QUICK START GUIDE

PPM-3 Protection and Power Management

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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**

ℹ️ 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.

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 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 quick start guide

1.2.1 General purpose
This Quick Start Guide mainly includes general product information, mounting instructions and wiring descriptions.

The general purpose of this document is to help the user with the first steps of installing and using the Multi-line 2 system.

⚠️ Please make sure that you also read the Installation Instructions 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
This Quick Start Guide is mainly intended for the panel builder in charge. On the basis of this document, the panel builder designer will give the electrician the information he needs in order to get started with the installation. For detailed electrical drawings, please see the Installation Instructions.

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. What’s in the delivery?

2.1 Standard and optional

2.1.1 Standard delivery

The main unit

Standard display, DU-2

Display cable, 3 m

Two CANbus resistors, 120 ohm

2.1.2 Optional delivery

PC cable for utility software (option J7)
**Additional standard display, DU-2 (option X2)**

Display unit, DU-2  
Layout is option-dependent  

DC/DC converter and 2 x CANbus cable 3 m

**Additional operator panel, AOP-1 with 0.5 m cable (option X3)**

AOP-1  
0.5 m cable

**Additional operator panel, AOP-2 with DC/DC converter and 2x3 m CANbus cable (option X4)**

AOP-2  
DC/DC converter and 2 x CANbus cable 3 m
3. Getting started

3.1 Connecting the devices

3.1.1 Connecting the display with the main unit
Connect the SUB-D display cable to the main unit and the display unit as shown in the picture below.

![Image of device connections](image)

- No use of tools or brute force when tightening finger-screws on display cable.

3.1.2 Connecting the power supply to the main unit

![Image of power supply connections](image)
1. Terminal 1: +24V DC
2. Terminal 2: 0V DC
3. Terminal 98: +24V DC
4. Terminal 99: 0V DC

3.1.3 Connecting the AOP-1 (optional)

3.1.4 Connecting the AOP-2 (optional)
The CAN cable for the CANbus communication between the display unit of main unit no. 1 and the AOP-2 has to be connected to the CAN port (CAN 2) of the display unit (DU-2) and the CAN port (CAN 1) of the AOP-2 as shown in the below drawing.

The AOP-2 can be placed up to 200 m from the main display. The AOP-2 requires a separate power supply unit, while the display receives the power supply through the display cable from the main unit.

For further information about the installation of multiple displays and AOP-2s, please refer to the document "Description of option X".
3.1.5 Terminal strip overview: DG (diesel generator); slots 1, 2, 5 and 6

Connecting the most important inputs and outputs to a DG (diesel generator) unit

Terminal strip overviews
Slots #1, #2, #5 and #6

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
3.1.6 Terminal strip overview: DG (diesel generator); slots 3, 4, 7 and 8

Connecting the most important inputs and outputs to a DG (diesel generator) unit

Terminal strip overviews

Slots #3, #4, #7 and #8

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
3.1.7 Terminal strip overview: EDG (emergency generator); slots 1, 2, 5 and 6

Connecting the most important inputs and outputs to an EDG (emergency generator) unit

Terminal strip overviews
Slots #1, #2, #5 and #6

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
3.1.8 Terminal strip overview: EDG (emergency generator); slots 3, 4, 7 and 8

Connecting the most important inputs and outputs to an EDG (emergency generator) unit

**Terminal strip overviews**

Slots #3, #4, #7 and #8

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
### 3.1.9 Terminal strip overview: SG (shaft generator); slots 1, 2, 5 and 6

Connecting the most important inputs and outputs to a SG (shaft generator) unit

**Terminal strip overviews**

**Slots #1, #2, #5 and #6**

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
3.1.10 Terminal strip overview: SG (shaft generator); slots 3, 4, 7 and 8
Connecting the most important inputs and outputs to a SG (shaft generator) unit

Terminal strip overviews
Slots #3, #4, #7 and #8

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
### 3.1.11 Terminal strip overview: SCB (shore connection); slots 1, 2, 5 and 6

Connecting the most important inputs and outputs to a SCB (shore connection) unit

**Terminal strip overviews**

**Slots #1, #2, #5 and #6**

<table>
<thead>
<tr>
<th>Options</th>
<th>Options</th>
<th>Options</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCB close</td>
<td>SCB open</td>
<td>Configurable</td>
<td>Configurable</td>
</tr>
<tr>
<td>Slot 1</td>
<td>Slot 2</td>
<td>Slot 4</td>
<td>Slot 5</td>
</tr>
</tbody>
</table>

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
3.1.12 Terminal strip overview: SCB (shore connection); slots 3, 4, 7 and 8

Connecting the most important inputs and outputs to a SCB (shore connection) unit

Terminal strip overviews

Slots #3, #4, #7 and #8

The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
### 3.1.13 Terminal strip overview: BTB (bus tie breaker); slots 1, 2, 5 and 6

Connecting the most important inputs and outputs to a BTB (bus tie breaker) unit

#### Terminal strip overviews

Slots #1, #2, #5 and #6

---

<table>
<thead>
<tr>
<th>Option: External communication</th>
<th>Options:</th>
<th>Option:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Modbus RTU</td>
<td></td>
<td>- 13 analogue outputs</td>
</tr>
<tr>
<td>- Modbus DP</td>
<td></td>
<td>- 16/25/473 inputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 16/25/473 outputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 579/60/735 and AC inputs</td>
</tr>
</tbody>
</table>

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**Getting started**

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The most important connections are marked with an arrow. For further information, please refer to the installation instructions.
### 3.1.14 Terminal strip overview: BTB (bus tie breaker); slots 3, 4, 7 and 8

Connecting the most important inputs and outputs to a BTB (bus tie breaker) unit

**Terminal strip overviews**

Slots #3, #4, #7 and #8

---

**The most important connections are marked with an arrow. For further information, please refer to the installation instructions.**
4. The first steps

4.1 Adjusting essential parameters

4.1.1 Unit ID number

As default, all DG units are set to the ID number 1, all SG/SC are set to ID number 17, all BTB units are set to ID number 33, and the EDG unit is set to ID number 1. Each unit must have a different ID number to be able to communicate via the internal CANbus line. The following table shows the selection of ID number in connection to the main unit number:

<table>
<thead>
<tr>
<th>DG number</th>
<th>ID number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG 1..16</td>
<td>ID 1..16</td>
</tr>
<tr>
<td>EDG</td>
<td>ID 1..16</td>
</tr>
<tr>
<td>SG 1..2</td>
<td>ID 17..20</td>
</tr>
<tr>
<td>SG 1..2</td>
<td>ID 17..20</td>
</tr>
<tr>
<td>BTB 1..8</td>
<td>ID 33..40</td>
</tr>
</tbody>
</table>

The next steps will explain how to change the ID number for the diesel generator unit number two.

Press JUMP

Use the or arrow keys to find setting 7530 “Int. Comm. ID” and press .

Use the or arrow keys to place the cursor under ID, and press .

Use the or arrow keys to set the password (factory setting is 2000). Press .

Use the or arrow keys to set the value to 2.

Use the or arrow keys to place the cursor under SAVE and press .

The Internal CAN ID is now 02. Use the key to move out of the menu system.

4.1.2 Basic AC values

This chapter guides you through the most essential parameters, which have to be adjusted before the PPM can be taken in operation.
The setpoints can either be adjusted from the display unit or by using the DEIF utility software. The following examples will show how to adjust the parameters from the display unit.

All settings are reached by placing the cursor under SETUP (in the main page) and pressing .

Place the cursor under SYST and press .

Place the cursor under GEN and press .

Place the cursor under the setting you require and press .

### Generator nominal settings

<table>
<thead>
<tr>
<th>Channel number</th>
<th>Setpoint</th>
<th>Minimum setting</th>
<th>Factory setting</th>
<th>Maximum setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>6001</td>
<td>Nominal frequency</td>
<td>48.0 Hz</td>
<td>50.0 Hz</td>
<td>62.0 Hz</td>
</tr>
<tr>
<td>6002</td>
<td>Nominal power</td>
<td>10 kW</td>
<td>1000 kW</td>
<td>20000 kW</td>
</tr>
<tr>
<td>6003</td>
<td>Nominal current</td>
<td>0 A</td>
<td>1904 A</td>
<td>9000 A</td>
</tr>
<tr>
<td>6004</td>
<td>Nominal voltage</td>
<td>100 V</td>
<td>400 V</td>
<td>25000 V</td>
</tr>
</tbody>
</table>

To adjust the transformer settings, use the or push-button to get to the transformer page:

### VT and CT settings

<table>
<thead>
<tr>
<th>Channel number</th>
<th>Setpoint</th>
<th>Minimum setting</th>
<th>Factory setting</th>
<th>Maximum setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>6041</td>
<td>GEN Transformer U primary</td>
<td>100 V</td>
<td>400 V</td>
<td>25000 V</td>
</tr>
<tr>
<td>6042</td>
<td>GEN Transformer U secondary</td>
<td>100 V</td>
<td>400 V</td>
<td>690 V</td>
</tr>
<tr>
<td>6043</td>
<td>GEN Transformer I primary</td>
<td>5 A</td>
<td>2000 A</td>
<td>9000 A</td>
</tr>
<tr>
<td>6044</td>
<td>GEN Transformer I secondary</td>
<td>1 A</td>
<td>1 A</td>
<td>5 A</td>
</tr>
<tr>
<td>6051</td>
<td>BB settings U primary</td>
<td>100 V</td>
<td>400 V</td>
<td>25000 V</td>
</tr>
<tr>
<td>6052</td>
<td>BB settings U secondary</td>
<td>100 V</td>
<td>400 V</td>
<td>690 V</td>
</tr>
</tbody>
</table>

To adjust the power management settings, go back to the system setup menu and highlight the power management (PM) setup.
4.2 Installation of the utility software (USW)

4.2.1 Downloading the software
1. Go to www.deif.com
2. Select Documentation & Software
3. Select Software download
4. In the dropdown menu, select Multi-line 2 utility software v.3.x
5. Fill in your e-mail address and click “Submit”

You will now receive an e-mail containing a link. Click the link and follow the instructions.

The USW is now installed on your computer.

4.2.2 Installation of USB drivers
On Windows Vista machines, the USB drivers are installed automatically.

This is the procedure on Windows XP machines:

When you connect the DEIF product, Windows XP will launch two "Hardware Wizards". Two drivers are installed, so please let Windows execute both "Found new Hardware Wizard"s.

We recommend letting the Hardware Wizard install the software automatically by choosing the "Recommended" option. If the "Advanced" option is chosen, the needed files are available from the USW3 installation folder (default: C:\Program Files\DEIF\USW3\) in the "USB driver files/source PreInstaller" folder.

Please select "Continue Anyway" if a "Hardware Installation" warning (see screenshot below) appears during the installation.

4.2.3 Getting connected with the PPM
Connect the service port to the USB on the computer (option J7 or option J3).
Click the Utility Software 3 icon on the desktop or in the Windows Start menu.

Desktop icon: ![Utility Software 3 icon](image1)

Quick launch and Start menu icon: ![Utility Software 3 icon](image2)

The below window appears.

![Application Settings](image3)

Open the application settings by clicking this icon.

![Device Manager](image4)

Open "Windows device manager".

Check the COM port used for communication, and make sure the settings correspond to the application settings.
You are now online with the PPM.

4.2.4 Read parameters from the device

Open the "Parameters" list.

After retrieving all the parameters, the device is ready to be configured.

4.2.5 Basic configuration of a device using the utility software

When the parameters have been uploaded, the options below will be available.
The parameters can be configured as follows:

Click a parameter and the dialogue box below will appear.

Click this or use the bar to adjust the setpoint, then click "Write" and "OK".

The parameter setpoint has now been changed and downloaded to the device.

⚠️ For further information, please refer to the General Guidelines for Commissioning.

4.3 Configuring the plant application

4.3.1 Configuring the plant application

To configure the application, you need to go to the application configuration:
Select PPM for product type and the plant setup, in this case: Multiple DG(s) + BTB + SHAFT meaning the plant consists of multiple diesel generators, a bus tie breaker and a shaft generator.

The resulting plant overview looks like this:

The configuration is now placed on area3. If you need to add or change one of the areas (1 area per PPM unit), just click the area in question.
Use the ADD and DELETE button to add or delete generators/tie breakers. Remember to tick the box for the type in question.

Upload/download of application

Once finished, the application has to be downloaded to the unit.

An existing application can be uploaded as well.

**4.4 Broadcast of the application**

**4.4.1 Broadcast of the application**
To broadcast the uploaded application from one unit to the other units connected to the internal CANbus line, press the push-button and select the parameter 9190. Select the application number, which should be transmitted to the other units:
After selecting the application, the broadcast function has to be activated:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Text</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2780</td>
<td>Reg. Output</td>
<td>Selection of Governor output type (2781) and AVR (2782). Possible settings are “relay” or “analogue”.</td>
</tr>
<tr>
<td>2600</td>
<td>Relay control (Governor)</td>
<td>Selection of which relays to use. Setting 2603 for increase relay, setting 2604 for decrease relay. Normally used: Relay 65 for increase and relay 67 for decrease. NOTE: These settings are only present if &quot;relay&quot; has been selected in setting 2781.</td>
</tr>
<tr>
<td>2720</td>
<td>Relay control (AVR)</td>
<td>Selection of which relays to use. Setting 2723 for increase relay, setting 2724 for decrease relay. Normally used: Relay 69 for increase and relay 71 for decrease. NOTE: These settings are only present if &quot;relay&quot; has been selected in setting 2782.</td>
</tr>
<tr>
<td>5981</td>
<td>Governor output (analogue)</td>
<td>Selection of which analogue output to use. NOTE: This setting is only available if &quot;analogue&quot; has been selected in setting 2781. Normally used is analogue output 66.</td>
</tr>
<tr>
<td>5991</td>
<td>AVR output (analogue)</td>
<td>Selection of which analogue output to use. NOTE: This setting is only available if &quot;analogue&quot; has been selected in setting 2782. Normally used is analogue output 71.</td>
</tr>
</tbody>
</table>

During transmit, the broadcasting unit indicates that the unit is sending the application by the following information message: “BROADCASTING APPL.” while the receiving units are indicating the following information message: “RECEIVING APPL.”.

4.5 Configuring the speed governor and AVR outputs

4.5.1 Settings
Dependent on the hardware configuration, relays or analogue outputs can be used for speed governor and AVR control.
The settings used for these are:

AVR control requires option D1.

Analogue outputs require option E1, E2, EF2, or EF4.
Setup of a controller with analogue option and AVR option

For further information, please refer to the General Guidelines for Commissioning.
Setup of a controller with relay and AVR option

For further information, please refer to the General Guidelines for Commissioning.

For further information, please check the following documents:
PPM 3.0 Designer’s Reference Handbook (doc. no. 4189340671)
PPM 3.0 Installation Instructions (doc. no. 4189340741)
PPM 3.0 Operator’s Manual (doc. no. 4189340673)
5. Drawings

5.1 Diagrams

5.1.1 Minimum configuration, DG, EDG, SG, SC, BTB

Minimum configuration (DG unit)
Minimum configuration (EDG unit)
Minimum configuration (SG unit)
Minimum configuration (SC unit)
Minimum configuration (BTB unit)