Operating the

MP 204
Electronic Motor Protection Unit

via
GENIbus or G100

Edition 2.28, May 2011

This document is mainly intended for development engineers integrating GENIbus based Grundfos motors/pumps in automation systems using a direct access to GENIbus or access via the gateway G100.

It contains all data items from the Functional Profile of the device with a description of how to use and interpret them. This makes the application programmer able to operate and configure the motors/pumps for different applications and to utilize their functionality to its full extend.

Using the information in this document for implementation of direct GENIbus access presuppose knowledge of the GENIbus communications protocol as described in the *GENIbus Protocol Specification.*

Using the information for implementation of communication with GENIbus devices via G100 presuppose knowledge of how to access data in G100 from the main network in question. Documents for each of the main network connections are included on the PC Tool G100 Package CD ROM.

Contents

1. Introduction

This document describes the functional profile for the Grundfos motor protection unit MP 204. By using direct GENIbus communication, or by using communication via gateway G100 you can access the data items in the functional profile. Both ways of communication use the same identifier names and the same access rights (read/write). However, there are some small differences in the way data is represented and accessed, which influences the description in this manual. These differences are important to notice, and so they are summarized here:

	GENIbus directly	**Via gateway G100**
Protocol	GENIpro, see /1/	G100 Basic: • G100 protocol, see /4/ G100 R/M/P: • G100 protocol, see /4/ • Comli protocol, see /6/ • Modbus, see /7/ G100 Profibus: • Profibus-DP, see /8/ G100 Interbus: • See /9/
Addressing the unit	Unit Address = No. (given with R100) + 0x1F Example: Give the device No. 4 with R100, then its GENIbus address will be 0x04+0x1F = 0x23	Index = No. (given with R100) + 0x211F Example: Give the device No. 4 with R100, then its G100 index will be 0x04+0x211F = 0x2123
Adressing a data item	Is done with a Class No. [2; 5] and an ID code [0; 255]	Is done with a subindex [0; 255]
Data Format	The basic format is 8 bit. 16 bit items are split into two 8 bit items with suffix _hi, _lo 24 bit items are split into three 8 bit items with suffix _hi, _lo1, _lo2 32 bit items are split into two 8 bit items with suffix _hi, _lo1, _lo2, _lo3	Subindex <240: data items are 16 bit Subindex >= 240: data items are 32 bit
Scaling	Scaling information like range and unit is requested separately for each data item with an INFO operation. Some data items have a predefined scaling. In these cases it will be mentioned in the tables.	Scaling is predefined and mentioned in the tables

Table 1: *Summarizing the differences in accessing GENIbus data directly or via the gateway G100.*

When a data item is referred to in the text or in a table, it will often be done like this:

`i_asym` (2, 49 / 16)

`i_asym` is the identifier for the data item. *(2, 49 / 16)* means Class 2, ID code No. 47 for GENIbus access and subindex 16 for G100 access.

Notice that not all available data items are explained in the text chapters, but the overview in chapter 11 contains a complete list.

DATA NOT AVAILABLE
8 bit data item values of '0xFF' must be interpreted as “NA” (data not available) for GENIbus. For 16/32 bit values this rule counts for the high order byte (For a low order data item to a 16/32 bit value '0xFF' is a legal value). For G100 the value '0xFFFF' and '0xFFFFFFFF' has this meaning for a 16 bit or a 32 bit data item respectively.

CHANGING OF SETTINGS
Whenever a setting in the MP 204 is changed via a command (Class 3 data item), a configuration parameter (Class 4 data item) or via a reference value (Class 5 data item) the setting will take effect instantaneously, meaning that there is no need to power the MP 204 off and on again. Settings (but not mode changes) are always preserved during power off.

GENIBUS MAXIMUM TELEGRAM LENGTH
The MP 204 cannot buffer telegrams longer than 70 byte. So, for GENIbus access, telegrams are not allowed to exceed a complete length of 70 byte neither for Data Requests nor for Data Replies.

2. Addressing

Any GENIbus unit can be addressed by sending a telegram to its personal Unit Address. The Unit Address can be configured from the bus by writing to the data item:

`unit_addr` (4, 46 / 94)

From the factory the address has been preset to a standard value (=231). The Unit Address for each unit on the bus system must have been written with a unique value for the network communication to work. This can be done via the bus if the units are connected one at a time and then programmed or it can be done with R100 which is the most obvious and easy way. Notice that assigning a unit No *x* with R100 means assigning the unit the physical network address *x+31*.

If communicating directly over GENIbus, the Broadcast Address (=255) can also be used to get in contact with a unit. Caution must be exercised when requesting data via broadcast addressing. If more than one unit is connected several simultaneous replies might result.

3. Device Identification

The data items **`unit_family` (2, 148 / 40)**, **`unit_type` (2, 149 / 41)** and **`unit_version` (2, 150 / 42)** can be used to identify different GENIbus units. The MP 204 replies with:

`unit_family` (2, 148 / 42)	=	7
`unit_type` (2, 149 / 43)	=	1
`unit_version` (2, 150 / -)	=	0

The MP 204 is prepared for temperature measuring using the analogue Tempcon power line signal and a platinum resistor thermometer (PT resistor). The installer uses a setup command (see later) to enable/disable these signals according to the physical installation. When MP 204 knows that a PT resistor is connected, it can automatically detect the type of platinum resistor used. This information is contained in the data item below.

`temp_meas_type` (2, 98 / 33) Temperature measuring type. Platinum resistor type is automatically detected from software.

Bit No.	Description
1-0	*Tempcon signal*
	00: No signal
	01: Analogue signal
	10: Digital signal (future)
4-2:	*Platinum resistor*
	000: Open circuit
	001: Short circuit
	010: PT100
	011: PT500
	100: PT1000

4. Display and signal interface

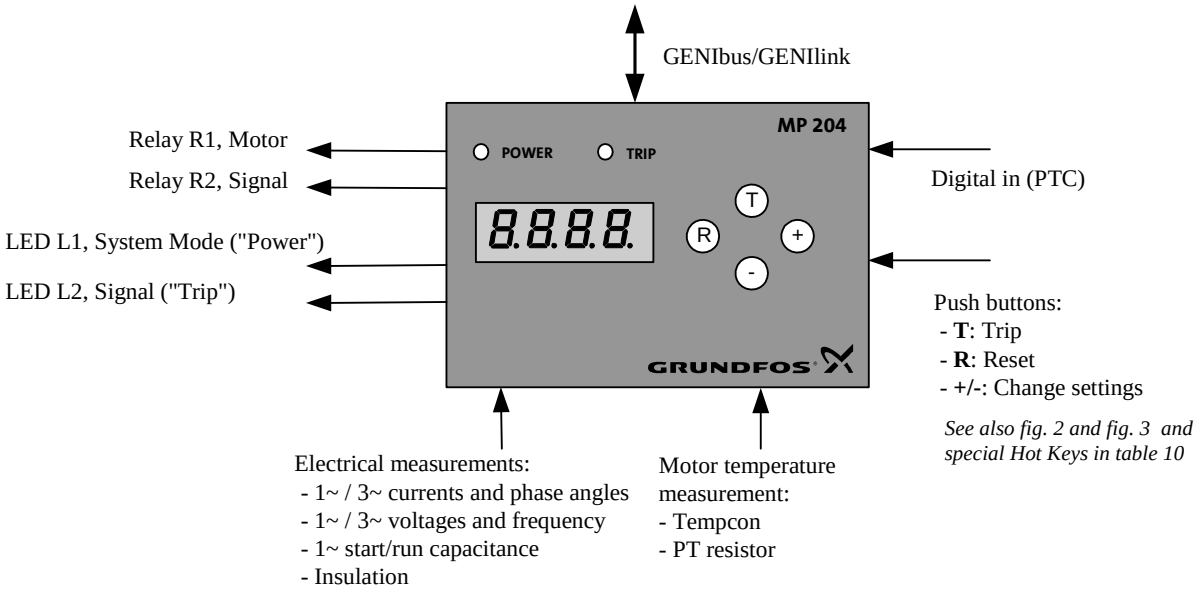


Figure 1: *Overview of MP 204 input/output signals (Context diagram).*

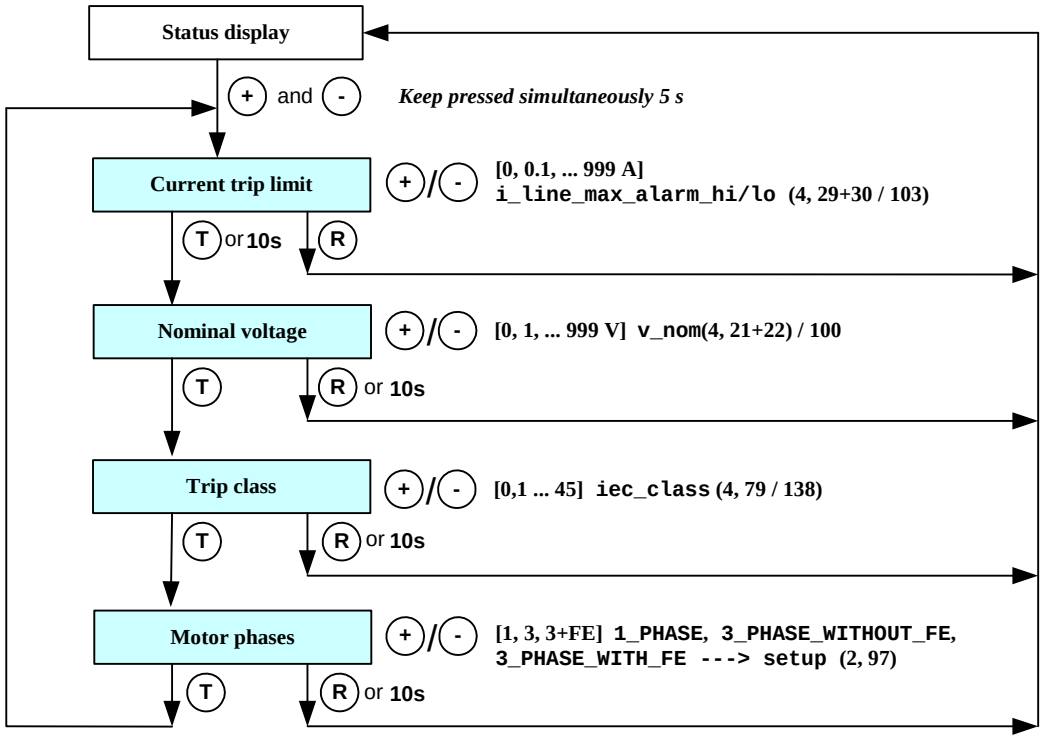


Figure 2: *Configuration of MP204 functionality via the LED display. The comments to the right show the value range of the displayed parameter and the data item in which it is stored. Used commands are also shown. After 10 s without any keys pressed the display returns to the status display (figure 3).*

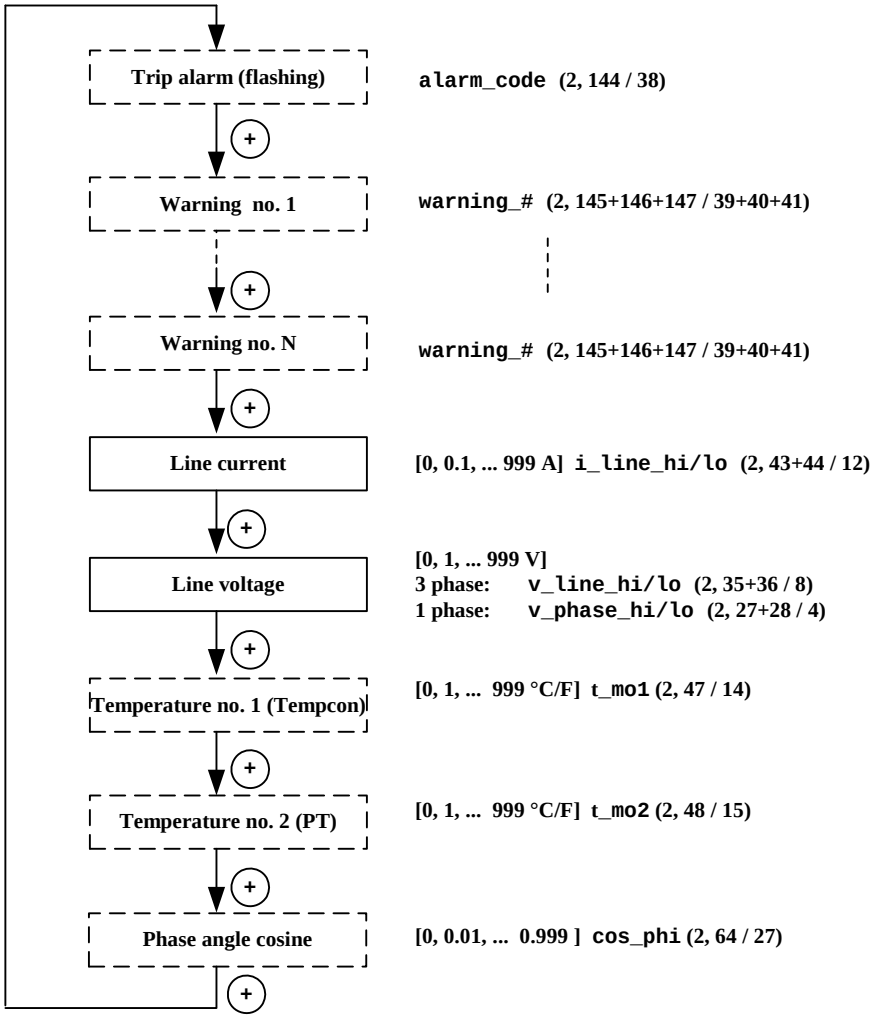


Figure 3: *Display of status. The temperature values and cos(φ) are only shown if the signal in question is enabled in the data item* ***setup*** *(2, 97 / 32). If a temperature signal is enabled but the signal is faulty, a horizontal line '----' will be shown. After 5 s without any keys pressed the display returns to the primary status parameter (in this case* ***i_line_hi/lo****), which is selected in the data item* ***display_setup*** *(4, 87 / 142). The comments to the right show the value range of the displayed parameter and the data item in which it is stored.*
If the MP 204 has tripped, the Alarm Code proceeded by an 'A' will be shown flashing instead of the primary status parameter. If warnings are present their code proceeded by an 'E' will be shown (if enabled), as illustrated.

display_setup (4, 87 / 122) Setup of certain features for the display.

Bit No.	Description
0:	*Unit system*
	0: SI (default)
	1: US
1:	*Enable display of warnings*
	0: Warnings are not shown in display (default)
	1: Warnings shown as specified in figure 3
3-2:	*Primary status value (shown continuously)*
	00: Line current (default)
	01: Temperature 1 (Tempcon signal)
	10: Temperature 2 (PT Resistor signal)
	11: -
4:	*Enable display of cos(φ)*
	0: cos(φ) is not shown in display
	1: cos(φ) is shown in display (default)

5. Mode Control and Functional Setup

The figures below illustrate how the MP 204 works. After power is applied, MP 204 will remain in the System Mode "Power on" for the time **`t_power_on_delay` (4, 76 / 135)**. This is indicated with a green blinking LED 1. Only the timeout can terminate this mode.

Hereafter MP 204 checks that all supervised values, which can be measured when the motor is switched off (voltage, PT temperature, insulation resistance etc…) are within the configured protection limits (table 5) and that no other alarm condition is present (external digital alarm, wrong phase sequence, etc…). If this is fulfilled Operating mode "Started" will be entered in case **`setup`** bit 7 equals 0 and Operating mode "Tripped 3" will be entered in case **`setup`** bit 7 equals 1. If it is not fulfilled Operating mode "Tripped 1" will result.

System Modes	**Power on** →	**Operating**				**Fault**
Operation Modes		**Started**	**Tripped 1**	**Tripped 2**	**Tripped 3**	
Relay R1 (Motor)	Open	Closed	Open	Open	Open	Open
Relay R2 (Signal)	Open	Open *)	Closed	Closed	Open	Open
LED 1 (System Mode)	Green blink	Green	Green	Green	Green	Red
LED 2 (Follows R2)	Off	Off *)	Red on	Red on	Off	Off
Ready	Off	On	On/Off **)	On	On	Off

) This is the normal condition, but it can be changed in two ways. R2 can be commanded independently by the commands **`RELAY2_OPEN`, **`RELAY2_CLOSED`** (LED 2 will follow it). If protection is disabled (command **`PROTECTION_D`**) Operating mode "Tripped 1" will not result in the case of an alarm condition, Operating mode will remain "Started", but R2 will be closed and LED 2 will be On.*

***) On if no alarm condition is present and the Auto restart timeout has elapsed, else Off.*

Figure 4: *An illustration of System Modes and Operating modes*

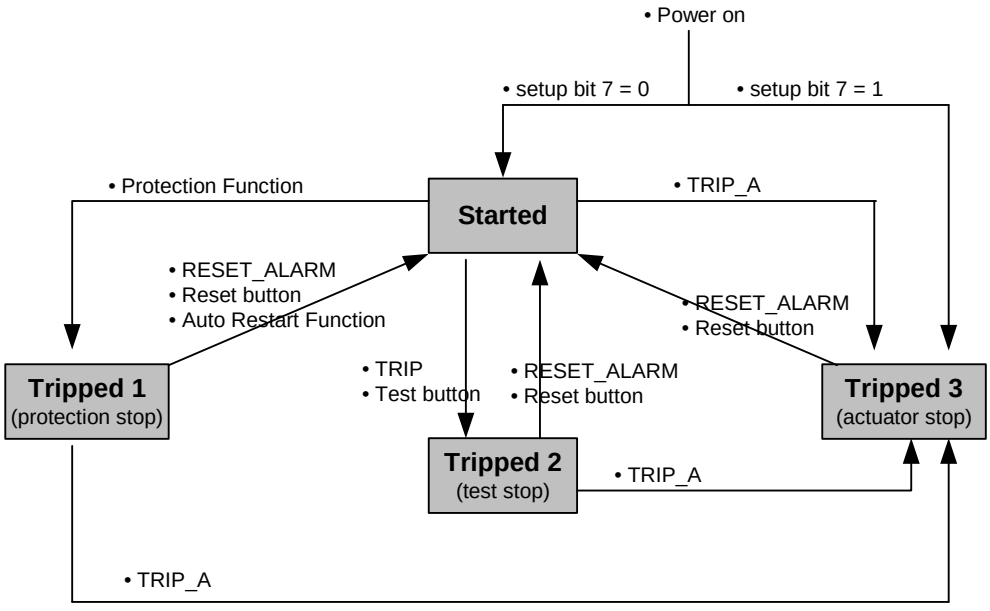


Figure 5: *An illustration of the events that control Operating mode changes. Whenever a return to "Started" from one of the Trip Modes is attempted the Protection Function is first evaluated. If an alarm results the Operating mode will be "Tripped 1".*

If the connected motor is a 3 phase motor and the learning function is armed (which is the case from factory) the actual phase sequence will be measured after 120s and be considered the correct one. It will be stored as the

reference phase sequence, used for comparison for all following power up phase sequence checks (recorded in **setup**).

If the connected motor is a 1 phase motor and the learning function is armed (which is the case from factory) the start and the run capacitances will be measured when the motor is switched on and be considered as the reference values, **c_start_ref** and **c_run_ref**. These values will be stored as the reference used for comparison for the future monitoring of capacitance.

If MP 204 detects a hardware fault, System Mode "Fault" will result. Only a power off can terminate this mode.

With the command **TRIP** it is possible to provoke MP 204 to trip. It will enter Operation Mode "Tripped 2" and the alarm code "Commanded trip" will result. This is identical to pressing the "Test" button. The MP 204 will never restart automatically from Operating mode "Tripped 2". This condition can only be released with a **RESET_ALARM** command, pressing of the Reset button or power off.

With the command **TRIP_A** it is possible to provoke MP 204 to trip without indicating it with R2, LED 2 or in the alarm code system (chapter 6). It will enter Operating Mode "Tripped 3" from where it can only be released with a **RESET_ALARM** command, pressing of the Reset button or power off. "Tripped 3" is for actuator operation of MP 204.

The commands **RELAY2_OPEN** / **RELAY2_CLOSE** can only be used to toggle the signal relay (R2) in Operating mode "Started". The red diode LED 2 will always follow R2.

It is possible to disable the Motor Protection Function of the MP 204 with the command **PROTECTION_D**. This is called motor protection override. The red alarm indication of LED 2 and the activation of the alarm signal relay (R2) is however always active, so is the alarm code system (chapter 6). In other words, you will get the alarm, but the motor will not be switched out. When MP 204 operates with the protection functions disabled the green LED 1 will have a pulsing light instead of a steady light. The command **PROTECTION_E** or power off will release the motor protection override.

act_mode1 (2, 95 / 30) Actual modes operated with commands. None of these modes are preserved during power off, they all return to the power on default.

Bit No.	Description
2-0:	*Operating modes* 000: Started (power on default if **setup** bit 7 = 0) 001: Tripped 1 (due to Motor Protection Function) 010: Tripped 2 (due to **TRIP** command or TEST button) 011: Tripped 3 (due to **TRIP_A** command. Power on default if **setup** bit 7 = 1)
3:	*Motor electrically switched off* 0: Motor is not switched off (it is running and consuming power) 1: Motor is electrically switched off (by ext. contactor or by MP204)
4:	*Relay 1 (motor control relay)* 0: Relay 1 opened 1: Relay 1 closed (power on default after timeout)
5:	*Relay 2 (signal relay)* 0: Relay 2 opened (power on default) 1: Relay 2 closed
6:	*Function Modes* 0: Use, result of command **USE** (power on default) 1: Test, result of command **TEST**
7:	*Protection Modes* 0: Protection enabled, command **PROTECTION_E** (power on default) 1: Protection disabled, command **PROTECTION_D**

act_mode2 (2, 96 / 31) Operated by MP 204 itself.

Bit No.	Description
1-0:	*System Modes (can be operated by MP 204 itself)* 00: Power up (**t_power_on_delay**) 01: Operating 10: Fault, MP 204 has a device fault, power off is required to restart
2:	*Ready* 0: MP204 not "Ready" (Alarm present or Auto restart timeout running)

1: MP204 "Ready" (No alarm present and Auto restart timeout elapsed)

3: *Pending Alarm (cleared with **RESET_ALARM** or power off)*
0: No pending alarm
1: Pending alarm

led_ctr (2, 141 / 35) Controls the LED indicators

Bit No.	Description	
2-0:	*Status of LED 1 (red/green), System Mode*	
	000: Off:	Power off
	001: Green blinking (4 Hz, 50% on):	Power up
	010: Green on:	Operating
	011: Red blinking:	-
	100: Red on:	Device fault
	101: Green pulsing (1 Hz, 90% on):	Protection function disabled
4-3:	*Status of LED 2 (red), follows signal relay R2*	
	00: Off:	Operating mode "Started" (if R2 is not commanded)
	01: Blinking:	-
	10: On:	Operating mode "Tripped" (if R2 is not commanded and protection is not disabled)

Command	Class, ID / Subindex	Action
TRIP	3, 81 / 63	Equals the pressing of front plate button "Test" • Opens Relay 1 (motor control relay) and closes Relay 2 (signal relay) • Updates Relay 1 Mode to be "Open" (**act_mode1**) • Updates Relay 2 Mode to be "Closed" (**act_mode1**) • Updates Operating mode to be "Tripped 2" (**act_mode1**) • Updates Pending Alarm bit to be "On" (**act_mode2**) • LED 2 = Red on (follows Relay 2) • **alarm_code** = "Commanded trip", alarm log updated
TRIP_A	3, 95 / 75	• Opens Relay 1 (motor control relay) • Updates Relay 1 Mode to be "Open" (**act_mode1**) • Updates Operating mode to be "Tripped 3" (**act_mode1**) • Display shows OFF
RELAY2_OPEN	3, 79 / -	• Opens Relay 2 (signal relay) • Updates Relay 2 Mode to be "Open" (**act_mode1**) • LED 2 = off (follows Relay 2)
RELAY2_CLOSE	3, 80 / -	• Closes Relay 2 (signal relay) • Updates Relay 2 Mode to be "Closed" (**act_mode1**) • LED 2 = Red on (follows Relay 2)
RESET_ALARM	3, 2 / 56	If the motor is not in Operating mode "Started" and the Protection Function doesn't return an alarm event, 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 Operating mode to be "Started" (**act_mode1**) • Updates Relay 1 Mode to be "Closed" (**act_mode1**) • Updates Relay 2 Mode to be "Opened" (**act_mode1**) • LED 2 = off If the Motor Protection Function returns an alarm event Operating mode "Tripped 1" will result instead. In all Operating modes except "Tripped 3" **RESET_ALARM** equals the pressing of front plate button "RESET".
PROTECTION_E	3, 11 / 57	• General protection enable. All the motor protections which have been enabled in **alarms1_enable** and **alarms2_enable** will be active • Updates Protection Mode to be "Enabled" (**act_mode1**)
PROTECTION_D	3, 12 / 58	• General protection disable (motor protection override). When an alarm occur the motor will not be switched out. • Updates Protection Mode to be "Disabled" (**act_mode1**) • The red diode LED2 and the signal relay R2 is still active • The **alarm_code**, **warning_code** and the alarm log is still active

Table 2: *Mode changing commands. All mode changing's are recorded in **act_mode1***

`setup` (2, 97 / 32) Device setup operated with setup commands (this setup is saved during power off)

Bit No. Description

0: *Phase sequence*
- 0: Phase sequence right: L1-L2-L3 (factory default)
- 1: Phase sequence left: L3-L2-L1

Reversed with **`REVERSE_SEQUENCE`**

2-1: *Motor type*
- 00: 1~ motor connected, command **`1_PHASE`**
- 01: 3~ motor without FE, command **`3_PHASE_WITHOUT_FE`** (factory default)
- 10: 3~ motor with FE, **`3_PHASE_WITH_FE`**
- 11: -

3: *Tempcon measurement*
- 0: Temperature measured by Tempcon disabled, command **`TEMPCON_D`** (factory default)
- 1: Temperature measured by Tempcon enabled, command **`TEMPCON_E`**

4: *PT measurement*
- 0: Temp. measured by PT resistor disabled, command **`PT_RESISTOR_D`** (factory default)
- 1: Temp. measured by PT resistor enabled, command **`PT_RESISTOR_E`**

5: *Auto restart*
- 0: Auto restart disabled, command **`AUTO_RESTART_D`**
- 1: Auto restart enabled, command **`AUTO_RESTART_E`** (factory default)

6: Learning
- 0: Phase/capacitance learning unarmed (learning has taken place)
- 1: Phase/capacitance learning armed, command **`ARM_LEARNING`** (factory default). Point after the last digit in the display will be flashing.

7: *Power on start/stop*
- 0: Power on start selected, command **`POWER_ON_START`** (factory default)
- 1: Power on stop selected, command **`POWER_ON_STOP`**

Command	Class, ID / Subindex	Action
`AUTO_RESTART_E`	3, 41 / 60	• Enables automatic restart after Operating mode “Tripped 1”
`AUTO_RESTART_D`	3, 42 / 61	• Disables automatic restart after Operating mode “Tripped 1”
`REVERSE_SEQUENCE`	3, 84 / 64	• Reverses the present setting of the correct phase sequence
`ARM_LEARNING`	3, 85 / 65	• For 3 phase motor: Arms the phase sequence learning function. The next time MP 204 is powered on the phase sequence will be detected and stored as reference sequence in **`setup`**. • For 1 phase motor: Arms the capacitance learning function. The next time MP 204 is powered on the start and run capacitance will be measured and stored as reference in **`c_start_ref_hi/lo`**, **`c_run_ref_hi/lo`**. As long as “Learning” is armed, the point after the last digit in the display will be flashing. When “Learning” completes the display will show `Lrn` for 5 s.
`1_PHASE`	3, 89 / 69	• Setup of MP 204 to monitor a 1 phase motor.
`3_PHASE_WITHOUT_FE`	3, 90 / 70	• Setup of MP 204 to monitor a 3 phase motor. The Functional Earth wire (FE) is not connected
`3_PHASE_WITH_FE`	3, 91 / 71	• Setup of MP 204 to monitor a 3 phase motor. The Functional Earth wire (FE) is connected
`TEMPCON_E`	3, 92 / 72	• Enable temperature measurement with Tempcon power line signal
`TEMPCON_D`	3, 93 / 73	• Disable temperature meas. with Tempcon power line signal
`PT_RESISTOR_E`	3, 94 / 74	• Enable temperature measurement with PT resistor
`PT_RESISTOR_D`	3, 98 / 76	• Disable temperature measurement with PT resistor
`POWER_ON_START`	3, 99 / 77	• Motor will be switched on (Operating mode Started) after power on
`POWER_ON_STOP`	3, 100 / 78	• Motor will be switched off (Operating mode Tripped 3) after power on

Table 3: *Setup commands. The result of each of these commands is recorded in* ***`setup`****.*

`dig_in` (2, 99 / 34) Value of the digital inputs

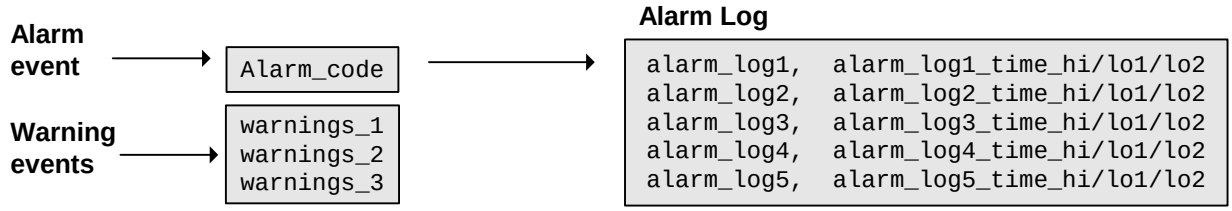
Bit No.	Description
0:	*Value of digital input 0* 1: PTC open (alarm high temperature) 0: PTC closed
1:	*Measured phase sequence* 0: Phase sequence is right: L1-L2-L3 1: Phase sequence is left: L3-L2-L1
7-2:	-

6. Alarm Handling and Alarm Setup

6.1 Data items for alarm/warning status

If an alarm event occurs when MP 204 is in Operating mode "Started" or when attempting to enter this mode from one of the Trip Modes, it will automatically enter the Operating mode "Tripped 1". A system of data items for recording alarm events in the form of *codes* and *bits* exist in the MP 204. The data items to use are listed and explained below and illustrated in figure 6. The interpretation of the codes are according to Table 4.

`alarm_code` (2, 144 / 38), `warnings_1` (2, 145 / 39), `warnings_2` (2, 146 / 40), `warnings_3` (2, 147 / 41):
An alarm which has caused the MP 204 to trip is shown as a code number in **`alarm_code`**. In Operating modes "Tripped 1", "Tripped 2" and "Tripped 3" the value is kept and not updated until restart is attempted. Warnings are shown by setting the corresponding bit in one of the warning data items. Several warnings can be present and be shown simultaneously. See the data items **`warnings_1`**, **`warnings_2`** and **`warnings_3`**.



Figur 6: *Illustration of the MP 204 alarm and warning recording system. Notice that warnings are not logged.*

Code	Alarm/Warning Cause	Reaction Delay	1~/3~	A/W	Restart
2	Missing phase	-	3	A	condition+**`t_auto_restart`**
3	External Fault Signal (PTC)	**`trip_delay`**	1+3	A	condition+**`t_auto_restart`**
4	Too many auto restarts (**`auto_restarts_per_24h`**)	-	1+3	A	reset required
9	Phase sequence reversal	-	3	A	condition+**`t_auto_restart`**
12	Service warning (**`t_run_trip_cnt`**)	-	1+3	W	-
15	Main system communication alarm	-	1+3	A	condition+**`t_auto_restart`**
18	Commanded trip, Trip 2 mode (Not in alarm log)	-	1+3	A	reset required
20	Insulation resistance low (**`r_insulation`**)	**`trip_delay`**	3	A+W	condition+**`t_auto_restart`**
21	Too many starts per hour (**`starts_per_h`**)	-	1+3	W	-
26	Load continues despite motor relay R1 is off (tripped)	-	1+3	W	-
32	Overvoltage (**`v_phase`**, **`v12`**, **`v23`**, **`v31`**)	**`trip_delay`**	1+3	A+W	condition+**`t_auto_restart`**
40	Undervoltage (**`v_phase`**, **`v12`**, **`v23`**, **`v31`**)	**`trip_delay`**	1+3	A+W	condition+**`t_auto_restart`**
48	Overload (**`i_line`**, **`i1`**, **`i2`**, **`i3`**)	**`iec_class/ cur_trip_delay`**	1+3	A+W	**`t_auto_restart`**
56	Underload (**`i_line`**, **`i1`**, **`i2`**, **`i3`**)	**`trip_delay`**	1+3	A+W	**`t_auto_restart`**
64	Overtemperature Tempcon measurement (**`t_mo1`**)	**`trip_delay`**	3	A+W	condition+**`t_auto_restart`**
71	Overtemperature PT100 measurement (**`t_mo2`**)	**`trip_delay`**	1+3	A+W	condition+**`t_auto_restart`**
91	Tempcon sensor signal fault	**`trip_delay`**	1+3	W	-
111	Current asymmetry (**`i_asym`**)	**`trip_delay`**	3	A+W	**`t_auto_restart`**
112	Cos(φ) max alarm (**`cos_phi`**)	**`trip_delay`**	1+3	A+W	**`t_auto_restart`**
113	Cos(φ) min alarm (**`cos_phi`**)	**`trip_delay`**	1+3	A+W	**`t_auto_restart`**
120	Aux. winding alarm $I_{aux}<0.05 \cdot I_{line,max,alarm}$	**`trip_delay`**	1	A	**`t_auto_restart`**
123	Start capacitor too low (**`c_start`**)	**`trip_delay`**	1	A+W	**`t_auto_restart`**
124	Run capacitor too low (**`c_run`**)	**`trip_delay`**	1	A+W	**`t_auto_restart`**
175	PT100 temperature sensor signal fault	**`trip_delay`**	1+3	W	-

Table 4*: Alarm Code numbering system. A: always an alarm; W: always a warning; A+W: can be both.*

warnings_1 (2, 145 / 39) Status of active warnings, byte 1

Bit No.	Description
0:	Voltage max warnings: 3-ph. motor: **v12**, **v23**, **v31**>(100%+**v_max_warn**)*__v_nom__/100% 1-ph. motor: **v_phase**>(100%+**v_max_warn**)*__v_nom__/100%
1:	Voltage min warnings: 3-ph. motor: **v12**, **v23**, **v31**<(100%-**v_min_warn**)*__v_nom__/100% 1-ph. motor: **v_phase**<(100%-**v_min_warn**)*__v_nom__/100%
2:	Line current max warning: 3-phase motor: **i1**, **i2**, **i3**>**i_line_max_warn** 1-phase motor: **i_line**>**i_line_max_warn**
3:	Line current min warning: 3-phase motor: **i1**,**i2**,**i3**<(100%-**i_min_warn**)*__i_line_max_warn__/100% 1-phase motor: **i_line**<(100%-**i_min_warn**)*__i_line_max_warn__/100%
4:	Line current asymmetry warning (**i_asym**>**i_asym_max_warn**)
7-5:	-

warnings_2 (2, 146 / 40) Status of active warnings, byte 2

Bit No.	Description
0:	Insul. resist. warning (**r_insulation<r_insulation_warn**)
1:	Motor temperature (Tempcon) warning (**t_mo1**>**t_mo1_warn**)
2:	Motor temperature (PT resistor) warning (**t_mo2**>**t_mo2_warn**)
3:	-
4:	Cos(φ) max warning limit (**cos_phi**>**cos_phi_max_warn**)
5:	Cos(φ) min warning limit (**cos_phi**<**cos_phi_min_warn**)
6:	Starts per hour warning **starts_per_h>starts_per_h_warn**
7:	-

warnings_3 (2, 147 / 41) Status of active warnings, byte 3

Bit No.	Description
0:	Start capacitor min warning: **c_start**<(100%-**c_start_min_warn**)*__c_start_ref__/100%
1:	Run capacitor min warning: **c_run**<(100%-**c_run_min_warn**)*__c_run_ref__/100%
2:	-
3:	Tempcon sensor signal fault warning
4:	PT sensor signal fault warning
5:	Service warning: **t_run_trip_cnt** > **t_run_trip_warn**
6:	Load continues despite motor has tripped
7:	-

6.2 Data items for alarm log

alarm_log# (2, 153+157+161+165+169 / 44+45+46+47+48):
The Alarm Log contains the code for the 5 last occurred alarms. The *Pending Alarm* bit (**act_mode2.3**) tells if an unacknowledged alarm is pending. If the alarm is actual (alarm condition present), the cause for it can be found in **alarm_code**. If a restart has occurred the cause for the latest alarm can always be found in **alarm_log1,** which always contains the latest alarm. When a new alarm occurs it is added to the Alarm Log and the existing ones will be pushed to the next position. The command **RESET_ALARM_LOG** will clear the alarm log.

alarm_log#_time_hi/lo1/lo2 (2, 154..156 + 158..160 + 162..164 + 166..168 + 170..172 / 248,249,250,-,-):
To each of the logged alarms corresponds a 24 bit time stamp (i.e. 3 data items) counting in 1 min, which is a converted reading of the power on time counter (**t_on_hi/lo1/lo2)** at the time when the alarm is logged.

6.3 Data items for enabling and disabling alarm/warnings

Each alarm/warning can be enabled or disabled by the usage of the below configuration parameters. Notice that corresponding alarms and warnings cannot be enabled/disabled independently.

`alarms1_enable` (4, 70 /109) Individual enable/disable of alarms/warnings, byte 1. Default: all enabled.

Bit No.	Description
0:	Voltage max alarms: 3-ph. motor: **`v12`**, **`v23`**, **`v31`**>(100%+**`v_max_alarm`**)*`v_nom`/100% 1-ph. motor: **`v_phase`**>(100%+**`v_max_alarm`**)*`v_nom`/100% Voltage max warnings: 3-ph. motor: **`v12`**, **`v23`**, **`v31`**>(100%+**`v_max_warn`**)*`v_nom`/100% 1-ph. motor: **`v_phase`**>(100%+**`v_max_warn`**)*`v_nom`/100%
1:	Voltage min alarms: 3-ph. motor: **`v12`**, **`v23`**, **`v31`**<(100%-**`v_min_alarm`**)*`v_nom`/100% 1-ph. motor: **`v_phase`**<(100%-**`v_min_alarm`**)*`v_nom`/100% Voltage min warnings: 3-ph. motor: **`v12`**, **`v23`**, **`v31`**<(100%-**`v_min_warn`**)*`v_nom`/100% 1-ph. motor: **`v_phase`**<(100%-**`v_min_warn`**)*`v_nom`/100%
2:	Line current max alarm/warning: 3-phase motor alarm: **`i1`**, **`i2`**, **`i3`**>**`i_line_max_alarm`** 1-phase motor alarm: **`i_line`**>**`i_line_max_alarm`** 3-phase motor warning: **`i1`**, **`i2`**, **`i3`**>**`i_line_max_warn`** 1-phase motor warning: **`i_line`**>**`i_line_max_warn`**
3:	Line current min alarm/warning 3-phase motor alarm: **`i1`**, **`i2`**, **`i3`**<(100%-**`i_min_alarm`**)*`i_line_max_alarm`/100% 1-phase motor alarm: **`i_line`**<(100%-**`i_min_alarm`**)*`i_line_max_alarm`/100% 3-phase motor warning: **`i1`**, **`i2`**, **`i3`**<(100%-**`i_min_warn`**)*`i_line_max_warn`/100% 1-phase motor warning: **`i_line`**<(100%-**`i_min_warn`**)*`i_line_max_warn`/100%
4:	Line current asymmetry alarm (**`i_asym`**>**`i_asym_max_alarm`**) Line current asymmetry warning (**`i_asym`**>**`i_asym_max_warn`**)
5:	Phase sequence alarm: Actual sequence differs from reference sequence (in **`setup`**).
6:	Missing phase alarm
7:	Mains system communication alarm (communications watchdog)

`alarms2_enable` (4, 71 / 110) Individual enable/disable of alarms/warnings, byte 2. Default: all enabled except bit 7.

Bit No.	Description
0:	Insul. resist. alarm (**`r_insulation<r_insulation_alarm`**) Insul. resist. warning (**`r_insulation<r_insulation_warn`**)
1:	Motor temperature (Tempcon) alarm (**`t_mo1`**>**`t_mo1_alarm`**) Motor temperature (Tempcon) warning (**`t_mo1`**>**`t_mo1_warn`**)
2:	Motor temperature (PT resistor) alarm (**`t_mo2`**>**`t_mo2_alarm`**) Motor temperature (PT resistor) warning (**`t_mo2`**>**`t_mo2_warn`**)
3:	External digital alarm (PTC), digital input 0.
4 :	Cos(φ) max alarm limit (**`cos_phi`**>**`cos_phi_max_alarm`**) Cos(φ) max warning limit (**`cos_phi`**>**`cos_phi_max_warn`**)
5:	Cos(φ) min alarm limit (**`cos_phi`**<**`cos_phi_min_alarm`**) Cos(φ) min warning limit (**`cos_phi`**<**`cos_phi_min_warn`**)
6:	Starts per hour warning **`starts_per_h>starts_per_h_warn`**
7:	Restarts per 24 hour alarm: **`auto_restarts_per_24h>auto_restarts_per_24h_alarm`**

`alarms3_enable` (4, 72 / 111) Individual enable/disable of alarms/warnings, byte 3. Default: all enabled except bit 5.

Bit No.	Description
0:	Start capacitor min alarm: **`c_start`**<(100%-**`c_start_min_alarm`**)***`c_start_ref`**/100%
1:	Run capacitor min alarm: **`c_run`**<(100%-**`c_run_min_alarm`**)***`c_run_ref`**/100%
2:	Auxiliary winding alarm: **`i3`** < 0.05 * **`i_line_max_alarm`**
3:	Tempcon sensor signal fault warning
4:	PT sensor signal fault warning
5:	Service warning: **`t_run_trip_cnt`** > **`t_run_trip_warn`**
6:	Load continues despite motor has tripped
7:	-

6.4 Implicit alarm/warning de-activation

The different functional options represented by **`setup`**, will implicitly (independent of the state of the enable bits) de-activate certain alarms/warnings. They are listed in the table below.

`setup` option	Implicit alarm/warning de-activation
`1_PHASE`	• Phase sequence reversal alarm • Current asymmetry alarm/warning • Insulation resistance alarm/warning • Tempcon temperature (**`t_mo1`**) max alarm/warning • Tempcon temperature sensor signal warning
`3_PHASE_WITH_FE`	• Auxiliary winding fault • Start capacitor low alarm/warning • Run capacitor low alarm/warning
`3_PHASE_WITHOUT_FE`	• Insulation resistance alarm/warning • Auxiliary winding fault • Start capacitor low alarm/warning • Run capacitor low alarm/warning
`TEMPCON_D`	• Tempcon temperature (**`t_mo1`**) max alarm/warning • Tempcon temperature sensor signal warning
`PT_RESISTOR_D`	• PT resistor temperature (**`t_mo2`**) max alarm/warning • PT resistor temperature sensor signal warning
`TEMPCON_E` AND **"Tempcon signal OK"**	• Max/min voltage alarm/warning
`PT_RESISTOR_E` AND **"PT signal OK"**	• Max/min voltage alarm/warning

***Table 5**: A list of setup options, which implicitly de-activates certain alarms/warnings*

6.5 Restarting after trip

When the MP 204 has tripped the following actions can bring it back to normal mode ("Started") again:

- The **`RESET_ALARM`** command will make MP 204 start the pump in case no alarm condition exist.
- The RESET button will make MP 204 start the pump in case no alarm condition exist ("Tripped 1" mode and "Tripped 2" mode only).
- Auto Restart Timeout will restart the motor in case Auto Restart is enabled for that particular alarm and no alarm condition exist ("Tripped 1" mode only).

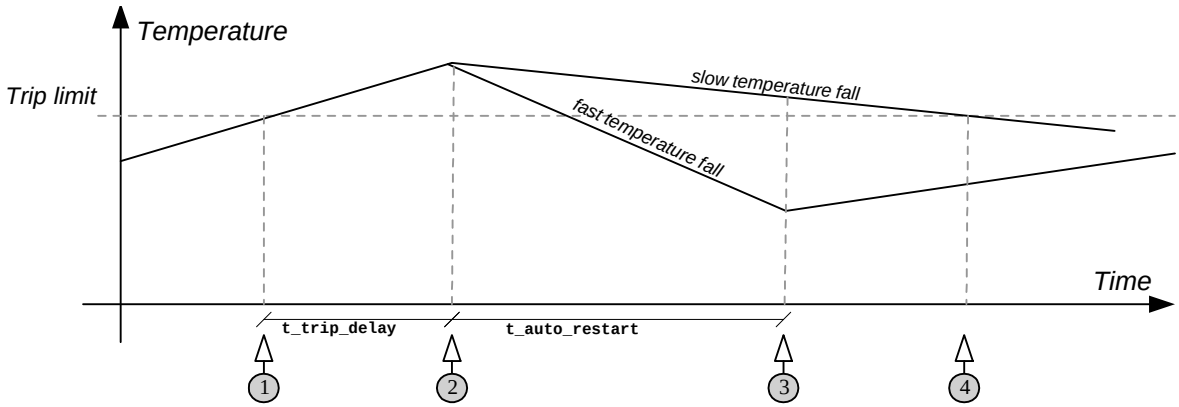


Figure 7: *Illustration of motor switch off and restart.*

1. *Supervised value exceeds the trip limit. Trip delay timeout is started.*
2. *The supervised value has been above the trip limit for a period equal to the Trip delay time => trip event recognised => motor switched off. Auto restart timeout started.*
3. *Fast temperature fall: Auto restart time has passed. Because the supervised value is below the trip limit the pump will be switched on..*
   Slow temperature fall: Auto restart time has passed. But because the supervised value is not below the trip limit the pump will remain switched off.
4. *The supervised value goes below the trip limit. Because the Auto restart time has already passed the pump will now be switched on..*

The duration of Auto Restart Timeout is controlled with **t_auto_restart**. An overall enabled/disabled of Auto Restart can be done with command **AUTO_RESTART_E** / **AUTO_RESTART_D**. Restart on specific alarm conditions can be enabled/disabled with the below data items.

restart1_enable (4, 73 / 112) Individual enable/disable of auto restart after alarm condition.
Default: all enabled.

Bit No.	Description
0:	Voltage max alarms: 3-ph. motor: **v12**, **v23**, **v31**>(100%+**v_max_alarm**)*v_nom/100% 1-ph. motor: **v_phase**>(100%+**v_max_alarm**)*v_nom/100%
1:	Voltage min alarms: 3-ph. motor: **v12**, **v23**, **v31**<(100%-**v_min_alarm**)*v_nom/100% 1-ph. motor: **v_phase**<(100%-**v_min_alarm**)*v_nom/100%
2:	Line current max alarm: 3-phase motor: **i1**, **i2**, **i3**>**i_line_max_alarm** 1-phase motor: **i_line**>**i_line_max_alarm**
3:	Line current min alarm: 3-phase motor: **i1**, **i2**, **i3**<(100%-**i_min_alarm**)*i_line_max_alarm/100% 1-phase motor: **i_line**<(100%-**i_min_alarm**)*i_line_max_alarm/100%
4:	Line current asymmetry alarm (**i_asym**>**i_asym_max_alarm**)
5:	Phase sequence alarm: Actual sequence differs from reference sequence (in **setup**).
6:	Missing phase alarm
7:	Main system communication alarm (communications watch dog)

restart2_enable (4, 74 / 113) Individual enable/disable of auto restart after alarm condition.
Default: all enabled.

Bit No.	Description
0:	Insul. resist. alarm (**r_insulation>r_insulation_alarm**)
1:	Motor temperature (Tempcon) alarm (**t_mo1**>**t_mo1_alarm**)
2:	Motor temperature (PT resistor) alarm (**t_mo2**>**t_mo2_alarm**)
3:	External digital alarm (PTC), digital input 0.

4 : Cos(φ) max alarm limit (**cos_phi**>**cos_phi_max_alarm**)
5 : Cos(φ) min alarm limit (**cos_phi**<**cos_phi_min_alarm**)
7-6 : - -

restart3_enable (4, 75 / 114) Individual enable/disable of auto restart after alarm condition.
Default: all enabled.

Bit No.	Description
0:	Start capacitor min alarm (1. phase motor): **c_start**<(100%-**c_start_min_alarm**)*__c_start_ref__/100%
1:	Run capacitor min alarm (1. phase motor): **c_run**<(100%-**c_run_min_alarm**)*__c_run_ref__/100%
2:	Auxiliary winding fault (1. phase motor): **i3** < 0.05 * **i_line_max_alarm**
7-3:	-

6.6 IEC Trip Class

Alarm generation (Tripping) in case of excessive line current (**i1, i2, i3**) is done according to the IEC Trip Class (**iec_class**) algorithm, which emulates thermal conditions in a motor. The warning indication however is activated as soon as the warning limit is steadily exceeded. If Trip Class 'P' (pump) has been selected (corresponds to value 0) another tripping strategy is used.

6.7 "Pump" trip class

If Trip Class 'P' (pump) has been selected (corresponds to value 0) line current tripping takes place according to **i_line_max_alarm_hi/lo** [0.1 A] and **cur_trip_delay** [0.1s].

Tripping if:
3 phase motor: **i1**, **i2**, **i3 > i_line_max_alarm** for a duration longer than **t_cur_trip_delay**
1 phase motor: **i_line > i_line_max_alarm** for a duration longer than **t_cur_trip_delay**

As usual the warning indication is activated as soon as the warning limit is steadily exceeded.

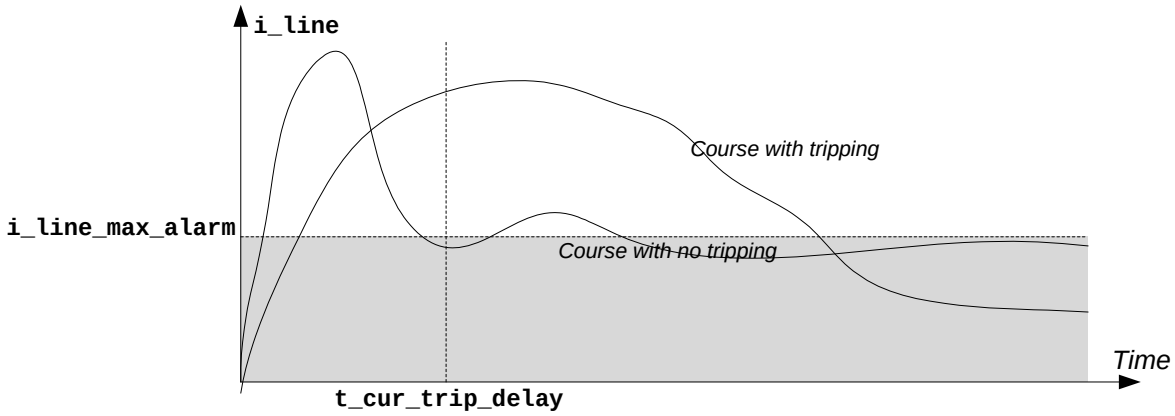


***Figure 8**: Illustration of the "protection shape" used when protection class "P" has been selected. An internal "summing function" keeps account of for how long time the current is above or below* **i_line_max_alarm**. *To a certain extend this emulates thermal conditions.*

7. Physical Values

Data item	Scaling	Bit size	Description		Associated data items	
			3-phase motors	1-phase motors	Max/min loggings (Measured data)	Protection limits (Config. param.)
v1	0.1 V	16	L1 phase voltage [1)]	=0 (reference voltage)	-	-
v2	0.1 V	16	L2 phase voltage [1)]	L2 phase voltage	-	-
v3	0.1 V	16	L3 phase voltage [1)]	Aux winding voltage	-	-
v_phase	0.1 V	16	Mean of phase voltages [1)]	L2 phase voltage (=v2)	v_max_log_hi/lo[*)] v_min_log_hi/lo[*)]	v_max_alarm[*)] [+%] v_min_alarm[*)] [-%] v_max_warn[*)] [+%] v_min_warn[*)] [-%]
v12	0.1 V	16	Line voltage L1-L2	"NA"	v_max_log_hi/lo[**)] v_min_log_hi/lo[**)]	v_max_alarm[**)] [+%] v_min_alarm[**)] [-%] v_max_warn[**)] [+%] v_min_warn[**)] [-%]
v23	0.1 V	16	Line voltage L2-L3	"NA"		
v31	0.1 V	16	Line voltage L3-L1	"NA"		
v_line	0.1 V	16	Mean of line voltages	"NA"		
i1	0.1 A	16	L1 line current	Neutral current	-	i_line_max_alarm_hi/lo i_min_alarm [-%] i_line_max_warn_hi/lo i_min_warn [-%]
i2	0.1 A	16	L2 line current	Current in mains winding	-	
i3	0.1 A	16	L3 line current	Current in aux. winding	-	d.o.[**)] < 5 %[*)] of i_line_max_alarm_hi/lo
i_line	0.1 A	16	Mean of line currents	Line current (=Neutral current)	i_line_max_log_hi/lo i_line_min_log_hi/lo	i_line_max_alarm_hi/lo i_min_alarm [-%] i_line_max_warn_hi/lo i_min_warn [-%]
i_line_start	0.1 A	16	Motor Start current	Motor start current	-	-
ang12	1 °	8	Voltage angle L2-L1	"NA"	-	-
ang13	1 °	8	Voltage angle L3-L1	"NA"	-	-
cos_phi1	0.01	8	L1 phase angle cosine [1) 3)]	"NA"	-	-
cos_phi2	0.01	8	L2 phase angle cosine [1) 3)]	"NA"	-	-
cos_phi3	0.01	8	L3 phase angle cosine [1) 3)]	"NA"	-	-
i_asym	0.1 %	8	Line current asymmetry [3)]	"NA"	-	i_asym_max_alarm[**)] i_asym_max_warn[**)]
cos_phi	0.01	8	Phase angle cosine [3)] (power factor)	Phase angle cosine [3)] (power factor)	-	cos_phi_max_alarm cos_phi_min_alarm cos_phi_max_warn cos_phi_min_warn
c_start	1 µF	16	"NA"	Start capacitor[3)]	-	c_start_min_alarm[*)] [-%] c_start_min_warn[*)] [-%]
c_run	1 µF	16	"NA"	Run capacitor[3)]	-	c_run_min_alarm[*)] [-%] c_run_min_warn[*)] [-%]
r_insulation	10 kΩ	8	Insulation resistance [4) 2)]	"NA"		r_insulation_min_alarm r_insulation_min_warn
p	1 W	32	Power consumption	Power consumption	-	-
energy	1 kWh	32	Energy consumption	Energy consumption	-	-
f_line	0.5 Hz	8	Line frequency	Line frequency	-	-
t_mo1	1 °C	8	Motor temperature [3)] measured by Tempcon	Motor temperature [3)] measured by Tempcon	-	t_mo1_max_alarm t_mo1_max_warn
t_mo2	1 °C	8	Motor temperature measured by PT resistor	Motor temperature measured by PT resistor	-	t_mo2_max_alarm t_mo2_max_warn

[1)] In case "3 phase without FE" is selected the calculation is based on the sum of the voltages (reconstructed earth). This will be correct when the voltages are symmetrical but show a deviation for the non-symmetrical case.

[2)] This data items can only be measured when the motor is switched **off**. Otherwise the value shows "NA".

[3)] This data items can only be measured when the motor is switched **on**. Otherwise the value shows "NA".

[4)] This data item can only be measured for 3-phase motor with FE. Otherwise the value shows "NA".

[*)] These data items/values are only used for 1-phase motors

[**)] These data items/values are only used for 3-phase motors

Table 6: *Overview of all the physical data items related to the power supply system and the motor to be protected.*

The max/min loggings of voltage equals phase voltage values for single-phase motors and line voltage values for 3 phase motors. The voltage limits and the capacitor limits are scaled in % relative to the nominal value of the data item they associate with (**v_nom**, **c_start_ref**, **c_run_ref**) and the minimum current limits are scaled in % relative to **i_line_max_alarm** (all such relative scaled limits are indicated with [+%] or [-%] in the table). All other limits are absolute values and are scaled in the same unit as the data item they associate with. All the max/min loggings can be reset with **RESET_MAX_MIN_LOG.** All the alarm limits can be individually enabled/disabled with the configuration parameters **alarms1_enable** and **alarms2_enable**.

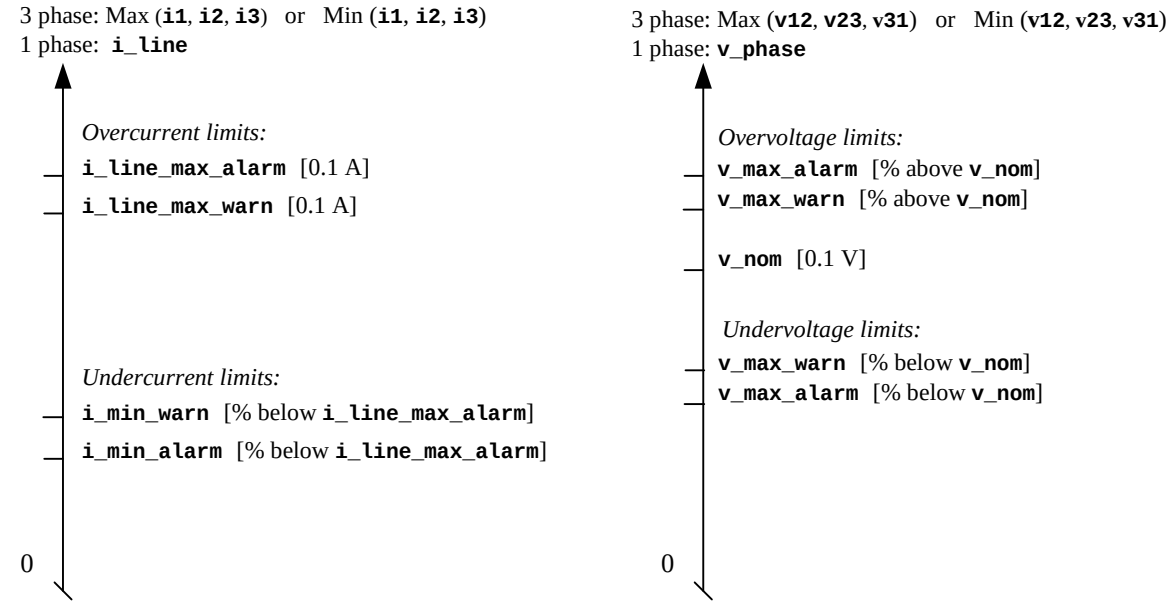


***Figure 9**: Illustration of the current and voltage protection limits. Notice the difference between a relative limit (e.g. **i_min_warn**) and an absolute limit (e.g. **i_line_max_warn**).Also notice that in the 3 phase case are the limits used for each of the line values.*

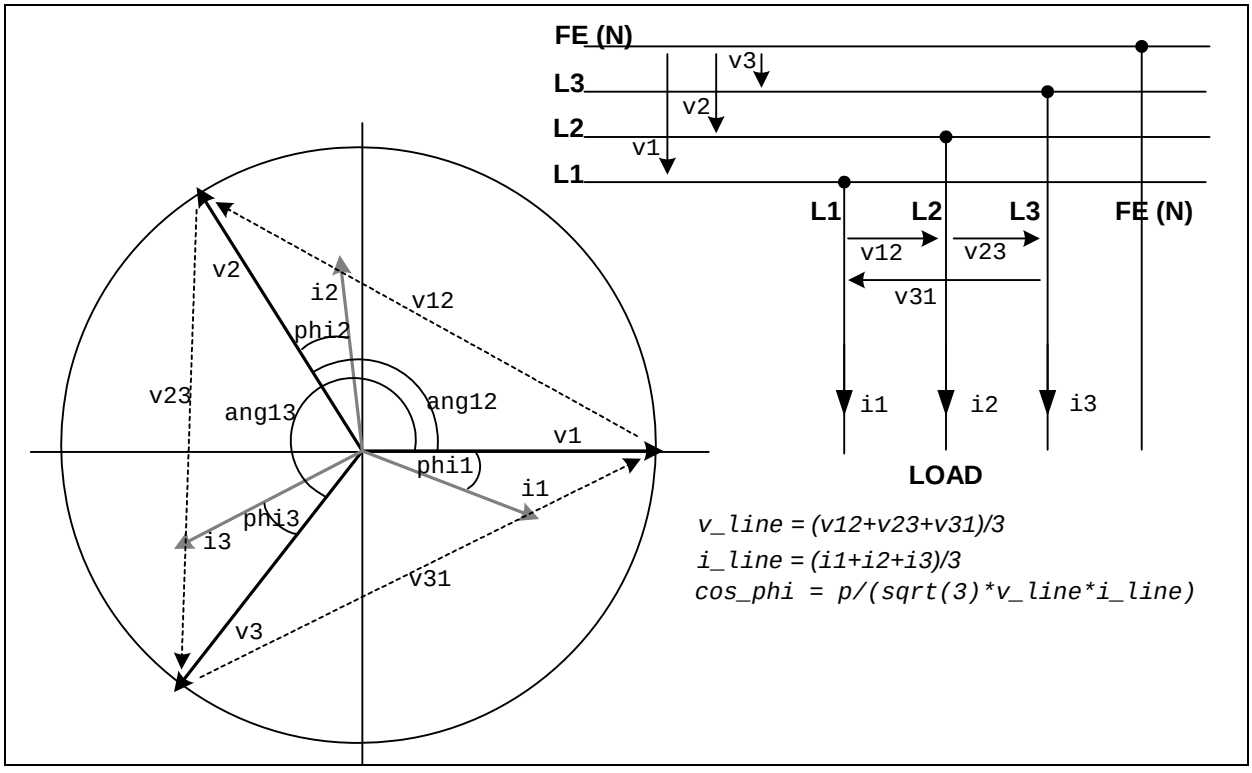


***Figure 10**: Current and voltage definitions for 3-phase supply. The formulas show the relation between the data items in the functional profile. Power is calculated from the momentary values:*

$p = 1/N \Sigma_N [v_1 i_1 + v_2 i_2 + v_3 i_3]$.

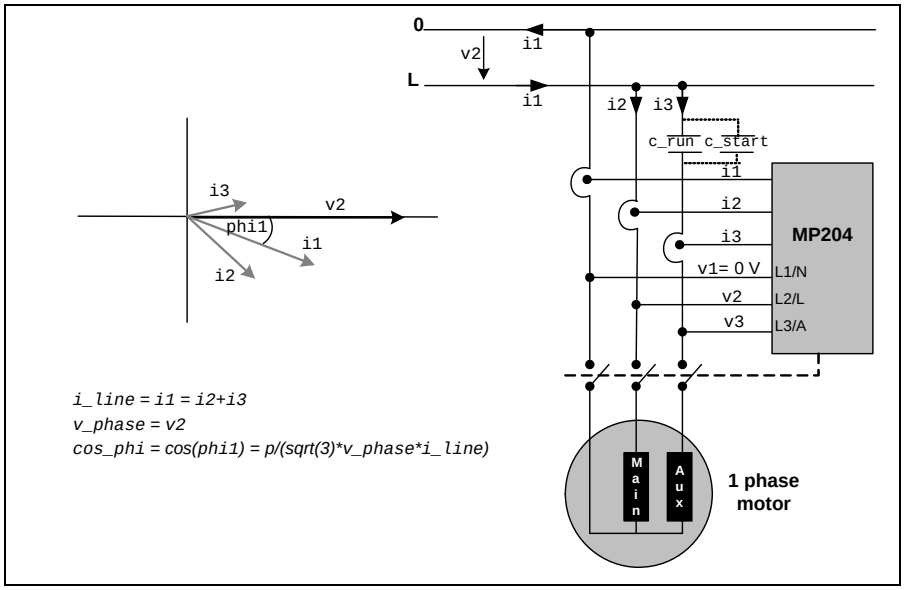


***Figure 11**: Current and voltage definitions for single-phase supply. The formulas show the relation between the data items in the functional profile. Power is calculated from the momentary values:*
$p = 1/N \Sigma_N [v_{line} i_{line}]$.

Calculation of current asymmetry and voltage distortion

3 Phase motors:
i_asym *= Max [(Max(**i1**, **i2**, **i3**) - **i_line**)/**i_line** , (**i_line** - Min(**i1**, **i2**, **i3**)/**i_line**] * 1000*
v_phase_distortion *= Max [**v1**/avg(v_1)*sqrt(8)/π -1, **v2**/avg(v_2)*sqrt(8)/π - 1, **v3**/avg(v_3)*sqrt(8)/π - 1] * 1000*

1 Phase motors:
i_asym *= "NA"*
v_phase_distortion *= (**v_phase**/avg(v_{phase})*sqrt(8)/π - 1) * 1000*

The unit of measure is in all cases [0.1 %]

8. "Counters"

"Counter" data items		Associated trip counter	Trip counter cleared with command	Trip counter preset by Write to
Energy [1kWh … $4.3 \cdot 10^9$ kWh]	energy_hi energy_lo1 energy_lo2 energy_lo3	energy_trip_cnt_hi energy_trip_cnt_lo1 energy_trip_cnt_lo2 energy_trip_cnt_lo3	RESET_ENERGY_CNT	energy_trip_cnt_set_hi energy_trip_cnt_set_lo1 energy_trip_cnt_set_lo2 energy_trip_cnt_set_lo3
Running hours [1min …30y]	t_run_hi t_run_lo1 t_run_lo2	t_run_trip_cnt_hi t_run_trip_cnt_lo1 t_run_trip_cnt_lo2	RESET_HOUR_CNT	t_run_trip_cnt_set_hi t_run_trip_cnt_set_lo1 t_run_trip_cnt_set_lo2
Power on hours [1min …30y]	t_on_hi t_on_lo1 t_on_lo2	-	-	-
Starts [1 … $16.8 \cdot 10^6$]	start_cnt_hi start_cnt_lo1 start_cnt_lo2	start_trip_cnt_hi start_trip_cnt_lo1 start_trip_cnt_lo2	RESET_START_CNT	start_trip_cnt_set_hi start_trip_cnt_set_lo1 start_trip_cnt_set_lo2
Auto restarts [1 … 65535]	-	auto_restart_trip_cnt_hi auto_restart_trip_cnt_lo	RESET_RESTART_CNT	-

Table 7: *Overview of "counter" data items, their associated trip counters and the possible operations to perform on them.*

"Per time counter" data item		Max/min logging	Protection limit
No. of starts per hour (moving average)	starts_per_h	starts_per_h_max_log	starts_per_h_max (W)
No. of restarts per 24 h (moving average)	auto_restarts_per_24h	-	auto_restarts_per_24h_max (A)

Table 8: *Overview of "per time counter" data items and their associated data items.*

9. Booting

Booting the MP204 means to return settings to predefined (factory) values. The MP204 has two booting levels as described in Table 9.

	User boot	Factory boot
Activation	Command **USER_BOOT**	• Command **FACT_BOOT**
Purpose	Returns all settings available via R100 (user settings) to their factory default.	Returns all settings to their factory default
Action	• Returns all conf. parameters to their factory default, except: **unit_addr**, and **comm._watchdog**. • Returns the setup (**setup** (2, 97 / 32)) to factory default. • Resets all trip counters (table 7) • Performs a power on hardware reset (like key reset*)).	• Returns all configuration parameters to their factory default. • Returns the setup (**setup** (2, 97 / 32)) to factory default. • Resets all counters and trip counters (table 7) • Resets the alarm log • Resets the max/min log • Performs a power on hardware reset (like key reset*)).

*) keeping all buttons pressed for 10s generates a hardware reset called a Key reset

Table 9: *Booting the MP204.*

10. Hot keys

Buttons	Action
+/– simultaneously for 5 s	Configuration mode
R/- simultaneously for 10 s	Learning function activated
All keys simultaneously for 10 s	MP204 is hardware reset (Key reset)

Table 10: *Overview of hot keys.*

11. GENIbus programmable options

11.1 GENIbus Communication Watchdog

The MP 204 can be configured to monitor the communication over GENIbus with the main system. This is done with a so-called communication watchdog. In case communication is interrupted for a time period longer than the preset time interval the watchdog will trip the motor with the alarm code “Main system communication fault”.

`comm_watchdog` (4, 85 / 120) Communication watchdog for the GENIbus interface

Value	Description
0:	Communication watchdog disabled (factory default)
1-254:	Communication watchdog enabled, setting in seconds
255:	Communication watchdog disabled

Notice that bit 7 in **`alarms1_enable`** has to be set as well for the communications watchdog to be enabled.

11.2 GENIpro setup

`geni_setup` (4, 81 / -) GENIbus setup

Bit No.	Description
0:	0: Slave unit type (fixed) 1: Master unit type
1:	0: No connection reply 1: Connection reply
3-2:	-
4:	0: Normal reply delay [3ms; 50ms] 1: Prolonged reply delay [40ms; 50ms]
7-5	-

12. Operation of MP 204 from Main Controller

Below is an example of a control panel for operation and monitoring of a MP204 that can be realized by using bus communication either directly with GENIbus or via G100. Such a panel can be designed in many other ways than shown here. It can also be simpler with less data and functionality or it can be more advanced utilizing more of the data items from the functional profile. In the following it will be explained how the displayed functionality is implemented by reading and writing the related data items. The operations on the data items are identical whether the GENIbus protocol is used or the communication takes place via G100 using Profibus or Modbus. The telegram format is however different in the three cases.

12.1 Explanations to the MP204 Control Panel status screen

Heading text information

- The type of connected motor: **setup** (2, 97 / 32) bits 1-2.
- The nominal voltage: **v_nom_hi/lo** (4, 21-22 / 80)
- The maximum current: **i_line_max_alarm_hi/lo** (4, 29-30 / 83)
- IEC protection class: **iec_class** (4, 79 / 118)

Status frame

- The 3 line currents and voltages: **i1_hi/lo** (2, 37-38 / 9), **i2_hi/lo** (2, 39-40 / 10), **i3_hi/lo** (2, 41-42 / 11), **v12_hi/lo** (2, 29-30 / 5), **v23_hi/lo** (2, 31-32 / 6) and **v31_hi/lo** (2, 33-34 / 7)
- The average current and voltage: **i_line_hi/lo** (2, 43-44 / 12) and **v_line_hi/lo** (2, 35-36 / 8)
- The other electrical values: **p_hi/lo1/lo2/lo3** (2, 65-68 / 240), **energy_hi/lo1/lo2/lo3** (2, 69-72 /241), **cos_phi** (2, 64 / 27), **i_asym** (2, 49 / 16), **r_insulation** (2, 94 / 29)
- Sequence: **setup** (2, 97 / 32) bit 0
- PTC: **dig_in** (2, 99 / 34) bit 0
- Temperature (Tempcon, PT100): **t_mo1** (2, 47 / 14), **t_mo2** (2, 48 / 15)
- Power on time: **t_on_hi/lo1/lo2** (2, 80-82 / 244)
- Running time: **t_run_hi/lo1/lo2** (2, 77-79 / 243)
- Start counter: **start_cnt_hi/lo1/lo2** (2, 86-88 / 246)

Operation frame

- Test trip button submits the command **TRIP** (3, 81 / 63)
- Actuator trip button submits the command **TRIP_A** (3, 95 / 75)
- Reset alarm button submits the command **RESET_ALARM** (3, 2 / 56)
- Reset alarm log button submits the command **RESET_ALARM_LOG** (3, 51 / 62)
- System mode: **act_mode2** (2, 96 / 31) bits 0-1
- Motor relay status: **act_mode1** (2, 95 / 30) bit 4
- Signal relay status: **act_mode1** (2, 95 / 30) bit 5

Setup status frame

PT temperature measurement: **setup** (2, 97 / 32) bit 3
Tempcon temperature measurement: **setup** (2, 97 / 32) bit 4
Auto restart: **setup** (2, 97 / 32) bit 5
Learning: **setup** (2, 97 / 32) bit 6
Power on start: **setup** (2, 97 / 32) bit 7

Alarm frame

Actual alarm: **alarm_code** (2, 144 / 38)
Trip delay: **t_trip_delay** (4, 77 / 116)
Auto restart time: **t_auto_restart** (4, 78 / 117)
Alarm log with time stamps: **alarm_log1** (2, 153 / 44), **alarm_log1_time_hi/lo1/lo2** (2, 154-156 / 248)
alarm_log2 (2, 157 / 45), **alarm_log2_time_hi/lo1/lo2** (2, 158-160 / 249)
alarm_log3 (2, 161 / 46), **alarm_log3_time_hi/lo1/lo2** (2, 162-164 / 250)
alarm_log4 (2, 165 / 47), **alarm_log4_time_hi/lo1/lo2** (2, 166-168 / -)*)
alarm_log5 (2, 169 / 48), **alarm_log5_time_hi/lo1/lo2** (2, 170-172 / -)*)
*) the time stamp for logged alarm 4 and 5 is not available via G100

Warnings frame
Active warnings: **warnings_1** (2, 145 / 39), **warnings_2** (2, 146 / 40), **warnings_3** (2, 147 / 41)

12.2 Explanations to the MP204 Control Panel setup screen

Enable event	Event	Trip limit	Warning limit	Enable auto restart
alarms1_enable.0	Voltage high	v_max_alarm	v_max_warn	restart1_enable.0
alarms1_enable.1	Voltage low	v_min_alarm	v_min_warn	restart1_enable.1
alarms1_enable.2	Current high	i_line_max_alarm_hi/lo	i_line_max_warn_hi/lo	restart1_enable.2
alarms1_enable.3	Current low	i_line_min_alarm_hi/lo	i_line_min_warn_hi/lo	restart1_enable.3
alarms1_enable.4	Asymmetry	i_asym_max_alarm	i_asym_max_warn	restart1_enable.4
alarms1_enable.5	Phase sequence reversal			restart1_enable.5
alarms1_enable.6	Missing phase			restart1_enable.6
alarms1_enable.7	Mains system communica.			restart1_enable.7
alarms2_enable.0	Insulation low	r_insul_min_alarm	r_insul_min_warn	restart2_enable.0
alarms2_enable.1	Motor temp. (Tempcon)	t_mo1_max_alarm	t_mo1_max_warn	restart2_enable.1
alarms2_enable.2	Motor temperature (PT)	t_mo2_max_alarm	t_mo2_max_warn	restart2_enable.2
alarms2_enable.3	External digital (PTC)			restart2_enable.3
alarms2_enable.4	Power factor high	cos_phi_max_alarm	cos_phi_warn_alarm	restart2_enable.4
alarms2_enable.5	Power factor low	cos_phi_min_alarm	cos_phi_warn_alarm	restart2_enable.5
alarms2_enable.6	Starts per hour		starts_per_hour_warn	
alarms2_enable.7	Auto re-starts per 24 h	auto_restarts_per_24h_a		
alarms3_enable.0	Start capacitor low	c_start_min_alarm	c_start_min_warn	restart3_enable.0
alarms3_enable.1	Run capacitor low	c_run_min_alarm	c_run_min_warn	restart3_enable.1
alarms3_enable.2	Aux. winding current low			restart3_enable.2
alarms3_enable.3	Tempcon sensor sig. fault			
alarms3_enable.4	PT sensor signal fault			
alarms3_enable.5	Time for service		t_run_trip_warn_hi/lo	
alarms3_enable.6	Load despite trip			

- Modifying the Nominal voltage: **v_nom_hi/lo** (4, 21-22 / 80)
- Modifying IEC trip class: write **iec_class** (4, 79 / 118)
- Modifying Trip delay: write **t_trip_delay** (4, 77 / 116)
- Modifying Auto restart time: write **t_auto_restart** (4, 78 / 117)

- Changing “General Autorestart”: **AUTO_RESTART_E** (3, 41 / 60) / **AUTO_RESTART_D** (3, 42 / 61)
- Changing “General Protection”: **PROTECTION_E** (3, 11 / 57) / **PROTECTION_D** (3, 12 / 58)

Motor: 1 phase
Vnom: xxx.x V
Imax: xxx.x A IEC Class: xx

Go to setup screen

Status

Phase voltage	xxx.x V
Auxiliary voltage	xxx.x V
Phase current	xx.x A
Power	xxx.x W
Energy	xxx.x kWh
Power factor	0.xx

	Measured	Reference
Run capacitor	xxx uF	xxx uF
Start capacitor	xxx uF	xxx uF

PTC	0
Temperature (Tempcon)	xxx C
Temperature (PT100)	xxx C
Power on time	xxx h xx min
Running time	xxx h xx min
Start counter	xxx

Operation

Test trip

Actuator trip

Reset alarm

Reset alarm log

System mode	Operating
R1 (Motor relay)	Closed
R2 (Signal relay)	Open

Setup status

PT temp. meas.	Enabled
Tempcon meas.	Enabled
Auto restart	Enabled
Learning	Unarmed
Power on start	Enabled

Alarms

Actual alarm
(111) Current asymmetry

Trip delay	xxx s
Auto restart time	xxx s

Alarm log

(111) Current asymmetry	0 h 5 min
(032) Voltage high	57 h 23 min
(020) Insulation low	230 h 12 min
(009) Phase sequence reversal	367 h 7 min
(015) Main system communication	978 h 49 min

Warnings

- Voltage high
- Voltage low
- Current high
- Current low
- ● Current asymmetry
- Insulation low
- Temperature (Tempcon) high
- Temperature (PT) high
- Power factor high
- Power factor low
- Starts per hour high
- ● Start capacitor low
- Run capacitor low
- Auxiliary winding
- Tempcon signal fault
- ● PT sensor signal fault
- ● Time for service
- Load despite tripped motor

Motor: 3 phase with Functional Earth
Vnom: xxx.x V
Imax: xxx.x A IEC Class: xx

Go to setup screen

Status

	Voltage	Current
L1	xxx.x V	xxx.x A
L2	xxx.x V	xxx.x A
L3	xxx.x V	xxx.x A
Average	xxx.x V	xxx.x A

Power	xxx.x W
Energy	xxx.x kWh
Power factor	0.xx
Asymmetry	xx.x %
Insulation	xxx kOhm

Sequence	L1-L2-L3
PTC	0
Temperature (Tempcon)	xxx C
Temperature (PT100)	xxx C
Power on time	xxx h xx min
Running time	xxx h xx min
Start counter	xxx

Operation

- Test trip
- Actuator trip
- Reset alarm
- Reset alarm log

System mode	Operating
R1 (Motor relay)	Closed
R2 (Signal relay)	Open

Setup status

PT temp. meas.	Enabled
Tempcon meas.	Enabled
Auto restart	Enabled
Learning	Unarmed
Power on start	Enabled

Alarms

Actual alarm: (111) Current asymmetry

Trip delay	xxx s
Auto restart time	xxx s

Alarm log

(111) Current asymmetry	0 h 5 min
(032) Voltage high	57 h 23 min
(020) Insulation low	230 h 12 min
(009) Phase sequence reversal	367 h 7 min
(015) Main system communication	978 h 49 min

Warnings

- Voltage high
- Voltage low
- Current high
- Current low
- ● Current asymmetry
- Insulation low
- Temperature (Tempcon) high
- Temperature (PT) high
- Power factor high
- Power factor low
- Starts per hour high
- ● Start capacitor low
- Run capacitor low
- Auxiliary winding
- Tempcon signal fault
- ● PT sensor signal fault
- ● Time for service
- Load despite tripped motor

Setup MP204

1 phase motor

Go to status screen

	Event	Trip limit	Warning limit	Auto restart
✓	**Voltage high**	xx %	xx %	✓
✓	**Voltage low**	xx %	xx %	✓
✓	**Current high**	xxx.x A	xxx.x A	✓
✓	**Current low**	xx %	xx %	✓
✓	**Mains system communication**			✓
✓	**Motor temperature (PT)**	xx C	xx C	✓
✓	**External digital (PTC)**			✓
✓	**Power factor high**	0.xx	0.xx	✓
✓	**Power factor low**	0.xx	0.xx	✓
✓	**Starts per hour**		xx	
✓	**Auto re-starts per 24 h**	xxx		
✓	**Start capacitor low**	xxxx uF	xxxx uF	✓
✓	**Run capacitor low**	xxxx uF	xxxx uF	✓
✓	**Aux. winding current low**			✓
✓	**PT sensor signal fault**			
✓	**Time for service**		xxxx h	
✓	**Load despite trip**			

✓ **General Protection**
✓ **General Auto restart**

Nominel voltage	**xxx.x V**
IEC trip class	**xx**
Trip delay	**xxx s**
Auto restart time	**xxx s**

Program

Setup MP204

3 phase motor

Go to status screen

	Event	Trip limit	Warning limit	Auto restart
✓	**Voltage high**	xx %	xx %	✓
✓	**Voltage low**	xx %	xx %	✓
✓	**Current high**	xxx.x A	xxx.x A	✓
✓	**Current low**	xxx.x A	xxx.x A	✓
✓	**Asymmetry**	xx.x %	xx.x %	✓
✓	**Phase sequence reversal**			✓
✓	**Missing phase**			✓
✓	**Mains system communication**			✓
✓	**Insulation low**	xxxx kOhm	xxxx kOhm	✓
✓	**Motor temperature (Tempcon)**	xx C	xx C	✓
✓	**Motor temperature (PT)**	xx C	xx C	✓
✓	**External digital (PTC)**			✓
✓	**Power factor high**	0.xx	0.xx	✓
✓	**Power factor low**	0.xx	0.xx	✓
✓	**Starts per hour**		xx	
✓	**Auto re-starts per 24 h**	xxx		
✓	**Tempcon sensor signal fault**			
✓	**PT sensor signal fault**			
✓	**Time for service**		xxxx h	
✓	**Load despite trip**			

✓ **General Auto restart**
✓ **General Protection**

Nominel voltage	**xxx.x V**
IEC trip class	**xx**
Trip delay	**xxx s**
Auto restart time	**xxx s**

Program

12.3 GENIbus telegram examples

Request	
Start Delimiter, SD	0x27
Length, LE	0x32
Destination Address, DA	0x20
Source Address, SA	0x01
Class 2: Measured data	0x02
OS=0 (GET), Length=46	0x2E
v12_hi, ID29	0x1D
v12_lo, ID30	0x1E
v23_hi, ID31	0x1F
v23_lo v, ID32	0x20
v31_hi, ID33	0x21
v31_lo, ID34	0x22
v_line_hi, ID35	0x23
v_line_lo, ID36	0x24
i1_hi, ID37	0x25
i1_lo, ID38	0x26
i2_hi, ID39	0x27
i2_lo, ID40	0x28
i3_hi, ID41	0x29
i3_lo, ID42	0x2A
i_line_hi, ID43	0x2B
i_line_lo, ID44	0x2C
p_hi, ID65	0x41
p_lo1, ID66	0x42
p_lo2, ID67	0x43
p_lo3, ID68	0x44
energy_hi, ID69	0x45
energy_lo1, ID70	0x46
energy_lo2, ID71	0x47
energy_lo3, ID72	0x48
cos_phi, ID64	0x40
i_asym, ID49	0x31
r_insulate, ID94	0x5E
setup, ID97	0x61
dig_in, ID99	0x63
t_mo1, ID47	0x2F
t_mo2, ID48	0x30
t_run_hi, ID77	0x4D
t_run_lo1, ID78	0x4E
t_run_lo2, ID79	0x4F
t_on_hi, ID80	0x50
t_on_lo1, ID81	0x51
t_on_lo2, ID82	0x52
start_cnt_hi, ID86	0x56
start_cnt_lo1, ID87	0x57
start_cnt_lo2, ID88	0x58
act_mode1, ID95	0x5F
act_mode2, ID96	0x60
alarm_code, ID144	0x90
warnings_1, ID145	0x91
warnings_2, ID146	0x92
warnings_3, ID147	0x93
CRC high	0xC0
CRC low	0x79

Reply	
Start Delimiter, SD	0x24
Length, LE	0x32
Destination Address, DA	0x01
Source Address, SA	0x20
Class 2: Measured data	0x02
Ack=0 (OK), Length=46	0x2E
- value example -	0x0F
- value example -	0xA0
- value example -	0x0F
- value example -	0xA0
- value example -	0x0F
- value example -	0xA0
- value example -	0x0F
- value example -	0xA0
- value example -	0x03
- value example -	0x09
- value example -	0x03
- value example -	0x09
- value example -	0x03
- value example -	0x09
- value example -	0x03
- value example -	0x09
- value example -	0x00
- value example -	0x00
- value example -	0xD2
- value example -	0x48
- value example -	0x01
- value example -	0xE5
- value example -	0x09
- value example -	0x34
- value example -	0x61
- value example -	0x11
- value example -	0xF4
- value example -	0x02
- value example -	0x00
- value example -	0x47
- value example -	0x43
- value example -	0x00
- value example -	0xE5
- value example -	0x2A
- value example -	0x01
- value example -	0x2B
- value example -	0xA5
- value example -	0x00
- value example -	0x00
- value example -	0xC5
- value example -	0x00
- value example -	0x00
- value example -	0x00
- value example -	0x00
- value example -	0x00
- value example -	0x00
CRC high	
CRC low	

Fig. 12.1: *GENIbus telegram requesting all Measured data (Class 2) needed for the MP204 Control Panel example (except Alarm log)*

Request	
Start Delimiter, SD	0x27
Length, LE=8	0x08
Destination Address, DA	0x20
Source Address, SA	0x01
Class 4: Configuration	0x04
OS=2 (SET), Length=4	0x84
v_nom_hi, ID21	0x15
- value example -	0x0F
v_nom_lo, ID22	0x16
- value example -	0xA0
CRC high	0x37
CRC low	0xE0

Reply	
Start Delimiter, SD	0x24
Length, LE	0x04
Destination Address, DA	0x01
Source Address, SA	0x20
Class 4: Configuration	0x04
Ack=0 (OK), Length=0	0x00
CRC high	0x5B
CRC low	0x43

Fig. 12.2: *GENIbus telegram example writing some Configuration parameters (Class 4).*

Request	
Start Delimiter, SD	0x27
Length, LE	0x05
Destination Address, DA	0x20
Source Address, SA	0x01
Class 3: Command	0x03
OS=2 (SET), Length=1	0x81
TRIP_A, ID95	0x5F
CRC high	0x16
CRC low	0x0D

Reply	
Start Delimiter, SD	0x24
Length, LE	0x04
Destination Address, DA	0x01
Source Address, SA	0x20
Class 3: Command	0x03
Ack=0 (OK), Length=0	0x00
CRC high	0xC2
CRC low	0xD4

Fig. 12.3: *GENIbus telegram example writing a command (Class 3)*

12.4 G100 Profibus telegram examples

Profibus is described in the G100 Support Files document *Profibus/profibus.pdf*.

Request	
COUNT (in master)	0x01
COM_REF (Don't care)	0x00
INVOKE_ID (Don't care)	0x00
SERVICE (Read multiple)	0x0E
PRIMITIVE (Request)	0x00
OBJ_LENGTH_HI	0x00
OBJ_LENGTH_LO (=31)	0x19
NO_OF_INDICES	0x0B
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **v12**	0x05
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **v23**	0x06
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **v31**	0x07
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **v_line**	0x08
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **i1**	0x09
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **i2**	0x0A
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **i3**	0x0B
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **i_line**	0x0C
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **t_mo1**	0x0E
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **p**	0xF0
CHK_SUM_HI	-
CHK_SUM_LO	-

Reply	
COUNT (in G100)	0x06
COM_REF (Don't care)	0x00
INVOKE_ID (Don't care)	0x00
SERVICE (Read multiple)	0x0E
PRIMITIVE (Reply)	0x01
OBJ_LENGTH_HI	0x00
OBJ_LENGTH_LO (=38)	0x26
RESULT (0=OK)	0x00
ERR_CLASS	0x00
ERR_CODE	0x00
ADD_CODE_HI	0x00
ADD_CODE_LO	0x00
LENGTH (=35)	0x23
OBJ_LENGTH	0x02
VALUE_HI, **v12_hi**	0x0F
VALUE_LO, **v12_lo**	0xA0
OBJ_LENGTH	0x02
VALUE_HI, **v23_hi**	0x0F
VALUE_LO, **v23_lo**	0xA0
OBJ_LENGTH	0x02
VALUE_HI, **v31_hi**	0x0F
VALUE_LO, **v31_lo**	0xA0
OBJ_LENGTH	0x02
VALUE_HI, **v_line_hi**	0x0F
VALUE_LO, **v_line_lo**	0xA0
OBJ_LENGTH	0x02
VALUE_HI, **i1_hi**	0x03
VALUE_LO, **i1_lo**	0x09
OBJ_LENGTH	0x02
VALUE_HI, **i2_hi**	0x03
VALUE_LO, **i2_lo**	0x09
OBJ_LENGTH	0x02
VALUE_HI, **i3_hi**	0x03
VALUE_LO, **i3_lo**	0x09
OBJ_LENGTH	0x02
VALUE_HI, **i_line_hi**	0x03
VALUE_LO, **i_line_lo**	0x09
OBJ_LENGTH	0x02
VALUE_HI, (=0)	0x00
VALUE_LO, **t_mo1**	0x37
OBJ_LENGTH	0x04
VALUE_HI, **p_hi**	0x01
VALUE_LO1, **p_lo1**	0x23
VALUE_LO2, **p_lo2**	0xA2
VALUE_LO3, **p_lo3**	0xF1
CHK_SUM_HI	-
CHK_SUM_LO	-

Fig. 12.4: *Profibus telegram requesting currents, voltages, temperatures and power. The MP204 has No. 1 (=index 0x2120)*

Request	
COUNT (in master)	0x01
COM_REF (Don't care)	0x00
INVOKE_ID (Don't care)	0x00
SERVICE (Write)	0x03
PRIMITIVE (Request)	0x00
OBJ_LENGTH_HI	0x00
OBJ_LENGTH_LO (=6)	0x06
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **v_nom**	0x50
LENGTH	0x02
VALUE_HI	0x0F
VALUE_LO	0xA0
CHK_SUM_HI	-
CHK_SUM_LO	-

Reply	
COUNT (in G100)	0x06
COM_REF (Don't care)	0x00
INVOKE_ID (Don't care)	0x00
SERVICE (Write)	0x03
PRIMITIVE (Reply)	0x01
OBJ_LENGTH_HI	0x00
OBJ_LENGTH_LO (=5)	0x05
RESULT (0=OK)	0x00
ERR_CLASS	0x00
ERR_CODE	0x00
ADD_CODE_HI	0x00
ADD_CODE_LO	0x00
CHK_SUM_HI	-
CHK_SUM_LO	-

Fig. 12.5: *Profibus telegram example writing a Configuration parameter. Only <u>one</u> subindex can be written at a time.*

Request	
COUNT (in master)	0x01
COM_REF (Don't care)	0x00
INVOKE_ID (Don't care)	0x00
SERVICE (Write)	0x03
PRIMITIVE (Request)	0x00
OBJ_LENGTH_HI	0x00
OBJ_LENGTH_LO (=5)	0x05
INDEX_HI	0x21
INDEX_LO	0x20
SUB_INDEX, **TRIP_A**	0x4B
LENGTH	0x01
VALUE	0x01
CHK_SUM_HI	-
CHK_SUM_LO	-

Reply	
COUNT (in G100)	0x06
COM_REF (Don't care)	0x00
INVOKE_ID (Don't care)	0x00
SERVICE (Write)	0x03
PRIMITIVE (Reply)	0x01
OBJ_LENGTH_HI	0x00
OBJ_LENGTH_LO (=5)	0x05
RESULT (0=OK)	0x00
ERR_CLASS	0x00
ERR_CODE	0x00
ADD_CODE_HI	0x00
ADD_CODE_LO	0x00
CHK_SUM_HI	-
CHK_SUM_LO	-

Fig. 12.6: *Profibus telegram example writing a Command.*

12.5 G100 Modbus telegram examples

In the G100 Support Files folder *RMP\PLC register calculations* you can find the spreadsheet file *MP204 via G100 Modbus.xls* that can help you calculate the correct Modbus register address for any data item in a MP204 with any No. Find description of usage of Modbus protocol with G100 in the document *RMP/modbus.pdf*.

Request

G100 address	0x01
Function code (read)	0x03
Start register high	0x1F
Start register low - 1	0x80
No of registers high	0x00
No of registers low	0x0C
CRC low	-
CRC high	-

Reply

G100 address	0x01
Function code (read)	0x03
Byte count (=24)	0x15
Value of **v12_hi/lo**	0x0F
	0xA0
Value of **v23_hi/lo**	0x0F
	0xA0
Value of **v31_hi/lo**	0x0F
	0xA0
Value of **v_line_hi/lo**	0x0F
	0xA0
Value of **i1_hi/lo**	0x03
	0x09
Value of **i2_hi/lo**	0x03
	0x09
Value of **i3_hi/lo**	0x03
	0x09
Value of **i_line_hi/lo**	0x03
	0x09
Value of **i_line_start_hi/lo**	0x07
	0xAB
Value of **t_mo1**	0x00
	0x37
Value of **t_mo2**	0x00
	0x3B
Value of **i_asym**	0x00
	0x04
CRC low	-
CRC high	-

Fig. 12.7: *Modbus read telegram requesting currents, voltage and, temperature for MP204 No. 1. Notice the subtraction of 1 from the start register in the request as required by the Modbus protocol. Notice also that all registers returned are 16 bit (2 bytes for each item). Requesting data items with sub index>=240 will return 32 bit values (4 bytes for each item)*

Request

G100 address	0x01
Func. code (write multiple)	0x03
Start register high, **v_nom**	0x1F
Start register low - 1	0xCB
No of registers high	0x00
No of registers low	0x01
Byte count	0x02
Data high, **v_nom_hi**	0x0F
Data low, **v_nom_lo**	0xA0
CRC low	-
CRC high	-

Reply

G100 address	0x01
Func. code (write multiple)	0x03
Start register high	0x1F
Start register low - 1	0xCB
No of registers high	0x00
No of registers low	0x01
CRC low	-
CRC high	-

Fig. 12.8: *Modbus telegram example writing the value 400.0 V to the Configuration parametrr **v_nom** (Register 0x1FCC in MP204 No. 1).*
Notice that all items with subindex<240 have 16 bit values and all items with subindex>=240 have 32 bit values. Only <u>one</u> subindex can be written at a time.

Request

G100 address	0x01
Func. code (write multiple)	0x03
Start register high, **TRIP_A**	0x1F
Start register low - 1	0xC6
No of registers high	0x00
No of registers low	0x01
Byte count	0x02
Data high	0x00
Data low	0x01
CRC low	-
CRC high	-

Reply

G100 address	0x01
Func. code (write multiple)	0x03
Start register high	0x1F
Start register low - 1	0xC6
No of registers high	0x00
No of registers low	0x01
CRC low	-
CRC high	-

Fig. 12.9: *Modbus telegram example writing the Command **TRIP_A**. (Register 0x1FC7 in MP204 No. 1) Notice the using of value "1" in the data field to trigger the execution of the command.*

13. References

Reference	Document Title	Document File
/1/	MP 204 Installation and operating instructions	Booklet
/2/	GENIbus Protocol Specification	genibus.pdf
/3/	G100 Protocol Specification	g100prot.pdf
/4/	G100 Object Reference Specification	objref.pdf
/5/	Accessing G100 via the Satt Control Comli Protocol	comli.pdf
/6/	Accessing G100 via Modbus	modbus.pdf
/7/	Accessing G100 via Profibus-DP	profibus.pdf

14. Data Item Overview

Explanation to used abbreviations for scaling:

<unit>: The data item has this unit as its fixed scaling. Extended precision is used throughout.
unscaled: The data item is unscaled (e.g. a number, a counter, etc.)
bits: The data item is bit interpreted. The bit interpretation is explained in the text chapters

Identifier	GENIbus		G100		R/W	Description
	Class, ID	scaling	Sub-index	scaling		
v1_hi [1)] v1_lo [1)]	2, 21 2, 22	0.1 V	1	0.1 V	R	3-phase motor: Phase voltage for L1 1-phase motor: Equals 0V (reference)
v2_hi [1)] v2_lo [1)]	2, 23 2, 24	0.1 V	2	0.1 V	R	3-phase motor: Phase voltage for L2 1-phase motor: Phase voltage
v3_hi [1)] v3_lo [1)]	2, 25 2, 26	0.1 V	3	0.1 V	R	3-phase motor: Phase voltage for L3 1-phase motor: Auxiliary winding voltage
v_phase_hi [1)] v_phase_lo [1)]	2, 27 2, 28	0.1 V	4	0.1 V	R	3-phase motor: Mean of the ph. voltages 1-phase motor: Phase voltage (=v2)
v12_hi [**)] v12_lo [**)]	2, 29 2, 30	0.1 V	5	0.1 V	R	3-phase motor: Voltage between L1-L2 1-phase motor: 'NA'
v23_hi [**)] v23_lo [**)]	2, 31 2, 32	0.1 V	6	0.1 V	R	3-phase motor: Voltage between L2-L3 1-phase motor: 'NA'
v31_hi [**)] v31_lo [**)]	2, 33 2, 34	0.1 V	7	0.1 V	R	3-phase motor: Voltage between L3-L1 1-phase motor: 'NA'
v_line_hi [**)] v_line_lo [**)]	2, 35 2, 36	0.1 V	8	0.1 V	R	3-phase motor: Mean of the line voltages 1-phase motor: 'NA'
i1_hi i1_lo	2, 37 2, 38	0.1 A	9	0.1 A	R	3-phase motor: Line current for line L1 1-phase motor: Neutral current
i2_hi i2_lo	2, 39 2, 40	0.1 A	10	0.1 A	R	3 phase motor: Line current for line L2 1 phase motor: Current in mains winding
i3_hi i3_lo	2, 41 2, 42	0.1 A	11	0.1 A	R	3 phase motor: Line current for line L3 1 phase motor: Current in aux. winding
i_line_hi i_line_lo	2, 43 2, 44	0.1 A	12	0.1 A	R	3-phase motor: Mean of the line currents 1-phase motor: Line current for line L1
i_line_start_hi i_line_start_lo	2, 45 2, 46	0.1 A	13	0.1 A	R	Line start current measured as the peak of the rms value for a period.
t_mo1 [3)]	2, 47	1 °C	14	1 °C	R	Motor temperature measured by Tempcon
t_mo2	2, 48	1 °C	15	1 °C	R	Motor temperature measured by PT resistor
i_asym [**) 3)]	2, 49	0.1 %	16	0.1 %	R	Line current asymmetry
c_start_hi [*) 3)] c_start_lo [*) 3)]	2, 50 2, 51	1 µF	17	1 µF	R	Start capacitor value
c_run_hi [*) 3)] c_run_lo [*) 3)]	2, 52 2, 53	1 µF	18	1 µF	R	Run capacitor value
c_start_ref_hi [*)] c_start_ref_lo [*)]	2, 54 2, 55	1 µF	19	1 µF	R	Start capacitor reference value (result of learning function or preset)
c_run_ref_hi [*)] c_run_ref_lo [*)]	2, 56 2, 57	1 µF	20	1 µF	R	Run capacitor reference value (result of learning function or preset)
f_line	2, 58	0.5 Hz	21	0.1 Hz	R	Line frequency
ang12 [**)]	2, 59	1 °	22	1 °	R	Voltage angle between the lines L1-L2
ang13 [**)]	2, 60	1 °	23	1 °	R	Voltage angle between the lines L1-L3
cos_phi1 [**) 1) 3)]	2, 61	0.01	24	0.01	R	Current phase angle cosine for line L1
cos_phi2 [**) 1) 3)]	2, 62	0.01	25	0.01	R	Current phase angle cosine for line L2
cos_phi3 [**) 1) 3)]	2, 63	0.01	26	0.01	R	Current phase angle cosine for line L3
cos_phi [3)]	2, 64	0.01	27	0.01	R	Power factor
p_hi p_lo1 p_lo2 p_lo3	2, 65 2, 66 2, 67 2, 68	1 W	240	1 W	R	Power consumption
energy_hi energy_lo1 energy_lo2 energy_lo3	2, 69 2, 70 2, 71 2, 72	1 kWh	241	1 kWh	R	Energy consumption.
energy_trip_cnt_hi energy_ trip_cnt lo1 energy_ trip_cnt lo2 energy_ trip_cnt lo3	2, 73 2, 74 2, 75 2, 76	1 kWh	242	1 kWh	R	Energy consumption trip counter. Can be written via energy_trip_cnt_set and cleared with RESET_ENERGY_CNT
t_run_hi t_run_lo1 t_run_lo2	2, 77 2, 78 2, 79	1 min	243	1 min	R	Running time counter.
t_on_hi t_on_lo1 t_on_lo2	2, 80 2, 81 2, 82	1 min	244	1 min	R	Power on time counters
t_run_trip_cnt_hi t_run_trip_cnt_lo1 t_run_trip_cnt_lo2	2, 83 2, 84 2, 85	1 min	245	1 min	R	Running time trip counter. Can be written via t_run_trip_cnt_set. Cleared with RESET_HOUR_CNT
start_cnt_hi start_cnt_lo1 start_cnt_lo2	2, 86 2, 87 2, 88	unscaled	246	unsca.	R	No. of starts counter.
start_trip_cnt_hi start_trip_cnt_lo1 start_trip_cnt_lo2	2, 89 2, 90 2, 91	unscaled	247	unsca.	R	No. of starts trip counter. Can be written via start_trip_cnt_set and cleared with RESET_START_CNT
auto_restart_trip_cnt_hi auto_restart_trip_cnt_lo	2, 92 2, 93	unscaled	28	unsca.	R	No. of auto restarts trip counter. Can be cleared with RESET_RESTART_CNT

r_insulation[4) 2)]	2, 94	10 kΩ	29	1 kΩ	R	Motor insulation resistance. Value range [0; 100]~[0-1000kΩ]. The value 101 is used to signal >1000kΩ
act_mode1	2, 95	bits	30	bits	R	Modes operated via commands, se text
act_mode2	2, 96	bits	31	bits	R	Modes operated by MP 204 itself, se text
setup	2, 97	bits	32	bits	R	Setup via commands and learning function Factory: 0x62
temp_meas_type	2, 98	bits	33	bits	R	Temperature measurement type
dig_in	2, 99	bits	34	bits	R	Status of digital input (PTC)
led_ctr	2, 141	bits	35	bits	R	Status of indication LED's
starts_per_h	2, 142	unscaled	36	unsca.	R	Moving average of starts per h
auto_restarts_per_24h	2, 143	unscaled	37	unsca.	R	Moving average of auto restarts per 24 h
alarm_code	2, 144	unscaled	38	unsca.	R	Alarm code, see table
warnings_1	2, 145	bits	39	bits	R	Warning bits byte 1
warnings_2	2, 146	bits	40	bits	R	Warning bits byte 2
warnings_3	2, 147	bits	41	bits	R	Warning bits byte 3
unit_family	2, 148	unscaled	42	unsca.	R	Unit family code (=7)
unit_type	2, 149	unscaled	43	unsca.	R	Unit type code (=1)
unit_version	2, 150	unscaled	-	-	R	Unit version code (=0)
alarm_log1	2, 153	unscaled	44	unsca.	R	Alarm code for logged alarm No. 1
alarm_log1_time_hi alarm_log1_time_lo1 alarm_log1_time_lo2	2, 154 2, 155 2, 156	1 min	248	1 min	R	1minutes counter for logged alarm No. 1
alarm_log2	2, 157	unscaled	45	unsca.	R	Alarm code for logged alarm No. 2
alarm_log2_time_hi alarm_log2_time_lo1 alarm_log2_time_lo2	2, 158 2, 159 2, 160	1 min	249	1 min	R	1 minutes counter for logged alarm No. 2
alarm_log3	2, 161	unscaled	46	unsca.	R	Alarm code for logged alarm No. 3
alarm_log3_time_hi alarm_log3_time_lo1 alarm_log3_time_lo2	2, 162 2, 163 2, 164	1 min	250	1 min	R	1 minutes counter for logged alarm No. 3
alarm_log4	2, 165	unscaled	47	unsca.	R	Alarm code for logged alarm No. 4
alarm_log4_time_hi alarm_log4_time_lo1 alarm_log4_time_lo2	2, 166 2, 167 2, 168	1 min	-	1 min	R	1 minutes counter for logged alarm No. 4
alarm_log5	2, 169	unscaled	48	unsca.	R	Alarm code for logged alarm No. 5
alarm_log5_time_hi alarm_log5_time_lo1 alarm_log5_time_lo2	2, 170 2, 171 2, 172	1 min	-	1 min	R	1 minutes counter for logged alarm No. 5
v_max_log_hi v_max_log_lo	2, 173 2, 174	0.1 V	49	0.1 V	R	3 phase motor: Logged max line voltage 1 phase motor: Logged max phase voltage
v_min_log_hi v_min_log_lo	2, 175 2, 176	0.1 V	50	0.1 V	R	3 phase motor: Logged min line voltage 1 phase motor: Logged min phase voltage
i_line_max_log_hi i_line_max_log_lo	2, 177 2, 178	0.1 A	51	0.1 A	R	Logged max line current
i_line_min_log_hi	2, 179	0.1 A	52	0.1 A	R	Logged min line current
i_line_min_log_lo	2, 180					
starts_per_h_max_log	2, 181	unscaled	53	unsca.	R	Logged max value of starts per h
v_phase_distortion	2, 182	0.1 %	54	0.1 %	R	Phase voltage distortion
RESET	3, 1	-	55	-	W	Hardware resets the MP 204
RESET_ALARM	3, 2	-	56	-	W	Resets pending alarms and returns relays to default (power on) position
FACT_BOOT	3, 3	-	-	-	W	All parameters returned to factory setting
USER_BOOT	3, 4	-	-	-	W	User adj. param. returned to fact. setting
PROTECTION_E	3, 11	-	57	-	W	Setting all motor protection to be enabled
PROTECTION_D	3, 12	-	58	-	W	Setting all motor protection to be disabled
USE	3, 19	-	-	-	W	Makes the MP 204 enter Use Mode
TEST	3, 20	-	-	-	W	Makes the MP 204 enter Test Mode
RESET_HOUR_CNT	3, 36	-	59	-	W	Resets hour trip counter
AUTO_RESTART_E	3, 41	-	60	-	W	Setting auto restart to be enabled
AUTO_RESTART_D	3, 42	-	61	-	W	Setting auto restart to be disabled
RESET_ALARM_LOG	3, 51	-	62	-	W	Resets the alarm log
RELAY2_OPEN	3, 79	-	-	-	W	Opens signal relay R2
RELAY2_CLOSE	3, 80	-	-	-	W	Closes signal relay R2
TRIP	3, 81	-	63	-	W	Makes the MP 204 trip (like Test button)
REVERSE_SEQUENCE	3, 84	-	64	-	W	Reversing the phase sequence reference
ARM_LEARNING	3, 85	-	65	-	W	Phase/capacitance learning armed
RESET_START_CNT	3, 86	-	66	-	W	Resets the start trip counter
RESET_RESTART_CNT	3, 87	-	67	-	W	Resets the restart trip counter
RESET_MAX_MIN_LOG	3, 88	-	68	-	W	Reset the max/min current and voltage log
1_PHASE	3, 89	-	69	-	W	Setting of MP 204 for single phase
3_PHASE_WITHOUT_FE	3, 90	-	70	-	W	Setting of MP 204 for three phase (3 wire)
3_PHASE_WITH_FE	3, 91	-	71	-	W	Setting of MP 204 for three phase+FE
TEMPCON_E	3, 92	-	72	-	W	Enable temp. measurement with Tempcon
TEMPCON_D	3, 93	-	73	-	W	Disble temp. measurement with Tempcon
PT_RESISTOR_E	3, 94	-	74	-	W	Enable temp. measurement with PT resistor
TRIP_A	3, 95	-	75	-	W	Makes the MP 204 trip without any alarm
PT_RESISTOR_D	3, 98	-	76	-	W	Disable temp. meas. with PT resistor
POWER_ON_START	3, 99	-	77	-	W	Motor will be switched on after power on
POWER_ON_STOP	3, 100	-	78	-	W	Motor will be switched off after power on
RESET_ENERGY_CNT	3, 101	-	79	-	W	Resets kWh trip counter
production_code_1	4, 0	unscaled	-	-	R/W	BCD bar code data 1 (type code msb)
production_code_2	4, 1	unscaled	-	-	R/W	BCD bar code data 2 (type code)
production_code_3	4, 2	unscaled	-	-	R/W	BCD bar code data 3 (type code)
production_code_4	4, 3	unscaled	-	-	R/W	BCD bar code data 4 (type code lsb)
production_code_5	4, 4	unscaled	-	-	R/W	BCD bar code data 5 (revision)
production_code_6	4, 5	unscaled	-	-	R/W	BCD bar code data 6 (production year)
production_code_7	4, 6	unscaled	-	-	R/W	BCD bar code data 7 (production week)
production_code_8	4, 7	unscaled	-	-	R/W	BCD bar code data 8 (serial no. msb)
production_code_9	4, 8	unscaled	-	-	R/W	BCD bar code data 9 (serial no.)
production_code_10	4, 9	unscaled	-	-	R/W	BCD bar code data 10 (serial no. lsb)

configuration_code_1	4, 10	unscaled	-	-	R/W	Configuration code marker 1
configuration_code_2	4, 11	unscaled	-	-	R/W	Configuration code marker 2
configuration_code_3	4, 12	unscaled	-	-	R/W	Configuration code marker 3
configuration_code_4	4, 13	unscaled	-	-	R/W	Configuration code marker 4
vir_conf_code_year	4, 14	unscaled	-	-	R/W	Virgin conf. code year marker
vir_conf_code_week	4, 15	unscaled	-	-	R/W	Virgin conf. code week [1-52] marker
act_conf_code_year	4, 16	unscaled	-	-	R/W	Actual conf. code year marker
act_conf_code_week	4, 17	unscaled	-	-	R/W	Actual conf. code week [1-52] marker
v_nom_hi v_nom_lo	4, 21 4, 22	0.1 V	80	0.1 V	R/W	Nominal phase voltage / line voltage Factory: 400.0 V
v_max_alarm	4, 23	%	81	%	R/W	Max percentage alarm limit above v_nom Factory: 20 %
v_min_alarm	4, 24	%	82	%	R/W	Max percentage alarm limit below v_nom Factory: 20 %
i_line_max_alarm_hi i_line_max_alarm_lo	4, 29 4, 30	0.1 A	83	0.1 A	R/W	Line current max alarm limit (IEC947-4) Factory: 0 A
i_min_alarm	4, 31	1 %	84	1 %	R/W	% alarm limit below i_line_max_alarm Factory: 40 %
c_start_min_alarm*)	4, 33	1 %	85	1 %	R/W	% alarm limit below c_start_ref Factory: 50 %
c_run_min_alarm*)	4, 34	1 %	86	1 %	R/W	% alarm limit below c_run_ref Factory: 50 %
t_mo1_max_alarm	4, 35	1 °C	87	1 °C	R/W	Tempcon temperature meas. alarm limit Factory: 75 °C
t_mo2_max_alarm	4, 36	1 °C	88	1 °C	R/W	PT temperature measurement alarm limit Factory: 60 °C
i_asym_max_alarm **)	4, 37	0.1 %	89	0.1 %	R/W	Line current asymmetry alarm limit Factory: 10.0 %
r_insul_min_alarm	4, 38	10 kΩ	90	1 kΩ	R/W	Insulation resistance minimum alarm limit Factory: 20 kΩ
cos_phi_max_alarm	4, 39	0.01	91	0.01	R/W	Cos(φ) max alarm limit Factory: 1.00
cos_phi_min_alarm	4, 40	0.01	92	0.01	R/W	Cos(φ) min alarm limit Factory: 0.50
t_run_trip_warn_hi t_run_trip_warn_lo	4, 41 4, 42	100 h	93	100 h	R/W	Service warning limit Factory: 10000 h
unit_addr	4, 46	unscaled	94	unsca.	R/W	GENIbus unit address Factory: 231
group_addr	4, 47	unscaled	95	unsca.	R/W	GENIbus group address Factory: 247
v_max_warn	4, 48	1 %	96	1 %	R/W	Max percentage warn. limit above v_nom Factory: 15 %
v_min_warn	4, 49	1 %	97	1 %	R/W	Max percentage warn. limit below v_nom Factory: 15 %
i_line_max_warn_hi i_line_max_warn_lo	4, 56 4, 57	0.1 A	98	0.1 A	R/W	Line current max warning limit Factory: 0 A

i_min_warn	4, 58	1 %	99	1 %	R/W	% warning limit below i_line_max_alarm Factory: 40 %
c_start_min_warn*)	4, 60	1 %	100	1 %	R/W	% Warning limit below c_start_ref Factory 25 %
c_run_min_warn*)	4, 61	1 %	101	1 %	R/W	% warning limit below c_start_ref Factory: 25 %
t_mo1_max_warn	4, 62	1 °C	102	1 °C	R/W	Tempcon temperature meas. warning limit Factory: 65 °C
t_mo2_max_warn	4, 63	1 °C	103	1 °C	R/W	PT temperature measurement warning limit Factory: 50 °C
i_asym_max_warn **)	4, 64	0.1 %	104	0.1 %	R/W	Line current asymmetry warning limit Factory: 8.0 %
r_insul_min_warn	4, 65	10 kΩ	105	1 kΩ	R/W	Insulation resistance minimum warn. limit Factory: 100 kΩ
r100_menu_select	4, 66	bits	-	-	R/W	Used exclusively by R100 Factory: 40
cos_phi_max_warn	4, 67	0.01	106	0.01	R/W	Cos(φ) max warn limit Factory: 0.99
cos_phi_min_warn	4, 68	0.01	107	0.01	R/W	Cos(φ) min warn limit Factory: 0.65
starts_per_h_warn	4, 69	unscaled	108	unsca.	R/W	Maximum starts per h warning limit Factory: 40
alarms1_enable	4, 70	bits	109	bits	R/W	Individual E/D of alarms, byte 1 Factory: 0xFF
alarms2_enable	4, 71	bits	110	bits	R/W	Individual E/D of alarms, byte 2 Factory: 0x7F
alarms3_enable	4, 72	bits	111	bits	R/W	Individual E/D of alarms, byte 3 Factory: 0x1F
restart1_enable	4, 73	bits	112	bits	R/W	Individual enable/disable of auto restart after alarm condition, byte 1 Factory: 0xFF
restart2_enable	4, 74	bits	113	bits	R/W	Individual enable/disable of auto restart after alarm condition, byte 2 Factory: 0x3F
restart3_enable	4, 75	bits	114	bits	R/W	Individual enable/disable of auto restart after alarm condition, byte 3 Factory: 0x07
t_power_on_delay	4, 76	1 s	115	1 s	R/W	Power on delay Factory: 5 s
t_trip_delay	4, 77	1 s	116	1 s	R/W	Trip delay (all faults except max. current) Factory: 5 s
t_auto_restart	4, 78	10 s	117	1 s	R/W	Auto restart time (Alarm standby time) Factory: 300 s
iec_class	4, 79	unscaled	118	unsca.	R/W	IEC947-4 Motor protection class Factory: 0
cur_trans_factor	4, 80	unscaled	119	unsca.	R/W	Current transformer amplification factor Factory: 1

geni_setup	4, 81	bits	-	-	R/W	GENIpro specific setup Factory: 2
r100_menu_setup1	4, 82	bits	-	bits	R/W	Used exclusively by R100 Factory: 0
r100_menu_setup2	4, 83	bits	-	bits	R/W	Used exclusively by R100 Factory: 0
r100_menu_setup3	4, 84	bits	-	bits	R/W	Used exclusively by R100 Factory: 0
comm_watchdog	4, 85	1 s	120	1 s	R/W	Communication watchdog timeout and E/D Factory: 0 (disabled)
auto_restarts_per_24h_alarm	4, 86	unscaled	121	unsca.	R/W	Max no. of auto restarts /24h, alarm limit Factory: 3
display_setup	4, 87	bits	122	bits	R/W	Configuration of displayed parameters Factory: 0x10 (current, SI, no warn, cos(φ))
t_cur_trip_delay	4, 90	0.1 s	123	0.1 s	R/W	Line current trip delay for IEC Class 0 Factory: 5 s
t_run_trip_cnt_set_hi	5, 1	1 min	253	1 min	R/W	For presetting of the running time trip counter t_run_trip_cnt_hi/lo1/lo2
t_run_trip_cnt_set_lo1	5, 2					
t_run_trip_cnt_set_lo2	5, 3					
energy_trip_cnt_set_hi	5, 4	1 kWh	254	1 kWh	R/W	For presetting of the energy trip counter energy_trip_cnt_hi/lo1/lo2/lo3
energy_trip_cnt set_lo1	5, 5					
energy_trip_cnt set_lo2	5, 6					
energy_trip_cnt set_lo3	5, 7					
start_trip_cnt_set_hi	5, 8	unscaled	255	unsca.	R/W	For presetting of the start trip counter start_trip_cnt_hi/lo1/lo2
start_trip_cnt_set_lo1	5, 9					
start_trip_cnt_set_lo2	5, 10					
c_start_ref_set_hi	5, 11	1 µF	125	1 µF	R/W	For presetting of the start capacitor reference value c_start_ref_hi/lo
c_start_ref_set_lo	5, 12					
c_run_ref_set_hi	5, 13	1 µF	126	1 µF	R/W	For presetting of the run capacitor reference value c_run_ref_hi/lo
c_run_ref_set_lo	5, 14					
alarms_1_sim	5, 15	bits	127	bits	R/W	Used to generate simulated alarms/warnings. The bits are OR'ed with the real alarms/warnings. Can be cleared with RESET_ALARM or 'R' button. Bit interpretation like warnings_1, warnings_2 and warnings_3
alarms_2_sim	5, 16	bits	128	bits	R/W	
alarms_3_sim	5, 17	bits	129	bits	R/W	
warnings_1_sim	5, 18	bits	130	bits	R/W	
warnings_2_sim	5, 19	bits	131	bits	R/W	
warnings_3_sim	5, 20	bits	132	bits	R/W	

product_name	7, 1	-	-	-	R	Name (type code) of the device
project_name	7, 2	-	-	-	R	Name, description or code for the project
software_name1	7, 3	-	-	-	R	Unique software identifier 1 (name/release)
compile_date	7, 4	-	-	-	R	Compile date for this software release
protocol code	7, 5	-	-	-	R	Name/release for GENIpro implementation
developers	7, 7	-	-	-	R	Participating software developers (initials)
compile_time	7, 8	-	-	-	R	Compile time for this software release
rtos_code	7, 12	-	-	-	R	Name/release for used RTOS
software_name2	7, 14	-	-	-	R	Unique software identifier 2 (name/release)

*) Only available when MP 204 has been setup for 1-phase motors. Otherwise the value shows "NA".

**) Only available when MP 204 has been setup for 3-phase motors. Otherwise the value shows "NA".

1) In case "3-phase without FE" is selected the calculation is based on the sum of the voltages (reconstructed earth). This will be correct when the voltages are symmetrical but show a deviation for the non-symmetrical case.

2) This data items can only be measured when the motor is switched **off**. Otherwise the value shows "NA".

3) This data items can only be measured when the motor is switched **on**. Otherwise the value shows "NA".

4) This data item can only be measured when MP 204 has been setup for 3-phase motor with FE. Otherwise the value shows "NA".