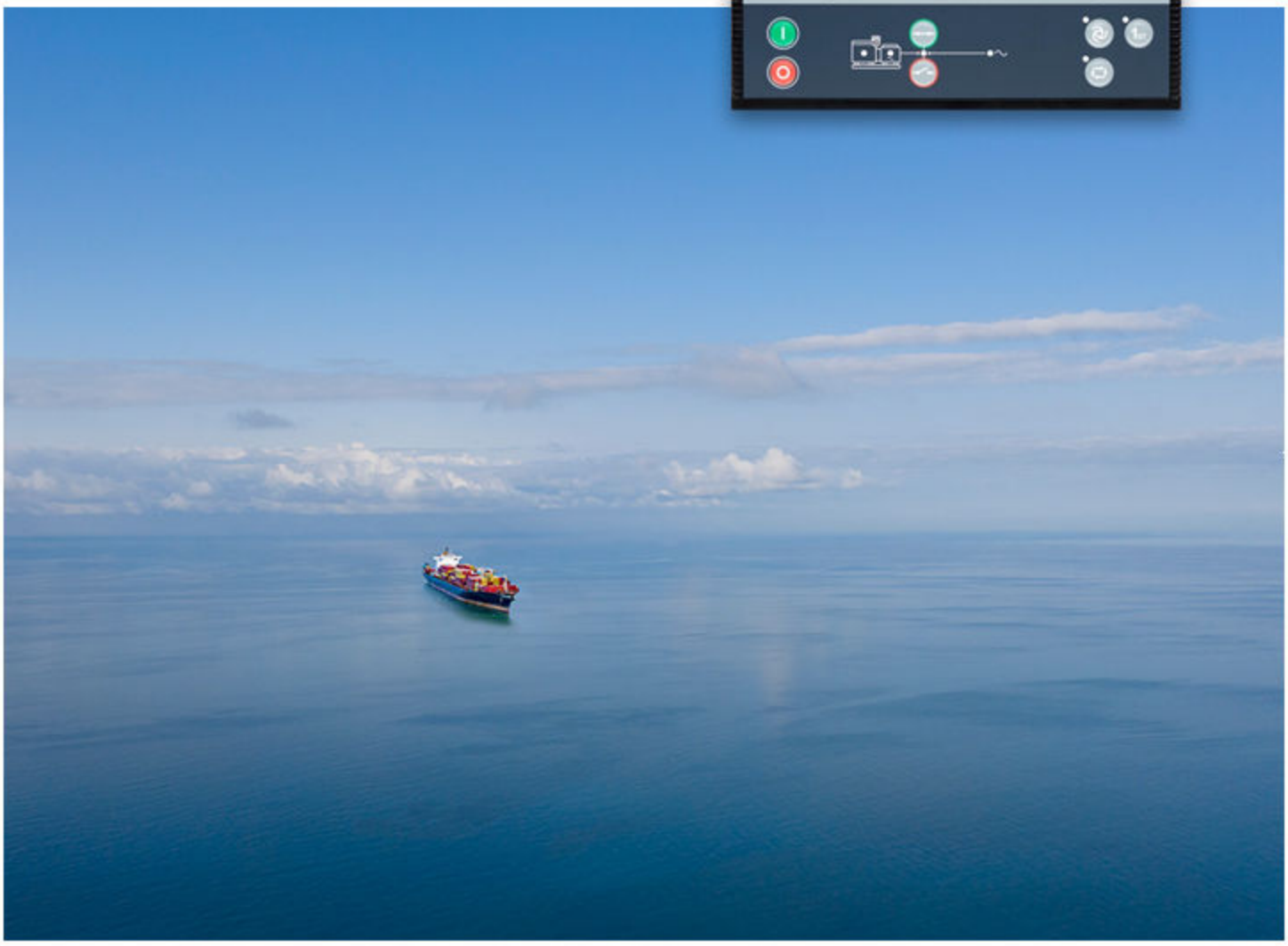
Converting PPM-2 to PPM 300

4189341202B

PPM 300 Application notes

DEIF Improve Tomorrow



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

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

Notes

INFO
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.

DANGER!
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.

DANGER!
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 terminal 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 replacement.

INFO
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 300 unit.

DANGER!
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 300 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

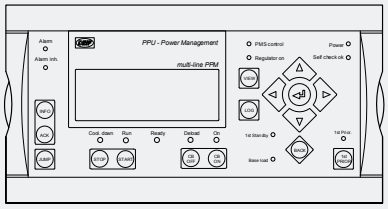
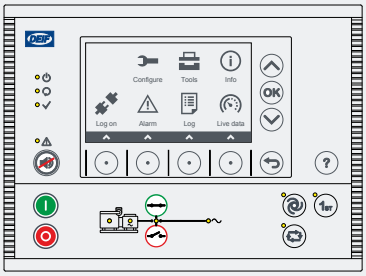
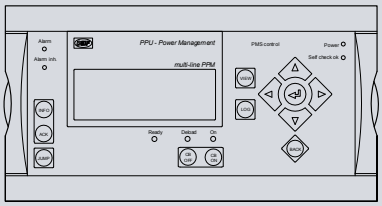
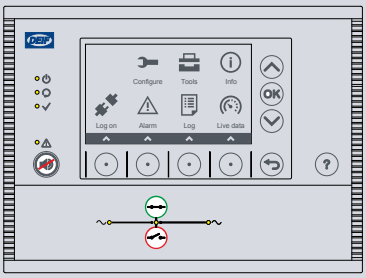
This document mainly includes general information (in point form) on how to upgrade a standard PPM-2 to a PPM 300 system, including mounting instructions and wiring descriptions, parameter and general standard conversions. Contact DEIF support for more details.

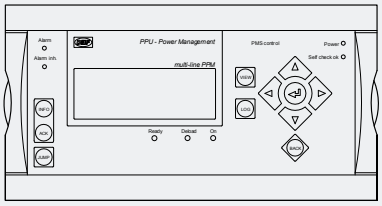
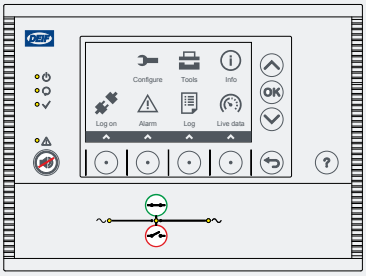
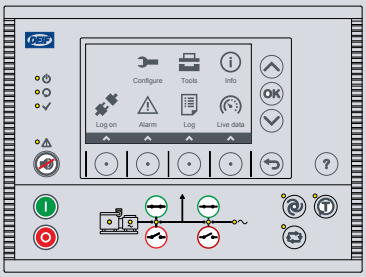
The general purpose of this document is to help the user with the first steps of upgrading a standard PPU power management system.

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

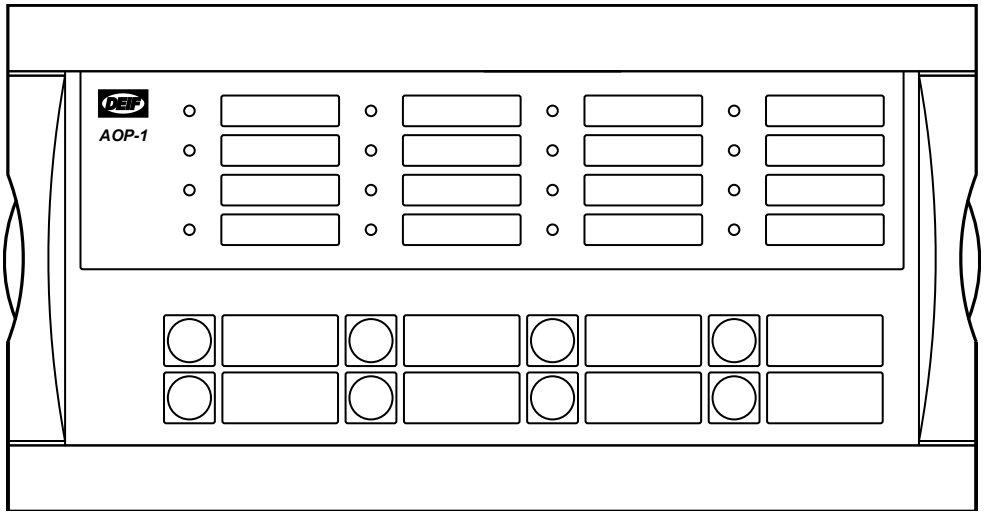
The table below shows an overview of standard displays and the options of converting the displays.

PPM-2	PPM 300	Note
		Engine control
		Bus tie breaker

PPM-2	PPM 300	Note
		Shaft generator / Shore connection
		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 300, the additional display is not an option.

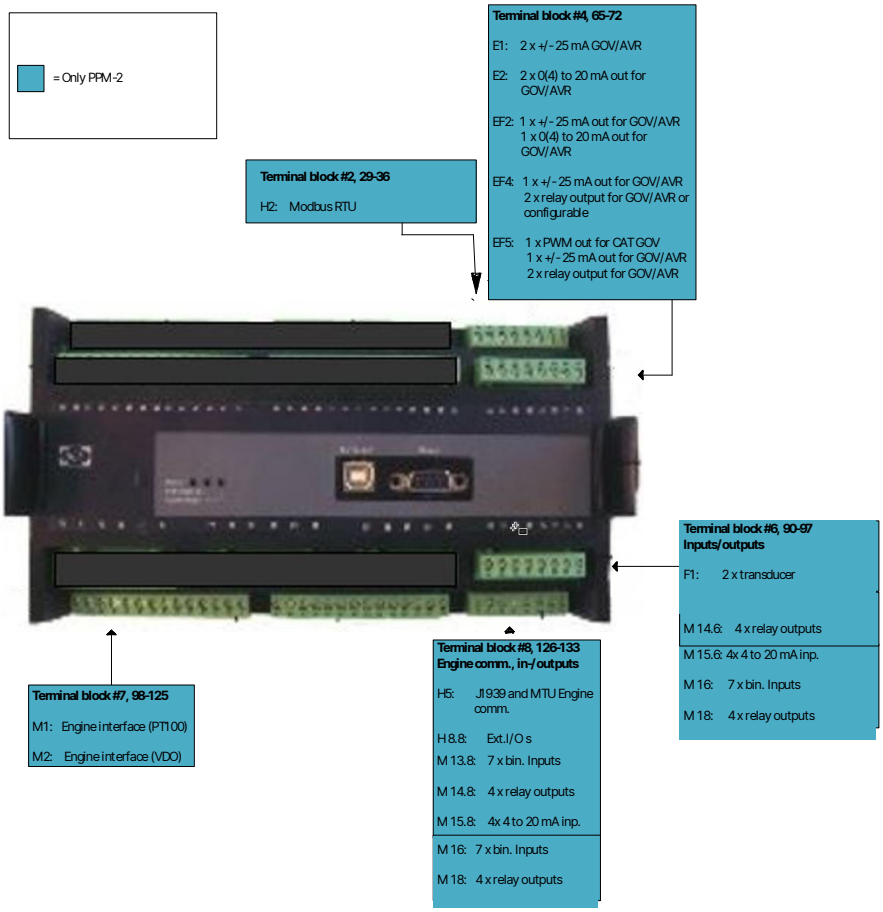
The way to solve this is to use an AGI 410 (HMI) touch screen to handle the functions if needed.

See dimensions of the AGI 410 in www.deif.com/products/agi-400.

2.1.4 Descriptions of options

The PPM-2 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.



PPM 300 does not have the above options.

The table below provides an overview and description of the PPM-2 options and shows which options can be converted to PPM 300.

PPM-2	Description	Option type	PPM 300
Option D1	Voltage/VAr/cos phi controlQ load sharing	Software/ Hardware	Standard
Option E1	+/-25 mA for speed governor +/-25 mA for AVR	Hardware	Standard
Option EF2	+/-25 mA for speed governor 1 × 0(4) 20 mA transducer output	Hardware	Standard
Option EF4	+/-25 mA for speed governor or AVR 2 × relay outputs for speed governor or AVR	Hardware	Standard
Option F1	2 × 0(4) to 20 mA transducer out	Hardware	Standard
N/A	+/-25 mA for AVR PWM speed governor signal.	Hardware	Standard

PPM-2	Description	Option type	PPM 300
Option H2	Modbus communication	Hardware	N/A
N/A	Serial communication Profibus	Hardware	N/A
N/A	Reading of J1939 values	Hardware	N/A
N/A	Engine communication - CAN bus J1939	Hardware	N/A
N/A	CAN bus interface for external I/O modules (Beckhoff) in slot #2 or slot #8	Hardware	N/A
Option J1	Display cable, 3 m	Hardware	
Option J2	Display cable, 6 m	Hardware	
Option J3	PC cable for utility software (RS-232)	Hardware	N/A
N/A	PC cable for option N-programming	Hardware	N/A
Option J6	Display cable, 1 m	Hardware	
N/A	PC cable for utility software (USB), 1 m	Hardware	N/A
Option K1 and K2	Documentation	Hardware	N/A
Standard	Engine control and protection (safety system)	Hardware	Standard
N/A	7 digital inputs in slot #6 and/or slot #8	Hardware	Standard
M18	4 relay outputs in slot #6 and/or slot #8	Hardware	Standard
Option M15	4 analogue inputs in slot #8	Hardware	Standard
Option M16	7 Binary inputs in slot #6	Hardware	Standard
N5	Modbus TCP/IP	Hardware	Standard
N6			
N/A	Verified class 0.5	Hardware	Standard
X2	Additional standard display on CAN bus	Hardware	N/A
N/A	Additional Operator Panel (AOP-1)	Hardware	N/A
X4	Additional Operator Panel (AOP-2)	Hardware	N/A

2.2 Installation and parameter setup

2.2.1 Wiring installation

The table below shows an overview of the terminals on PPM-2 and PPM 300.

Some input/outputs might not be available in PPM 300.

Each PPM 300 controller type is delivered with the inputs and outputs already configured according to the default configuration.

General description	Terminal PPM-2	Terminal description	Terminal PPM 300	Terminal description	Note
Power supply	1	24 V DC (+)	PSM3.1 term.1	24 V DC (+)	Power supply module
Power supply	2	0 V DC (-)	PSM3.1 term.2	0 V DC (-)	Power supply module
Status	3+4	relay	PSM3.1 term. 3+4	relay	Alarm > Status OK

General description	Terminal PPM-2	Terminal description	Terminal PPM 300	Terminal description	Note
Configurable/ Trip NEL 1	5 + 6	Relay 1 (NO)		Configurable	
Configurable/ Trip NEL 2	8+9	Relay 2 (NO)		Configurable	
PMS Alarm	11 + 12	Relay 3 (NO)	PSM3.1 term. 5+6	Relay Output	Alarm > Any alarm 6 Common (Configurable)
CB OFF Open breaker	14 + 15	Relay 4 (NO)	IOM3.1 term.1+2+3	Relay Output	[Breaker] > Control > [Open] (Configurable)
CB ON sync.	17 + 18	Relay Output (NO)	IOM3.1 term.4+5+6	Relay Output	[Breaker] > Control > [Close] (Configurable)
Configurable (Relay 26)	20	Transistor output			
Configurable (Relay 27)	21	Transistor output			
COMMON (TERM.20-21)	22	COMMON	IOM3.1 term.23	COMMON (TERM.13-22)	
Configurable/ secured ON	23	Binary optocoupler input		Configurable	
Configurable/ secured OFF	24	Binary optocoupler input		Configurable	
Shore pos. OFF	25	Binary optocoupler input		Configurable	Application depended
Forced SWBD	26	Binary optocoupler input		Configurable	
PMS CONTROL	27	Binary optocoupler input	IOM3.1 term.22	Digital input (OFF: 0 to 2 V DC, ON: 8 to 36 V DC, Impedance: 4.7 kΩ)	Mode > PMS control (Configurable)
Common for terminals 23-27	28	Common		Common for terminals 23-27	
Modbus RTU RS-485	29 30 31	DATA + DATA GND DATA -		N/A	Modbus is only available on TCP/IP
Load sharing	37 38 39	Active (P)load sharing Common Reactive (Q)load sharing		N/A	
BLACKOUT	43	Binary optocoupler input		Configurable Digital input	
HC 1 REQUEST/ Configurable	44	Binary optocoupler input		Configurable Digital input	
HC 2 REQUEST/ Configurable	45	Binary optocoupler input		Configurable Digital input	
HC 1 CONNECTED/ Configurable	46	Binary optocoupler input		Configurable Digital input	

General description	Terminal PPM-2	Terminal description	Terminal PPM 300	Terminal description	Note
HC 2 CONNECTED/ Configurable	47	Binary optocoupler input		Configurable Digital input	
HC 1 FIXED LOAD/ Configurable	48	Binary optocoupler input		Configurable Digital input	
HC 2 FIXED LOAD/ Configurable	49	Binary optocoupler input		Configurable Digital input	
ALARM INHIBIT 1/ Configurable	50	Binary optocoupler input		Configurable Digital input	
ALARM INHIBIT 2/ Configurable	51	Binary optocoupler input		Configurable Digital input	
Configurable	52	Binary optocoupler input		Configurable Digital input	
Load dependent stop block	53	Binary optocoupler input		Configurable Digital input	
CB OPEN	54	Binary optocoupler input	IOM3.1 term.13	Digital input (OFF: 0 to 2 V DC, ON: 8 to 36 V DC, Impedance: 4.7 kΩ)	[Breaker] > Feedback > [Open] (Configurable)
CB CLOSED	55	Binary optocoupler input	IOM3.1 term.14	Digital input (OFF: 0 to 2 V DC, ON: 8 to 36 V DC, Impedance: 4.7 kΩ)	[Breaker] > Feedback > [Closed] (Configurable)
COMMON (TERM. 43-55)	56	Common			
Start ACKN. HC 1/ Configurable	57 + 58	Relay 6 (NO)		Configurable Digital Output	
Start ACKN. HC 2/ Configurable	59 + 60	Relay 7 (NO)		Configurable Digital Output	
Configurable	61 + 62	Relay 8 (NO)		Configurable Digital Output	
Configurable	63 + 64	Relay 9 (NO)		Configurable Digital Output	
SPEED Raise	65 + 66	relay ouput	GAM3.1 term. 1+2	Relay output	Regulators > Governor > GOV increase (Configurable)
SPEED Lower	67 + 68	relay output	GAM3.1 term. 3+4	Relay 67 (NO)	Regulators > Governor > GOV decrease (Configurable)
Configurable (Relay 12)/ Raise U (Option D)	69 + 70	relay output		Configurable	
Configurable (Relay 13)/ Lower U (Option D)	71 + 72	relay output		Configurable	
I1	73 + 74	Current meas.	ACM3.1 term.9+10	Current meas.	[Source] L1

General description	Terminal PPM-2	Terminal description	Terminal PPM 300	Terminal description	Note
I2	75 + 76	Current meas.	ACM3.1 term. 11+12	Current meas.	[Source] L2
I3	77 + 78	Current meas.	ACM3.1 term.13+14	Current meas.	[Source] L3
U1	79	Volt. meas. Gen	ACM3.1 term. 5	Volt. meas. Gen	[Source] L1
U2	81	Volt. meas. Gen	ACM3.1 term.6	Volt. meas. Gen	[Source] L2
U3	83	Volt. meas. Gen	ACM3.1 term.7	Volt. meas. Gen	[Source] L3
U1	85	Volt. meas. BB	ACM3.1 term.1	Volt. meas. BB	[Busbar] L1
U2	87	Volt. meas. BB	ACM3.1 term.2	Volt. meas. BB	[Busbar] L2
U3	89	Volt. meas. BB	ACM3.1 term.3	Volt. meas. BB	[Busbar] L3
CAN bus interface #1	128	CAN-L		N/A	
CAN bus interface #1	130	CAN-H		N/A	
CAN bus interface #2	131	CAN-L		N/A	
CAN bus interface #2	133	CAN-H		N/A	

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 products.

There are two versions, 1.x for PPM-2 and PICUS for PPM 300.

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 300	Description	Value
6001	Nom. frequency	269	Hz	Configure > Parameters > Generator Nominal settings	Nom. f (1)	Hz
6002	Nom. power	270	kW	Configure > Parameters > Generator Nominal settings	Nom. P (1)	kW
6003	Nom. current	271	A	Configure > Parameters > Generator Nominal settings	Nom. I (1)	A

Parameter PPM-2	Description	Address	Value	Parameter PPM 300	Description	Value
6004	Nom. voltage	272	V	Configure > Parameters > Generator Nominal settings	Nom. U (1)	V
N/A				Configure > Parameters > Engine > Nominal settings	Nom. RPM (1)	RPM
6021	Volt. prim. GEN	273	V	Configure > Parameters > Generator > AC setup	G primary U	V
6022	Volt. sec. GEN	274	V	Configure > Parameters > Generator > AC setup	G secondary U	V
6023	Current prim.	275	A	Configure > Parameters > Generator > AC setup	G primary I	A
6024	Current sec.	276	A	Configure > Parameters > Generator > AC setup	G secondary I	A
6031	Volt. prim. BUS	277	V	Configure > Parameters > Busbar > AC setup	BB primary U1	V
6032	Volt. sec. BUS	278	V	Configure > Parameters > Busbar > AC setup	BB secondary U1	V
N/A				Configure > Parameters > Busbar > AC setup	BB nominal U1	V

2.2.3 Parameter setup regulator governor

The table below illustrates the differences in the regulator parameter setup.

In PPM 300, the possibility to adjust the differential band in the regulator has been added.

Parameter setup digital regulator for governor

Parameter PPM-2	Description	Address	Parameter PPM 300	Description
2512	Freq. control Kp	92	Configure > Parameters > Regulators > Governor: Relay output settings > Frequency regulation.	f Kp
2513	Freq. control Ki	93	Configure > Parameters > Regulators > Governor: Relay output settings > Frequency regulation	f Ti
2522	Power control Kp	96	Configure > Parameters > Regulators > Governor: Relay output settings > Power regulation.	P Kp
2523	Power control Ki	97	Configure > Parameters > Regulators > Governor: Relay output settings > Power regulation.	f deadband

2.2.4 Parameter setup relay or analogue governor

In PPM 300, it is possible to change between relay and analogue governor setup.

You must assign these outputs under **Configure > Input/output**. Select the hardware module, then select a digital output to configure.

Most of the controller inputs and outputs can be assigned any function. Functions are not restricted to specific hardware modules. For example, governor and AVR control functions can use any inputs and outputs, and do not have to use the inputs and outputs on the Governor and AVR module (GAM3.1).

The governor and AVR module has terminals for analogue load sharing. It also has four relay outputs, two analogue outputs and a pulse width modulation output, and two analogue inputs. These I/Os are configurable.

Standard/default: The PPM 300 is set up using relay regulation.

If PPM-2 is using analogue regulation, it requires an analogue option card.

Parameter setup relay or analogue governor

Controller	Parameter	Description	Address	Set point
PPM-2	N/A	Option dependent	N/A	N/A
PPM 300	Configure > Input/ output	Reg. output GOV		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 300 standard unit controls the governor on relay output GAM3.1, slot 5 terminal 1-4. These are fully configurable.

The table below shows the differences in the standard parameter settings.

Parameter setup governor relay

Controller	Parameter	Description	Address	Value
PPM-2	2621	GOV Min ON time	112	ms
PPM-2	2622	GOV period time	113	ms
PPM 300	Parameters > Regulator Governor: Relay output settings	Minimum ON time	N/A	ms
PPM 300	Parameters > Regulator Governor: Relay output settings	Period time	N/A	ms

2.2.6 Synchronisation setup

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

Synchronisation setup

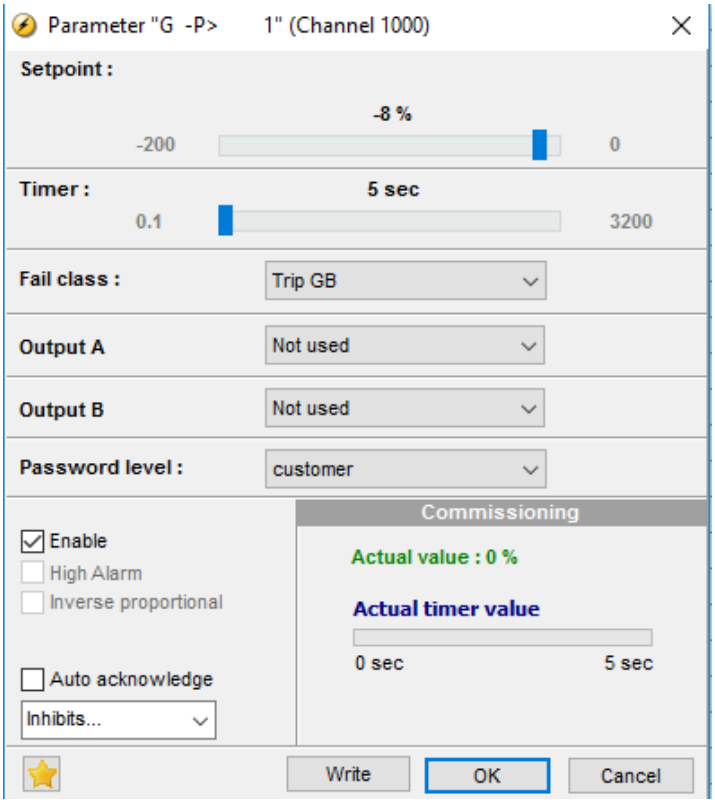
Parameter PPM-2	Description	Address	Parameter PPM 300	Description
2021	Sync. dfMax	71	Parameters > Breakers >Generator breaker	Delta frequency max.
2022	Sync. dfMin	72	Parameters > Breakers >Generator breaker	Delta frequency min.

Parameter PPM-2	Description	Address	Parameter PPM 300	Description
2023	Sync. duMax	73	Parameters > Breakers >Generator breaker	Delta voltage max.
2024	Sync. t CB	74	Parameters > Breakers >Generator breaker	Breaker close time
2091	Blackout dfMax	80	Configure > Parameters > AC configuration > [Source] > Voltage and frequency OK (blackout start).	Minimum OK frequency
2092	Blackout duMax	81	Configure > Parameters > AC configuration > [Source] > Voltage and frequency OK (blackout start).	Maximum OK frequency
N/A				Sync. blackout enable

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.

PPM-2 protection setup from USW-3



Fail classes

All activated alarms must be configured with a fail class. The fail classes define the category of the alarms and the subsequent alarm action.

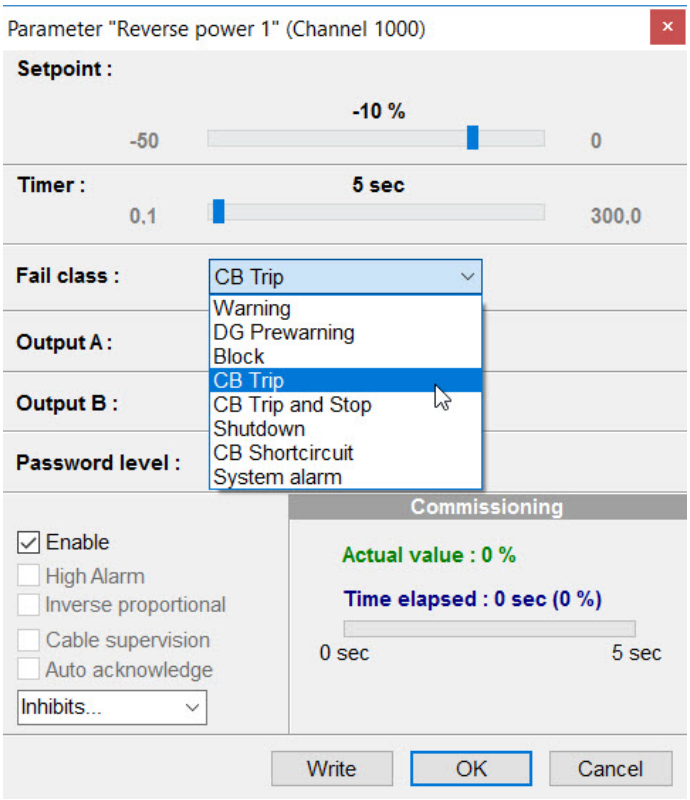
In PPM 300, the same adjustment points are present, but "Fail class" is called "Actions".

PPM-2 has eight different fail classes, compared with PPM 300 which has six different actions.

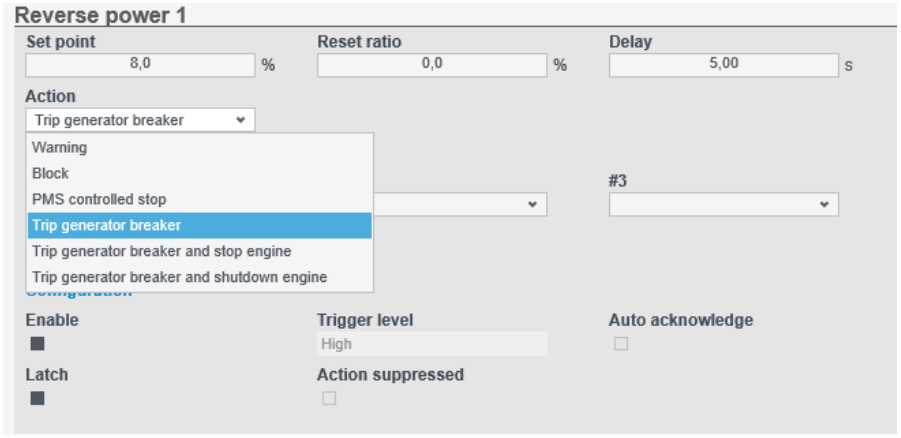
In PPM 300 it is NOT possible to set fail class to, for example: DG Prewarning , CB shortcircuit, and System alarm.

See the **Designers Reference handbook** for more information.

PPM-2 fail class setup

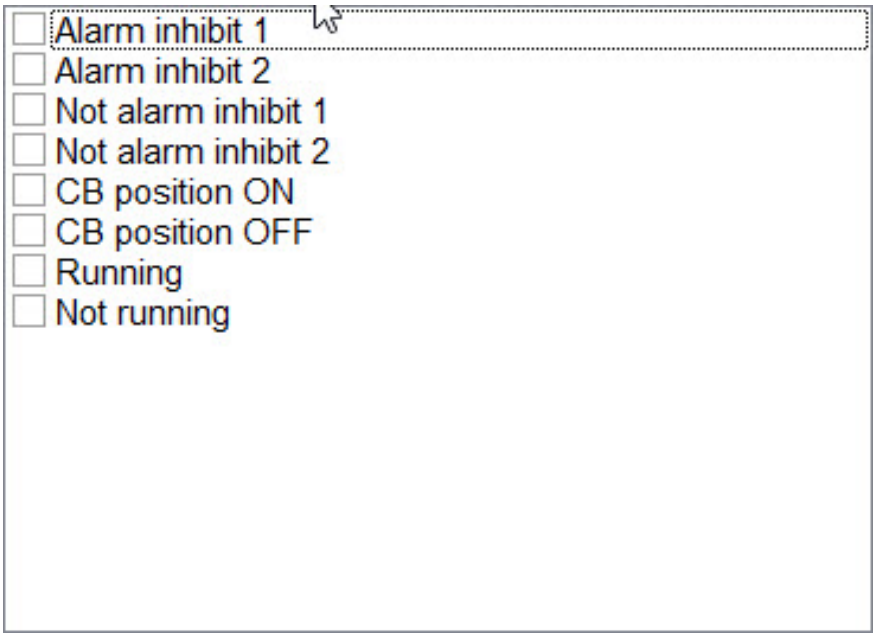


PPM 300 fail class setup

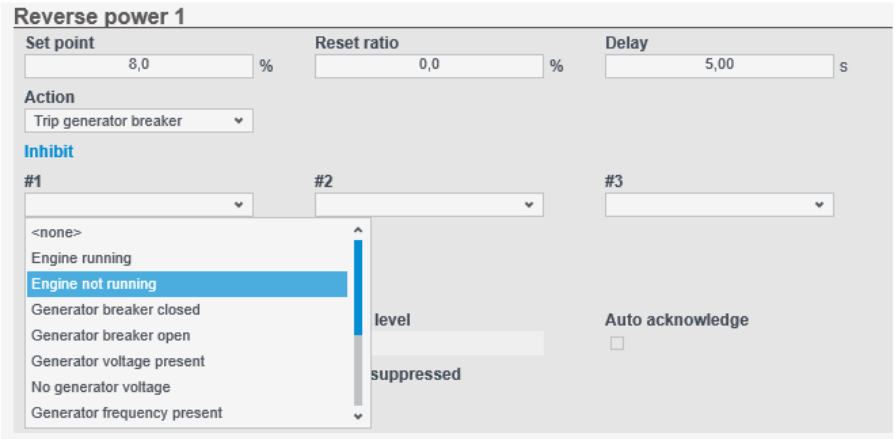


In order to select when the alarms are to be active, there is a configurable inhibit setting for every alarm. Inhibits are also different from PPM-2 to PPM 300 parameter. The inhibit functionality is only available via the PC utility software. For every alarm there is a drop-down window where it is possible to select which signals that have to be present in order to inhibit the alarm.

PPM-2 Inhibit setup



PPM 300 Inhibit setup



See the **Designers Reference handbook** for more information.

2.2.8 External communication - using Modbus

PPM-2

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 from a PPM-2 to a PPM 300 controller.

PPM 300

The controller includes a built-in client for Modbus TCP/IP

In cases using Modbus RTU in the PPM-2, the PPM 300 controller must have an additional Modbus mapping device to fulfil the need in a retrofit project.

INFO
If Modbus is used for SCADA, AMS, and so on, DEIF DK should be contacted to modify the Modbus list in PPM 300.