MP 204

Installation and operating instructions

MP 204
Installation and operating instructions
(all available languages)
http://net.grundfos.com/qr/i/96650480

GRUNDFOS

MP 204

Original installation and operating instructions

Table of contents

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.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

1.1 Hazard statements

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

DANGER

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

WARNING

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

CAUTION

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

The hazard statements are structured in the following way:

SIGNAL WORD

Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

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

Observe these instructions for explosion-proof products.

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

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

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

Tips and advice that make the work easier.

2. Product introduction

2.1 Intended use

MP 204 is an electronic motor protector, designed for the protection of an asynchronous motor or a pump. It must always be installed in a cabinet.

MP 204 is designed for single- and three-phase motors. In single-phase motors, the start and run capacitors are also measured. Cos φ is measured in both single- and three-phase systems.

MP 204 must only be installed according to the technical specifications. See the installation and operating instructions for the product.

2.2 Features

The motor protector consists of the following components

- a cabinet incorporating instrument transformers and electronics.
- an operating panel with operating buttons and display for reading of data.

MP 204 operates with two sets of limits:

- a set of warning limits
- a set of trip limits.

If one or more of the warning limits are exceeded, the motor continues to run, but the warnings will appear in the MP 204 display.

If one of the trip limits is exceeded, the trip relay stops the motor. At the same time, the signal relay is operating to indicate that the limit has been exceeded.

Some values only have a warning limit.

The warning can also be read by means of Grundfos GO Remote.

2.3 Applications

MP 204 can be used as a stand-alone motor protector.

MP 204 may also be incorporated in a Grundfos Dedicated Controls system in which it functions as a motor protector and data collection unit transmitting measured values via Grundfos GENIbus to the Grundfos CU 362 control unit.

Monitoring of MP 204 is possible via Grundfos GENIbus.

The power supply to MP 204 is in parallel with the supply to the motor. Motor currents up to 120 A are passed directly through MP 204. MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement. MP 204 disconnects the contactor if, for example, the current exceeds the preset value.

The pump is protected secondarily by measuring the temperature with a Tempcon sensor, a Pt100/Pt1000 sensor and a PTC sensor/thermal switch.

3. Receiving the product

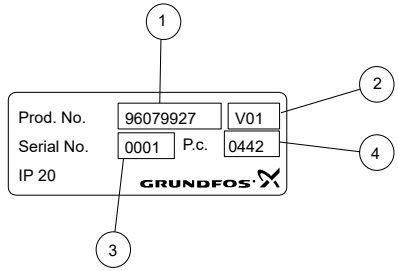
3.1 Transporting the product

CAUTION
Falling objects
Minor or moderate personal injury
- Wear safety shoes and helmet.

CAUTION
Sharp element
Minor or moderate personal injury
- Wear protective gloves to avoid being cut by the sharp edges of the packaging.

4. Nameplates

Rating and approvals.



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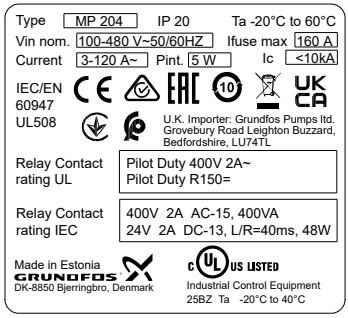
Nameplate on front cover

These four numbers must be stated when contacting Grundfos:

Pos.	Description
1	Product number
2	Version number
3	Serial number
4	Production code



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Nameplates on the side of MP 204

5. Product range

- MP 204
- external current transformers up to 1000 A.

6. Functions

- Phase-sequence monitoring
- indication of current or temperature (user selection)
- input for PTC/thermal switch
- indication of temperature in °C or °F (user selection)
- 4-digit, 7-segment display
- setting and status reading with Grundfos GO Remote
- setting and status reading via GENIbus.

Tripping conditions

- Overload
- underload (dry running)
- temperature (Tempcon sensor, PTC/thermal switch and Pt sensor)
- missing phase
- phase sequence
- overvoltage
- undervoltage
- power factor (cos φ)
- current unbalance.

Warnings

- Overload
- underload
- temperature (Tempcon, see section *12.2 Submersible pumps*, and Pt sensor)
- overvoltage
- undervoltage
- power factor (cos φ)(in connection with single- and three-phase connection)
- run capacitor (single-phase operation)
- start capacitor (single-phase operation)
- loss of communication in network
- harmonic distortion.

Learning function

- Phase sequence (three-phase operation)
- run capacitor (single-phase operation)
- start capacitor (single-phase operation)
- identification and measurement of Pt100/Pt1000 sensor circuit.

Related information

12.2 Submersible pumps

6.1 Factory settings

Current limit: 0 A

Nominal voltage: 400 V

Class: P (trip delay: 5 seconds)

Trip delay: 5 seconds

Number of phases: 3, non-earthed

Power-on delay: 5 seconds Learning function: Active

Active trip limits

Overload according to class

Underload: - 40 %

Overvoltage: + 20 %

Undervoltage: - 20 %

Phase-sequence monitoring

Current unbalance: 10 %

PTC/thermal switch

The overvoltage and undervoltage trip limits are deactivated automatically if the temperature monitoring with Tempcon or Pt100/Pt1000 is set to active.

Active warnings

Run capacitor, low: - 50 %

Start capacitor, low: - 50 %

7. Mechanical installation

DANGER
Electric shock
Death or serious personal injury

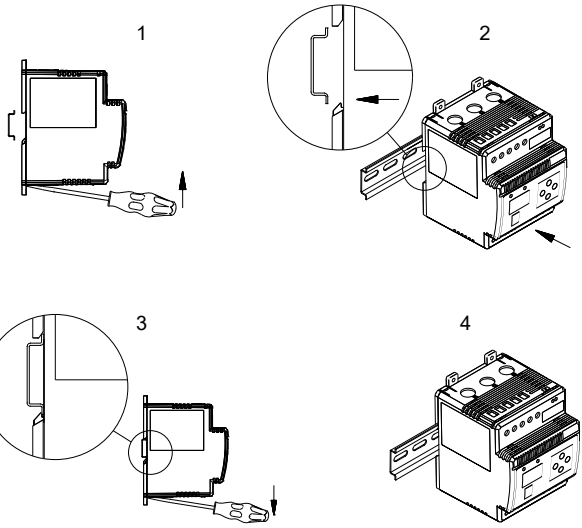
- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.
- Ensure that the sensor and power cables are separated when installing sensors and switches.
- Always install the product inside a suitable cabinet.

7.1 MP 204 in control cabinet

MP 204 is designed for mounting in a control cabinet, either on a mounting plate or on a DIN rail.

7.2 MP 204 on DIN rail

Mounting and removal of MP 204 mounted on a DIN rail is shown in figs *Mounting* and *Removal*.



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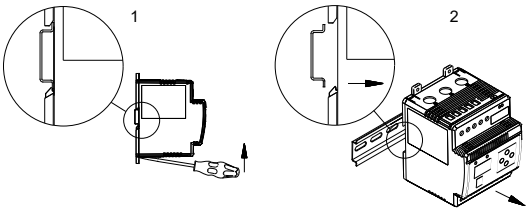
Mounting



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Removal

8. Electrical connection

WARNING
Electric shock
Death or serious personal injury

- The electrical connection must be carried out by an authorized electrician in accordance with local regulations.

DANGER
Electric shock
Death or serious personal injury

- All cables taken through the product and the current transformers must be insulated.
- Insulation between the cabinet and the product must have a suitable insulation resistance or the cabinet must be connected to protective earth.
- Ensure that the trip/signal relay output is maximum 400 V AC.

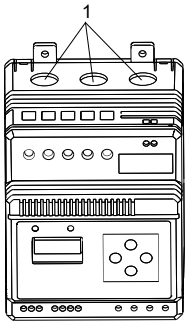
WARNING
Electric shock
Death or serious personal injury

- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.
- Ensure that the power and sensor cables are separated when mounting the relay output connections.
- Make sure that the wiring polarity matches the installation instructions.

WARNING
Cause of fire
Death or serious personal injury

- The product must not be supplied with pump voltage if it exceeds the rating mentioned on the nameplate.
- Ensure that the branch circuit fuse is maximum 8 A.

8.1 Overview



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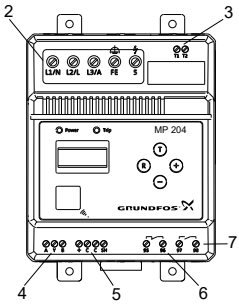
Cable entries



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Terminals

Pos.	Designation	Three-phase connection	Single-phase connection	Cable
1	I1	Entry for phase L1 to motor	Entry for neutral	Max. ∅16
	I2	Entry for phase L2 to motor	Entry for phase	
	I3	Entry for phase L3 to motor	Entry for auxiliary winding	
2	L1/N	Supply: L1	Supply: Neutral	Max. 6 mm^2 *
	L2/L	Supply: L2	Supply: Phase	
	L3/A	Supply: L3	Auxiliary winding	
	FE	Functional earth		
	5	Insulation measurement		
3	T1	PTC/thermal switch		Max. 2.5 mm^2 **
	T2			
4	A	GENIbus data A		
	Y	Reference/screen		
	B	GENIbus data B		
5	+	Pt100/Pt1000 sensor		
	C			
	C			
	SH	Screen		
6	95	Trip relay NC		
	96			
7	97	Signal relay NO		
	98			

* 10 mm^2 with cable terminal

** 4 mm^2 with cable terminal

UL requirement.
For field wiring terminals, minimum 60/75 °C stranded copper conductors must be used.

Related information

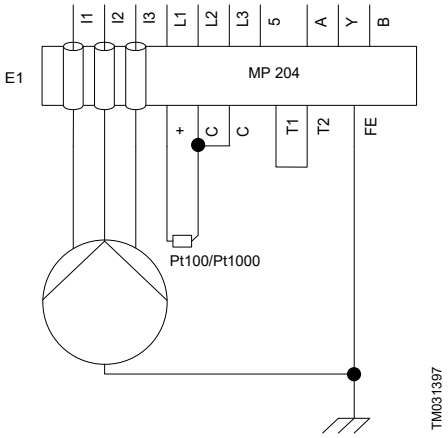
8.2 Input for Pt100/Pt1000
8.3 Input for PTC/thermal switch
8.4 Backup fuses

8.2 Input for Pt100/Pt1000

See fig. *Terminals*, pos. 5.

Terminal designation	Description
+	Resistance input.
C	Correction for conductor resistance. To be connected by means of a three-core Pt100/Pt1000 connection, otherwise the two "C" terminals are to be short-circuited.
C	Correction for conductor resistance. To be connected by means of a three-core Pt100/Pt1000 connection, otherwise the two "C" terminals are to be short-circuited.
SH	0 V (screen).

For examples of Pt100/Pt1000 connection, see figs *Two-core Pt100/Pt1000 connection* and *Three-phase connection*.



Two-core Pt100/Pt1000 connection

Related information

8.1 Overview
8.5.1 Three-phase system

8.3 Input for PTC/thermal switch

See fig. *Terminals*, pos. 3.

Terminal designation	Description
T1	Connection of PTC/thermal switch
T2	

If not used, short-circuit the PTC input using a wire, or deactivate it with Grundfos GO Remote.

Related information

8.1 Overview

8.4 Backup fuses

Maximum backup fuse sizes which may be used for MP 204 appear from the table below:

MP 204	Maximum size [A]	Type
Without external current transformer	120	RK5
With 200/5 external current transformer	200	RK5
With 300/5 external current transformer	300	RK5
With 500/5 external current transformer	500	RK5
With 750/5 external current transformer	750	RK5
With 1000/5 external current transformer	1000	RK5

At motor currents up to and including 120 A, the cables to the motor can be taken directly through the L1-L2-L3 of MP 204.

At motor currents above 120 A, current transformers must be used. See fig. *Cable entries*, pos. 1.

If backup fuses above 50 A are used, the L1-L2-L3 and "5" to MP 204 must be protected separately with maximum 10 A fuses. See fig. *Three-phase connection*.

If current transformers are used, the L1-L2-L3 and "5" to MP 204 must be protected with maximum 10 A fuses.

For installation examples, see figs *Three-phase connection* to *Current transformers*.

Related information

8.1 Overview

8.5.1 Three-phase system

8.6 External current transformers

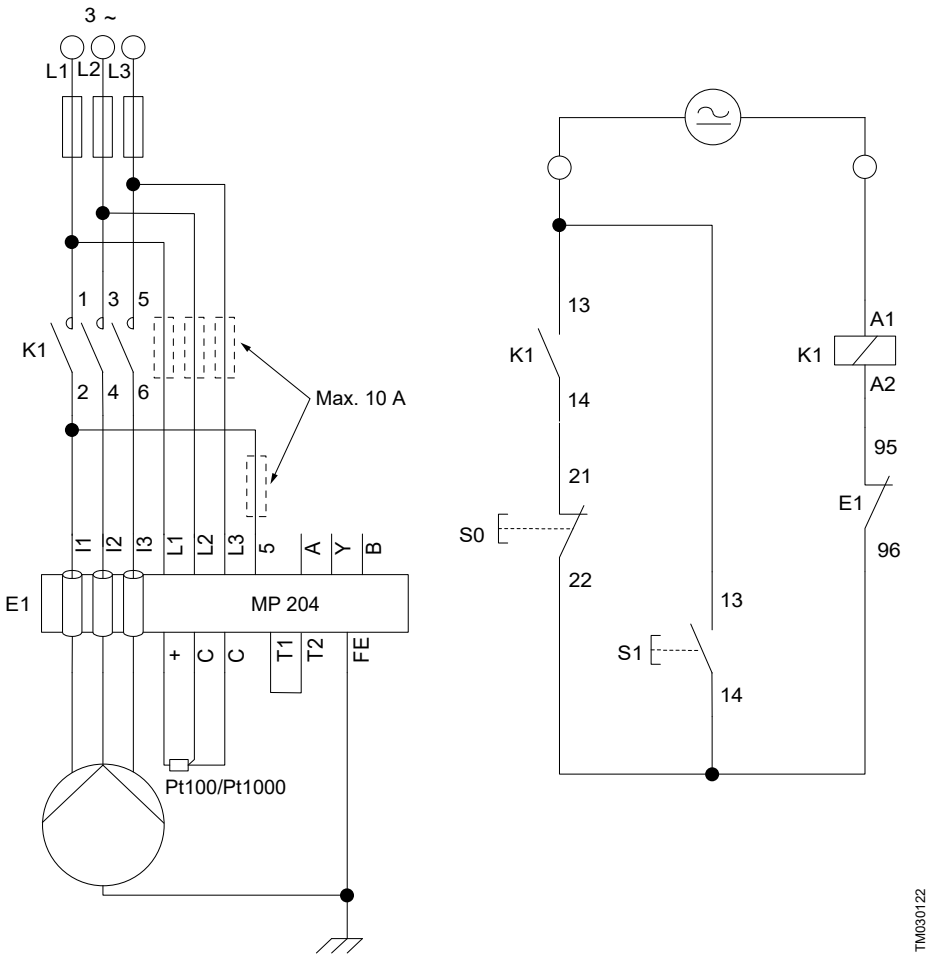
8.5 Wiring diagrams

8.5.1 Three-phase system

The wiring diagram, fig. *Three-phase connection*, shows an example of a three-phase pump with insulation measurement.

The connections to L1, L2, L3 and "5" can be made with a cable of up to 10 mm^2. A special fuse unit up to approximately 50 A is therefore not required.

If larger backup fuses are used, the voltage to the L1, L2 and L3 must be protected separately. We recommend a maximum of 10 A or less.



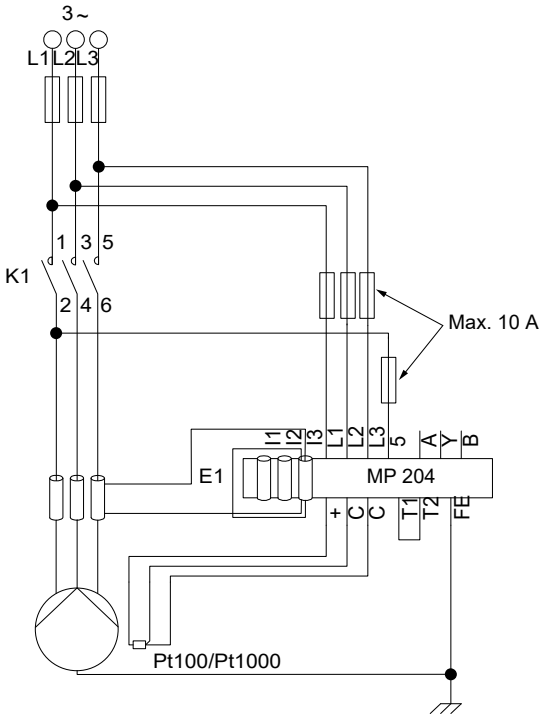
Three-phase connection

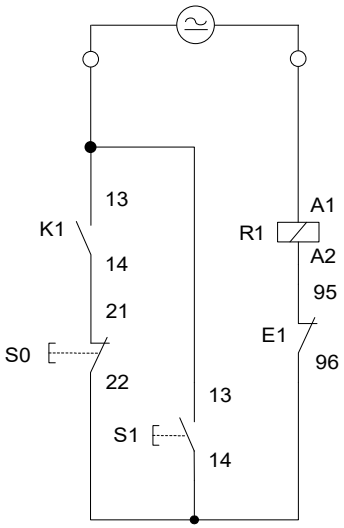
Related information

8.2 Input for Pt100/Pt1000

8.4 Backup fuses

8.5.2 Three-phase system with external current transformers





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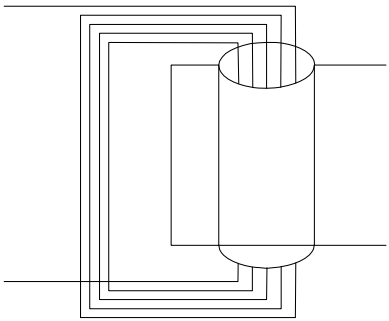
Three-phase connection with current transformers



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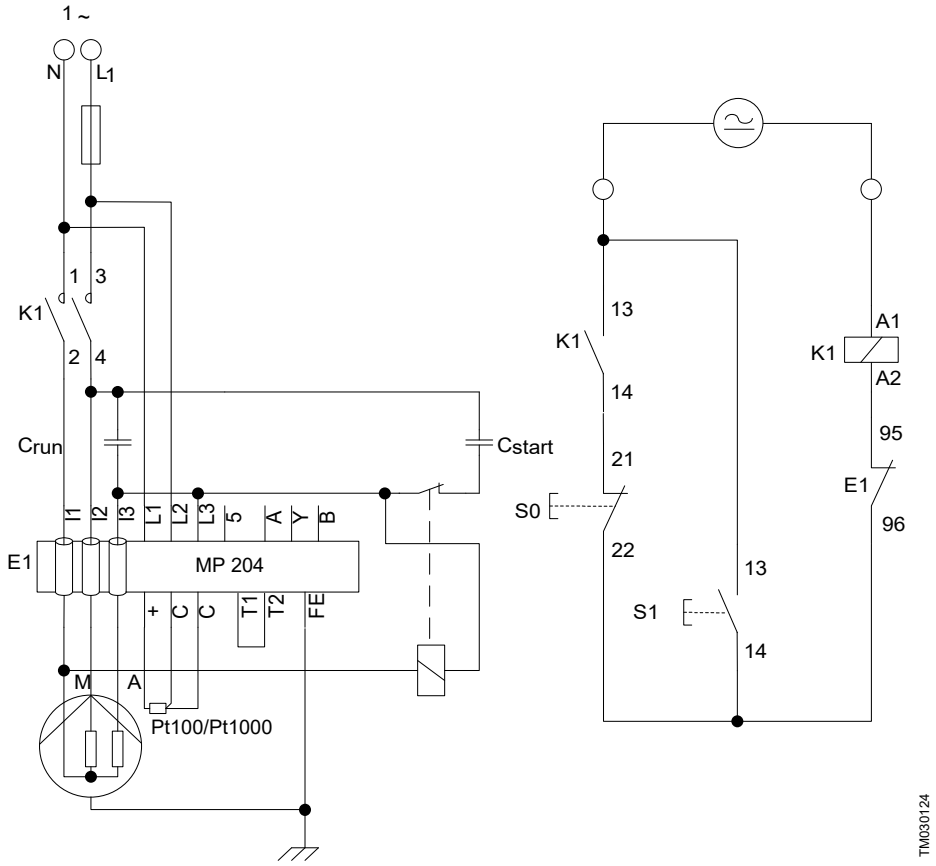
Five windings per phase through MP 204

8.5.3 Single-phase system with start and run capacitors



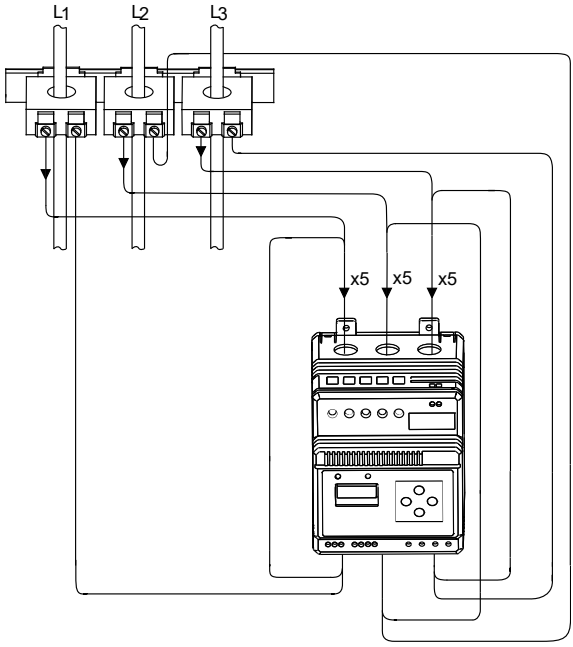
Single-phase connection

8.6 External current transformers

At motor currents above 120 A, external current transformers must be used. Fit the transformers as shown in fig. *Current transformers*.

Take the three measuring cables through the three holes in MP 204 five times per phase. See fig. *Five windings per phase through MP 204*.

The three current transformers must be fitted in the same direction, and the measuring cables must be connected in the same way.



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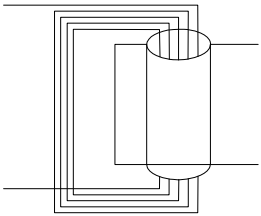
Current transformers



TM031398

Five windings per phase through MP 204

Current transformer ratio	$I_{max.}$	$P_{max.}$
200:5	200 A	5 VA
300:5	300 A	5 VA
500:5	500 A	5 VA
750:5	750 A	5 VA
1000:5	1000 A	5 VA

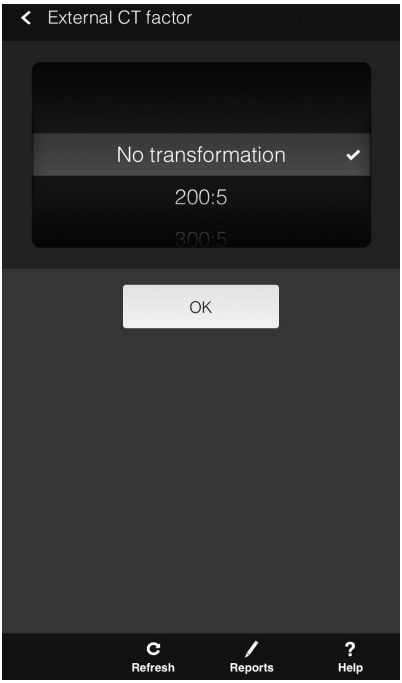
Related information

8.4 Backup fuses

8.6.1 MP 204 setup

8.6.1 MP 204 setup

When external current transformers are used together with MP 204 and the installation is made as described in section *External current transformers*, the actual current transformer factor must be set in the MP 204 with the Grundfos GO Remote.



TM081810

External CT factor

Related information

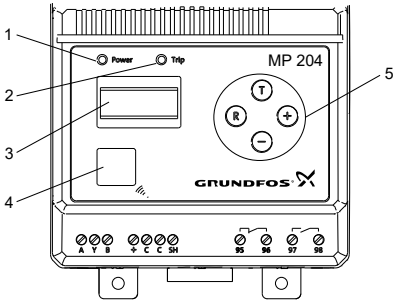
8.6 External current transformers

9. Startup

A basic setting of MP 204 can be made on the operating panel.

Additional functions must be set with Grundfos GO Remote or PC Tool Water Utility.

9.1 Operation



TM081430

Operating panel

Pos.	Indication	Description
1	"Power" indicator light	Flashes green until MP 204 is ready for operation (power-on delay). Is permanently green when MP 204 is ready for operation. Flashes red when communicating with Grundfos GO Remote.
2	"Trip" indicator light	Is red when the trip relay is activated.
3	Display	4 digits, for basic setting and data reading.
4	IR field	Grundfos GO Remote communication.
5	Operating buttons	T R + − Setting and operation.

Related information

9.3 Learning function

9.1.1 Button (Test)

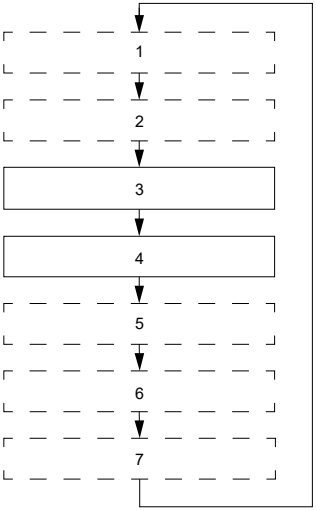
Press the T button to open trip relay connection 95-96 and close signal relay connection 97-98. The red "Trip" indicator light is on. The function is identical to the overload trip.

9.1.2 Button (Reset)

Press the R button to change the tripped state to normal state with trip relay connection 95-96 closed and signal relay connection 97-98 open. The red "Trip" indicator light is off. This implies that the tripped state has actually ceased. The R button also resets warnings, if any.

9.1.3 Button (+)

Normally the actual current or temperature appears on the display. Press the button to show information on the display, according to the following sequence:



Sequence on the display

Sequence on the display

Pos.	Description
1	Trip code (flashing)
2	Warning code no. 1-n
3	Current
4	Voltage
5	Temperature Tempcon
6	Temperature Pt sensor
7	Phase angle cos φ

- The trip code only appears if MP 204 has tripped. Switches between "trip" and trip code.
- The warning code only appears if the limit value of one or more warnings has been exceeded, and if warning code indication has been activated.
- Temperatures only appear if the matching sensors have been connected and activated. If no Tempcon signal is received, "----" appears on the MP 204 display.
- Cos φ only appears if this menu has been enabled with Grundfos GO Remote.

When the motor is operating, the display shows the actual value.

When the motor stops, the display shows the last measured value.

9.1.4 Button (-)

Only used in connection with the basic setting of MP 204.

9.2 Setting on operating panel

Press the + and - buttons simultaneously for a minimum of 5 seconds to open the programming mode. When the display shows three dots, the buttons can be released.

The set value, e.g. "4.9 A", appears. The unit symbol "A" is flashing.

Enter these values:

- rated current
- nominal voltage
- trip class
- number of phases.

Note: Insulation measurement is only possible of earthed three-phase systems.

If no buttons are activated, the voltage appears after 10 seconds.

After an additional 10 seconds, the set voltage is stored automatically, and the programming mode ends. See fig. *Example of basic setting*.

Note: Changes in rated current must be finished by pressing T to store the change.

Related information

9.2.4 Number of phases

9.2.1 Rated current

Set the rated motor current with the + and - buttons. See the motor nameplate.

- Press T to store the setting and continue.
- Press R to cancel the change and finish.

The programming mode ends automatically after 10 seconds, and the change is cancelled. See fig. *Example of basic setting*.

Related information

9.2.4 Number of phases

9.2.2 Nominal voltage

Set the nominal voltage with the + and − buttons.

- Press T to store the setting and continue.
- Press R to store the setting and finish.

The programming mode ends automatically after 10 seconds, and the change is stored. See fig. *Example of basic setting*.

Related information

9.2.4 Number of phases

9.2.3 Trip class

Set the trip class with the + and − buttons.

For submersible pumps, manual setting of the trip delay, class "P", is normally selected. The time is factory-set to 10 seconds. It can be changed with Grundfos GO Remote.

For other pumps, the required IEC trip class (1-45) is to be set. Normally class 10 is selected. For trip curves, see section *IEC trip curves*.

- Press T to store the setting and continue.
- Press R to store the setting and finish.

The programming mode ends automatically after 10 seconds, and the change is stored. See fig. *Example of basic setting*.

Related information

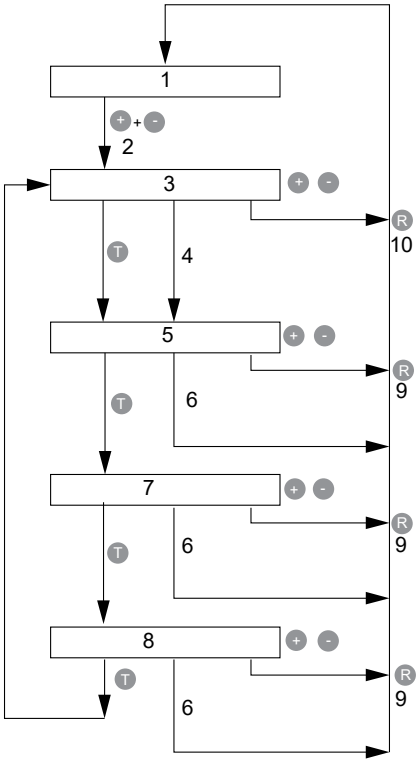
9.2.4 Number of phases

9.2.4 Number of phases

Set the number of phases with the + and − buttons (1 phase, 3 phases (non-earthed) or 3 phases with FE (functional earth)).

- Press T to store the setting and continue.
- Press R to store the setting and finish.

The programming mode ends automatically after 10 seconds, and the change is stored. See fig. *Example of basic setting*.



Example of basic setting

Pos.	Description
1	Status display
2	Press and hold for approximately 5 seconds
3	Set rated current
4	10 seconds The value is not stored
5	Set nominal voltage
6	10 seconds The value is stored

Pos.	Description
7	Set trip class
8	Set number of phases
9	The value is stored
10	The value is not stored

Related information

9.2 Setting on operating panel

9.2.1 Rated current

9.2.2 Nominal voltage

9.2.3 Trip class

9.3 Learning function

The learning function is factory-set to "Enabled".

After 2 minutes of continuous motor operation, "LRN" appears on the display for approximately 5 seconds, while the values are being stored in MP 204. See fig. *Operating panel*, pos. 3.

If, for instance, a Pt sensor or capacitor has been replaced, reactivate the learning function by pressing the R and − buttons for a minimum of 10 seconds.

The dot in the right side of the display is flashing. MP 204 is waiting for current to pass through the unit for a minimum of 120 seconds. Then the phase sequence is measured and stored.

In single-phase systems, MP 204 measures the capacity of the start and run capacitors and stores the values as reference.

If a Pt100/Pt1000 sensor is installed, the cable impedances to the sensor are measured and stored as reference.

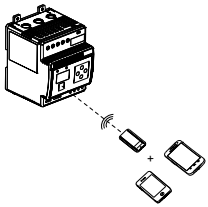
Related information

9.1 Operation

10. Grundfos GO Remote

The product is designed for infrared communication with Grundfos GO Remote. MP 204 must be configured using Grundfos GO Remote. The Grundfos GO Remote application can be downloaded from Apple Store and Google Play.

Grundfos GO Remote enables setting of functions and gives access to status overviews, technical product information, alarm logs and actual operating parameters.



TM074665

Grundfos GO Remote communication via infrared connection, IR

Grundfos MI 301

Separate module enabling radio or infrared communication. Use the module together with an Android or iOS-based smart device with Bluetooth connection.

10.1 Infrared communication

When communicating via infrared light, Grundfos GO Remote must be pointed at the operating panel.

10.2 Communication

If a Grundfos Communication Interface Unit (CIU) is to be used, we recommend you to fit it according to the wiring diagram and layout supplied with the Control MP 204.

All variants can be extended with external communication as an option.

10.3 Grundfos GO Remote menus

"Status and limits"

- "Average current"
- "Average voltage"
- "Tempcon motor temperature"
- "Pt sensor temperature"
- "Current unbalance"
- "Insulation resistance"
- "Cos φ"
- "Power consumption"

- "Energy consumption"
- "Energy trip counter"
- "Phase information"
- "Operating hours"
- "Number of starts"
- "Trip counter"
- "Harmonic distortion"

"Alarms and warnings"

- "Alarm log"

"Settings"

- "Mains connection"
- "Trip IEC class"
- "Trip class delay"
- "Trip delay"
- "Rated voltage"
- "External CT factor"
- "Power-on delay"
- "Automatic restarting"
- "Tempcon temperature"
- "PT sensor"
- "Insulation measurement"
- "PTC sensor/thermal switch"
- "Restarts per 24 hours"
- "Display units"
- "Display setup"
- "Show cos φ"
- "Show warning"
- "Number"
- "Learning"
- "Service"
- "Service warning"
- "Starts per hour"
- "Reset trip counter"
- "Reset energy counter"
- "Reset start counter"
- "Reset hours counter"
- "Reset all trip counters"
- "Store settings"
- "Recall settings"
- "Undo"
- "Unit configuration"

11. MP 204 with GENIbus

DANGER
Electric shock
Death or serious personal injury

- Ensure that the sensor and power cables are separated when installing GENIbus.
- Insulation between the cabinet and the product must have a suitable insulation resistance or the cabinet must be connected to protective earth.
- All cables taken through the product and the current transformers must be insulated.

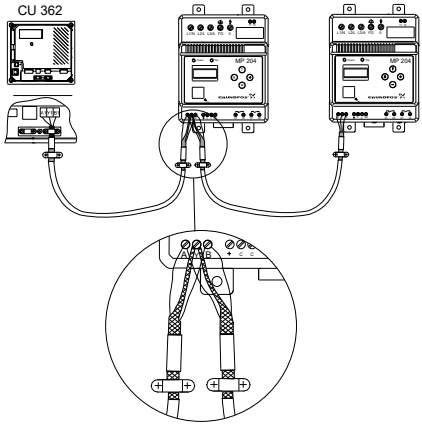
If several MP 204 units are connected to the same GENIbus, the connection is to be made as shown in fig. *GENIbus*.

Leave the screen as close to the conductive support as possible.

If GENIbus has been in use, and bus communication monitoring has been activated, MP 204 continues to monitor the bus activity. If MP 204 does not receive GENIbus telegrams, MP 204 presumes that the GENIbus connection has been disconnected and indicates a fault on the individual units.

Each of the units in the chain must be assigned an identification number with Grundfos GO Remote.

For further information about GENIbus, see Grundfos Product Center at www.grundfos.com.



GENIbus

12. Pump operation with MP 204

DANGER
Cause of fire
Death or serious personal injury

- The product must not be supplied with pump voltage that exceeds the rating on the nameplate.

12.1 Industrial pumps

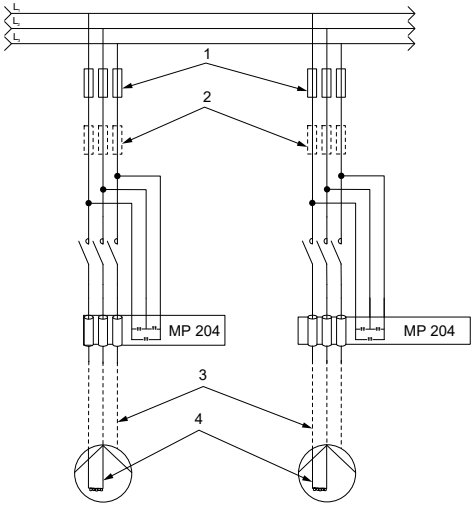
Industrial pumps may incorporate a PTC/thermal switch to be connected direct to MP 204.

Industrial pumps mainly apply IEC trip classes 20 to 30, depending on the liquid viscosity.

12.2 Submersible pumps

Submersible pumps normally have a short startup time. Trip class "P" can therefore be applied with advantage for these pumps. It is possible to set very short times down to for example 900 ms, used for certain specific applications.

To prevent the Tempcon signal from one submersible pump from interfering with the signal from another, cabling must be carefully made to allow measurements to be made of both pumps at the same time. The motor cables must be kept apart and not installed in the same cable tray. To avoid interference, it may be necessary to fit a filter on the power cables. See fig. *Submersible pump installation with Tempcon*.



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Submersible pump installation with Tempcon

Pos.	Description
1	Fuses
2	Filter
3	Cables are installed in separate conduits and cable trays
4	Tempcon circuit

Related information

6. Functions

12.3 Wastewater pumps

Wastewater pumps may incorporate a PTC/thermal switch to be connected direct to MP 204.

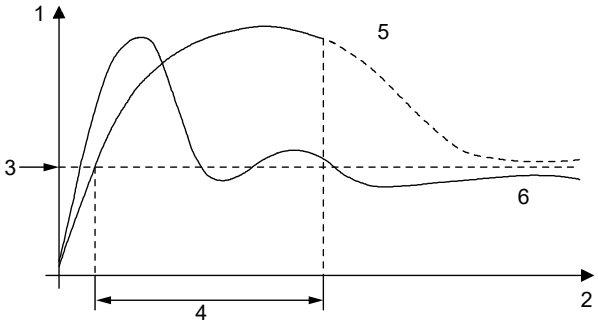
Wastewater pumps may also be connected to a Pt100/Pt1000 sensor. The sensor can also be connected direct to MP 204.

The Pt100/Pt1000 can be activated with Grundfos GO Remote. See PC Tool Water Utility.

A high IEC trip class is to be applied for wastewater pumps, especially grinder-type pumps. Classes 25 to 35 are the optimum choice. Apply IEC trip class 45 for pumping liquids of extremely high viscosity or liquids containing many solid particles.

13. Curves

13.1 Trip class "P"



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Curves for trip class "P"

Pos.	Description
1	Current
2	Time
3	Rated motor current
4	Trip delay
5	1. Curve with tripping
6	2. Curve without tripping

The trip delay indicates the maximum period of time during which the overload condition is allowed to exist, for example 5 seconds.

Example

A pump is to cut out after 900 ms because the rated current has been exceeded.

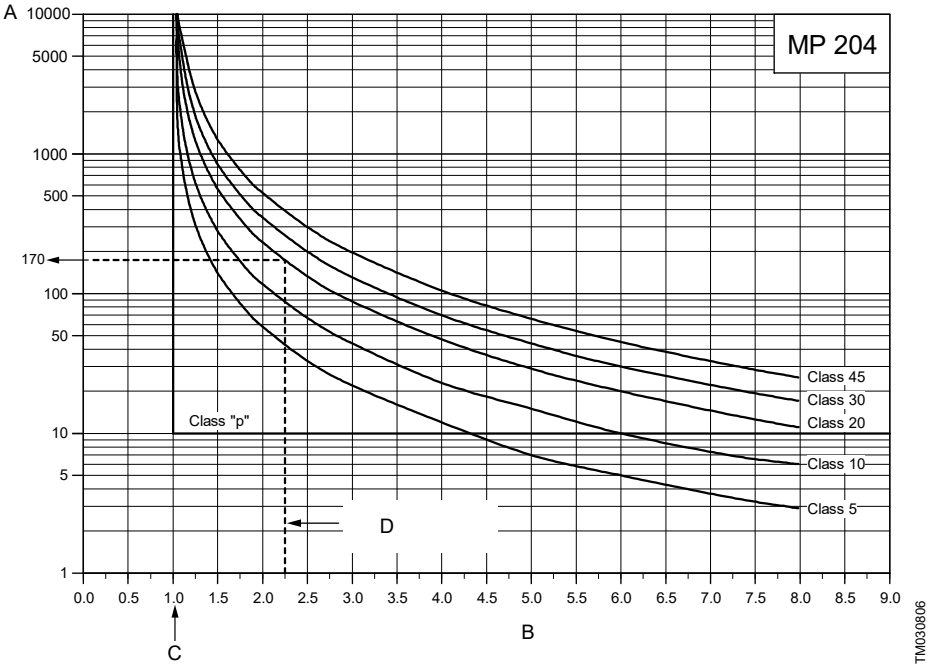
- Select trip class "P".
- Set the overload limit to 10 A (the rated motor current is stated on the nameplate).
- Set the trip delay to 900 ms.

Figure *Curves for trip class "P"*, curve 1: The pump has an abnormal startup time, and the current exceeds 10 A. MP 204 trips after 900 ms.

Figure *Curves for trip class "P"*, curve 2: The pump has a normal startup time, and the current exceeds 10 A only briefly (< 900 ms). MP 204 does not trip.

The curves are examples and cannot be used for readings.

13.2 IEC trip curves



IEC trip curves

Pos.	Description
A	Time [s]
B	x rated current
C	Rated current
D	2.25 x rated current

Example

- Set MP 204 to IEC trip class 20.
- Set the overload limit to 10 A. The rated motor current is stated on the nameplate.

At a motor current of 22.5 A (10 x 2.25), MP 204 trips after approximately 170 seconds.

14. Technical data

Ambient temperature

- During operation: -20 - +60 °C. The product must not be exposed to direct sunlight.
- In stock: -25 - +85 °C.
- During transport: -25 - +85 °C.

Relative humidity

5-95 %.

Materials

Enclosure class: IP20.

Plastic type: Black PC / ABS.

Weight

1.25 kg

15. Electrical data

Supply voltage

100-480 VAC, 50/60 Hz.

Current consumption

Maximum 5 W.

Short-circuit rating

Suitable for use on a circuit capable of delivering no more than 15,000 RMS symmetrical amperes, 480 V maximum.

15.1 Outputs

Trip relay

Voltage category	III
Insulation voltage	400 V to all other terminals
Insulation test voltage	4 kVAC
Maximum load	400 VAC, 2 A, AC-15/ 24 VDC, 2 A, DC-13, L/R = 40 ms
Minimum load	5 V/10 mA
Maximum load power AC/DC	400 VA/48 W
Contact type	Normally closed contact

Signal relay

Voltage category	III
Insulation voltage	400 V to all other terminals
Insulation test voltage	4 kVAC
Maximum load	400 VAC, 2 A, AC-15/24 VDC, 2 A, DC-13, L/R = 40 ms
Minimum load	5 V/10 mA
Maximum load power AC/DC	400 VA/48 W
Contact type	Normally open contact

15.2 Inputs

Input for PTC/thermal switch

Voltage category	III
Insulation voltage	400 V to all other terminals
Insulation test voltage	4 kVAC
Output voltage (open contact)	5 V
Output current (closed contact)	2 mA
Voltage step from high to low 	2.0 V
Equivalent external load	1.5 kΩ
Voltage step from low to high 	2.5 V
Equivalent external load	2.2 kΩ
Input filter time	41 ± 7 ms

Input for Pt100/Pt1000 sensor

Voltage category	II
Insulation voltage	50 V to system earth
Insulation test voltage	700 VDC
Temperature range	0-200 °C
Sensor type	Screened 2- or 3-core cable
Sensor current (Pt100)	2.5 mA
Sensor current (Pt1000)	0.25 mA

Mains frequency suppression	50-60 Hz
Filter times	
Integration time	100 ms
Reading interval	400 ms

15.3 Insulation measurement method

The insulation resistance is measured applying a rectified alternating voltage. The test voltage can therefore not be measured using an ordinary voltmeter.

The open-circuit test voltage is calculated as follows:

$$U_{test} \cong \sqrt{\frac{2}{3}} x U_{mains} \quad [V]$$

Example

MP 204 is connected to 3 x 400 V.

$$U_{test} \cong \sqrt{\frac{2}{3}} x 400 = 327 \quad [V]$$

15.4 Measuring ranges

	Measuring range	Accuracy	Resolution
Current without external current transformer	3-120 A	± 1 %	0.1 A
Current with external current transformer	120-999 A	± 1 %	1 A
Phase-to-phase voltage *	80-610 VAC	± 1 %	1 V
Frequency	47-63 Hz	± 1 %	0.5 Hz
Insulation resistance	10-1 MΩ	± 10 %	10 kΩ
Temperature via Pt100/Pt1000	0-180 °C	± 1 °C	1 °C
Temperature via Tempcon	0-125 °C	± 3 °C	1 °C
Power consumption	0-16 MW	± 2 %	1 W
Power factor (cos φ)	0-0.99	± 2 %	0.01
Run capacitor (single-phase)	10-1000 µF	± 10 %	1 µF
Start capacitor (single-phase)	10-1000 µF	± 10 %	1 µF
Number of starts	0-65535	-	1
Energy consumption	0-4x10^9 kWh	± 5 %	1 kWh

* The measuring circuit in MP 204 is designed for this range, but MP 204 must only be applied with rated supply voltage 100-480 VAC due to safety and approval requirements.

15.5 Setting ranges

	Setting range	Resolution
Current without external current transformer	3-120 A	0.1 A
Current with external current transformer	120-999 A	1 A
Phase-to-phase voltage *	80-610 VAC	1 V
Temperature via Pt100/Pt1000	0-180 °C	1 °C
Temperature via Tempcon	0-125 °C	1 °C
Power factor (cos φ)	0-0.99	0.01
IEC trip class	1-45 and "P"	1
Special trip class "P" (pump), trip delay	0.1 - 30 seconds	0.1 second
External current transformer factor	1-100	1
Run capacitor (single-phase)	10-1000 µF	1 µF
Start capacitor (single-phase)	10-1000 µF	1 µF
Number of starts per hour	0-65535	1
Number of starts per 24 hours	0-65535	1
Trip delay (other than current)	1-100 seconds	1 second
Automatic restarting time	10-3000 seconds	10 seconds
Power-on delay	1-19 seconds	1 second

* The measuring circuit in MP 204 is designed for this range, but MP 204 must only be applied with rated supply voltage 100-480 VAC due to safety and approval requirements.

16. Fault finding

WARNING
Electric shock
Death or serious personal injury

- Before dismantling, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

16.1 Warning and trip codes

Example	MP 204 display	A	32
Pos.	1	2	3

Pos.	Explanation
1	MP 204 display
2	A = Trip E = Warning
3	Fault code

Fault code	Trip	Warning	Cause of trip/warning
2	A	-	Missing phase
3	A	-	PTC/thermal switch
4	A	-	Too many automatic restarts per 24 hours
9	A	-	Wrong phase sequence
12	-	E	Service warning
15	A	-	Communication alarm for main system
18	A	-	Commanded trip (not in alarm log)
20	A	E	Low insulation resistance
21	-	E	Too many starts per hour
26	-	E	The motor is operating even if MP 204 is tripped
32	A	E	Overvoltage
40	A	E	Undervoltage
48	A	E	Overload
56	A	E	Underload
64	A	E	Overtemperature, Tempcon measurement
71	A	E	Overtemperature, Pt100/Pt1000 measurement
91	-	E	Signal fault, Tempcon sensor
111	A	E	Current unbalance
112	A	E	Cos φ, max.
113	A	E	Cos φ, min.
120	A	-	Auxiliary winding fault
123	A	E	Start capacitor, low
124	A	E	Run capacitor, low
175	-	E	Signal fault, Pt100/Pt1000 sensor

16.2 Fault finding the product

Fault	Possible cause	Remedy
MP 204 is not showing Cos (φ) and Energy Consumption.	Wrong connection of phases or learning function has not been completed.	Check the correct connection of phases L1, L2, L3, etc., and then repeat the learning function.
MP 204 display is not showing FFFF.	Checksum in the EERPOM is incorrect.	Reprogram the firmware to MP 204 from Grundfos PC Tool Water Utility.
MP 204 display shows P.	Internal failure.	Replace unit.
MP 204 display shows EEE0 or EEE3	Internal failure.	Replace unit.

17. Disposing of the product

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

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

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

See also end-of-life information at *www.grundfos.com/product-recycling*.

18. Document quality feedback

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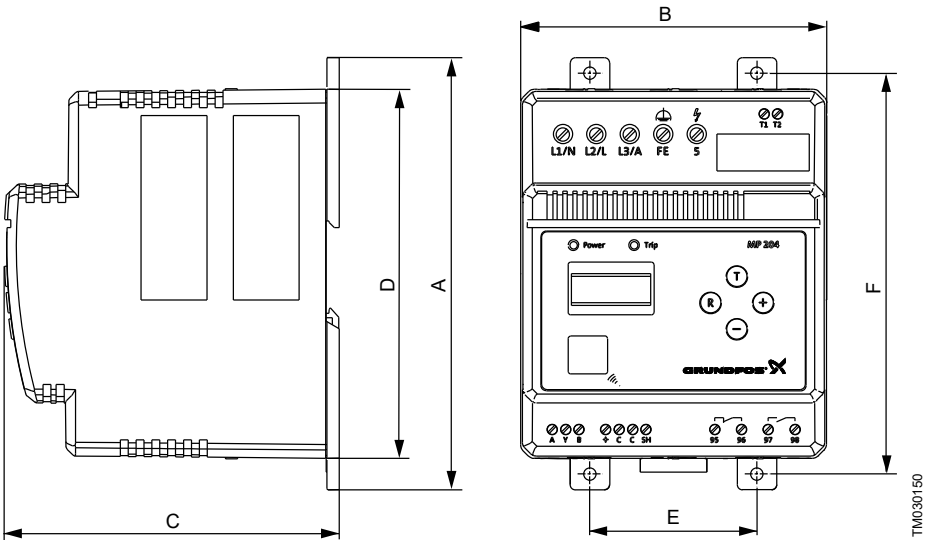
A.1. Appendix

MP 204 dimensions

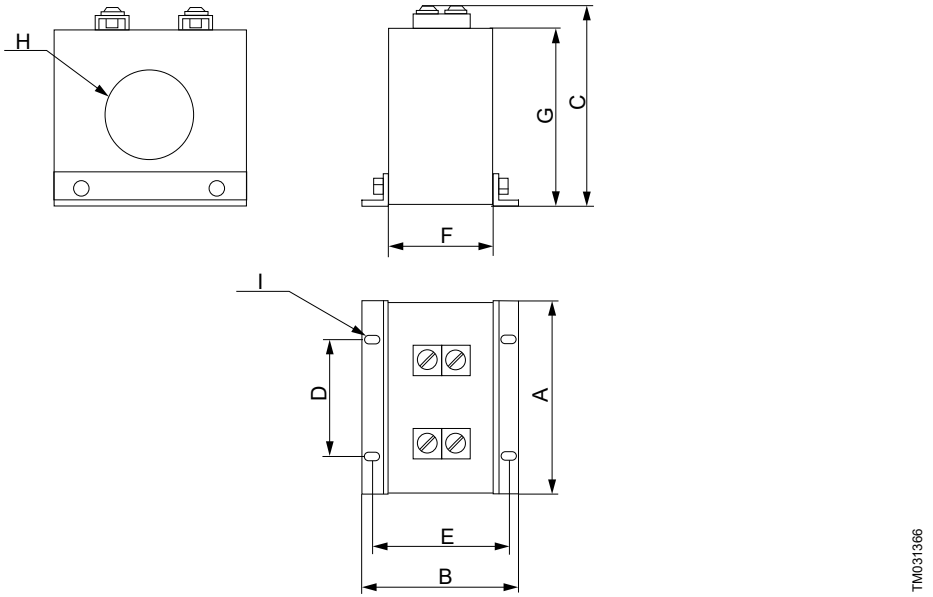


A	B	C	D	E	F
164	116	127	140	63	151

All dimensions in mm.

A.2. Appendix

Current transformer dimensions



Type	A	B	C	D	E	F	G	H ID	I ID	MP 204 CT factor
200:5	71.4	50.8	77.7	34.0	38.1	25.4	71.4	26.9	4.6	8
	2.81	**2.00**	**3.06**	**1.34**	**1.50**	**1.00**	**2.81**	**1.06**	**0.18**	
300:5	71.4	50.8	77.7	34.0	38.1	25.4	71.4	26.9	4.6	12
	2.81	**2.00**	**3.06**	**1.34**	**1.50**	**1.00**	**2.81**	**1.06**	**0.18**	
500:5	79.2	50.8	85.3	36.8	38.1	25.4	79.2	34.8	4.6	20
	3.12	**2.00**	**3.36**	**1.45**	**1.50**	**1.00**	**3.12**	**1.37**	**0.18**	
750:5	90.7	50.8	91.7	50.8	38.1	25.4	85.6	41.1	4.6	30
	3.57	**2.00**	**3.61**	**2.00**	**1.50**	**1.00**	**3.37**	**1.62**	**0.18**	
1000:5	91.9	50.8	98.0	50.8	38.1	25.4	91.9	47.5	4.6	40
	3.62	**2.00**	**3.86**	**2.00**	**1.50**	**1.00**	**3.62**	**1.87**	**0.18**	

Measurements in **bold** are inches.

Argentina
Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500industin
1619 - Garín Pcia. de B.A.
Tel.: +54-3327 414 444
Fax: +54-3327 45 3190

Australia
GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Tel.: +61-8-8461-4611
Fax: +61-8-8340-0155

Austria
GRUNDFOS Pumpen Vertrieb
Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Fax: +43-6246-883-30

Belgium
N.V. GRUNDFOS Bellux S.A.
Boomsesteenweg 81-83
B-2630 Aartselaar
Tel.: +32-3-870 7300
Fax: +32-3-870 7301

Belarus
Представительство ГРУНДФОС в Минске
220125, Минск
ул. Шафарнянская, 11, оф. 56, БЦ «Порт»
Тел.: +375 17 397 397 3
+375 17 397 397 4
Факс: +375 17 397 397 1
E-mail: minsk@grundfos.com

Bosnia and Herzegovina
GRUNDFOS Sarajevo
Zmaja od Bosne 7-7A
BiH-71000 Sarajevo
Tel.: +387 33 592 480
Fax: +387 33 590 465
www.ba.grundfos.com
E-mail: grundfos@bih.net.ba

Brazil
BOMBAS GRUNDFOS DO BRASIL
Av. Humberto de Alencar Castelo Branco, 630
CEP 09850 - 300
São Bernardo do Campo - SP
Tel.: +55-11 4393 5533
Fax: +55-11 4343 5015

Bulgaria
Grundfos Bulgaria EOOD
Slatina District
Iztochna Tangenta street no. 100
BG - 1592 Sofia
Tel.: +359 2 49 22 200
Fax: +359 2 49 22 201
E-mail: bulgaria@grundfos.bg

Canada
GRUNDFOS Canada inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Tel.: +1-905 829 9533
Fax: +1-905 829 9512

China
GRUNDFOS Pumps (Shanghai) Co. Ltd.
10F The Hub, No. 33 Suhong Road
Minhang District
Shanghai 201106 PRC
Tel.: +86 21 612 252 22
Fax: +86 21 612 253 33

Columbia
GRUNDFOS Colombia S.A.S.
Km 1.5 vía Siberia-Cota Conj. Potrero Chico,
Parque Empresarial Arcos de Cota Bod. 1A.
Cota, Cundinamarca
Tel.: +57(1)-2913444
Fax: +57(1)-8764586

Croatia
GRUNDFOS CROATIA d.o.o.
Buzinski prilaz 38, Buzin
HR-10010 Zagreb
Tel.: +385 1 6595 400
Fax: +385 1 6595 499
www.hr.grundfos.com

Czech Republic
GRUNDFOS Sales Czechia and Slovakia s.r.o.
Čajkovského 21
779 00 Olomouc
Tel.: +420-585-716 111

Denmark
GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tel.: +45-87 50 50 50
Fax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia
GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel.: + 372 606 1690
Fax: + 372 606 1691

Finland
OY GRUNDFOS Pumput AB
Trukkikuja 1
FI-01360 Vantaa
Tel.: +358-(0) 207 889 500

France
Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tel.: +33-4 74 82 15 15
Fax: +33-4 74 94 10 51

Germany
GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Fax: +49-(0) 211 929 69-3799
E-mail: infoservice@grundfos.de
Service in Deutschland:
kundendienst@grundfos.de

Greece
GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Tel.: +0030-210-66 83 400
Fax: +0030-210-66 46 273

Hong Kong
GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor, Siu Wai industrial Centre
29-33 Wing Hong Street & 68 King Lam Street, Cheung Sha Wan
Kowloon
Tel.: +852-27861706 / 27861741
Fax: +852-27858664

Hungary
GRUNDFOS Hungária Kft.
Tópark u. 8
H-2045 Törökbálint
Tel.: +36-23 511 110
Fax: +36-23 511 111

India
GRUNDFOS Pumps india Private Limited
118 Old Mahabalipuram Road
Thoraipakkam
Chennai 600 097
Tel.: +91-44 2496 6800

Indonesia
PT GRUNDFOS Pompa
Graha intirub Lt. 2 & 3
Jln. Cililitan Besar No.454. Makasar,
Jakarta Timur
ID-Jakarta 13650
Tel.: +62 21-469-51900
Fax: +62 21-460 6910 / 460 6901

Ireland
GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Tel.: +353-1-4089 800
Fax: +353-1-4089 830

Italy
GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Fax: +39-02-95309290 / 95838461

Japan
GRUNDFOS Pumps K.K.
1-2-3, Shin-Miyakoda, Kita-ku
Hamamatsu
431-2103 Japan
Tel.: +81 53 428 4760
Fax: +81 53 428 5005

Korea
GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Tel.: +82-2-5317 600
Fax: +82-2-5633 725

Latvia
SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60
LV-1035, Rīga,
Tel.: + 371 714 9640, 7 149 641
Fax: + 371 914 9646

Lithuania
GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel.: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia
GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie industrial Park
40150 Shah Alam, Selangor
Tel.: +60-3-5569 2922
Fax: +60-3-5569 2866

Mexico
Bombas GRUNDFOS de México
S.A. de C.V.
Boulevard TLC No. 15
Parque industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Tel.: +52-81-8144 4000
Fax: +52-81-8144 4010

Netherlands
GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Fax: +31-88-478 6332
E-mail: info_gnl@grundfos.com

New Zealand
GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Tel.: +64-9-415 3240
Fax: +64-9-415 3250

Norway
GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tel.: +47-22 90 47 00
Fax: +47-22 32 21 50

Poland
GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel.: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal
Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Fax: +351-21-440 76 90

Romania
GRUNDFOS Pompe România SRL
S-PARK BUSINESS CENTER, Clădirea A2, etaj 2
Str. Tipografilor, Nr. 11-15, Sector 1, Cod 013714
Bucuresti, Romania
Tel.: 004 021 2004 100
E-mail: romania@grundfos.ro

Russia
ООО Грундфос Россия
ул. Школьная, 39-41
Москва, RU-109544, Russia
Тел. (+7) 495 564-88-00 (495) 737-30-00
Факс (+7) 495 564 8811
E-mail grundfos.moscow@grundfos.com

Serbia
Grundfos Srbija d.o.o.
Omladinskih brigada 90b
11070 Novi Beograd
Tel.: +381 11 2258 740
Fax: +381 11 2281 769
www.rs.grundfos.com

Singapore
GRUNDFOS (Singapore) Pte. Ltd.
25 Jalan Tukang
Singapore 619264
Tel.: +65-6681 9688
Faxax: +65-6681 9689

Slovakia
GRUNDFOS s.r.o.
Prievozská 4D 821 09 BRATISLAVA
Tel.: +421 2 5020 1426
sk.grundfos.com

Slovenia
GRUNDFOS LJUBLJANA, d.o.o.
Leskoškova 9e, 1122 Ljubljana
Tel.: +386 (0) 1 568 06 10
Fax: +386 (0)1 568 06 19
E-mail: tehnika-si@grundfos.com

South Africa
GRUNDFOS (PTY) LTD
16 Lascelles Drive, Meadowbrook Estate
1609 Germiston, Johannesburg
Tel.: (+27) 10 248 6000
Fax: (+27) 10 248 6002
E-mail: lgradidge@grundfos.com

Spain
Bombas GRUNDFOS España S.A.
Camino de la Fuentecilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Fax: +34-91-628 0465

Sweden
GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46 31 332 23 000
Fax: +46 31 331 94 60

Switzerland
GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-44-806 8111
Fax: +41-44-806 8115

Taiwan
GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Tel.: +886-4-2305 0868
Fax: +886-4-2305 0878

Thailand
GRUNDFOS (Thailand) Ltd.
92 Chaloem Phrakiat Rama 9 Road
Dokmai, Pravej, Bangkok 10250
Tel.: +66-2-725 8999
Fax: +66-2-725 8998

Turkey
GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
Ihsan dede Caddesi
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Tel.: +90 - 262-679 7979
Fax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine
ТОВ "ГРУНДФОС УКРАЇНА"
Бізнес Центр Європа
Столичне шосе, 103
м. Київ, 03131, Україна
Tel.: (+38 044) 237 04 00
Fax: (+38 044) 237 04 01
E-mail: ukraine@grundfos.com

United Arab Emirates
GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone, Dubai
Tel.: +971 4 8815 166
Fax: +971 4 8815 136

United Kingdom
GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 4TL
Tel.: +44-1525-850000
Fax: +44-1525-850011

U.S.A.
Global Headquarters for WU
856 Koomey Road
Brookshire, Texas 77423 USA
Phone: +1-630-236-5500

Uzbekistan
Grundfos Tashkent, Uzbekistan
The Representative Office of Grundfos Kazakhstan in Uzbekistan
38a, Oybek street, Tashkent
Tel.: (+998) 71 150 3290 / 71 150 3291
Fax: (+998) 71 150 3292

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