

PROFIBUS and PROFINET for Grundfos MP 204

Installation and operating instructions



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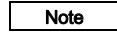
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1. Symbols used in this document**Warning**

If these safety instructions are not observed, it may result in personal injury.



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



Notes or instructions that make the job easier and ensure safe operation.

2. Introduction

2.1 About this functional profile

This functional profile describes these protocols for the Grundfos MP 204 motor protector:

- CIU 150 PROFIBUS DP
- CIU 500 PROFINET IO.

The data in this document are subject to change without prior notice. 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 commissioning and programming of PROFIBUS and PROFINET devices.

2.5 Definitions and abbreviations

ARP	Address Resolution Protocol. Translates IP addresses into MAC addresses
Auto-MDIX	Ensures that both crossover cable types and non-crossover cable types can be used.
CAT5	Ethernet cable type with four twisted pairs of wires.
CAT5e	Enhanced CAT5 cable with better performance
CAT6	Cable with very high performance.
CIM	Communication Interface Module
CIU	Communication Interface Unit
CRC	Cyclic Redundancy Check. A data error detection method.
DHCP	Dynamic Host Configuration Protocol. Used to configure network devices so that they can communicate on an IP network.
DNS	Domain Name System. Used to resolve host names to IP addresses.
Enumeration	List of values
GENibus	Proprietary Grundfos fieldbus standard
GENIpro	Proprietary Grundfos fieldbus protocol
Grundfos GO	A Grundfos handheld remote control device for controlling Grundfos products via infrared or radio. Based on smart phone technology.
H	Head (pressure)
HTTP	Hyper Text Transfer Protocol. The protocol commonly used to navigate the world wide web.
IANA	Internet Assigned Numbers Authority
IP	Internet Protocol
LED	Light-Emitting Diode
Local mode	The Grundfos product uses the setpoint and operating mode set with a handheld remote control (R100 or Grundfos GO Remote) or by the use of buttons on the pump.

MAC	Media Access Control. Unique network address for a piece of hardware.
MP 204	Grundfos Motor Protector
Ping	Packet InterNet Groper. A software utility that tests the connectivity between two TCP/IP hosts.
Q	Flow rate
R100	Grundfos handheld infrared remote control
Remote mode	The Grundfos product uses the setpoint and operating mode set from PROFIBUS.
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
SNTP	Simple Network Time Protocol. Used for clocks synchronization between computer systems.
TCP	Transmission Control Protocol. Protocol for Internet communication and Industrial Ethernet communication.
TCP/IP	Transmission Control Protocol/Internet Protocol. Protocol for Internet communication.
Transmission speed	Bits transferred per second, bits/s
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.
UTF-8	Unicode Transformation Format. Character encoding.

3. System description

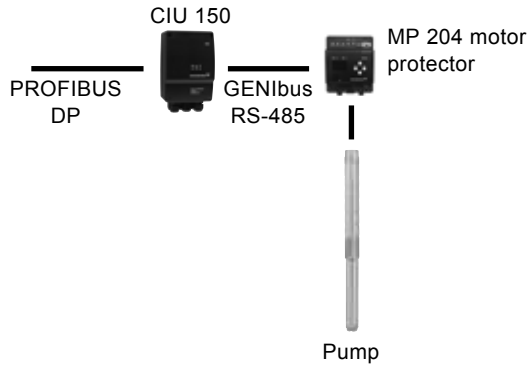
The system diagrams give an overview of how to connect the CIU 150 or CIU 500 to the Grundfos MP 204 that is to be connected to a PROFIBUS or PROFINET network.

CIU

The CIU unit is a box incorporating a power supply module and a CIM 150/500 module. It can either be mounted on a DIN rail or on a wall. See fig. 1 and fig. 2. The enclosure class is IP54.

3.1 PROFIBUS DP (CIU 150)

The CIU 150 offers a PROFIBUS DP connection to the MP 204.

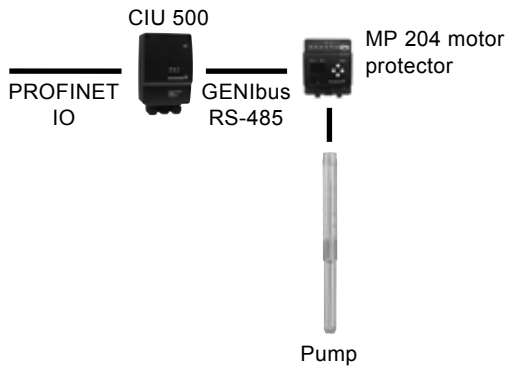


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Fig. 1 Grundfos SP pump connected to an MP 204 which is then connected to PROFIBUS DP via a CIU 150

3.2 PROFINET IO (CIU 500)

The CIU 500 offers a PROFINET IO connection to the MP 204.



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Fig. 2 Grundfos SP pump connected to an MP 204 which is then connected to PROFINET IO via a CIU 500

4. Specifications

4.1 CIU unit

General data	Description	Comments
Ambient humidity	30-95 %	Relative, non-condensing.
Operating temperature	-20 °C to +45 °C	
Storage temperature	-25 °C to +70 °C	
GENIbus visual diagnostics	LED2	Will be in one of these states: Off, constantly green, flashing red, constantly red. See section 5.6 Status LEDs for PROFIBUS DP and section 6.5 Status LEDs for PROFINET IO.
Power supply (CIU)	24-240 V	Located in the CIU.
GENIbus connection type (CIU)	RS-485, 3-wire + screen	Conductors: A, B and Y.
CIU box enclosure class	IP54	
CIU box dimensions (H x W x D)	182 x 108 x 82 mm	

4.2 CIM 150 PROFIBUS DP

The table below provides an overview of the specifications for the Grundfos CIM 150 and CIU 150. For further details, please 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	Corresponds to 328 feet. See section 5.3.1 Data transmission rates and cable length .
Slave address	1-126	Set via rotary switches SW3 and SW4. See section 5.4 Setting the PROFIBUS address .
Line termination	On or off	Set via DIP switches SW1 and SW2. See section 5.5 Termination resistors . Auto detected
Recommended cable cross-section	0.20 - 0.25 mm ²	AWG24 or AWG23
Supported transmission speed	9.6 Kbits/s to 12 Mbits/s	Auto detected.
PROFIBUS visual diagnostics	LED1	Off, constantly green, flashing red, constantly red. See section 5.6 Status LEDs .
Maximum number of PROFIBUS devices at a physical network segment	32	Up to 125 devices if repeaters are used (physically segmented network).

4.3 CIM 500 PROFINET IO

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

PROFINET IO specifications	Description	Comments
Application layer	DHCP, HTTP, Ping, FTP, SMTP, SNTP, PROFINET IO	Rotary switch in position 0.
Transport layer	TCP	
Internet layer	Internet protocol V4 (IPv4)	
Link layer	ARP, Media Access Control (Ethernet)	
Ethernet cable	Screened/unscreened, twisted-pair cables, 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 protocols	PROFINET IO, Modbus TCP	Selected with rotary switch, section 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 fig. 3. 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 by using a repeater another 32 devices can be connected. This can be repeated until the maximum number of addresses are used. Make sure that each device is connected to a proper earth potential.

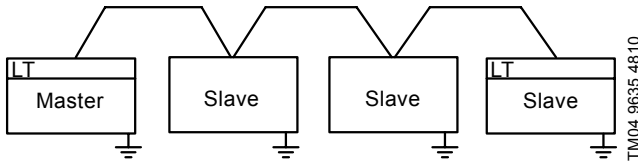


Fig. 3 Example of PROFIBUS bus segment with line termination

5.2 CIM 150 PROFIBUS module

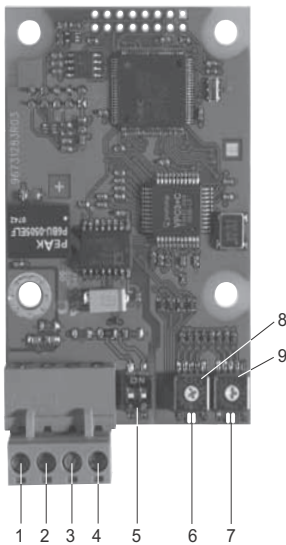


Fig. 4 CIM 150 PROFIBUS module

Pos.	Designation	Description
1	B (Rx/D/TxD-P)	PROFIBUS terminal B (positive data signal)
2	A (Rx/D/TxD-N)	PROFIBUS terminal A (negative data signal)
3	DGND	PROFIBUS terminal DGND (only for external termination)
4	VP	+5 VDC (only for external termination)
5	SW1/SW2	On/off switches for termination resistors
6	LED1	Red/green status LED for PROFIBUS communication
7	LED2	Red/green status LED for GENIbus communication between the CIU 150 and the Grundfos product
8	SW3	Hex switch for setting the PROFIBUS address (four most significant bits)
9	SW4	Hex switch for setting the PROFIBUS address (four least significant bits)

Note The power supply (pos. 4, fig. 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 IEC 61158.

Example

Siemens, 6XV1 830-0EH10.

kbits/s	Maximum cable length
	[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

See fig. 5.

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).

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

Note

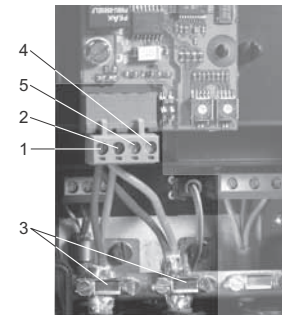


Fig. 5 Connecting the PROFIBUS

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

5.4 Setting the PROFIBUS address

The CIM 150 PROFIBUS module has two hexadecimal rotary switches for setting the PROFIBUS address. The two switches are used for setting the four most significant bits (SW3) and the four least significant bits (SW4), respectively. See fig. 6.



Fig. 6 Setting the PROFIBUS address

The table below shows examples of PROFIBUS address settings.

Note *The PROFIBUS address must be set decimally from 1 to 126. The address 126 is normally used for special purposes and should not be used.*

PROFIBUS address	SW3	SW4
8	0	8
20	1	4
31	1	F
126	7	E

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

For complete overview of the PROFIBUS addresses, see section 11. [PROFIBUS address](#).

5.5 Termination resistors

The termination resistors are fitted on the CIM 150 PROFIBUS module. See fig. 7.

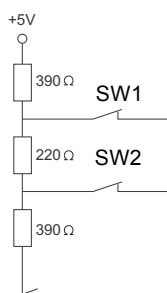


Fig. 7 Internal termination resistors

The CIM 150 has a DIP switch with two switches (SW1 and SW2) for cutting the termination resistors in and out. Figure 8 shows the DIP switches in cut-out state.

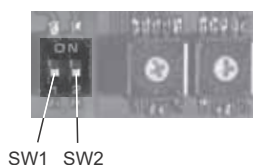


Fig. 8 Cutting termination resistors in and out

DIP switch settings

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

Note *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. See fig. 4.

- Red/green status LED (LED1) for PROFIBUS communication.
- Red/green status LED (LED2) for GENIbus communication between the CIU 150 and the connected Grundfos product.

LED1

Status	Description
Off.	The CIM 150 has been switched off.
Constantly green.	The CIM 150 is ready for PROFIBUS data transmission (Data Exchange State).
Constantly red.	CIM 150 module fault. The CIM 150 does not support the connected Grundfos product.
Flashing red.	Wrong or missing PROFIBUS configuration or no contact to the PROFIBUS master.

LED2

Status	Description
Off.	The CIM 150 is switched off.
Constantly green.	GENIbus communication between the CIM 150 and the Grundfos product is OK.
Constantly red.	The CIM 150 does not support the connected Grundfos product.
Flashing red.	No GENIbus communication between the CIM 150 and the Grundfos product.

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

5.7 Communication watchdog

The state of the PROFIBUS communication watchdog can be changed with a PROFIBUS commissioning tool, e.g. Siemens Simatic Manager. If the watchdog is enabled, all bits in the ControlModule (see section 7.2) are automatically set to "0" if the PROFIBUS communication is broken.

As a result, the Grundfos product will be set to local mode and then be operating according to the local operating mode, local setpoint and local control mode.

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 will be cleared, and the Grundfos product will be set to local mode and then be operating according to the local operating mode, local setpoint and local control mode.

6. PROFINET IO, CIM 500 setup

6.1 Connecting the Ethernet cable



Warning

The CIM 500 must only be connected to SELV or SELV-E circuits.

RJ45 plugs and Ethernet cable must be used. The cable shield must be connected to protective earth at both ends.

Note

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

The 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.

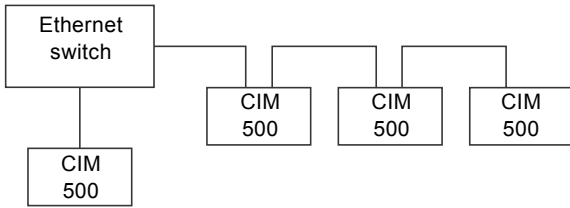


Fig. 9 Example of Industrial Ethernet network

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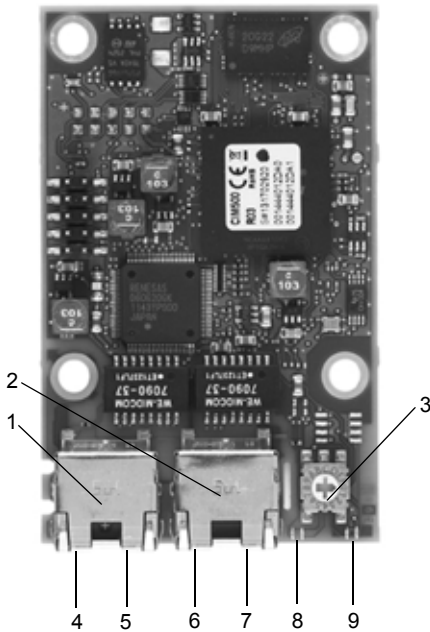


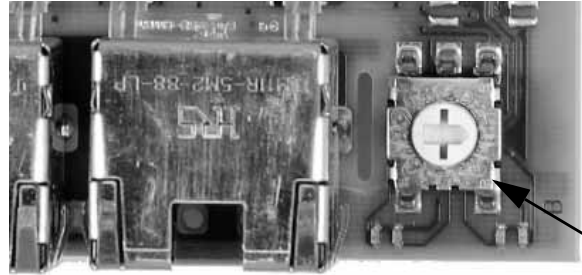
Fig. 10 Example of Ethernet connection (CIM 500)

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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/red status LED for Ethernet communication	LED1
9	Green/red status LED for internal communication between module and pump.	LED2

6.2 Setting the Industrial Ethernet protocol

The CIM 500 Ethernet module has a rotary switch for selection of the Industrial Ethernet protocol. See fig. 11.



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Fig. 11 Selecting the Industrial Ethernet protocol

Pos.	Description
0	PROFINET IO (default from factory)
1	Modbus TCP
2..E	Reserved, LED1 will be permanently red to indicate an invalid configuration
F	Reset to factory default Note: The rotary switch has to be set in this position for 20 seconds before the CIM 500 resets to factory default. During this period LED1 will be flashing red and green at the same time to indicate that a reset will occur.

Note

Every change of the rotary switch, when the module is powered on, will cause the module to restart.

6.3 Setting up the IP addresses

The CIM 500 Ethernet module is default set up to a fixed IP address. It is possible to change the IP address settings from the built in web server.

Default IP settings used by web server	IP address: 192.168.1.100 Subnet mask: 255.255.255.0 Gateway: 192.168.1.1
IP settings for Modbus TCP	Must be set up by the Web server
Device name and IP settings for PROFINET IO	Static configuration from Web server or configuration from PROFINET IO configuration tool.

6.4 Establish connection to the Webserver

The CIM 500 module can be configured using the built-in Web server. To establish a connection from a PC to CIM 500 the following steps are required:

- Connect the PC and the CIM 500 module using an Ethernet cable
- Configure the PC Ethernet port to the same subnetwork as the CIM 500, e.g. 192.168.1.101, and the subnet mask to 255.255.255.0. See section [A.2 Web server configuration](#) on page 23.
- Open a standard Internet browser and type 192.168.1.100 in the URL field.
- Log in to the Web server using:

User	admin (default)
Password	Grundfos (default)

Note *User and password may have been changed from their factory default values.*



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Fig. 12 CIM 500 connected to PC

Note *Both ETH1 and ETH2 can be used to establish a connection to the Web server.*

Note *The web server can be accessed while the selected Industrial Ethernet protocol is active.*

6.5 Status LEDs

The CIM 500 Ethernet module has two Status LEDs, (LED1 and LED2).

See fig. 10.

- Red/green status LED (LED1) for Ethernet communication
- Red/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. LED will flash 10 times when activated from master.
Permanently green	The CIM 500 is ready for data transmission (data exchange state).
Flashing red (3 Hz, duty cycle 50 %)	Wrong or missing PROFINET IO configuration. See section 9.2.1 LED status .
Pulsing red (0.3 Hz, duty cycle 10 %)	Configured, but connection to master lost. See section 9.2.1 LED status .
Permanently red	Product not supported. See section 9.2.1 LED status .
Permanently red and green	Error in firmware download. See section 9.2.1 LED status .
Flashing red and green	After 20 seconds in this state, the CIM 500 factory settings are restored and the device is restarted.

LED2

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

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

6.6 DATA and LINK LEDs

The CIM 500 Ethernet module has two connectivity LEDs related to each RJ45 connector. See fig. 10.

DATA1 and DATA2

These yellow LEDs indicate data traffic activity.

Status	Description
Yellow off	No data communication on RJ45 connector.
Yellow flashing	Data communication ongoing on RJ45 connector.
Steady yellow	Heavy network traffic on RJ45 connector.

LINK1 and LINK2

These green LEDs shows whether the ethernet cable is properly connected.

Status	Description
Green off	No Ethernet Link on RJ45 connector
Green on	Ethernet Link on RJ45 connector is OK

7. Detailed description of data modules

7.1 Data types

The Grundfos CIM 150/500 supports the following data types. All data types, except for data type 10, comply with specification IEC 61158-6 standard data types for use in 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.

7.2 Control module (ControlModule, module 1)

The control module is a PROFIBUS/PROFINET output module used for the control of the MP 204. Its data type is 10, non-standard.

Byte	Bit	Name	Event trigger
1	0	ResetAlarm	Rising edge
	1	TestTrip	Rising edge
	2	ResetStartCounter	Rising edge
	3	ResetRestartCounter	Rising edge
	4	ResetOprTimeCounter	Rising edge
	5	ResetEnergyCounter	Rising edge
	6	ResetLogs	Rising edge
	7	-	-
	0	OnOff	State
	1-7	-	-

7.2.1 Explanation to event trigger

Rising edge

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

State

Control bits with a state event trigger behave like a "state" that is forced upon the MP 204. In the CIU 150, the "actual state" of the MP 204 as read from the StatusModule is continuously compared with the "requested" state in the ControlModule, and the CIU 150 writes the appropriate GENIbus command to the MP 204 to make the two states correspond to each other. Due to state restrictions or priorities, this might not always be possible (see explanation to the bit in question).

7.2.2 Explanation to control bits

ResetAlarm

Control bit that resets alarms and warnings. If the motor is not in operating mode "Started" and if no alarm conditions preventing starting are present, the MP 204 will restart the motor and reset a pending alarm indication, if any:

- Closes relay 1 (motor control relay) and opens relay 2 (signal relay).
- Updates the operating mode to "Started".
- The red "Trip" indicator light on the MP 204 is switched off (follows relay 2).

If an alarm condition is present, the operating mode "MotorProtectingTrip" will result (remain) instead.

This control bit has the same function as the [R] button on the MP 204.

TestTrip

Control bit that has the same function as the [T] button on the MP 204.

- Opens relay 1 (motor control relay) and closes relay 2 (signal relay).
- Updates the operating mode to "TestTrip".
- The red "Trip" indicator light on the MP 204 is switched on (follows relay 2).
- The MP 204 display shows "A18" (TestTrip alarm).

ResetStartCounter

Control bit that resets the NumberOfStartsTripCnt (module 41).

ResetRestartCounter

Control bit that resets the AutorRestartsTripCnt (module 42).

ResetOprTimeCounter

Control bit that resets the operatingTimeTripCnt (module 39).

ResetEnergyCounter

Control bit that resets the EnergyTripCnt (module 36).

ResetLogs

Control bit that resets all maximum/minimum logs:

- LineVoltageMaxLog (module 45)
- LineVoltageMinLog (module 46)
- LineCurrentMaxLog (module 47)
- LineCurrentMinLog (module 48)
- StartsPerHourMaxLog (module 49).

OnOff

Control bit that switches the motor on and off.

With this bit the MP 204 operating mode can be switched between "Started (On)" and "ActuatorStop (Off)".

If the MP 204 operating mode is "MotorProtectionTrip" or "TestTrip", the OnOff control bit has no effect.

0: Actuator stop, motor switched off.

1: Start, motor switched on.

7.3 Status module (StatusModule, module 4)

The status module is a PROFIBUS/PROFINET input module used for reading status from the MP 204. Its data type is 10, non-standard.

Byte	Bit	Name
1	0	ResetAlarmAck
	1	TestTripAck
	2	ResetStartCounterAck
	3	ResetRestartCounterAck
	4	ResetOprTimeCounterAck
	5	ResetEnergyCounterAck
	6	ResetLogsAck
	7	-
2	0	Rotation
	1	ProtectionEnabled
	2	Ready
	3	Alarm
	4	PTCInput
	5	PhaseSequence
3	6-7	-
		OperatingMode [enumeration] 0: Started (On) 1: MotorProtectionTrip 2: TestTrip 3: ActuatorStop (Off)
4		SystemMode [enumeration] 0: PowerUp 1: Operating 2: MP204Fault

7.3.1 Explanation to status bits

ResetAlarmAck

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

TestTripAck

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

ResetStartCounterAck

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

ResetRestartCounterAck

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

ResetOprTimeCounterAck

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

ResetEnergyCounterAck

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

ResetLogsAck

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

Rotation

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

0: No rotation.

1: Rotation.

ProtectionEnabled

Status bit indicating whether the general protection function of the MP 204 is enabled (the MP 204 operates as a motor protector) or disabled (the MP 204 just operates as a monitor and start/stop actuator).

0: Protection disabled.

1: Protection enabled.

Ready

Status bit indicating that the MP 204 is started or ready to be started. During a test trip, the MP 204 will still be ready.

0: Not ready.

1: Ready.

Alarm

Status bit indicating that the motor has been switched off due to an alarm (operating mode equals "TestTrip" or "MotorProtectionTrip").

0: No alarm.

1: Alarm.

PTCInput

Status bit indicating the status of the PTC signal.

0: Closed.

1: Open (high-temperature alarm).

PhaseSequence

Status bit indicating the actual phase sequence.

-
- 0: Phase sequence is right: L1-L2-L3.
 - 1: Phase sequence is left: L3-L2-L1.
-

OperatingMode

Status enumeration showing the MP 204 operating mode.

-
- Started (On)
This is the normal mode when the motor is running without alarms (warnings may be present).
 - 0: The R1 motor relay is closed, the R2 alarm relay is open and the red "Trip" indicator light on the MP 204 is off.
-
- MotorProtectionTrip
The MP 204 has detected an alarm condition and has switched the motor off. Data module AlarmCode will contain the related code for the alarm condition. This code is also shown in the display.
 - 1: The R1 motor relay is open, the R2 alarm relay is closed and the red "Trip" indicator light on the MP 204 is on.
-
- TestTrip
This mode is the result of the TestTrip command or of pressing the [T] button. The alarm code "18" is shown in the display. The behaviour is equal to MotorProtectionTrip.
-
- ActuatorStop (Off)
This mode is the result of the state control bit OnOff = 0.
 - 3: The motor will be switched off, and the MP 204 display will show "OFF".
-

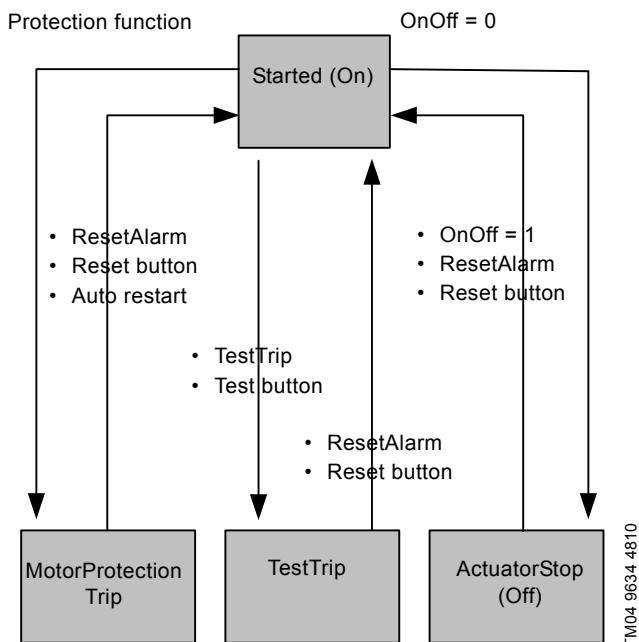


Fig. 13 Operating mode state event diagram

SystemMode

Status enumeration showing the MP 204 system mode.

-
- PowerUp
In this mode, the MP 204 is powering up, and the "Power" indicator light will be flashing green. A power-on delay [1-254s] can be programmed with the R100 or Grundfos GO remote to prolong this period. After power-up, the MP 204 automatically enters the system mode "Operation".
 - 0:
-
- 1: Operation
The normal system mode.
-
- MP204Fault
The MP 204 has a hardware fault. Power-off is required to attempt restarting. It may be necessary to replace the MP 204.
 - 2:
-

7.4 Alarm code module (AlarmCode, module 5)

In the AlarmCode module, the cause of a motor protection trip can be read in the form of an alarm code. The complete list of alarm codes supported by the MP 204 is shown below.

Note that a few of the alarm codes are warnings only (W).

They are included in the table for the sake of completeness.

They can never appear in the AlarmCode module, but only in the WarningBits module described in section [7.5 Warning bits module \(WarningBits, module 6\)](#).

The AlarmCode module has data type 5, unsigned 8.

Code	Alarm/warning description	A/W	Trip delay	3-phase	1-phase	Auto restart after alarm	Programmable limit
2	Missing phase	A	-	●	-	Condition + delay	Enabled
3	External alarm signal (PTC)	A	-	●	●	Condition + delay	E/D
4	Too many automatic restarts per 24 hours	A	-	●	●	Reset required	E/D + value
9	Phase sequence reversal	A	-	●	-	Condition + delay	Enabled
12	Service warning	W	-	●	●	-	Value
15	Communication alarm, main system	A	-	●	●	Condition + delay	Disabled
18	Test trip (control module TestTrip) not in alarm log	A	-	●	●	Reset required	-
20	Insulation resistance low	A + W	●	●	-	Condition + delay	E/D + value
21	Too many starts per hour	W	-	●	●	Condition	Enabled
26	Load continues even if motor relay R1 is off	W	-	●	●	Condition	Enabled
32	Overvoltage	A + W	●	●	●	Condition + delay	Value
40	Undervoltage	A + W	●	●	●	Condition + delay	Value
48	Overload (current too high)	A + W	IEC	●	●	Delay	Value
56	Underload (current too low)	A + W	●	●	●	Delay	Value
64	Overtemperature, Tempcon measurement	A + W	●	●	-	Condition + delay	E/D + value
71	Overtemperature, Pt100 measurement	A + W	●	●	●	Condition + delay	E/D + value
91	Signal fault, Tempcon sensor	W	●	●	●	-	E/D
111	Current asymmetry	A + W	●	●	-	Delay	Value
112	Cos(φ) too high	A + W	●	●	●	Delay	Value
113	Cos(φ) too low	A + W	●	●	●	Delay	Value
120	Auxiliary winding alarm	A	●	-	●	Delay	Enabled
123	Start capacitor, low	A + W	●	-	●	Delay	Value
124	Run capacitor, low	A + W	●	-	●	Delay	Value
175	Signal fault, Pt100 temperature sensor	W	●	●	●	-	E/D

7.4.1 Explanation to alarm code table

Text	Description
A/W	Alarm (A), warning (W) or alarm and warning (A + W).
Trip delay	Delay between the appearance of an alarm until the MP 204 switches the motor off. This delay, which is common to all the bullet-marked alarms, can be programmed with the R100 or Grundfos GO remote control. Alarms without Trip delay result in immediate reaction. Tripping due to overload is based on IEC standard trip curves.
1-phase/3-phase	Type of motor.
Auto restart	
• Condition	This means that the conditions for the alarm must have disappeared before a restart is possible.
• Delay	This means that restarting is delayed with the common restart delay which is programmable with the R100 or Grundfos GO remote control.
Programmable limit	
• Enabled	This protection is always enabled. It can only be disabled with a special programming tool.
• Disabled	This protection is always disabled. It can only be enabled with a special programming tool.
• E/D	Can be enabled/disabled with the R100 or Grundfos GO remote control.
• Value	Value of protection limit can be programmed with the R100 or Grundfos GO remote control.

7.5 Warning bits module (WarningBits, module 6)

The WarningBits module shows all actual warning conditions, one bit for each. Contrary to alarms, there can be many simultaneous warnings present. The complete list of warning bits and their equivalent codes are shown below.

The WarningBits module has data type 10, non-standard.

Byte	Bit	Bit name	Equivalent code	3-phase	1-phase	Programmable limit
1	0	Overvoltage	32	•	•	Value
	1	Undervoltage	40	•	•	Value
	2	Overload (current too high)	48	•	•	Value
	3	Underload (current too low)	56	•	•	Value
	4	Current asymmetry	111	•	-	Value
	5	-	-	-	-	-
2	0	Insulation resistance low	20	•	-	E/D + value
	1	Overtemperature, Tempcon measurement	64	•	-	E/D + value
	2	Overtemperature, Pt100 measurement	71	•	•	E/D + value
	3	-	-	-	-	-
	4	Cos(φ) too high	112	•	•	Value
	5	Cos(φ) too low	113	•	•	Value
	6	Too many starts per hour	21	•	•	Enabled
	7	-	-	-	-	-
3	0	Start capacitor, low	123	-	•	Value
	1	Run capacitor, low	124	-	•	Value
	2	-	-	-	-	-
	3	Signal fault, Tempcon sensor	91	•	-	E/D
	4	Signal fault, Pt100 temperature sensor	175	•	•	E/D
	5	Service warning	12	•	•	Enabled
	6	Load continues even if motor relay R1 is off	26	•	•	Enabled
	7	-	-	-	-	-

7.6 Measurement data modules

Module	Name	Data type	Unit	Description		Associated module(s)
				3-phase motor	1-phase motor	
7	PhaseVoltageL1	6	0.1 V	L1 phase voltage	Reference voltage (= 0)	-
8	PhaseVoltageL2	6	0.1 V	L2 phase voltage	Phase voltage	-
9	PhaseVoltageL3	6	0.1 V	L3 phase voltage	Auxiliary winding voltage	-
10	PhaseVoltageMean	6	0.1 V	Mean of phase voltages L1, L2 and L3	Phase voltage	For 1-phase motors, the max. and min. values are stored in LineVoltageMaxLog and LineVoltageMinLog.
11	LineVoltageL1L2	6	0.1 V	L1-L2 line voltage	-	For 3-phase motors, the max. and min. values are stored in LineVoltageMaxLog and LineVoltageMinLog.
12	LineVoltageL2L3	6	0.1 V	L2-L3 line voltage	-	
13	LineVoltageL3L1	6	0.1 V	L3-L1 line voltage	-	
14	LineVoltageMean	6	0.1 V	Mean of line voltages L1-L2, L2-L3 and L3-L1	-	LineVoltageMaxLog and LineVoltageMinLog.
15	LineCurrentL1	6	0.1 A	L1 line current	Neutral current	-
16	LineCurrentL2	6	0.1 A	L2 line current	Mains winding current	-
17	LineCurrentL3	6	0.1 A	L3 line current	Auxiliary winding current	-
18	LineCurrentMean	6	0.1 A	Mean value of line currents L1, L2 and L3	Line current (= neutral current)	-
19	LineCurrentStart	6	0.1 A	Peak line current from the latest motor start	Peak line current from the latest motor start	-
20	MotorTemp1	6	0.01 K	Motor temperature measured by Tempcon	Motor temperature measured by Tempcon	-
21	MotorTemp2	6	0.01 K	Motor temperature measured by PT resistor	Motor temperature measured by PT resistor	-
22	LineCurrentAsym	6	0.01 %	Line current asymmetry	-	-
23	CapacitorStart	6	1 μ F	-	Start capacitor value	-
24	CapacitorRun	6	1 μ F	-	Run capacitor value	-
25	CapacitorStartRef	6	1 μ F	-	Start capacitor reference value	-
26	CapacitorRunRef	6	1 μ F	-	Run capacitor reference value	-
27	LineFrequency	6	0.1 Hz	Line frequency	-	-
28	VoltageAngleL1L2	5	1 °	Voltage angle L1-L2	-	-
29	VoltageAngleL1L3	5	1 °	Voltage angle L2-L3	-	-
30	CosPhiL1	5	0.01	L1 current phase angle cosine	-	-
31	CosPhiL2	5	0.01	L2 current phase angle cosine	-	-
32	CosPhiL3	5	0.01	L3 current phase angle cosine	-	-
33	CosPhi		0.01	Mean phase angle cosine (power factor)	Mean phase angle cosine (power factor)	-
34	Power	7	1 W	Power consumption	Power consumption	-
35	Energy	7	1 kWh	Energy consumption	Energy consumption	-
36	EnergyTripCnt	7	1 kWh	Energy consumption trip counter (resettable)	Energy consumption trip counter (resettable)	ResetEnergyCounter in control module (module 1)
37	OperatingTime	7	1 h	Operating time	Operating time	-
38	TotalPoweredTime	7	1 h	Total powered time	Total powered time	-
39	OperatingTimeTripCnt	7	1 h	Operating time trip counter (resettable)	Operating time trip counter (resettable)	ResetOprTimeCounter in control module (module 1)
40	NumberOfStarts	7	1	Number of starts counter	Number of starts counter	-
41	NumberOfStartsTripCnt	7	1	Number of starts trip counter (resettable)	Number of starts trip counter (resettable)	ResetStartCounter in control module (module 1)
42	AutoRestartsTripCnt	7	1	Auto-restarts trip counter (resettable)	Auto-restarts trip counter (resettable)	ResetRestartCounter in control module (module 1)
43	InsulationResistance	6	10 kW	Insulation resistance	-	-
44	PhaseVoltageDistortion	6	0.01 %	Phase voltage distortion	Phase voltage distortion	-

Module	Name	Data type	Unit	Description		Associated module(s)
				3-phase motor	1-phase motor	
45	LineVoltageMaxLog	6	0.1 V	Logged maximum value of line voltage	Logged maximum value of line voltage	These values are stored until resetting with ResetLogs command in control module (module 1)
46	LineVoltageMinLog	6	0.1 V	Logged minimum value of line voltage	Logged minimum value of line voltage	-
47	LineCurrentMaxLog	6	0.1 A	Logged maximum value of line current	Logged maximum value of line current	-
48	LineCurrentMinLog	6	0.1 A	Logged minimum value of line current	Logged minimum value of line current	-
49	StartsPerHourMaxLog	5	1	Logged maximum value of starts per hour	Logged maximum value of starts per hour	-
50	StartsPerHour	5	1	Starts per hour (moving average)	Starts per hour (moving average)	Maximum value stored in StartsPerHourMaxLog
51	AutoRestartsPer24h	5	1	Auto restarts per hour (moving average)	Auto restarts per hour (moving average)	ResetLogs command in control module (module 1)

7.7 Device identification (DeviceIdentification, module 52)

The data type is 10, non-standard.

Byte	Name/description																				
	<table border="1"> <thead> <tr> <th>UnitFamily [enumeration]</th> <th>UnitType [enumeration]</th> </tr> </thead> <tbody> <tr> <td>1: UPE/MAGNA circulator pump</td> <td>5: UPE, 3-phase 7: MAGNA, 1-phase 9: MAGNA, 1-phase, small 10: MAGNA3</td> </tr> <tr> <td>2: E-pump, 1-phase/3-phase, based on MGE motor or CUE frequency converter</td> <td>2: MGE, 1-phase 3: MGE, 3-phase 4: MGE, 3-phase, large 5: CUE frequency converter 6: MGE, 3-phase, model G 7: MGE, model H/I</td> </tr> <tr> <td>7: MP 204 motor protector</td> <td>1: MP 204</td> </tr> <tr> <td>17: Hydro Multi-E model G and earlier models</td> <td>1: With 3-phase pumps 2: With 1-phase pumps</td> </tr> <tr> <td>21: Hydro MPC/Control MPC, Hydro Multi-B</td> <td>1: Hydro MPC/Control MPC, CU 351 2: Hydro Multi-B, CU 323</td> </tr> <tr> <td>25: CR Monitor</td> <td>1: CR Monitor, CU 351</td> </tr> <tr> <td>26: Dedicated Controls</td> <td>1: Dedicated Controls, CU 361</td> </tr> <tr> <td>30: Smart Digital Dosing, DDA</td> <td>1: Smart Digital Dosing, DDA</td> </tr> <tr> <td>39: Hydro Multi-E model H and later models</td> <td>1: With 3-phase pumps 2: With 1-phase pumps</td> </tr> </tbody> </table>	UnitFamily [enumeration]	UnitType [enumeration]	1: UPE/MAGNA circulator pump	5: UPE, 3-phase 7: MAGNA, 1-phase 9: MAGNA, 1-phase, small 10: MAGNA3	2: E-pump, 1-phase/3-phase, based on MGE motor or CUE frequency converter	2: MGE, 1-phase 3: MGE, 3-phase 4: MGE, 3-phase, large 5: CUE frequency converter 6: MGE, 3-phase, model G 7: MGE, model H/I	7: MP 204 motor protector	1: MP 204	17: Hydro Multi-E model G and earlier models	1: With 3-phase pumps 2: With 1-phase pumps	21: Hydro MPC/Control MPC, Hydro Multi-B	1: Hydro MPC/Control MPC, CU 351 2: Hydro Multi-B, CU 323	25: CR Monitor	1: CR Monitor, CU 351	26: Dedicated Controls	1: Dedicated Controls, CU 361	30: Smart Digital Dosing, DDA	1: Smart Digital Dosing, DDA	39: Hydro Multi-E model H and later models	1: With 3-phase pumps 2: With 1-phase pumps
UnitFamily [enumeration]	UnitType [enumeration]																				
1: UPE/MAGNA circulator pump	5: UPE, 3-phase 7: MAGNA, 1-phase 9: MAGNA, 1-phase, small 10: MAGNA3																				
2: E-pump, 1-phase/3-phase, based on MGE motor or CUE frequency converter	2: MGE, 1-phase 3: MGE, 3-phase 4: MGE, 3-phase, large 5: CUE frequency converter 6: MGE, 3-phase, model G 7: MGE, model H/I																				
7: MP 204 motor protector	1: MP 204																				
17: Hydro Multi-E model G and earlier models	1: With 3-phase pumps 2: With 1-phase pumps																				
21: Hydro MPC/Control MPC, Hydro Multi-B	1: Hydro MPC/Control MPC, CU 351 2: Hydro Multi-B, CU 323																				
25: CR Monitor	1: CR Monitor, CU 351																				
26: Dedicated Controls	1: Dedicated Controls, CU 361																				
30: Smart Digital Dosing, DDA	1: Smart Digital Dosing, DDA																				
39: Hydro Multi-E model H and later models	1: With 3-phase pumps 2: With 1-phase pumps																				
1																					
2	UnitType [enumeration] According to description above.																				
3	UnitVersion [enumeration] Used by Grundfos.																				
4	CIMSoftwareVersion [number]																				
5	CIMSoftwareRevision [number]																				
6	CIMModel [enumeration]																				

7.8 Alarm and warning simulation (EventSimulation, module 3)

This is a PROFIBUS/PROFINET output module used to activate the alarm and warning simulation function in the MP 204.

The data type is 10, non-standard.

The bits for simulation of warnings and alarms have the same interpretation as the bits in the WarningBits module. See section [7.5 Warning bits module \(WarningBits, module 6\)](#). Some extra bits are added for simulation of the alarms that cannot appear as warnings.

Byte	Name	Description	Event trigger
1	WarningSimBits1	Same bit interpretation as WarningBits byte 1	Value change
2	WarningSimBits2	Same bit interpretation as WarningBits byte 2	Value change
3	WarningSimBits3	Same bit interpretation as WarningBits byte 3	Value change
4	AlarmSimBits1	Same bit interpretation as WarningBits byte 1 with extra bits	Value change
5	AlarmSimBits2	Same bit interpretation as WarningBits byte 2 with extra bits	Value change
6	AlarmSimBits3	Same bit interpretation as WarningBits byte 3 with extra bits	Value change

Byte	Bit	Bit name	Equivalent code	Warning simulation	Alarm simulation
1				WarningSimBits1	AlarmSimBits1
	0	Overvoltage	32	•	•
	1	Undervoltage	40	•	•
	2	Overload (current too high)	48	•	•
	3	Underload (current too low)	56	•	•
	4	Current asymmetry	111	•	•
	5	Phase sequence reversal	9	-	•
	6	Missing phase	2	-	•
				WarningSimBits2	AlarmSimBits2
2	0	Insulation resistance low	20	•	•
	1	Overtemperature, Tempcon measurement	64	•	•
	2	Overtemperature, Pt100 measurement	71	•	•
	3	External alarm signal (PTC)	3	-	•
	4	Cos(φ) too high	112	•	•
	5	Cos(φ) too low	113	•	•
	6	Too many starts per hour	21	•	•
	7	Too many automatic restarts per 24 hours	4	Cannot be simulated	
				WarningSimBits3	AlarmSimBits3
3	0	Start capacitor, low	123	•	•
	1	Run capacitor, low	124	•	•
	2	Auxiliary winding alarm	120	-	•
	3	Signal fault, Tempcon sensor	91	•	•
	4	Signal fault, Pt100 temperature sensor	175	•	•
	5	Service warning	12	Cannot be simulated	
	6	Load continues even if motor relay R1 is off	26	Cannot be simulated	
	7	-	-	-	-

The simulation of an alarm or a warning can be stopped as follows:

- Clear the simulation bit.
- Execute the ResetAlarm command.
- Press the [R] button on the MP 204.
- Switch the MP 204 off and on.

Example

To simulate a current asymmetry alarm, set AlarmSimBits1 (byte 4, bit 4) in the EventSimulation module to "1".

Example

To simulate a Pt100 sensor signal fault warning, set WarningSimBits3 (byte 3, bit 4) in the EventSimulation module to "1".

8. Product simulation

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

It will thus be possible to connect a PROFIBUS/PROFINET master to a CIU 150 / 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 PROFIBUS/PROFINET master application program (e.g. PLC program) before the equipment is installed under real-life conditions.

8.1 CIU 150 Product Simulation

Product simulation mode is entered when the hexadecimal address switch has one of the values shown in the table below:

Address setting (section 5.4 Setting the PROFIBUS address)		Simulated product
SW3	SW4	
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 will be 15 (0x0F).

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

8.2 CIU 500 Product Simulation

Product simulation mode is entered via the web server. See section [A.4 PROFINET IO configuration](#) on page 24.

9. Fault finding

9.1 CIU 150

Faults in a CIU 150 PROFIBUS module can be detected by observing the status of the two communication LEDs. See the table below.

9.1.1 LED status

Fault (LED status)	Possible cause	Remedy
1. Both LEDs (LED1 and LED2) remain off when the power supply is connected.	a) The CIU 150 is defective.	Replace the CIU 150.
2. The LED for internal communication (LED2) is flashing red.	a) No internal communication between the CIU 150 and the MP 204.	<ul style="list-style-type: none"> • Check the cable connection between the CIU 150 and the MP 204. • Check that the individual conductors have been fitted correctly. • Check the power supply to the MP 204.
3. The LED for internal communication (LED2) is constantly red.	a) The CIU 150 does not support the connected MP 204.	Contact the nearest Grundfos company.
4. The PROFIBUS LED (LED1) is constantly red.	a) Fault in the CIU 150.	Contact the nearest Grundfos company.
5. The PROFIBUS LED (LED1) is flashing red.	a) Fault in the CIU 150 PROFIBUS configuration.	<ul style="list-style-type: none"> • Check that the PROFIBUS address (switches SW3 and SW4) has a valid value [1-126]. See section 5.4 Setting the PROFIBUS address. • Check that the GSD file used is correct. • Check that the PROFIBUS cable has been fitted correctly. • Check that the PROFIBUS termination is correct. See section 5.5 Termination resistors.

9.2 CIU 500

Faults in the CIU 500 can be detected by observing the status of the two communication LEDs. See the table below and section [4.3 CIM 500 PROFINET IO](#).

9.2.1 LED status

Fault (LED status)	Possible cause	Remedy
1. Both LEDs (LED1 and LED2) remain off when the power supply is connected	a) The CIU 500 is defective.	Replace the CIU 500.
2. The PROFINET IO LED (LED1) remains off.	a) The protocol selection switch (SW1) has been set in Modbus TCP position	Set the switch in position "0".
3. The LED for internal communication (LED2) is flashing red.	a) No internal communication between the CIU 500 and the Grundfos product.	<ul style="list-style-type: none"> • Check the cable connection between the Grundfos product and the CIU 500. • Check that the individual Conductors have been fitted correctly. • Check the power supply to the Grundfos product
4. The LED for internal communication (LED2) is permanently red.	a) The CIU 500 does not support the Grundfos product connected.	Contact the nearest Grundfos company.
5. The PROFINET IO LED (LED1) is permanently red.	a) Connected Grundfos product is not supported.	Contact the nearest Grundfos company.
	b) Illegal position of protocol switch (SW1)	Check that the rotary switch SW1 is set to "0".
6. The PROFINET IO (LED1) is flashing red.	a) Fault in the CIU 500 PROFINET IO configuration.	<ul style="list-style-type: none"> • Check that the right GSDML file is used. • Check that PROFINET IO IP address configuration is correct. See section 6. PROFINET IO, CIM 500 setup. • Check device name in CIM 500 and PROFINET IO master.
7. The PROFINET IO (LED1) is pulsing red.	a) Connection to master lost.	<ul style="list-style-type: none"> • Check cables. • Check master is running.
8. LED1 is permanently red and green at the same time	a) Error in firmware download.	Use the web server to download the firmware again.
9. LED2 is permanently red and green at the same time	a) Memory fault.	Replace the CIU 500.

10. Grundfos alarm and warning codes

This is a complete list of alarm and warning codes for Grundfos products. For the codes supported by the MP 204, see section [7.5 Warning bits module \(WarningBits, module 6\)](#).

Code	Description	Code	Description	Code	Description
1	Leakage current	80	Hardware fault, type 2	186	Signal fault, power meter sensor
2	Missing phase	81	Verification error, data area (RAM)	187	Signal fault, energy meter
3	External fault signal	82	Verification error, code area (ROM, FLASH)	188	Signal fault, user-defined sensor
4	Too many restarts	83	Verification error, FE parameter area (EEPROM)	189	Signal fault, level sensor
5	Regenerative braking	84	Memory access error	190	Limit exceeded, sensor 1 (e.g. alarm level in WW application)
6	Mains fault	85	Verification error, BE parameter area (EEPROM)	191	Limit exceeded, sensor 2 (e.g. high level in WW application)
7	Too many hardware shutdowns	88	Sensor fault	192	Limit exceeded, sensor 3 (e.g. overflow level in WW application)
8	PWM switching frequency reduced	89	Signal fault, (feedback) sensor 1	193	Limit exceeded, sensor 4 (e.g. low level in WW/tank filling application)
9	Phase sequence reversal	90	Signal fault, speed sensor	194	Limit exceeded, sensor 5
10	Communication fault, pump	91	Signal fault, temperature sensor 1	195	Limit exceeded, sensor 6
11	Water-in-oil fault (motor oil)	92	Calibration fault, (feedback) sensor	196	Operation with reduced efficiency
12	Time for service (general service information)	93	Signal fault, sensor 2	197	Operation with reduced pressure
13	Moisture alarm, analog	94	Limit exceeded, sensor 1	198	Operation with increased power consumption
14	Electronic DC-link protection activated (ERP)	95	Limit exceeded, sensor 2	199	Process out of range (monitoring/estimation/calculation/control)
15	Communication fault, main system (SCADA)	96	Setpoint signal outside range	200	Application alarm
16	Other	97	Signal fault, setpoint input	201	External sensor input high
17	Performance requirement cannot be met	98	Signal fault, input for setpoint influence	202	External sensor input low
18	Commanded alarm standby (trip)	99	Signal fault, input for analog setpoint	203	Alarm on all pumps
19	Diaphragm break (dosing pump)	104	Software shutdown	204	Inconsistency between sensors
20	Insulation resistance low	105	Electronic rectifier protection activated (ERP)	205	Level float switch sequence inconsistency
21	Too many starts per hour	106	Electronic inverter protection activated (EIP)	206	Water shortage, level 1
22	Moisture switch alarm, digital	110	Skew load, electrical asymmetry	207	Water leakage
23	Smart trim gap alarm	111	Current asymmetry	208	Cavitation
24	Vibration	112	Cos ϕ too high	209	Non-return valve fault
25	Setup conflict	113	Cos ϕ too low	210	High pressure
26	Load continues even if the motor has been switched off	114	Motor heater function activated (frost protection)	211	Low pressure
27	External motor protector activated (e.g. MP 204)	120	Auxiliary winding fault (single-phase motors)	212	Diaphragm tank precharge pressure out of range
28	Battery low	121	Auxiliary winding current too high (single-phase motors)	213	VFD not ready
29	Turbine operation (impellers forced backwards)	122	Auxiliary winding current too low (single-phase motors)	214	Water shortage, level 2
30	Change bearings (specific service information)	123	Start capacitor, low (single-phase motors)	215	Soft pressure build-up time-out
31	Change varistor(s) (specific service information)	124	Run capacitor, low (single-phase motors)	216	Pilot pump alarm
32	Overvoltage	144	Motor temperature 3 (Pt100, t _{mo3})	217	Alarm, general-purpose sensor high
33	Soon time for service (general service information)	145	Bearing temperature high (Pt100), in general or top bearing	218	Alarm, general-purpose sensor low
34	No priming water	146	Bearing temperature high (Pt100), middle bearing	219	Pressure relief not adequate
35	Gas in pump head, deaerating problem	147	Bearing temperature high (Pt100), bottom bearing	220	Fault, motor contactor feedback
36	Discharge valve leakage	148	Motor bearing temperature high (Pt100) in drive end (DE)	221	Fault, mixer contactor feedback

Code	Description	Code	Description	Code	Description
37	Suction valve leakage	149	Motor bearing temperature high (Pt100) in non-drive end (NDE)	222	Time for service, mixer
38	Vent valve defective	152	Communication fault, add-on module	223	Maximum number of mixer starts per hour exceeded
40	Undervoltage	153	Fault, analog output	224	Pump fault (due to auxiliary component or general fault)
41	Undervoltage transient	154	Communication fault, display	225	Communication fault, pump module
42	Cut-in fault (dV/dt)	155	Inrush fault	226	Communication fault, I/O module
45	Voltage asymmetry	156	Communication fault, internal frequency converter module	227	Combi event
48	Overload	157	Real-time clock out of order	228	Night flow max. limit exceeded
49	Overcurrent (i_line, i_dc, i_mo)	158	Hardware circuit measurement fault	229	Water on floor
50	Motor protection function, general shutdown (MPF)	159	CIM fault (Communication Interface Module)	230	Network alarm
51	Blocked motor/pump	160	GSM modem, SIM card fault	231	Ethernet: No IP address from DHCP server
52	Motor slip high	161	Sensor supply fault, 5 V	232	Ethernet: Auto-disabled due to misuse
53	Stalled motor	162	Sensor supply fault, 24 V	233	Ethernet: IP address conflict
54	Motor protection function, 3 sec. limit	163	Measurement fault, motor protection	234	Backup pump alarm
55	Motor current protection activated (MCP)	164	Signal fault, LiqTec sensor	235	Gas detected
56	Underload	165	Signal fault, analog input 1	236	Pump 1 fault
57	Dry running	166	Signal fault, analog input 2	237	Pump 2 fault
58	Low flow	167	Signal fault, analog input 3	238	Pump 3 fault
59	No flow	168	Signal fault, pressure sensor	239	Pump 4 fault
60	Low input power	169	Signal fault, flow sensor	240	Lubricate bearings (specific service information)
64	Overtemperature	170	Signal fault, water-in-oil (WIO) sensor	241	Motor phase failure
65	Motor temperature 1 (t_m or t_mo or t_mo1)	171	Signal fault, moisture sensor	242	Automatic motor model recognition failed
66	Temperature, control electronics (t_e)	172	Signal fault, atmospheric pressure sensor	243	Motor relay has been forced (manually operated/commanded)
67	Temperature too high, internal frequency converter module (t_m)	173	Signal fault, rotor position sensor (Hall sensor)	244	Fault, On/Off/Auto switch
68	External temperature/water temperature (t_w)	174	Signal fault, rotor origo sensor	245	Pump continuous runtime too long
69	Thermal relay 1 in motor (e.g. Klixon)	175	Signal fault, temperature sensor 2 (t_mo2)	246	User-defined relay has been forced (manually operated/commanded)
70	Thermal relay 2 in motor (e.g. thermistor)	176	Signal fault, temperature sensor 3 (t_mo3)	247	Power-on notice (device/system has been switched off)
71	Motor temperature 2 (Pt100, t_mo2)	177	Signal fault, Smart trim gap sensor	248	Fault, battery/UPS
72	Hardware fault, type 1	178	Signal fault, vibration sensor	249	User-defined event 1
73	Hardware shutdown (HSD)	179	Signal fault, bearing temperature sensor (Pt100), general or top bearing	250	User-defined event 2
74	Internal supply voltage too high	180	Signal fault, bearing temperature sensor (Pt100), middle bearing	251	User-defined event 3
75	Internal supply voltage too low	181	Signal fault, PTC sensor (short-circuited)	252	User-defined event 4
76	Internal communication fault	182	Signal fault, bearing temperature sensor (Pt100), bottom bearing	253	SMS data from DDD sensor not received within time
77	Communication fault, twin-head pump	183	Signal fault, extra temperature sensor	254	Inconsistent data model
78	Fault, speed plug	184	Signal fault, general-purpose sensor		
79	Functional fault, add-on module	185	Unknown sensor type		

11. PROFIBUS address

Decimal to hexadecimal conversion table for setting of the PROFIBUS address switches. See section [5.4 Setting the PROFIBUS address](#).

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

Subject to alterations.

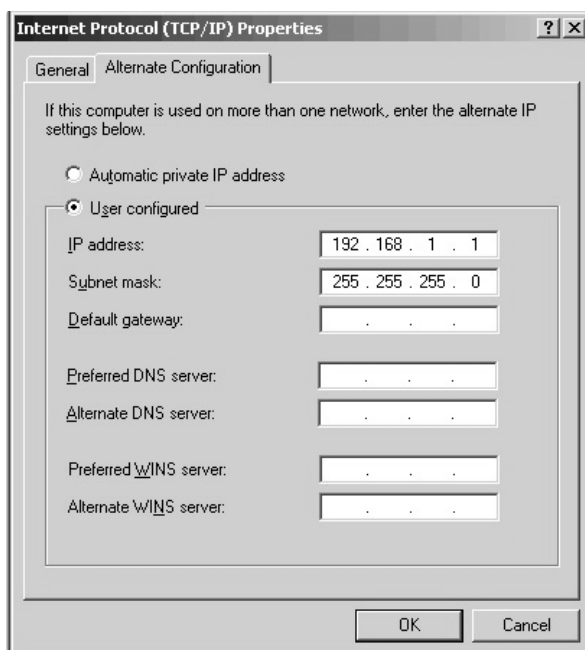
Appendix

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

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

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

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



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Fig. 1 Example from Windows XP

A.2 Web server configuration

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

Before configuration

- Check that the PC and CIM module are connected via an Ethernet cable.
- Check that the PC Ethernet port is set to the same network as the CIM module. For network configuration, see section [A.1 How to configure an IP address on your PC](#).

To establish a connection from a PC to CIM 500 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 web server.

A.3 Login

Fig. 2 Login

User name	Enter user name. Default: admin.
-----------	----------------------------------

Password	Enter password. Default: Grundfos.
----------	------------------------------------

Note

User name and password can be changed on the web server under "Grundfos Management"

A.4 PROFINET IO configuration

This web page is used to configure all the parameters relevant to the PROFINET IO protocol standard. All settings can also be configured from a standard PROFINET IO configuration tool, for instance Siemens Primary Setup Tool (PST). It is available on internet.

Fig. 3 Real Time Ethernet Protocol Configuration - PROFINET IO

Object	Description
Device Name	The PROFINET IO device name. It must be unique.
IP Address	The static IP address for CIM 500 on the PROFINET IO network.
Subnet Mask	Configure the subnet mask for the CIM 500 module on the PROFINET IO network.
Gateway	Configure the default gateway for the PROFINET IO network.
Use DHCP	The CIM 500 module can be configured to automatically obtain the IP address from a DHCP server on the network.
Grundfos product simulation	The CIM 500 can be put in product simulation mode to generate realistic simulated values of all the PROFINET IO input data modules. It will thus be possible to connect a PROFINET IO master to a CIM 500 fitted in a CIU or 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 are received and handled correctly by the PROFINET IO master application program (e.g. PLC program) before installing the device. To enable product simulation, select a product type from the drop down list. Product simulation will be terminated by a module power cycle.

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