DEIF

-power in control

CE

# MULTI-LINE 2
# APPLICATION NOTES



## Converting PPM-2 to PPM-3

- Parameter conversion
- Wiring
- Options
- I/O list
- Modbus

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Document no.: 4189341165A
SW version:

# 1. General information



# 2. Application and installation

# 1. General information

## 1.1 Warnings, legal information and safety

### 1.1.1 Warnings and notes

Throughout this document, a number of warnings and notes with helpful user information will be presented. To ensure that these are noticed, they will be highlighted as follows in order to separate them from the general text.

**Warnings**

**Warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.**

**Notes**

**Notes provide general information, which will be helpful for the reader to bear in mind.**

### 1.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

**The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.**

**Disclaimer**

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

### 1.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

**Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.**

### 1.1.4 Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

### 1.1.5 Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

## 1.2 About the Application Notes

### 1.2.1 General purpose

This document includes application notes for DEIF's Multi-line 2 unit. It mainly includes examples of different applications suitable for the unit.

**For functional descriptions, the procedure for parameter setup, parameter lists, and so on, see the Designer's Reference Handbook.**

The general purpose of the application notes is to offer the designer information about suitable applications for the Multi-line 2 unit.

**Make sure to read this document before starting to work with the Multi-line 2 unit and the genset to be controlled. Failure to do this could result in human injury or damage to the equipment.**

### 1.2.2 Intended users

The Application Notes are mainly intended for the person responsible for designing Multi-line 2 systems. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information in this document.

### 1.2.3 Contents and overall structure

This document is divided into chapters, and in order to make the structure simple and easy to use, each chapter will begin from the top of a new page.

# 2. Application and installation

## 2.1 About the application

### 2.1.1 General description

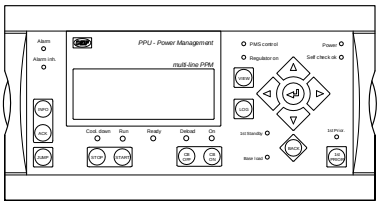
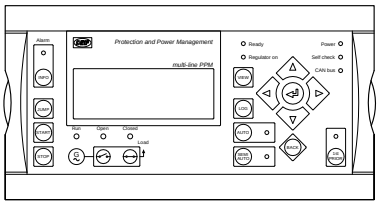
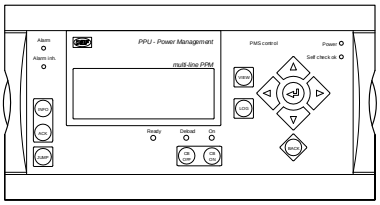
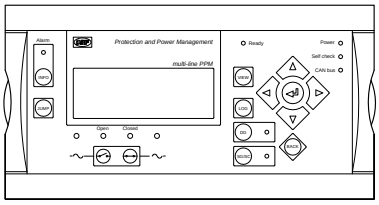
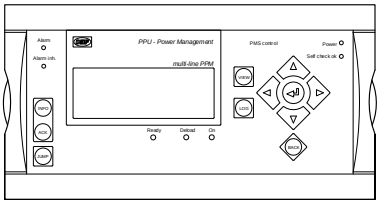
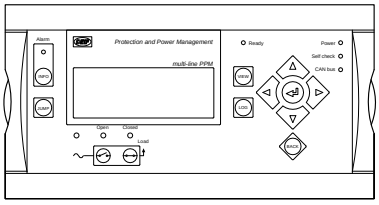
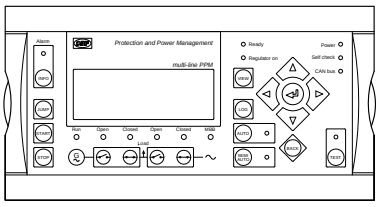
This document mainly includes general information (in point form) on how to upgrade a standard PPM-2 to a PPM-3 system, including mounting instructions and wiring descriptions, parameter and general standard conversions. Contact DEIF support for more details.

The general purpose of this document is to help the user with the first steps of upgrading a standard PPU power management system.

DEIF A/S always recommends to create a full backup parameter file before the old unit is powered down.

### 2.1.2 Converting the display

The table below shows an overview of standard displays and the options of converting the displays.

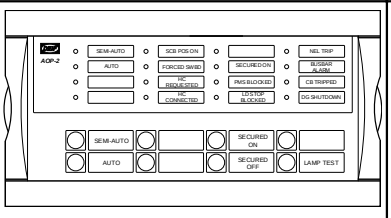
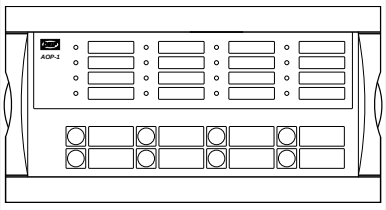
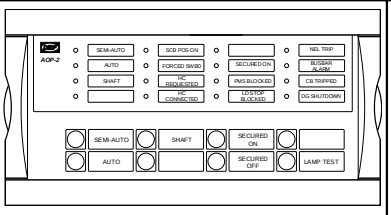
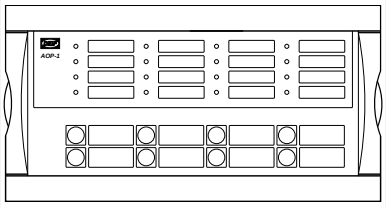
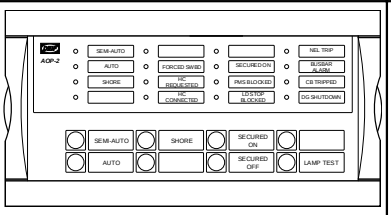
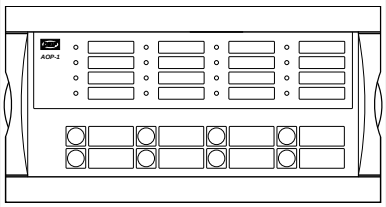
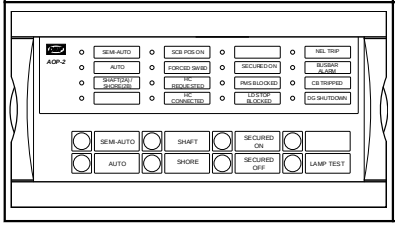
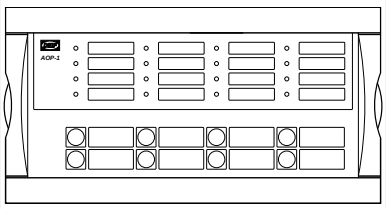
| PPM-2 | PPM-300 | Note |
|---|---|---|
|  |  | Engine control |
|  |  | Bus tie breaker |
|  |  | Shaft generator/shore generator |
| |  | Emergency generator |

## 2.1.3 Converting the additional display

The PPU power management unit will always be equipped with an additional operator panel for plant mode selection and control functions. The additional operator panel has 16 predefined text messages and 8 predefined push-buttons. The text messages for the LEDs and for the push-buttons can differ between the application types.

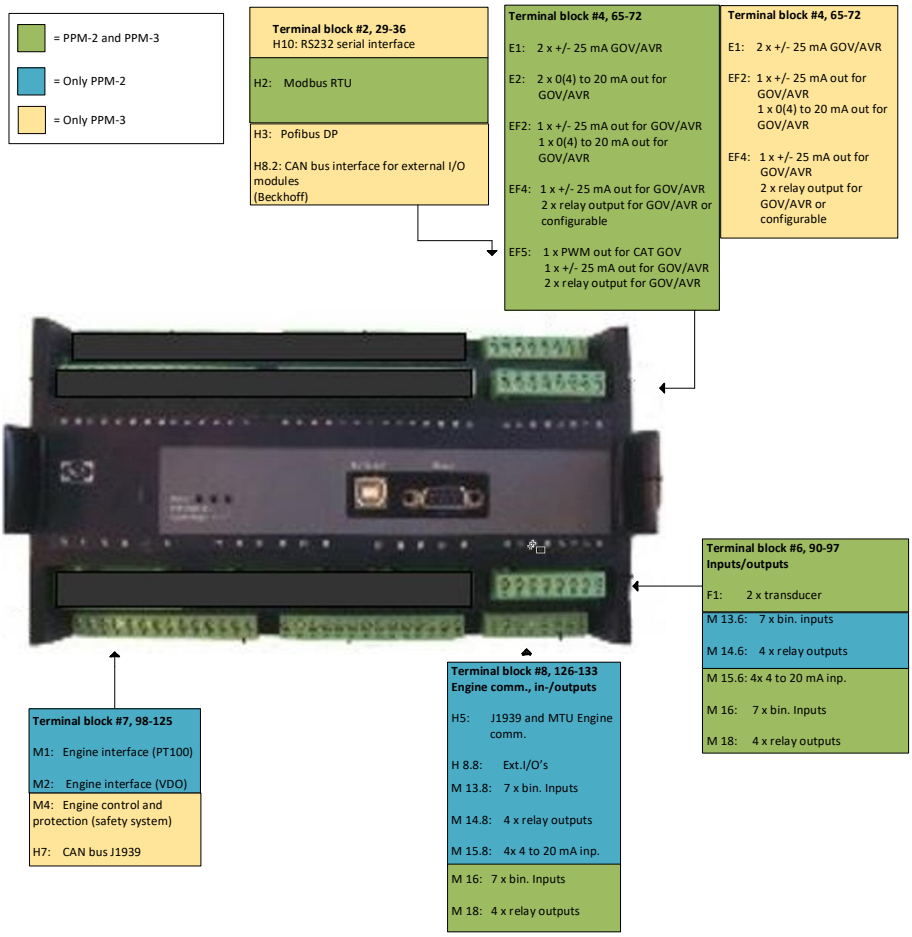
For PPM-3, the additional display is an option X3.
None of the 16 text messages and 8 push-buttons are predefined. The programming of the AOP-1 is made with the PC utility software, which can be downloaded from www.deif.com. Please refer to the help function in the PC utility software for programming instructions.
The option X3 can be used as an interface to the ML-2 units for indication of status and alarms together with buttons for alarm acknowledge and mode selection, for example.

The table below shows an overview of PPM-2 standard AOP-2 and the PPM-3 options X converting the displays.

| PPM-2 | PPM-3 | Note |
|---|---|---|
|  |  | PPM-2 SYSTEM 1 |
|  |  | PPM-2 SYSTEM 2_ SHAFT |
|  |  | PPM-2 SYSTEM 2_ SHORE |
|  |  | PPM-2 SYSTEM 3 |

## 2.1.4 Description of options

The unit housing is divided into board slot positions. This means that the unit consists of a number of printed circuit boards (PCBs) mounted in numbered slots - #1, 3, 4 and 5. Some of these board slots are standard and some are intended for options. The board slot positions are arranged as illustrated below.



The illustration below shows the location of the various options related to slots #2, 4, 6, 7 and 8.

The table below provides an overview and description of the PPM-2 options and shows which options can be converted to PPM-3.

| PPM-2 | Description | PPM-3 | Option type |
|---|---|---|---|
| | | | |
| Option D1 | Voltage/var/cos phi controlQ load sharing | Option D1 | Software/Hard-ware |
| Option E1 | +/-25 mA for speed governor<br>+/-25 mA for AVR | Option E1 | Hardware |
| Option EF2 | +/-25 mA for speed governor<br>1 × 0(4) 20 mA transducer output | Option EF2 | Hardware |
| Option EF4 | +/-25 mA for speed governor or AVR<br>2 × relay outputs for speed governor or AVR | Option EF4 | Hardware |
| Option F1 | 2 × 0(4) to 20 mA transducer out | Option F1 | Hardware |
| N/A | +/-25 mA for AVR<br>PWM speed governor signal. | Option EF5 | Hardware |
| Option H2 | Modbus communication | Option H2 | Hardware |
| N/A | Serial communication Profibus | Option H3 | Hardware |
| N/A | Reading of J1939 values | Option H5 | Hardware |
| N/A | Engine communication - CAN bus J1939 | Option H7 | Hardware |
| N/A | CAN bus interface for external I/O modules (Beckhoff) in slot #2 or slot #8 | Option H8.x | Hardware |
| Option J1 | Display cable, 3 m | Standard | Hardware |
| Option J2 | Display cable, 6 m | Option J2 | Hardware |
| Option J3 | PC cable for utility software (RS-232) | N/A | Hardware |
| N/A | PC cable for option N-programming | Option J4 | Hardware |
| Option J6 | Display cable, 1 m | Option J6 | Hardware |
| N/A | PC cable for utility software (USB), 1 m | Option J7 | Hardware |
| Option K1 and K2 | Documentation | Option K1 and K2 | Hardware |
| Standard | Engine control and protection (safety system) | Standard | Hardware |
| N/A | 7 binary inputs in slot #6 and/or slot #8 | Option M13.x | Hardware |
| M18 | 4 relay outputs in slot #6 and/or slot #8 | Option M14.x | Hardware |
| Option M15 | 4 analogue inputs in slot #8 | Option M15.x | Hardware |
| Option M16 | 7 Binary inputs in slot #6 | Option M13.x | Hardware |
| N5 | Modbus TCP/IP and alarms via SMS or email | Option N | Hardware |
| N6 | | | |
| N/A | Verified class 0.5 | Option Q1 | Hardware |
| X2 | Additional standard display on CAN bus | Option X2 | Hardware |
| N/A | Additional Operator Panel (AOP-1) | Option X3 | Hardware |
| X4 | Additional Operator Panel (AOP-2) | Option X4 | Hardware |

# 2.2 Installation and parameter setup

## 2.2.1 Wiring installation

Terminals for NEL and GB feedback have been changed. The table below shows an overview of the terminals on PPM-2 and PPM-3.

| General description | Terminal PPM-2 | Terminal description | Terminal PPM-3 | Terminal description | Note |
|---|---|---|---|---|---|
| Power supply | 1 | 24 V DC (+) | 1 | 24 V DC (+) | |
| Power supply | 2 | 0 V DC (-) | 2 | 0 V DC (-) | |
| Status | 3 + 4 | relay | 3 + 4 | relay | |
| Configurable/ Trip NEL 1 | 5 + 6 | Relay 1 (NO) | 61 + 62 | Configurable/Trip NEL 1 Relay 61 (NO) | Difference between the terminals |
| Configurable/ Trip NEL 2 | 8 + 9 | Relay 2 (NO) | 63 + 64 | Configurable/Trip NEL 2 Relay 63 (NO) | Difference between the terminals |
| PMS Alarm | 11 + 12 | Relay 3 (NO) | 5 + 6 | Relay 5 (NO) | Difference between the terminals In PPM-3 called Alarm horn |
| CB OFF Open breaker | 14 + 15 | Relay 4 (NO) | 14 + 15 | Relay 14 (NO) | |
| CB ON sync. | 17 + 18 | Relay output (NO) | 17 + 18 | Relay 17 (NO) | |
| Configurable (Relay 26) | 20 | Transistor output | 20 | Configurable (Relay 20) | Different relay name |
| Configurable (Relay 27) | 21 | Transistor output | 21 | Configurable (Relay 21) | Different relay name |
| COMMON (TERM.20-21) | 22 | COMMON | 22 | COMMON (TERM. 20-21) | |
| Configurable/ secured ON | 23 | Binary optocoupler input | 24 | Configurable | Difference between the terminals. Not preconfigured in PPM-3 |
| Configurable/ secured OFF | 24 | Binary optocoupler input | 25 | Configurable | Difference between the terminals. Not preconfigured in PPM-3 |
| Shore pos. OFF | 25 | Binary optocoupler input | 43 | Shore conn. ON/ Configurable | Difference between feedback state |

| General description | Terminal PPM-2 | Terminal description | Terminal PPM-3 | Terminal description | Note |
|---|---|---|---|---|---|
| Forced SWBD | 26 | Binary optocoupler input | 23 | SWBD Control | Difference between the terminals |
| PMS CONTROL | 27 | Binary optocoupler input | | | |
| Common for terminals 23-27 | 28 | Common | 28 | Common for terminals 23-27 | |
| Modbus RTU RS-485 | 29<br>30<br>31 | DATA +<br>DATA GND<br>DATA - | 29<br>30<br>31 | DATA +<br>DATA GND<br>DATA - | |
| Load sharing | 37<br>38<br>39 | Active (P)load sharing<br>Common<br>Reactive (Q)load sharing | 37<br>38<br>39 | Active (P)load sharing<br>Common<br>Reactive (Q)load sharing | |
| NOT USED! | 40<br>41 | -10 to 0 to 10 V DC | 40<br>41<br><br>42 | Ext. KW/Hz set point<br>Common<br>Ext. PF/var/V set point | |
| BLACKOUT | 43 | Binary optocoupler input | | Configurable digital input | Configure an available digital input from USW 3 |
| HC 1 REQUEST/ Configurable | 44 | Binary optocoupler input | 48 | HC 1 REQUEST/ Configurable | Difference between the terminals. |
| HC 2 REQUEST/ Configurable | 45 | Binary optocoupler input | 49 | HC 2 REQUEST/ Configurable | Difference between the terminals. |
| HC 1 CONNECTED/ Configurable | 46 | Binary optocoupler input | | | |
| HC 2 CONNECTED/ Configurable | 47 | Binary optocoupler input | | | . |
| HC 1 FIXED LOAD/Configurable | 48 | Binary optocoupler input | 50 | HC 1 Fixed load feedb./Configurable | Difference between the terminals |
| HC 2 FIXED LOAD/Configurable | 49 | Binary optocoupler input | 51 | HC 2 Fixed load feedb./Configurable | Difference between the terminals |

| General description | Terminal PPM-2 | Terminal description | Terminal PPM-3 | Terminal description | Note |
|---|---|---|---|---|---|
| ALARM INHIBIT 1/Configurable | 50 | Binary optocoupler input | 54 | ALARM INHIBIT 1/ Configurable | Difference between the terminals |
| ALARM INHIBIT 2/Configurable | 51 | Binary optocoupler input | 55 | ALARM INHIBIT 2/ Configurable | Difference between the terminals |
| Configurable | 52 | Binary optocoupler input | | Digital input | |
| Load-dependent stop block | 53 | Binary optocoupler input | | Configurable digital input | Configure an available digital input from USW 3 |
| CB OPEN | 54 | Binary optocoupler input | 26 | GB open | Difference between the terminals |
| CB CLOSED | 55 | Binary optocoupler input | 27 | GB closed | Difference between the terminals |
| COMMON (TERM. 43-55) | 56 | Common | 56 | COMMON (TERM. 43-55) | |
| Start ACKN. HC 1/Configurable | 57 + 58 | Relay 6 (NO) | 57 + 58 | Relay 57 (NO) | |
| Start ACKN. HC 2/Configurable | 59 + 60 | Relay 7 (NO) | 59 + 60 | Relay 59 (NO) | |
| Configurable | 61 + 62 | Relay 8 (NO) | | | Configure an available digital input from USW 3 |
| Configurable | 63 + 64 | Relay 9 (NO) | | | Configure an available digital input from USW 3 |
| SPEED Raise | 65 + 66 | Relay ouput | 65 + 66 | Relay 65 (NO) | Configurable digital output from USW 3 |
| SPEED Lower | 67 + 68 | Relay output | 67+ 68 | Relay 67 (NO) | Configurable digital output from USW 3 |
| Configurable (Relay 12)/ Raise U (Option D) | 69 + 70 | Relay output | 69 + 70 | Relay 69 (NO) | Configurable digital output from USW 3 |

| General description | Terminal PPM-2 | Terminal description | Terminal PPM-3 | Terminal description | Note |
|---|---|---|---|---|---|
| Configurable (Relay 13)/ Lower U (Option D) | 71 + 72 | Relay output | 71 + 72 | Relay 71 (NO) | Configurable digital output from USW 3 |
| I1 | 73 + 74 | Current meas. | 73 + 74 | Current meas. | |
| I2 | 75 + 76 | Current meas. | 75 + 76 | Current meas. | |
| I3 | 77 + 78 | Current meas. | 77 + 78 | Current meas. | |
| U1 | 79 | Volt. meas. Gen | 79 | Volt. meas. Gen | |
| U2 | 81 | Volt. meas. Gen | 81 | Volt. meas. Gen | |
| U3 | 83 | Volt. meas. Gen | 83 | Volt. meas. Gen | |
| U1 | 85 | Volt. meas. BB | 85 | Volt. meas. BB | |
| U2 | 87 | Volt. meas. BB | 87 | Volt. meas. BB | |
| U3 | 89 | Volt. meas. BB | 89 | Volt. meas. BB | |
| CAN bus interface #1 | 128 | CAN-L | A3 | CAN-L | Internal power management communication (redundant to CAN bus interface #2) or option H7 J1939 engine interface. |
| CAN bus interface #1 | 130 | CAN-H | A1 | CAN-H | Internal power management communication (redundant to CAN bus interface #2) or option H7 J1939 engine interface. |
| CAN bus interface #2 | 131 | CAN-L | B3 | CAN-L | Internal power management communication (redundant to CAN bus interface #1) |
| CAN bus interface #2 | 133 | CAN-H | B1 | CAN-H | Internal power management communication (redundant to CAN bus interface #1) |

## 2.2.2 Parameter settings - system setup

The PC utility software is a software program that can be used for configuration of the Multi-line 2 products. There are two versions, 1.x for PPM-2 and 3.x. for PPM-3.
The utility software can be downloaded at www.deif.com.

The table below shows a direct conversion of the parameters that include nominal settings.

**Nominal settings**

| Parameter PPM-2 | Description | Address | Value | Parameter PPM-3 | Description | Address | Value |
|---|---|---|---|---|---|---|---|
| 6001 | Nom. frequency | 269 | Hz | 6001 | Nom. f (1) | 407 | Hz |
| 6002 | Nom. power | 270 | kW | 6002 | Nom. P (1) | 408 | kW |
| 6003 | Nom. current | 271 | A | 6003 | Nom. I (1) | 409 | A |
| 6004 | Nom. voltage | 272 | V | 6004 | Nom. U (1) | 410 | V |
| N/A | | | | 6005 | Nom. RPM (1) | 411 | RPM |
| 6021 | Volt. prim. GEN | 273 | V | 6041 | G primary U | 428 | V |
| 6022 | Volt. sec. GEN | 274 | V | 6042 | G secondary U | 429 | V |
| 6023 | Current prim. | 275 | A | 6043 | G primary I | 430 | A |
| 6024 | Current sec. | 276 | A | 6044 | G secondary I | 431 | A |
| 6031 | Volt. prim. BUS | 277 | V | 6051 | BB primary U1 | 432 | V |
| 6032 | Volt. sec. BUS | 278 | V | 6052 | BB secondary U1 | 433 | V |
| N/A | | | | 6053 | BB nominal U1 | 1326 | V |

## 2.2.3 Parameter setup regulator governor

The table below illustrates the differences in the regulator parameter setup. In PPM-3, the possibility to adjust the differential band in the regulator has been added.

**Parameter setup regulator governor**

| Parameter PPM-2 | Description | Address | Parameter PPM-3 | Description | Address |
|---|---|---|---|---|---|
| 2512 | Freq. control Kp | 92 | 2511 | f Kp | 122 |
| 2513 | Freq. control Ki | 93 | 2512 | f Ti | 123 |
| N/A | | | 2513 | f Td | 124 |
| 2522 | Power control Kp | 96 | 2531 | P Kp | 126 |
| 2523 | Power control Ki | 97 | 2532 | P Ti | 127 |
| N/A | | | 2533 | P Td | 128 |

## 2.2.4 Parameter setup relay or analogue governor

In PPM-3, it is possible to change between relay and analogue governor setup, see the table below.

**Parameter setup relay or analogue governor**

| Controller | Parameter | Description | Address | Set point |
|---|---|---|---|---|
| PPM-2 | N/A | N/A | N/A | N/A |
| PPM-3 | 2781 | Reg. output GOV | 183 | Relay or analogue |

## 2.2.5 Parameter setup governor relay

The PPM-2 standard unit controls the governor on relay output terminals 65-68, slot #4, these are not configurable. The PPM-3 standard unit has four configurable relay outputs, placed in slot #4, terminals 65-72. The table below shows the differences in the standard parameter settings.

**Parameter setup governor relay**

| Controller | Parameter | Description | Address | Value | Output A | Output B |
|---|---|---|---|---|---|---|
| PPM-2 | 2622 | GOV period time | 113 | ms | N/A | N/A |
| PPM-3 | 2602 | GOV period time | 144 | ms | Not used Change to Terminal 65 | Not used Change to Terminal 67 |

## 2.2.6 Synchronisation setup

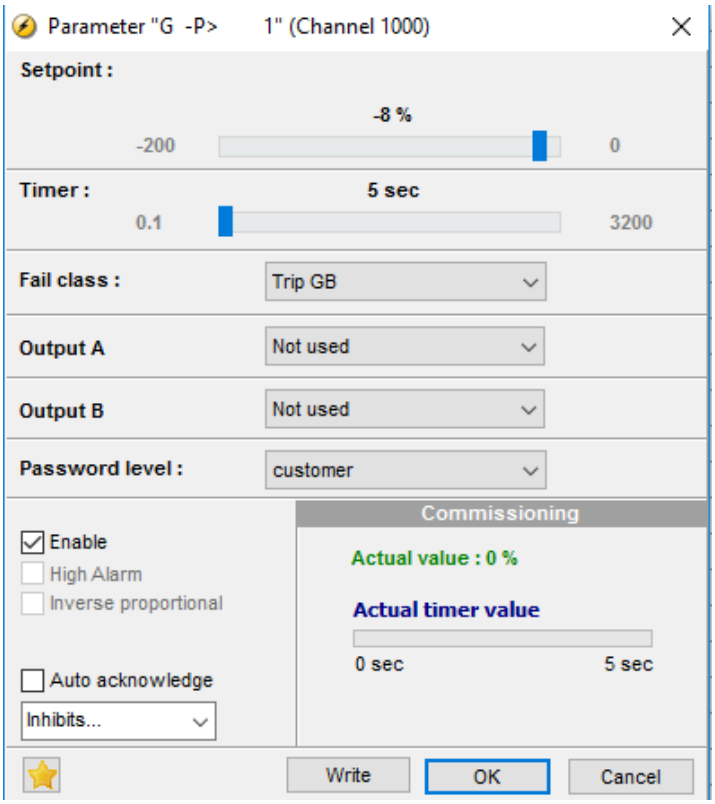
The table below shows which parameters are to be configured when setting the synchronisation.

**Synchronisation setup**

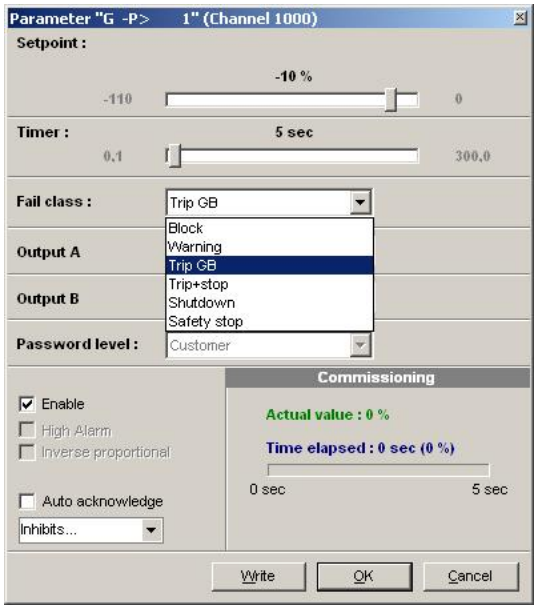
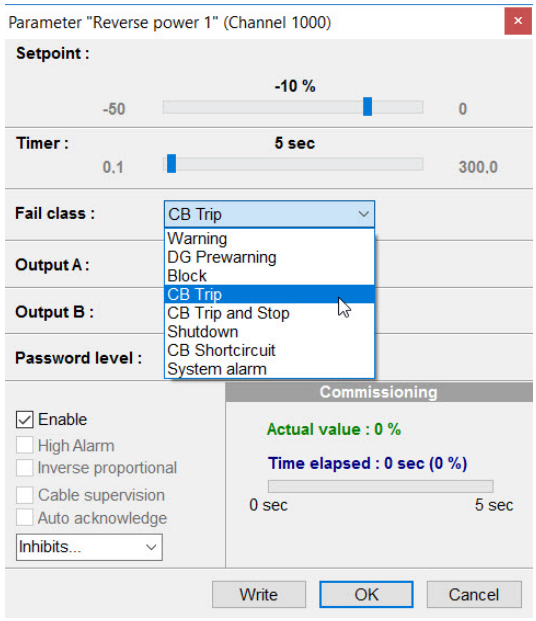
| Parameter PPM-2 | Description | Address | Parameter PPM-3 | Description | Address |
|---|---|---|---|---|---|
| 2021 | Sync. dfMax | 71 | 2021 | Sync. dfMax | 65 |
| 2022 | Sync. dfMin | 72 | 2022 | Sync. dfMin | 66 |
| 2023 | Sync. duMax | 73 | 2023 | Sync. duMax | 67 |
| 2024 | Sync. t CB | 74 | 2024 | Sync. t GB | 68 |
| 2091 | Blackout dfMax | 80 | 2111 | Blackout dfMax | 94 |
| 2092 | Blackout duMax | 81 | 2112 | Blackout duMax | 95 |
| N/A | | | 2113 | Sync. blackout enable | 96 |

## 2.2.7 Protection setup

The following adjustment points are available in PPM-2: Set points, delay timer, fail class, output A or B. The protection has a commissioning window where live status is shown.



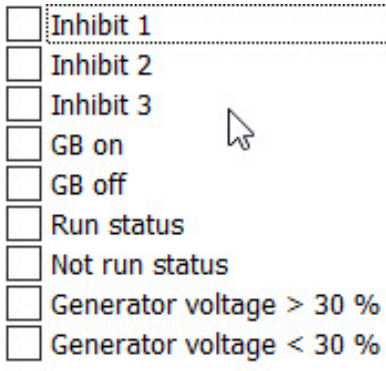
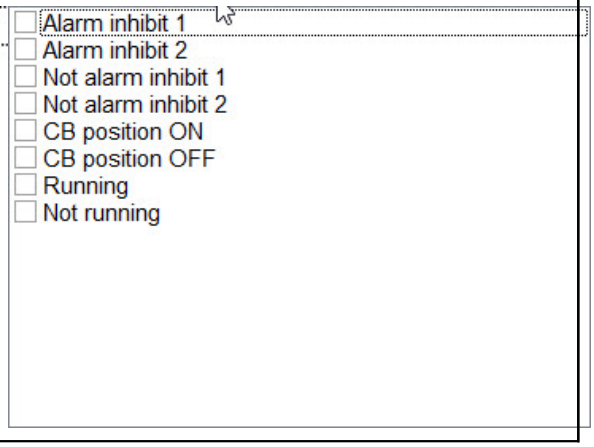
In PPM-3, the same adjustment points are present, but "Fail class" is different.
PPM-2 has eight different fail classes. PPM-3 has six different fail classes.
In PPM-3, it is NOT possible to set fail class to for example DG Prewarning, CB shortcircuit, and System alarm.
See the **Designers Reference Handbook** for more information

| PPM-3 Fail class | PPM-2 Fail class |
|---|---|
|  |  |





In order to select when the alarms are to be active, there is a configurable inhibit setting for every alarm. Inhibits are also different from PPM-2 to PPM-3 parameter. The inhibit functionality is only available via the PC utility software. For every alarm, there is a drop-down window where it is possible to select which signals have to be present in order to inhibit the alarm.
See the **Designers Reference Handbook** for more information

| PPM-3 Inhibits | PPM-2 Inhibits |
|---|---|
|  |  |

## 2.2.8 External communication - using Modbus

This only applies to the external communication board (options H2 and H3) located in slot #2.
The USB service port and Ethernet port (option N) also support Modbus.
The functions and readings on Modbus addresses are not the same in a PPM-2 as in a PPM-3 controller.

Th below table shows the comparability from PPM-2 to PPM-3 Modbus tables

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| Function code | Address | Item | Description | Function code | Address | Bit | Item | Description |
| F:03h | 0 | | Application version | F:04h | N/A | | | |
| F:03h | 1 | $U_{L1-L2}$ | Generator voltage. Measured in [V] | F:04h | 501 | | $U_{L1-L2}$ | Generator voltage L1-L2 [V] |
| F:03h | 2 | $U_{L2-L}3$ | Generator voltage. Measured in [V] | F:04h | 502 | | $U_{L2-L3}$ | Generator voltage L2-L3 [V] |
| F:03h | 3 | $U^{L3-L1}$ | Generator voltage. Measured in [V] | F:04h | 503 | | $U_{L3-L1}$ | Generator voltage L3-L1 [V] |
| F:03h | 4 | $U_{L1-N}$ | Generator voltage. Measured in [V] | F:04h | 504 | | $U_{L1-N}$ | Generator voltage L1-N [V] |
| F:03h | 5 | $U^{L2-N}$ | Generator voltage. Measured in [V] | F:04h | 505 | | $U_{L2-N}$ | Generator voltage L1-N [V] |
| F:03h | 6 | $U_{L3-N}$ | Generator voltage. Measured in [V] | F:04h | 506 | | $U_{L3-N}$ | Generator voltage L1-N [V] |
| F:03h | 7 | $F_{GEN}$ | Generator frequency. Measured in [HZ/100] | F:04h | 507 | | $F_{L1}$ | Generator f L1 [HZ/100] |
| F:03h | 8 | $I_{L1}$ | Generator current. Measured in [A] | F:04h | 513 | | $I_{L1}$ | Generator current L1 [A] |
| F:03h | 9 | $I_{L2}$ | Generator current. Measured in [A] | F:04h | 514 | | $I_{L2}$ | Generator current L2 [A] |

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| F:03h | 10 | $I_{L3}$ | Generator current. Measured in [A] | F:04h | 515 | | $I_{L3}$ | Generator current L3 [A] |
| F:03h | 11 | Cos-phi | 0 to 100 Generator cos phi. Measured in [cos-phi/100]. Unsigned value | F:04h | 538 | | PF | Generator PF [PF/100] |
| F:03h | 12 | $P_{GEN}$ | Generator active power. Measured in [kW]. Negative value means reverse power | F:04h | 519 | | $P_{GEN}$ | Generator power [kW] |
| F:03h | 13 | $Q_{GEN}$ | Generator reactive power. Measured in [kvar]. Positive value means generated inductive reactive power | F:04h | 523 | | $Q_{GEN}$ | Generator reactive power [kvar] |
| F:03h | 14 | $U_{BBL1-L2}$ | Busbar. Measure in [V] | F:04h | 539 | | $U_{BBL1-L2}$ | U BB L1-L2 [V] |
| F:03h | 15 | $F_{BB}$ | Busbar frequency L1. Measured in [Hz/100] | F:04h | 545 | | $F_{BB}$ | BB f L1 [Hz/100] |

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| F:03h | 16 [HI] | $R_{GEN}$EXPORT | Reactive energy counter, exported reactive power. Measured in [kVAr]. Max. 300000 MVArh | F:04h | 528 [HI] | | $R_{GEN,EXP}$ | Export, reactive energy counter [KVArh] |
| F:03h | 17 [LO] | $R_{GEN}$EXPORT | Reactive energy counter, exported reactive power. Measured in [kVAr]. Max. 300000 MVArh | F:04h | 829 [LO] | | $R_{GEN,EXP}$ | Export, reactive energy counter [KVArh] |
| F:03h | 18 [HI] | | Energy counter, exported power. Measured in [kWh]. Max. 300000 MWh | F:04h | 530 [HI] | | $E_{GEN,EXP}$ | Export, active energy counter, day [KWh] |
| F:03h | 19 [LO] | | Energy counter, exported power. Measured in [kWh]. Max. 300000 MWh | F:04h | 531 [LO] | | $E_{GEN,EXP}$ | Export, active energy counter, day [KWh] |
| F:03h | 20 | Alarms | Bit 0 1000. Reverse power 1 | F:04h | 1000 | Bit 0 | | G-P>1 |
| | | | Bit 1 1010. Reverse power 2 | | | Bit 1 | | G-P>2 |
| | | | Bit 2 1020. Reverse power inv. | | | Bit 2 | | Not used |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 3 1030. Overcurrent step 1 | | | Bit 3 | | G I>1 |
| | | | Bit 4 1040. Overcurrent step 2 | | | Bit 4 | | G I>2 |
| | | | Bit 5 1050. Overcurrent step 3 | | | Bit 5 | | G I>3 |
| | | | Bit 6 1060. Overcurrent step 4 | | | Bit 6 | | G I>4 |
| | | | Bit 7 1090. Overcurrent inverse | | | Bit 8 | | G I> inv. |
| | | | Bit 8 Not used | | | Bit 7 | | Not used |
| | | | Bit 9 1130. Fast over-current 1 | | | Bit 9 | | G I>>1 |
| | | | Bit 10 1140. Fast over-current 2 | | | Bit 10 | | G I>>2 |
| | | | Bit 11 1150. U-DH High step 1 | | | Bit 11 | | G U>1 |
| | | | Bit 12 1160. U-DH High step 2 | | | Bit 12 | | G U>2 |
| | | | Bit 13 1170. Low step 1 | | | Bit 13 | | G U<1 |
| | | | Bit 14 1180. U-DG Low step 2 | | | Bit 14 | | G U<2 |
| | | | Bit 15 1190. U-DG Low step 3 | | | Bit 15 | | G U>3 |
| F:03h | 21 | Alarms | Bit 0 1210. f-DG High step 1 | F:04h | 1001 | Bit 0 | | G f>1 |
| | | | Bit 1 1220. f-DG High step 2 | | | Bit 1 | | G f>2 |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 2 1230. f-DG High step 3 | | | Bit 2 | | G f>3 |
| | | | Bit 3 1240. f-DG Low step 1 | | | Bit 3 | | G f<1 |
| | | | Bit 4 1250. f-DG Low step 2 | | | Bit 4 | | G f<2 |
| | | | Bit 5 1260. f-DG Low step 3 | | | Bit 5 | | G f<3 |
| | | | Bit 6 1270. U-BB High step 1 | | | Bit 6 | | BB U> 1 |
| | | | Bit 7 1280. U-BB High step 2 | | | Bit 7 | | BB U>2 |
| | | | Bit 8 1290. U-BB High step 3 | | | Bit 8 | | BB U>3 |
| | | | Bit 9 1300. U-BB Low step 1 | | | Bit 9 | | BB U<1 |
| | | | Bit 10 1310. U-BB Low step 2 | | | Bit 10 | | BB U<2 |
| | | | Bit 11 1320. U-BB Low step 3 | | | Bit 11 | | BB U<3 |
| | | | Bit 12 1330. U-BB Low step 4 | | | Bit 12 | | BB U<4 |
| | | | Bit 13 1350. f-BB High step 1 | | | Bit 13 | | BB f>1 |
| | | | Bit 14 1360. f-BB High step 2 | | | Bit 14 | | BB f>2 |
| | | | Bit 15 1370. f-BB High step 3 | | | Bit 15 | | BB f>3 |

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| F:03h | 22 | Alarms | Bit 0 1380. f-BB Low step 1 | F:04h | 1002 | Bit 0 | | BB f< 1 |
| | | | Bit 1 1390. f-BB Low step 2 | | | Bit 1 | | BB f< 2 |
| | | | Bit 2 1400. f-BB Low step 3 | | | Bit 2 | | BB f< 3 |
| | | | Bit 3 1410. f-BB Low step 4 | | | Bit 3 | | BB f< 4 |
| | | | Bit 4 Re-served | | | | | |
| | | | Bit 5 Re-served | | | | | |
| | | | Bit 6 Not used | | | | | |
| | | | Bit 7 1450. Overload step 1 | | | Bit 7 | | G P> 1 |
| | | | Bit 8 1460. Overload step 2 | | | Bit 8 | | G P> 2 |
| | | | Bit 9 1470. Overload step 3 | | | Bit 9 | | G P> 3 |
| | | | Bit 10 1480. Overload step 4 | | | Bit 10 | | G P> 4 |
| | | | Bit 11 1490. Overload step 5 | | | Bit 11 | | G P> 5 |
| | | | Bit 12 1500. Unbalance current | | | Bit 12 | | Unbalance current |
| | | | Bit 13 1510. Unbalance Voltage | | | Bit 13 | | Unbalance voltage |
| | | | Q import | | | Bit 14 | | G -Q> |
| | | | Q export | | | Bit 15 | | G Q> |

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| F:03h | 23 | Alarms | Bit 0 1540. Gen neg. sequence current | F:04h | 1003 | Bit 0 | | Gen. neg.seq.I |
| | | | Bit 1 1550. Gen neg. sequence voltage | | | Bit 1 | | Gen. neg. seq. U |
| | | | Bit 2 Re-served | | | | | |
| | | | Bit 3 Re-served | | | | | |
| | | | Bit 4 Not used | | | | | |
| | | | Bit 5 Not used | | | | | |
| | | | Bit 6 Not used | | | | | |
| | | | Bit 7 Not used | | | | | |
| | | | Bit 8 1900 Overcurrent NEL 1 | | | Bit 7 | | NEL 1 I> |
| | | | Bit 9 1910 Overcurrent NEL 2 | | | Bit 8 | | NEL 2 I> |
| | | | Bit 10 1920 f-BB Low NEL 1 | | | Bit 10 | | NEL 1 BB f< |
| | | | Bit 11 1930 f-BB Low NEL 2 | | | Bit 11 | | NEL 2 BB f< |
| | | | Bit 12 1940 Overload step 1 NEL 1 | | | Bit 13 | | NEL 1 P> |
| | | | Bit 13 1950 Overload step 1 NEL 2 | | | Bit 14 | | NEL 2 P> |
| | | | Bit 14 1960 Overload step 2 NEL 1 | F:04h | 1004 | Bit 0 | | NEL 1 P>> |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 15 1970 Overload step 2 NEL 2 | | | Bit 1 | | NEL 2 P>> |
| F:03h | 24 | Alarms | Bit 0 3000. Dig. input term. 23 | F:04h | 1007 | Bit 0 | | Digital alarm input 23 |
| | | | Bit 1 3010. Dig. input term. 24 | | | Bit 1 | | Digital alarm input 24 |
| | | | Bit 2 3020. Dig. input term. 25 | | | Bit 2 | | Digital alarm input 25 |
| | | | Bit 3 3030. Dig. input term. 26 | | | Bit 3 | | Digital alarm input 26 |
| | | | Bit 4 3040. Dig. input term. 27 | | | Bit 4 | | Digital alarm input 27 |
| | | | Bit 5 3050. Dig. input term. 43 | F:04h | 1008 | Bit 0 | | Digital alarm input 43 |
| | | | Bit 6 3060. Dig. input term. 44 | | | Bit 1 | | Digital alarm input 44 |
| | | | Bit 7 3070. Dig. input term. 45 | | | Bit 2 | | Digital alarm input 45 |
| | | | Bit 8 3080. Dig. input term. 46 | | | Bit 3 | | Digital alarm input 46 |
| | | | Bit 9 3090. Dig. input term. 47 | | | Bit 4 | | Digital alarm input 47 |
| | | | Bit 10 3100. Dig. input term. 48 | | | Bit 5 | | Digital alarm input 48 |
| | | | Bit 11 3110. Dig. input term. 49 | | | Bit 6 | | Digital alarm input 49 |
| | | | Bit 12 3120. Dig. input term. 50 | | | Bit 7 | | Digital alarm input 50 |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 13 3130. Dig. input term. 51 | | | Bit 8 | | Digital alarm input 51 |
| | | | Bit 14 3140. Dig. input term. 52 | | | Bit 9 | | Digital alarm input 52 |
| | | | Bit 15 3150. Dig. input term. 53 | | | Bit 10 | | Digital alarm input 53 |
| F:03h | 25 | System alarms/ status | Bit 0 2100 Sync.win-dow | F:04h | 1005 | Bit 0 | | Synchronis-ing window |
| | | | Bit 1 2110 Sync. fail. alarm | | | Bit 1+2 | | Synchronis-ing failure GB |
| | | | Bit 2 2120 Phase se-quence er-ror alarm | | | Bit 3 | | Phase seq. failure |
| | | | Bit 3 2140 Connection breaker Close fail-ure | | | Bit 5+8 | | GB close failure |
| | | | Bit 4 2150 Connection breaker Open fail-ure | | | Bit 4+7 | | GB open failure |
| | | | Bit 5 2160 CB position fail. alarm | | | Bit 6+9 | | GB pos. fail-ure |
| | | | Bit 6 2590 Governor regulation fail. alarm | F:04h | 1006 | Bit 0 | | GOVER-NOR regula-tion fail. |
| | | | Bit 7 2610 AVR regula-tion fail. alarm | | | Bit 2 | | AVR regula-tion fail. |
| | | | Bit 8 4940 Battery low voltage alarm | F:04h | 1014 | Bit 1+3 | | U< aux. term 1 and 98 |

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 9 4950 Battery high voltage alarm | | | Bit 2+4 | | U> aux. term 1 and 98 |
| F:03h | 26 | Alarm relay status | Bit 0 Relay 0 status OK | F:04h | 1016 | | | |
| | | | Bit 1 Relay 1 | | | Bit 0 | | Relay 5 |
| | | | Bit 2 Relay 2 | | | Bit 1 | | Relay 8 |
| | | | Bit 3 Relay 3 | | | Bit 2 | | Relay 11 |
| | | | Bit 4 Relay 4 | | | Bit 3 | | Relay 14 |
| | | | Bit 5 Not used | | | | | |
| | | | Bit 6 HC 1 Acknowledge | | | Bit 11 | | Relay 57 |
| | | | Bit 7 HC 2 Acknowledge | | | Bit 12 | | Relay 59 |
| | | | Bit 8 Relay 8 | | | Bit 13 | | Relay 61 |
| | | | Bit 9 Relay 9 | | | Bit 14 | | Relay 63 |
| | | | Bit 14 Relay 14 | F:04h | 1017 | Bit 4 | | Relay 90 |
| | | | Bit 15 Relay 15 | | | Bit 5 | | Relay 92 |
| F:03h | 27 | Status | Bit 9 Connection breaker position ON | F:04h | 1018 | Bit 1+4 | | SGB/SCB pos. ON + GB pos. ON |
| | | | Synchronising | | | Bit 5 | | GB synchronising (NOT SG+SC) |
| F:03h | 28 | Alarm relay status | Bit 0 Relay 16 | F:04h | 1017 | Bit 6 | | Relay 94 |
| | | | Bit 1 Relay 17 | | | Bit 7 | | Relay 96 |
| | | | Bit 2 Relay 18 Start | | | Bit 14 | | Start relay |

| | **PPM-2** | | | | **PPM-3** | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 3 Relay 19 stop coil | | | Bit 15 | | Stop coil relay |
| | | | Bit 4 Relay 20 Start prepare | | | Bit 13 | | Start prepare |
| F:03h | 31 | $U_{BBL2-L3}$ | Busbar voltage. Measured in [V] | F:04h | 540 | | | U BB L2-L3 [V] |
| F:03h | 32 | $U_{BBL3-L1}$ | Busbar voltage. Measured in [V] | F:04h | 541 | | | U BB L3-L1 [V] |
| F:03h | 35 | $U_{BBL1-N}$ | Busbar voltage. Measured in [V] | F:04h | 542 | | | U BB L1-N [V] |
| F:03h | 36 | $U_{BBL2-N}$ | Busbar voltage. Measured in [V] | F:04h | 543 | | | U BB L2-N [V] |
| F:03h | 37 | $U_{BBL3-N}$ | Busbar voltage. Measured in [V] | F:04h | 544 | | | U BB L3-N [V] |
| F:03h | 38 | Running time | Hour | F:04h | 562 | | | Running hour counter, shutdown override |
| F:03h | 39 | RPM | RPM | F:04h | 576 | | | RPM |
| F:03h | 40 | $S_{GEN}$ | Generator apparent power. Measured in [kVA] | F:04h | 527 | | | Generator apparant power [kVA] |
| F:03h | 44 | $PHI_{BBL1-L2}$ | 0 to 359 Busbar phase angle. Measured in [deg.] | F:04h | 548 | | | U BB phase angle L1-L2 [Deg./10] |
| F:03h | 45 | $PHI_{BBL1-DGL1}$ | 0 to 359 Busbar/ generator phase angle. Measured in [deg.] | F:04h | 551 | | | U BB L1-U GEN L1 phase angle [Deg./10] |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| F:03h | 46 | | Circuit breaker operations counter | F:04h | 563+564 | | | No. of GB operations + No. of SGB/SCB operations |
| F:03h | 47 | | Supply voltage. Measured in [V/10] | F:04h | 567+568 | | | DC supply term. 1-2 [V/10] + DC supply term98-99 [V/10] |
| F:03h | 55 | | Analogue input no. 1 (scaled) | F:04h | 656 | | | 4-20 mA input, scaled term. 127 |
| F:03h | 56 | | Analogue input no. 2 (scaled) | F:04h | 657 | | | 4-20 mA input, scaled term. 129 |
| F:03h | 57 | | Analogue input no. 3 (scaled) | F:04h | 658 | | | 4-20 mA input, scaled term. 131 |
| F:03h | 59 | | Analogue input no. 5 (scaled) | F:04h | 586 | | | 4-20 mA input, scaled term. 91 |
| F:03h | 60 | | Analogue input no. 6 (scaled) | F:04h | 587 | | | 4-20 mA input, scaled term. 93 |
| F:03h | 61 | | Analogue input no. 7 (scaled) | F:04h | 588 | | | 4-20 mA input, scaled term. 95 |
| F:03h | 62 | | Analogue input no. 8 (scaled) | F:04h | 589 | | | 4-20 mA input, scaled term. 97 |
| F:03h | 63 | | No.of alarms | F:04h | 558 | | | No. of alarms |
| F:03h | 64 | | No. of unacknowledged alarms | F:04h | 559 | | | No. of unack. alarms |
| F:03h | 70 | Alarms | Bit 0 3180. Dig. input term 91 | F:04h | 1009 | Bit 7 | | Digital alarm input 91 |
| | | | Bit 1 3190. Dig. input term 92 | | | Bit 8 | | Digital alarm input 92 |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 2 32000. Dig. input term 93 | | | Bit 9 | | Digital alarm input 93 |
| | | | Bit 3 3210. Dig. input term 94 | | | Bit 10 | | Digital alarm input 94 |
| | | | Bit 4 3220. Dig. input term 95 | | | Bit 11 | | Digital alarm input 95 |
| | | | Bit 5 3230. Dig. input term 96 | | | Bit 12 | | Digital alarm input 96 |
| | | | Bit 6 3240. Dig. input term 91 | | | Bit 13 | | Digital alarm input 97 |
| | | | Bit 7 3250. VDO. input term 104 | F:04h | 1010 | Bit 0 | | Multi-input alarm 102 |
| | | | Bit 8 3260. VDO. input term 105 | | | Bit 1 | | Multi-input alarm 105 |
| | | | Bit 9 3270. VDO. input term 106 | | | Bit 2 | | Multi-input alarm 108 |
| | | | Bit 12 3300. Dig. inout term 112 | F:04h | | Bit 6 | | Digital alarm input 112 |
| | | | Bit 13 3310. Dig. input term 113 | | | Bit 7 | | Digital alarm input 113 |
| | | | Bit 14 3320. Dig. input term 114 | | | Bit 8 | | Digital alarm input 114 |
| | | | Bit 15 3330. Dig. input term 115 | | | Bit 9 | | Digital alarm input 115 |
| F:03h | 71 | Alarms | Bit 0 3340. Dig. input term 116 | | | Bit 10 | | Digital alarm input 116 |
| | | | Bit 1 3350. Dig. input term 117 | | | Bit 11 | | Digital alarm input 117 |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 2 3360. Dig. input term 118 | | | Bit 12 | | Digital alarm input 118 |
| F:03h | 72 | Alarms | Bit 0 4000. 4-20 mA input no. 91.1 | F:04h | 1012 | Bit 0 | | 4-20 mA 91.1 |
| | | | Bit 1 4010. 4-20 mA input no. 91.2 | | | Bit 1 | | 4-20 mA 91.2 |
| | | | Bit 2 4020. Wire break failure 91 | | | Bit 2 | | Wire failure analogue 91 |
| | | | Bit 3 4030. 4-20 mA input no. 93.1 | | | Bit 3 | | 4-20 mA 93.1 |
| | | | Bit 4 4040. 4-20 mA input no. 93.2 | | | Bit 4 | | 4-20 mA 93.2 |
| | | | Bit 5 4050. Wire break failure 93 | | | Bit 5 | | Wire failure analogue 93 |
| | | | Bit 6 4060. 4-20 mA input no. 95.1 | | | Bit 6 | | 4-20 mA 95.1 |
| | | | Bit 7 4070. 4-20 mA input no. 95.2 | | | Bit 7 | | 4-20 mA 95.2 |
| | | | Bit 8 4080. Wire break failure 95 | | | Bit 8 | | Wire failure analogue 95 |
| | | | Bit 9 4090. 4-20 mA input no. 97.1 | | | Bit 9 | | 4-20 mA 97.1 |
| | | | Bit 10 4100. 4-20 mA input no. 97.2 | | | Bit 10 | | 4-20 mA 97.2 |
| | | | Bit 11 4110. Wire break failure 97 | | | Bit 11 | | Wire failure analogue 97 |
| | | | Bit 12 4120. 4-20 mA input no. 98.1 | F:04h | 1046 | Bit 0 | | 4-20 mA 127.1 |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 13 4130. 4-20 mA input no. 98.2 | | | Bit 1 | | 4-20 mA 127.2 |
| | | | Bit 14 4140. Wire break failure 98 | | | Bit 2 | | Wire failure analogue 127 |
| | | | Bit 15 4150. 4-20 mA input no. 100.1 | | | Bit 3 | | 4-20 mA 129.1 |
| F:03h | 73 | Alarms | Bit 0 4160. 4-20 mA input no. 100.1 | | | Bit 4 | | 4-20 mA 129.2 |
| | | | Bit 1 4170. Wire break failure 100 | | | Bit 5 | | Wire failure analogue 129 |
| | | | Bit 2 4180. 4-20 mA input no. 102.1 | | | Bit 6 | | 4-20 mA 131.1 |
| | | | Bit 3 4190. 4-20 mA input no. 102.2 | | | Bit 7 | | 4-20 mA 131.2 |
| | | | Bit 4 4200. Wire break failure 102 | | | Bit 8 | | Wire failure analogue 131 |
| F:03h | 78 | Alarms | Bit 6 4750. Overspeed 1 | F:04h | 1013 | Bit 9 | | Overspeed 1 |
| | | | Bit 7 4760. Overspeed 2 | | | Bit 10 | | Overspeed 2 |
| F:03h | 79 | Alarms | Bit 0 4420. VDO input 104.1 | | | Bit 0 | | VDO/RMI oil/water/fuel 102.1 |
| | | | Bit 1 4430. VDO input 104.2 | | | Bit 1 | | VDO/RMI oil/water/fuel 102.2 |
| | | | Bit 2 4480. Wire break failure 104 | | | Bit 2 | | Wire break 102 |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 3 4570. VDO input 105.1 | | | Bit 3 | | VDO/RMI oil/water/fuel 105.1 |
| | | | Bit 4 4580. VDO input 105.1 | | | Bit 4 | | VDO/RMI oil/water/fuel 105.2 |
| | | | Bit 5 4610. Wire break failure 105 | | | Bit 5 | | Wire break 105 |
| | | | Bit 6 4720. VDO input 106.1 | | | Bit 6 | | VDO/RMI oil/water/fuel 108.1 |
| | | | Bit 7 4730. VDO input 106.2 | | | Bit 7 | | VDO/RMI oil/water/fuel 108.2 |
| | | | Bit 8 4740. Wire break failure 106 | | | Bit 8 | | Wire break 108 |
| F:03h | 80 | $P_{avail}$ | Total available power. Measured in [kW] | F:04h | 1501 | | | Available power |
| F:03h | 81 | $P_{cons}$ | Total consumed power. Measured in [kW] | F:04h | 1500 | | | Total power (Consumed) |
| F:03h | 106 | Status | Bit 0 PMS control | F:04h | 1019 | Bit 1 | | Status text (not 46-SWBD control) |
| | | | Bit 1 DG ready | | 1080 | | | Status text [47 - ready for operation) |
| | | | Bit 2 DG running | F:02h | 3 | | | Running |
| | | | Bit 3 Connection breaker position ON | | 0+1 | | | GB position ON + SGB/SCB position ON |

| | PPM-2 | | | | PPM-3 | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Bit 4 Synchronising | F:04h | 1080 | | | Status text (87-DG, 62-BTB, 63-SG, 64- SC, 65-EDG) |
| | | | Bit 5 Ramp down | F:02h | 1018 | Bit 2 | | Ramp dowwn |
| | | | Bit 6 Voltage/ frequency OK | | 4 | | | Generator voltage/ frequency OK |
| | | | Bit 8 Base load | F:04h | 1080 | | | Status text (44- Fixed power) |

| PPM-2 | | | | PPM-3 | | | | |
|---|---|---|---|---|---|---|---|---|
| F:03h | 50010 | | Base load set point[%] | | | | | Power regulator set point [%] |
| | 50017 | | P Avail Total available power [kW] | | | | | Total power available |
| | 50018 | | P Cons Total consumed power [kW] | | | | | Total consumed power |

| PPM-2 | | | | PPM-3 | | | | |
|---|---|---|---|---|---|---|---|---|
| F:10h | 4371 | | Select the 1st priority | F:03h | 7 | Bit 8 | | 1st priority |
| | 19000 | Year setting | 2003 to 2099 | F:10h | 58000 | | | 2003 to 2099 |
| | 19001 | Month setting | 1 to 12 | F:10h | 58001 | | | 1 to 12 |
| | 19002 | Date setting | 1 to 31 | F:10h | 58002 | | | 1 to 31 |
| | 19003 | Day setting | 1t o 7 (1=Monday, 7=Sunday) | F:10h | 58003 | | | 1 to 7 ( 1=Monday, 7=Sunday) |
| | 19004 | Hour setting | 0 to 23 | F:10h | 58004 | | | 0 to 23 |
| | 19005 | Minute setting | 0 to 59 | F:10h | 58005 | | | 0 to 59 |
| | 19006 | Second settting | 0 to 59 | F:10h | 58006 | | | 0 to 59 |

| **PPM-2** | | | | **PPM-3** | | | | |
|---|---|---|---|---|---|---|---|---|
| F:0h | 9 | Alarm ackn. | | F:0h | 9 | | | Alarm acknowledge |
| | 13 | Start | Semi-auto start command | F:0h | 0 | | | Remote start |
| | 14 | CB ON | Semi-auto connection breaker ON command | F:0h | 1 | | | Remote GB ON |
| | 15 | CB OFF | Semi-auto connection breaker OFF command | F:0h | 2 | | | Remote GB OFF |
| | 16 | Stop | Semi-auto stop command | F:0h | 3 | | | Remote stop |

## 2.2.9 M-Logic in PPM-3

The M-Logic functionality is included in the PPM-3 unit and is not an option-dependent function.

M-Logic is used to execute different commands at predefined conditions. M-Logic is not a PLC, but substitutes one if only very simple commands are needed.

M-Logic is a simple tool based on logic events. One or more input conditions are defined, and at the activation of those inputs, the defined output will occur. A great variety of inputs can be selected, such as digital inputs, alarm conditions and running conditions. A variety of the outputs can also be selected, such as relay outputs, change of genset modes and change of running modes.