck
Byte 3 (data type 5)	1	PulseAck
(ddid type o)	2	ResetVolumeCounterAck
	3	SetRTCAck
	4-7	-
	Miscellaneous	status [bits]
	Bit	Name
	0	Dosing (running)
(data type 5)	1	Warning
	2	Fault
	3	BusControlLocallyEnabled
	4-7	-

	ActualStartSt	op [enumeration]
	Value	Name
D / -	0	Started
Byte 5 (data type 5)	1	Stopped
(data type o)	2	Calibrating
	3	Service
	4-255	-
	ActualOperat	ingMode [enumeration]
	Value	Name
	0	Manual
D / A	1	Pulse
Byte 6 (data type 5)	2	Analog
(data type b)	3	Timer
	4	Batch
	5	Batch, HMI or GO app controlled
	6	6-255

7.6.1 Explanation of status bits

ActRemoteAccess

It is a status bit indicating whether the pump is in a state where it is controllable from the bus.

- The pump can only be controlled from its HMI or the GO app, and itsexternal signal inputs. In this state, all control bits are in the ControlModule and writing to any output module has no influence.
- In this state, the pump can be controlled by the bit settings in the ControlModule, as well as from the pump HMI or the GO app and
- external signal inputs, and the writing to the other output modules. To enter this state, the ControlModule bit 0 must be set and the pump must be started via the pump HMI or the GO app by pressing ▶/■.

ActDeaerating

It is a status bit indicating whether the pump is de-aerating.

0: The pump is not de-aerating.	
1: The pump is de-aerating.	

ActAnalogMode

It is a status bit indicating the selected type of the analog input signal.

0	: 0-	-20 r	mΑ
1	. 4	·20 r	πA

This is always the reading if the operating mode is not Analog.

ActTimerMode

It is a status bit indicating the selected timer mode.

0: Cy	cle timer mode
1: We	eek timer mode

ActSlowMode

It is a status bit indicating whether SlowMode has been enabled.

0.	SlowMode disabled:
0:	There is no slow-down of the suction stroke velocity.
	SlowMode enabled:

1: It slows down the suction stroke velocity to the velocity selected with the control bit Velocity.

Velocity

It is a status bit indicating the selected SlowMode suction stroke velocity.

0:	Selected SlowMode velocity 50 %:
	This is always the reading if SlowMode is disabled.
1:	Selected SlowMode velocity 25 %

ActAutoDeaeratingEnable

It is a status bit indicating whether automatic pump de-aeration is enabled.

ActFlowControlEnable	
automatic pump de-aeration is active.	1: Bus control has been en
The DigitalOutputs (module 34), bit 2, signals whenever the	Setting the RemoteAcce
Automatic pump de-aeration enabled:	0: app.
0: Automatic pump de-aeration disabled	_ The Bus control has not

It is a status bit indicating whether the FlowControl function is enabled.

0:	FlowControl function disabled
1:	FlowControl function enabled

ActProfiWatchdogEnable

It is a status bit indicating whether the PROFIBUS/PROFINET software watchdog is enabled.

0: PROFIBUS/PROFINET watchdog disabled

1: PROFIBUS/PROFINET watchdog enabled

See section PROFIBUS communication watchdog, CIM 150 or PROFINET communication watchdog, CIM 500 for a description of how to use the watchdog features.

ActAutoFlowAdaptEnable

It is a status bit indicating whether the AutoFlowAdapt function is enabled.

0:	AutoFlowAdapt function disabled:				
	This is always the reading if the FlowControl function is disabled.				
1:	AutoFlowAdapt function enabled				

ActPulseMemoryEnable

It is a status bit indicating whether the Pulse memory function is enabled.

0:	Pulse memory function disabled
1:	Pulse memory function enabled

Dosing (running)

It is a status bit indicating whether the DDA pump is dosing (running) at the moment.

0:	The pump is not dosing at the moment.
1:	The pump is dosing at the moment.

Warning

It is a warning status bit.

0:	No warning is present.
	A warning is present.
1:	The pump can, however, continue its precise dosing for the time being, but we recommend to have it serviced.

For further details about possible warnings and faults, as well as the pump behaviour in these situations, see section Alarms and warning.

Fault

It is a fault status bit. The pump stops dosing as long as the fault is present.

0: No fault is present.

1: A fault is present, and the pump remains stopped until the fault is corrected.

For further details about possible warnings and faults, as well as the pump behaviour in these situations, see section Alarms and warning.

BusControlLocallyEnabled

It is a status bit indicating whether Bus control has been enabled in the Settings menu on the pump HMI or the GO app.

The Bus control has not been enabled via the pump HMI or the GO $_{0:}\,$ app.

- Setting the RemoteAccess bit in the ControlModule has no effect.
- 1: Bus control has been enabled via the pump HMI or the GO app.

Related information

- 5.7.1 PROFIBUS communication watchdog, CIM 150
- 5.7.2 PROFINET communication watchdog, CIM 500
- 7.8 Alarms and warning

7.6.2 Explanation of command acknowledge bits

If the ActRemoteAccess bit is not set, PROFIBUS/PROFINET commands (and writings in general) will be prohibited and none of the acknowledge bits will ever be set. Command acknowledge bits can thus be used to check whether a command from ControlModule was sent or not.

ResetFaultAck

It is an acknowledge bit belonging to the ResetFault control bit. It is set when the control bit is set and the command is executed. It is cleared when the control bit is cleared.

PulseAck

It is an acknowledge bit belonging to the Pulse control bit. It is set when the control bit is set and the command is executed. It is cleared when the control bit is cleared.

ResetVolumeCounterAck

It is an acknowledge bit belonging to the ResetVolumeCounter control bit. It is set when the control bit is set and the command is executed. It is cleared when the control bit is cleared.

SetRTCAck

It is an acknowledge bit belonging to the SetRTC control bit. It is set when the control bit is set and the command is executed. It is cleared when the control bit is cleared.

Explanation of ActualStartStop

It is a status enumeration for reading whether the pump is started, stopped, calibrating or in service mode.

Value	Name
	Started
	This has the following meaning for the different operating modes:
	Manual:
	The pump doses according to the ActualSetpointManual (module 12).
	Analog:
	The pump doses according to the analog input signal and the analog scaling.
0	Pulse:
U	The pump doses according to the reception of pulses and the value of the ActualPulseVolume (module 13).
	Batch:
	The pump doses according to the reception of pulses and the values of the ActualBatchDosingVolume (module 14) and the ActualBatchDosingTime (module 15).
	Timer:
	The pumpdoses according to the timer functions using the batch dosing settings.
1	Stopped
	The pump is stopped by one of the control sources. The state of the control sources can be read from the ControlSourceStates (module 17).
	Calibrating
2	The pump is calibrating the dosing accuracy.
2	This is only possible via the pump HMI or the GO app by selecting Calibration in the Setup menu.
	Service
3	The pump stopped and has been brought into Service mode.
3	This is only possible via the pump HMI and can be done by pressing ▶/■ and 100% simultaneously.

7.6.3 Explanation of the ActualOperatingMode

It is the status enumeration for reading the actual operating mode. For an explanation of these modes and the belonging enumeration, see section Explanation of operating mode.

Related information

7.2.3 Explanation of operating mode

7.7 Measurement data modules

Module	Name	Data type
12	ActualSetpointManual	8
13	ActualPulseVolume	8
14	ActualBatchDosingVolume	8

12	ActualSetpointManual	8	l/h	It is the actual setpoint used in the operating mode Manual. It can be set via the SetpointManual (module 2) or via the pump HMI or the GO app.
13	ActualPulseVolume	8	I	It is the actual pulse volume used in the operating mode Pulse. It can be set via the SetPulseVolume (module 3) or via the pump HMI or the GO app.
14	ActualBatchDosingVolume	8	I	It is the actual batch dosing volume used in the operating mode Batch. It can be set via the SetBatchDosingVolume (module 4) or via the pump HMI or the GO app.
15	ActualBatchDosingTime	7	0.1 s	It is the actual batch dosing time used in the operating mode Batch. It can be set via the SetBatchDosingTime (module 5) or via the pump HMI or the GO app.
16	ActualPressureMax	8	bar	It is the actual value of the pressure alarm limit setting. It can be set via the SetPressureMax (module 6) or via the pump HMI or the GO app.
17	ControlSourceStates	5	Bits	It is the tatus of the start/stop control sources, 1 means Active. They can be active simultaneously. Bit 0: Stop via the pump HMI or the GO app Bit 1: External stop Bit 2: Stop from bus
18	FaultCode	5	Enum	
19	WarningCode	5	Enum	See section Status module (StatusModule, module 11).
20	WarningBits	6	Bits	
21	DateTime	10	BCD string	It is the present value of the internal real-time clock (RTC). It can be set via the SetDateTime (module 9) or via the pump HMI or the GO app. Byte 1: Year (from year 2000) Byte 2: Month [1-12] Byte 3: Day [1-31] Byte 4: Hour [0-23] Byte 5: Minute [0-59] Byte 6: Second [0-59]. Each byte is a binary-coded decimal (BCD) value. 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 .
22	DosingPressureMax	8	bar	It is the maximum dosing pressure, fixed factory-set value for this pump type.
23	DosingCapacityMax	8	l/h	It is the maximum dosing capacity, fixed factory-set value for this pump type.
24	DosingCapacityReference	8	l/h	It is the dosing capacity setpoint shown in the pump display. It represents the actual setpoint belonging to the actual operating mode and dosing state.
25	MeasuredDosingCapacity	8	l/h	It is the measured (actual) dosing capacity. The FlowControl bit in the ControlModule (module 1) must be enabled for this value to be available.
26	MeasuredPressure	8	bar	It is the measured pressure. The FlowControl bit in the ControlModule must be enabled. It corresponds to the Backpressure reading in the display.
27	PulseInputFrequency	8	Hz/min	It is the frequency of pulse input (external pulse input signal or PROFIBUS/PROFINET Pulse command in ControlModule).
28	RemainingDosingVolume	8	1	It is the actual remaining volume to be dosed. It is used in Batch mode.
29	VolumeTotal	8	I	It is the total volume dosed (non-resettable).
30	VolumeTripCounter	8	I	It is the dosed-volume trip counter (reset with ResetVolumeCounter command in ControlModule).
31	AnalogInput	8	A	It is the analog input signal 0-20 mA or 4-20 mA (used as setpoint in Analog mode).
32	AnalogOutput	8	A	It is the analog output signal. The parameter to map to the output is selected via the pump HMI or the GO app. If control from the PROFIBUS/PROFINET is selected, the analog output signal is controlled from the SetAnalogOutput (module 8).
33	DigitalInputs	5	Bits	It is the status of the external digital inputs: Logical "0": The input is not active. Logical "1": The input is active. The relay input type (NO or NC) is selected via the pump HMI or the GO app. Signals are fixed to the following: Bit 0: Low-level signal Bit 1: Empty signal Bit 2: External stop.

Unit

Description

Module	Name	Data type	Unit	Description
34	OutputRelays	5	Bits	It is the status of the two output relays: Logical "0": The output is not active. Logical "1": The output is active. The relay output type (NO or NC) is selected via the pump HMI or the GO app. The output relay modules are defined as follows: Bit 0: Relay 1 (select signal parameter via the pump HMI or the GO app) Bit 1: Relay 2 (select signal parameter via the pump HMI or the GO app) Bit 2: Auto-de-aerating (de-aerating valve open) . If Bus control is selected as the relay signal parameter, the relay can be controlled from the SetOutputRelays (module 7).
35	NumberOfPowerOns	6	-	It counts the number of times the pump is powered on (non-resettable).
36	RunTime	7	s	It counts the time the DDA pump is dosing (non-resettable).
37	OperatingHours	7	s	It counts the number of hours the DDA pump is switched on. It counts both when the pump is dosing and when it is not dosing.
38	StrokeCounter	7	-	It counts the number of strokes (non-resettable).
39	TimeToNextDosing	7	s	It is the time before the next dosing takes place (only in timer mode).

Related information

7.6 Status module (StatusModule, module 11)

English (GB)

7.8 Alarms and warning

Module	Name	Data type	Description
19 FoultCodo		F	It is the code for active pump alarm.
10	FaultCode	5	See the event code in the table below.
10	WarningCode	F	It is the code for the first active pump warning.
19	WarningCode	5	See the event code in the table below.
			It shows all active warnings.
			The belonging event code is shown in parenthesis.
			Byte 1
			Bit 0: Backpressure low (211) 7)
			Bit 1: Gas in pump head (35) ⁷⁾
			Bit 2: Cavitation (208) ⁷⁾
			Bit 3: Discharge valve leakage (36) ⁷⁾
			Bit 4: Suction valve leakage (37) ⁷⁾
			Bit 5: reserved
20	WarningBits	6	Bit 6: Service now (12)
20		0	Bit 7: Service soon (33)
			Byte 2
			Bit 0: Low level in tank (206)
			Bit 1: reserved
			Bit 2: Bit 2: FlowControl cable defect (169) ⁷⁾
			Bit 3: Real Time Clock out of order / Battery low (157)
			Bit 4: reserved
			Bit 5: Flow deviation / pumping capacity too low (17) ⁷⁾
			Bit 6: reserved
			Bit 7: reserved

7) It requires the FlowControlEnable bit in the ControlModule to be set.

In case of a pump alarm or pump warning, the modules WarningCode and FaultCode contain an event code for the cause of the problem. The complete list of possible alarm or warning codes from a DDA pump is shown in the table below.

Alarm events make the pump stop. Some of them require acknowledgement of the alarm before the pump can be restarted. This acknowledgement can come from the pump HMI or the GO app or the PROFIBUS/PROFINET by using the ResetFault command. The pump can only indicate one active alarm at a time, whereas there can be many simultaneously active warnings. The complete status of warnings can be read from the WarningBits module.

Event code	Event group	Event description	Depends on FlowControl enabled	Event action	Auto- acknowledge
210	Pump head	Maximum pressure limit exceeded, ActualPressureMax (module 16)	Yes	Alarm	Yes
211	Pump head	Backpressure too low Fixed low-pressure limit (1.5 bar)	Yes	⁸⁾ Alarm/ Warning	Yes
35	Pump head	Air bubbles, gas in pump head, de-aerating problem	Yes	Warning	Yes
208	Pump head	Cavitation	Yes	Warning	Yes
36	Pump head	Discharge (pressure) valve leakage	Yes	Warning	Yes
37	Pump head	Suction valve leakage	Yes	Warning	Yes
12	Pump head	Service now (time for service exceeded)	No	Warning	No
33	Pump head	Soon time for service (general service information)	No	Warning	No
17	Pump head	Flow deviation (performance requirement not met)	Yes	Warning	Yes
51	Pump head	Blocked motor/pump	No	Alarm	Yes
206	Tank	Low level in tank	No	Warning	Yes
57	Tank	Empty tank (dry running)	No	Alarm	Yes
169	Input signals	Cable breakdown on FlowControl	Yes	Warning	Yes
15	Communication	PROFIBUS/PROFINET communication fault (main network communication fault)	No	⁹⁾ Alarm	No
159	Communication	CIU communication fault (GENIbus communication fault), defective cable between the CIU 900 and the DDA pump	No	Alarm ⁹⁾	No
64	Motor head	The motor head is over heated	No	Alarm	Yes
157	RTC battery	Real Time Clock is out of order / low battery	No	Warning	Yes
165	Input signal	Setpoint signal fault, Analog input current above 21 mA	No	Alarm	Yes
97	Input signal	Setpoint signal fault, Analog input current below 2 mA	No	Alarm	Yes
247	Supply	Pump powered on	No	Alarm ¹⁰⁾	No

8) A warning or alarm is selected in the Settings menu via the pump HMI or the GO app.

9) An alarm only occurs when the ActProfiWatchdogEnable bit has been set and the control from the bus/cloud is enabled in DDA Settings > Communication menu

10) Occurs only if pump has been configured to be stopped after power on.

Related information

7.2.1 Explanation of control bits in ControlModule 7.6.1 Explanation of status bits

7.9 Device identification (DeviceIdentification, module 40)

The data type is 10, non-standard.

Byte	Name/description		
	UnitFamily [enumeration]	UnitType [enumeration]	
		1: Smart Digital Dosing, DDA	
1	1 30: Smart Digital Dosing, DDA	2: -	
		3: Smart Digital Dosing, DDA XL	
		4: Smart Digital Dosing, DDA-C	
2	UnitType [enumeration]		
Z	According to description above.		
3	UnitVersion [enumeration]		
5	Used by Grundfos.		
4	CIMSoftwareVersion [number]		
5	CIMSoftwareRevision [number]		
6	CIMModel [enumeration]		

8. Product simulation

The CIM can be put in product simulation mode in which case it generates life-like simulated values of all the PROFIBUS/ PROFINET input data modules.

Thus it is possible to connect a PROFIBUS/PROFINET master to a CIU 150 or 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 received and handled correctly by the PROFIBUS/PROFINET master application program, for example PLC program, before the equipment is installed under real-life conditions.

8.1 CIM 150 product simulation

Product simulation mode can be accessed when the hexadecimal address switch has one of the values shown in the table below.

Address setting		Simulated product	
SW3	SW4	— Simulated product	
F	0	Pump profile	
F	1	Booster system profile	
F	2	CR Monitor profile	
F	3	MP 204 motor protector profile	
F	4	Digital Dosing DDA profile	
F	5	Wastewater system profile	

The effective address is 15 (0x0F).

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

Related information

5.4 Setting the PROFIBUS address

8.2 CIM 500 product simulation

Product simulation mode can be accessed via the webserver.

9. Fault finding

9.1 CIM 150

You can detect faults in a CIM 150 PROFIBUS module by observing the status of the two communication LEDs.

9.1.1 LED status

9.1.1.1 Both LEDs (LED1 and LED2) remain off when the power supply is connected

Cause	Remedy
The CIM is fitted incorrectly in the Grundfos product.	Check if the CIM is fitted correctly in the Grundfos product.
The CIM is defective.	Replace the CIM.
9.1.1.2 LED2 for internal communication is flashing red	
Cause	Remedy
There is no internal communication between the CIM and the Grundfos product.	Check if the CIM is fitted correctly in the Grundfos product.
9.1.1.3 LED2 for internal communication is permanently red	
Cause	Remedy
The CIM does not support the dosing pump connected.	Contact the nearest Grundfos company.
9.1.1.4 PROFIBUS LED1 is permanently red	
Cause	Remedy
There is a fault in the CIM.	Contact the nearest Grundfos company.
9.1.1.5 PROFIBUS LED1 is flashing red	
Cause	Remedy
There is a fault in the CIM 150 PROFIBUS configuration.	 Make sure in the DDA settings menu that the PROFIBUS address has a valid value [1-125].
	Make sure the GSD file used is correct.
	Make sure the PROFIBUS cable has been fitted correctly.
	 Make suer the PROFIBUS termination is correct.

9.2 CIM 500

You can detect faults in the CIM 500 by observing the status of the two communication LEDs.

9.2.1 LED status

9.2.1.1 Both LEDs (LED1 and LED2) remain off when the power supply is connected

Cause	Remedy
The CIM is fitted incorrectly in the Grundfos product.	Check if the CIM is fitted correctly in the Grundfos product.
The CIM is defective.	Replace the CIM.
9.2.1.2 PROFINET IO LED1 remains off	
Cause	Remedy
The protocol selection switch (SW1) is set in the Modbus TCP position.	• Set the switch to 0.
9.2.1.3 LED2 for internal communication is flashing red	
Cause	Remedy
There is no internal communication between the CIM and the Grundfos product.	Check if the CIM is fitted correctly in the Grundfos product.
9.2.1.4 LED2 for internal communication is permanently red	
Cause	Remedy
The CIM does not support the dosing pump connected.	Contact the nearest Grundfos company.
9.2.1.5 PROFINET IO LED1 is permanently red	
Cause	Remedy
The connected Grundfos product is not supported.	Contact the nearest Grundfos company.

Cause	Remedy
The protocol switch (SW1) is in an illegal position.	Make sure the rotary switch SW1 is set to 0.
9.2.1.6 PROFINET IO LED1 is flashing red	
Cause	Remedy
There is a fault in the CIM 500 PROFINET IO configuration.	Make sure the right GSDML file is used.
	Make sure the PROFINET IO IP address configuration is correct.
	 Make sure the device name is in the CIM 500 and PROFINET IO master.
9.2.1.7 PROFINET IO LED1 is pulsing red	
Cause	Remedy
The connection with the master is lost.	Check the cables.
	Make sure the master is running.
9.2.1.8 LED1 is permanently red and green at the same time	
Cause	Remedy
There is an error in the firmware download.	Use the webserver to download the firmware again.
9.2.1.9 LED2 is permanently red and green at the same time	
Cause	Remedy
There is a memory fault.	Replace the CIM.

10. PROFIBUS address

This is the decimal to hexadecimal conversion table for setting the PROFIBUS address switches.

PROFIBUS address	SW3	SW4	PROFIBUS address	SW3	SW4	PROFIBUS address	SW3	SW4
1	0	1	46	2	E	91	5	В
2	0	2	47	2	F	92	5	С
3	0	3	48	3	0	93	5	D
4	0	4	49	3	1	94	5	E
5	0	5	50	3	2	95	5	F
6	0	6	51	3	3	96	6	0
7	0	7	52	3	4	97	6	1
8	0	8	53	3	5	98	6	2
9	0	9	54	3	6	99	6	3
10	0	A	55	3	7	100	6	4
11	0	В	56	3	8	101	6	5
12	0	С	57	3	9	102	6	6
13	0	D	58	3	A	103	6	7
14	0	E	59	3	В	104	6	8
15	0	F	60	3	С	105	6	9
16	1	0	61	3	D	106	6	A
17	1	1	62	3	E	107	6	В
18	1	2	63	3	F	108	6	С
19	1	3	64	4	0	109	6	D
20	1	4	65	4	1	110	6	E
21	1	5	66	4	2	111	6	F
22	1	6	67	4	3	112	7	0
23	1	7	68	4	4	113	7	1
24	1	8	69	4	5	114	7	2
25	1	9	70	4	6	115	7	3
26	1	A	71	4	7	116	7	4
27	1	В	72	4	8	117	7	5
28	1	С	73	4	9	118	7	6
29	1	D	74	4	A	119	7	7
30	1	E	75	4	В	120	7	8
31	1	F	76	4	С	121	7	9
32	2	0	77	4	D	122	7	A
33	2	1	78	4	E	123	7	В
34	2	2	79	4	F	124	7	С
35	2	3	80	5	0	125	7	D
36	2	4	81	5	1	126	7	E
37	2	5	82	5	2			
38	2	6	83	5	3			
39	2	7	84	5	4			
40	2	8	85	5	5			
41	2	9	86	5	6			
42	2	A	87	5	7			
43	2	В	88	5	8			
44	2	С	89	5	9			
45	2	D	90	5	A			

Related information

5.4 Setting the PROFIBUS address

A.1. How to configure an IP address on your PC using Windows 11

Make sure that you have the necessary administrator rights.

- 1. Go to Ethernet settings (for example, use the Windows "Search" function).
- 2. Select the drop-down menu for the Ethernet port in question.
- 3. Select Edit at the IP assignment.
- 4. Fill in the settings as below. Note that all addresses belong to the CIM 500 subnetwork 192.168.1.x. but are unique (gateway and DNS can be identical).

Edit IP settings	
Manual	
IPv4	
On On	
IP address	
192.168.1.10	
Subnet mask	
255.255.255.0	
Gateway	
192.168.1.1	
Preferred DNS	
192.168.1.1	
DNS over HTTPS	
Off	~
Alternate DNS	
DNS over HTTPS	
Off	~
IPv6 off	
Save	Cancel

Example from Windows 11

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A.2. Webserver configuration

The built-in webserver is an easy and effective way to monitor the status of the CIM 500 and configure the available functions and industrial Ethernet protocols. The webserver also makes it possible to update the firmware of the CIM 500, and store or restore settings. To establish a connection from a PC to the CIM 500, proceed as follows:

Before configuration

- Make sure that the PC and the CIM 500 are connected via an Ethernet cable.
- Make sure that the PC Ethernet port is set to the same network as the CIM 500. For network configuration, see section How to configure an IP address on your PC.
- To establish a connection from a PC to the CIM 500 for the first time, the following steps are required:
- 1. Open a standard internet browser and type 192.168.1.100 in the URL address field.
- 2. Log in to the webserver.

A.3. Login

grundfos [.] X	Grundfos CIM 500 Industrial Ethernet - Modbus	тср
Information System Version Licence Login Contact	Login Username: admin Password:	
Login		

TM056063_4412_GRAY

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

- The user name and password can be changed on the web server under Grundfos Management.

Related information

A.5. User Management

A.4. PROFINET IO configuration

This web page is used for configuring all the parameters relevant to the PROFINET IO protocol standard.

GRUNDFOS [®]	Real Time Eth	nernet Protocol Configuration - PROFINET IO
Version	Protocol Setting	gs
Configuration	Device Name:	
Real Time Ethernet Protocol	IP Address: Subnet Mask:	0.0.0.0
Network Settings User Management	Gateway:	0.0.0.0
Service Info Contact	Product Simula Grundfos product Submit	tion simulation: No Simulation
	Restart	
	Press the button to	o Restart the system: RESTART

RealTime Ethernet Protocol Configuration - PROFINET IO

Object	Description
	Fill in a device name according to the PROFINET rules:
	It must consists of one or more labels separated by a dot.
Device Name	The total length must be 1 to 240 characters.
Device Marine	The length of a label must be 1 to 63 characters.
	Labels must only consist of lower case characters, digits and "-".
	The first and the last character of a label must not be "-".
IP Address	This field is read-only. The IP address is assigned from the PLC. The PROFINET IO is not allowed to share the IP address with a CIM 500 webserver.
Subnet Mask	This field is read-only. The subnet mask is assigned from the PLC.
Gateway	This field is read-only. The gateway address is assigned from the PLC.
Grundfos product simulation	The module can be put in product simulation mode to generate realistic simulated values of all the PROFINET IO input data. It is thus possible to connect a PROFINET IO master to a module fitted in a CIU 900 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 PROFINET IO 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.
Restart	Press the restart button if the LED1 flashes red, indicating a wrong or missing PROFINET IO configuration.

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A.5. User Management

A login is required for any change in the CIM 500 settings, and this web page is used for configuring the username and password.





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User management

Related information

A.3. Login

A.6. Update

You can update the firmware by 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.

If you experience problems with logging in to the webserver after a firmware update, perform a factory reset.

Information	Update	
System Version	Firmware	
Licence	This updates the software of the CIM 500 module.	
Configuration	Firmware:	Browse
Real Time Ethernet Protocol		
Network Settings	Update	
GENIPRO I CP Protocol		
Firmware Update / Restart	Configuration	
Logout	I his downloads/uploads the configuration of the CIM 500 module.	
	File:	Browse
Service Info		
Contact	Download to module Upload from device	
	Restart	
	By pressing this button, the CIM 500 module will make a power reset	
	Restart module	

Update

Object	Description
Firmware	It is the path to the 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	It is the 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 makes a power-up reset.

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