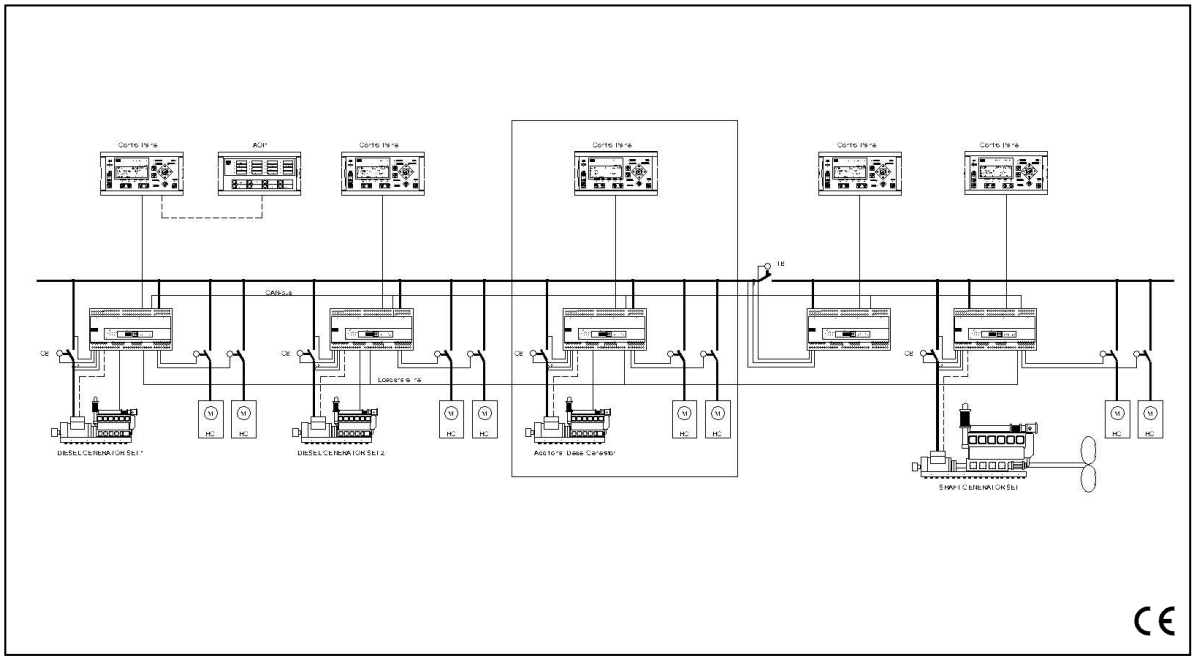
Data sheet

PPU Power Management (PPM)

4921240291C



Standard functions

Power management

- Load dependent start/stop
- Programmable start priority
- Heavy consumer control
- Blackout start sequence
- Supervision of a shore breaker
- Supervision of a bus coupler
- Additional operator panel (AOP)
- Black box recording tool (option)
- Symmetrical and asymmetrical load sharing
- Trip of non-essential load groups

Generator protection

- Over- and undervoltage
- Over- and underfrequency
- Reverse power
- Overcurrent
- Fast overcurrent (> 42ms)
- Overload
- Current unbalance
- Voltage asymmetry
- Loss of excitation and overexcitation

Busbar protection

- Over- and undervoltage
- Over- and underfrequency

Engine control

- Start/stop sequences
- AVR/speed governor control
- Overspeed protection
- Low lub. oil pressure protection
- High cooling water temp. protection
- Basic engine protections (back-up)

Display

- Push-buttons for start/stop
- Push-buttons for breaker operations
- Information messages
- Status text
- Alarm indication
- Start/stop priority change

General

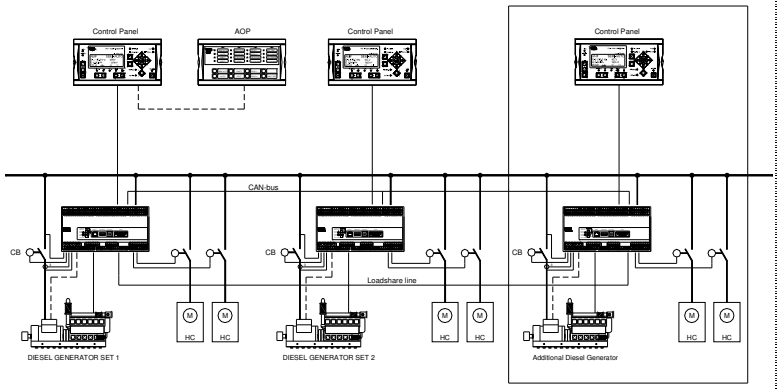
- Multiple AOP-2 in parallel
- Five standard languages (English, German, French, Spanish and Italian)
- Interfacing to alarm and monitoring systems (RS485 Modbus RTU or Ethernet TCP/IP Modbus/XML)
- USB interface from laptop
- SMS and e-mail function (option)
- Password protected parameter changes via display or PC software
- PC software as commissioning tool
- Programmable I/Os, set points, timers and alarms

DEIF A/S

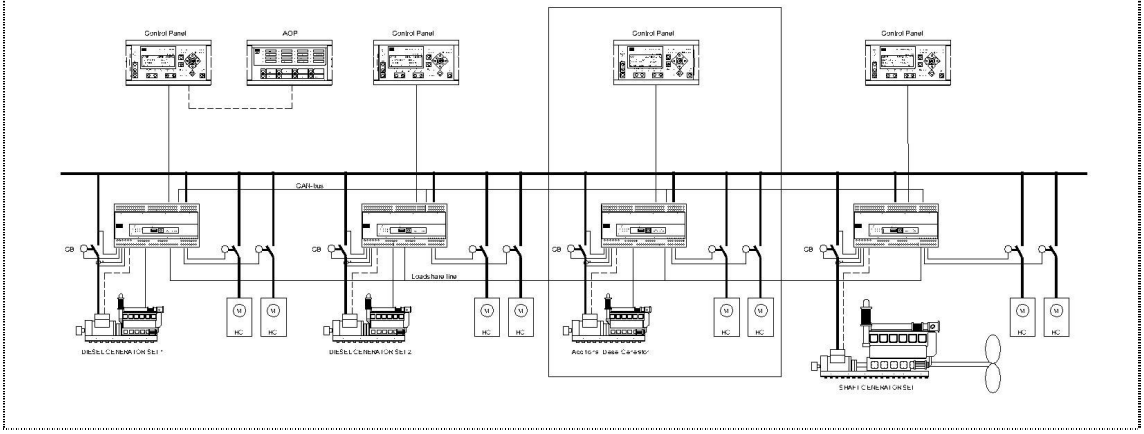
Application illustrations

SYSTEM	SYSTEM OVERVIEW	COMMENTS
SYSTEM 01	DG 1 + DG 2 + DGn	Minimum 2 diesel generators Maximum 8 diesel generators
SYSTEM 02	DG 1 + DG 2 + DGn + SG/SC	Minimum 2 diesel generators and 1 shaft generator/shore connection Maximum 8 diesel generators and 1 shaft generator/shore connection
SYSTEM 03	DG 1 + DG 2 + DGn + SG + TB	Minimum 2 diesel generators, 1 shaft generator and 1 bus tie breaker Maximum 8 diesel generators, 1 shaft generator and 1 bus tie breaker

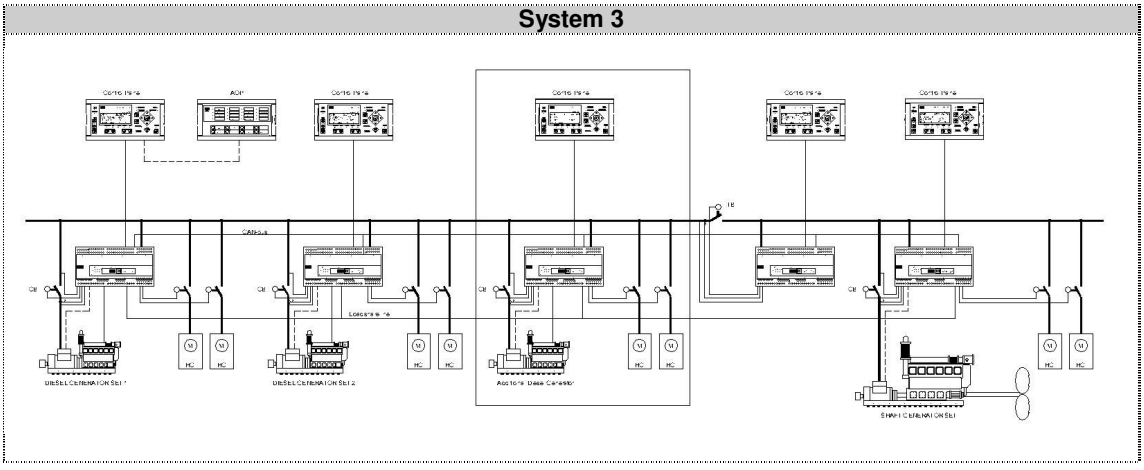
System 1



System 2



System 3



Application

The **P**PU **P**ower **M**anagement (PPM) is a standard power management system for marine applications. The system has been designed to carry out *generator control*, *supervision* and *protection* functions of up to 8 generators running in parallel. The PPM supports three main systems depending on the individual application.

The system performs power management features such as load dependent start/stop, programmable start priority, heavy consumer control, blackout start sequence, supervision of a shore breaker and a bus coupler, symmetrical and asymmetrical load sharing, trip of non-essential load groups and programmable I/Os etc. The PPM system covers the requirements for most simple and medium-sized marine systems. For more complex applications, the Delomatic system can be offered.

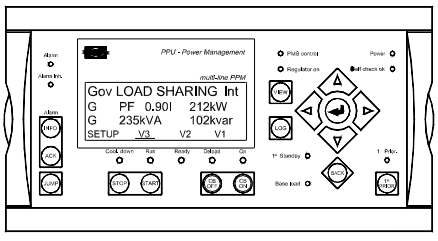
Each unit contains all necessary 3-phase measuring circuits and presents all values and alarms on the LCD display.

Besides the LCD display, the power management unit has an additional operator panel (AOP-2) with 8 push-buttons and 16 LEDs. The AOP-2 has a CANbus connection to the display unit and can be placed anywhere in the switchboard (max. 500 m from display unit). Multiple AOP-2s can be connected to the CANbus line with parallel operation. The AOP-2 enables status information over the system and includes plant mode control. Communication to an external alarm and monitoring system can be done via Ethernet TCP/IP Modbus, Ethernet TCP/IP XML or RS485 Modbus RTU.

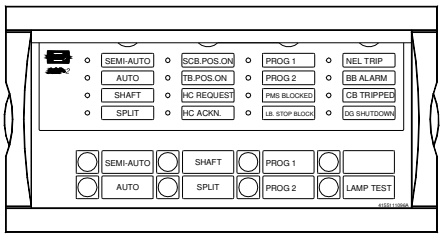
Display

The display is a separate unit and can be mounted directly on the PPM base unit or in the switchboard via the display cable.

Diesel generator



Additional operator panel (AOP-2)



Power Management

The power management functions are handled in a separate 32-bit processor. As default the PM processor is placed in DG unit 1. The load dependent start/stop function can be adjusted as predicted available rated power (kW), as predicted available apparent power (KVA) or as percentage rated power (%). The start priority selection can either be handled from the PM unit for the entire system or locally via a 1st priority push-button on each display unit.

The heavy consumer control is able to be adjusted as fixed load or variable load (e.g. thrusters). The output signal can also be adjusted as either pulse signal or steady signal. If a blackout situation occurs, the operator can define the following functions:

- Start one or two diesel generators,
- automatically change plant mode to SEMI-AUTO or AUTO mode, and
- in case of short circuit to activate one or no start attempts

In case of an open bus coupling switch, the system will automatically be forced into switchboard control. This will be indicated at the AOP-2 and additionally at each display unit by a yellow PMS control LED.

The load dependent stop function can be blocked by either an external input or by a set point.

Using the set point will only block the load dependent stop function in case of heavy consumer operation.

Power and frequency control

The **P**PU **P**ower **M**anagement (PPM) can control speed governors/AVRs by using relay or analogue output signals. The load sharing function has a separate analogue load share line. This allows placing of additional bus couplers anywhere in the switchboard and ensures active load sharing at open bus coupler positions.

The following regulator functions are available:

- Active load sharing
- Reactive load sharing
- Voltage control

Available options

Option	Description	Placed in	Note
D	***Voltage/var control***		
D1	Selection between: - Constant voltage control (stand-alone) - Reactive load sharing (island paralleling with other generators)	Software option	Not with EF2
E	***Analogue controller outputs***		
E1	+/-20mA for speed governor +/-20mA for AVR	Slot #4	AVR: Only when option D is chosen Not with EF functions
F	***Analogue transducer outputs***		
F1	2 x 0(4)...20mA transducer outputs	Slot #6	
EF	***Combination outputs***		
EF2	+/-20mA for speed governor 1 x 0(4)...20mA transducer output	Slot #4	Not with E1
EF3	1 x PWM (Pulse Width Modulated) output for CAT speed governor 1 x PWM (Pulse Width Modulated) output for droop +/-20mA for speed governor or AVR	Slot #4 + Slot #6	Not with E1, EF2, EF4, F1, M15, M16, M18
EF4	+/-20mA for speed governor or AVR 2 x relay outputs for speed governor or AVR	Slot #4	Not with E1, EF2 AVR: Requires D
H	***Serial communication***		
H2	Modbus RTU (RS485)	Slot #2	
J	***Cables***		
J2	Display cable with plugs, 6 m. UL94 (V1) approved	Other	
J7	PC USB cable 3 m	Other	
K	***Technical documentation***		
K1	Hard copy (as standard enclosed as CD ROM)	Other	
L	***Display gasket for IP54***		
M	***Configurable I/O extension cards***		
M15	4 x 0(4)…20mA analogue inputs	Slot #6	Not with F1, M16, M18
M16	7 x binary inputs	Slot #6	Not with F1, M15, M18
M18	4 x relay outputs	Slot #6	Not with F1, M15, M16
N	***Webarm functions***		
N4	Ethernet TCP/IP XML	Software option	
N5	Ethernet TCP/IP MODBUS	Software option	
N6	Advanced logging	Software option	
X	***Display***		
X4	Additional operator panel (AOP-2)	Other	With same functions as standard AOP-2 for parallel operations in different locations

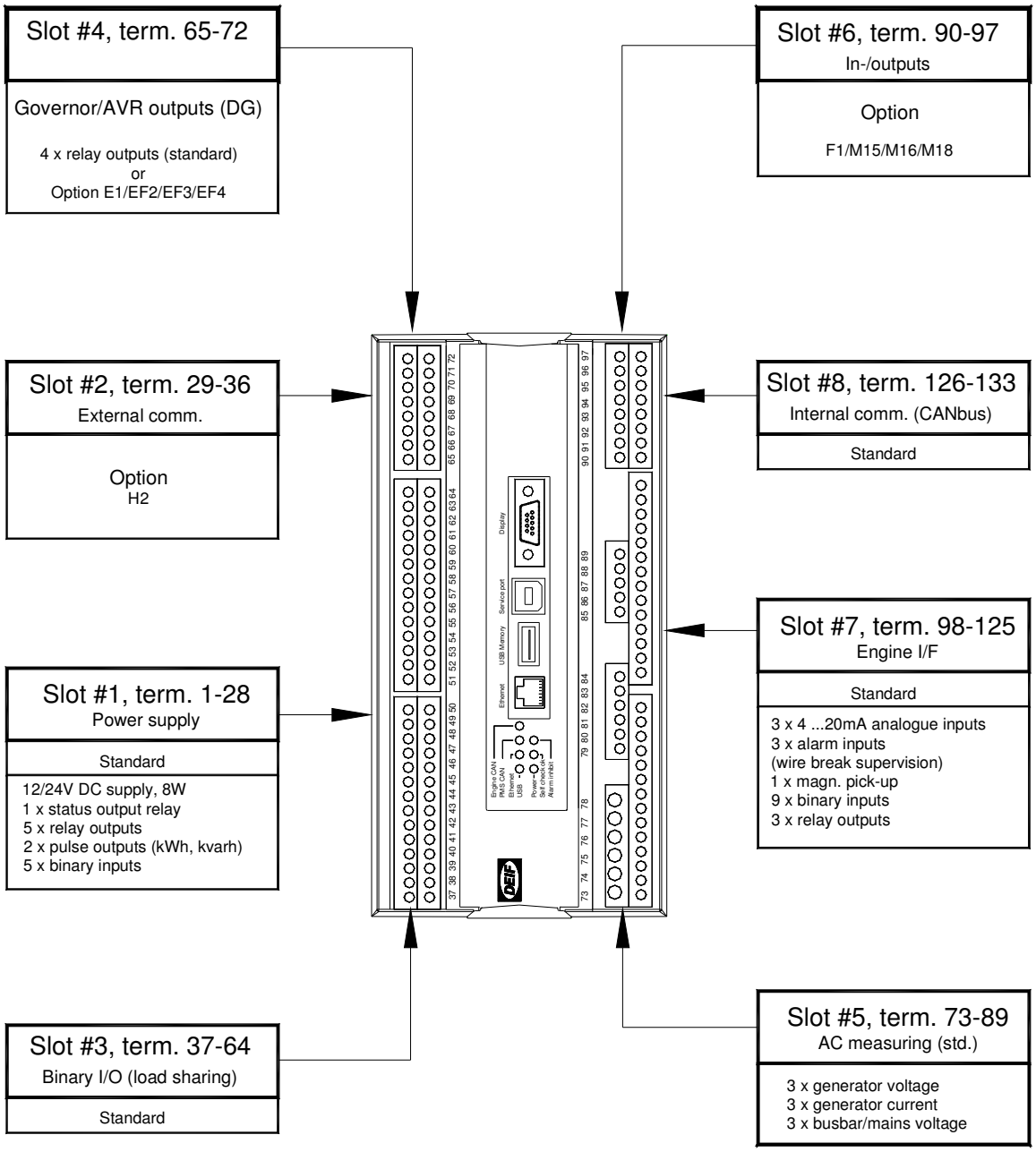
For detailed information about hardware options, please see hardware overview on page 5.

For detailed order information, please see order specifications on page 9.

Hardware overview

There can only be one hardware option in each slot. It is e.g. not possible to select option F1 and option M15 at the same time because all options require a PCB in slot #6.

Besides the hardware options shown on this page it is possible to select the software options mentioned on page 4 in this data sheet.



Technical specifications

Accuracy: Class 1.0, to IEC 688

Operating temp.: -25…70°C (-13...158°F)

Storage temp.: -40…70°C (-40...158°F)

Climate: Class HSE, to DIN 40040

Meas. voltage: 100-690V AC +/-20%

Consumption: Max. 0.25VA / phase

Meas. current: -/1 or -/5A AC

Consumption: Max. 0.3VA / phase

Current overload: 4 x I_n continuously
20 x I_n, 10 sec. (max. 75A)
80 x I_n, 1 sec. (max. 300A)

Meas. frequency: 30…70Hz

Aux. supply: 18-32V DC
Max. 11W consumption

Binary inputs: Optocoupler, bi-directional
Input voltage 8-32V DC

Relay outputs: 250V AC, 8A
24V DC, 2A
(Unit status output: 1A)

Open collector outputs: Supply 12…32V DC, max. 10mA

Analogue inputs: -10…0…+10V DC
Not galvanically separated
Impedance min. 90kΩ

Mounting: DIN-rail mount or base mount

DEIF recommends base mounting for marine applications.

If DIN-rail mounted in marine applications, additional means against excessive mechanical vibrations must be used.

Load sharing lines: -5…0…+5V DC

Analogue outputs: 0(4)...20mA
Galvanically separated
Active output (internal supply)
Load max. 500Ω

Safety: To EN 61010-1, installation category (overvoltage category) III, 600V, pollution degree 2

Galv. separation: Between AC voltage, AC current and other I/Os: 3250V AC, 50Hz, 1 min.

Between analogue outputs: 500V DC, 1 min.

EMC/CE: To EN 61000-1/2/3/4, SS4631503 (PL4) and IEC 255-3

Material: All plastic materials are self-extinguishing according to UL94 (V1)

Plug connections: AC current: 4 mm^2 multi stranded

Other: 2.5 mm^2 multi stranded

Display: 9-pole Sub-D female

PC: USB A-B

Ethernet: RJ45

Protection: Unit: IP20
Display: IP52 (IP54 with gasket: Option L)
To IEC 529 and EN 60529

Approvals: The PPM is approved by the major classification societies. Contact DEIF for details

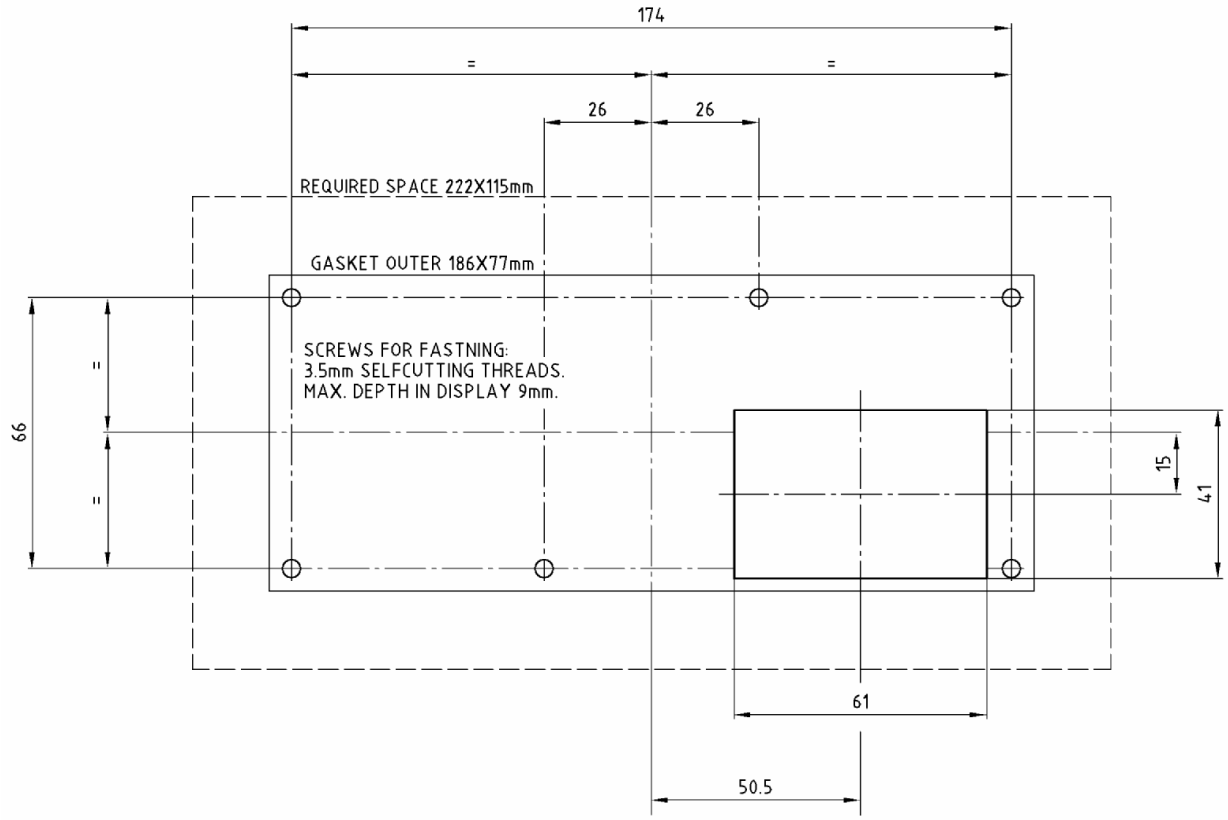
Governors: Multi-line 2 interfaces to all governors, including GAC, Barber-Colman, Woodward and Cummins

See interfacing guide at www.deif.com

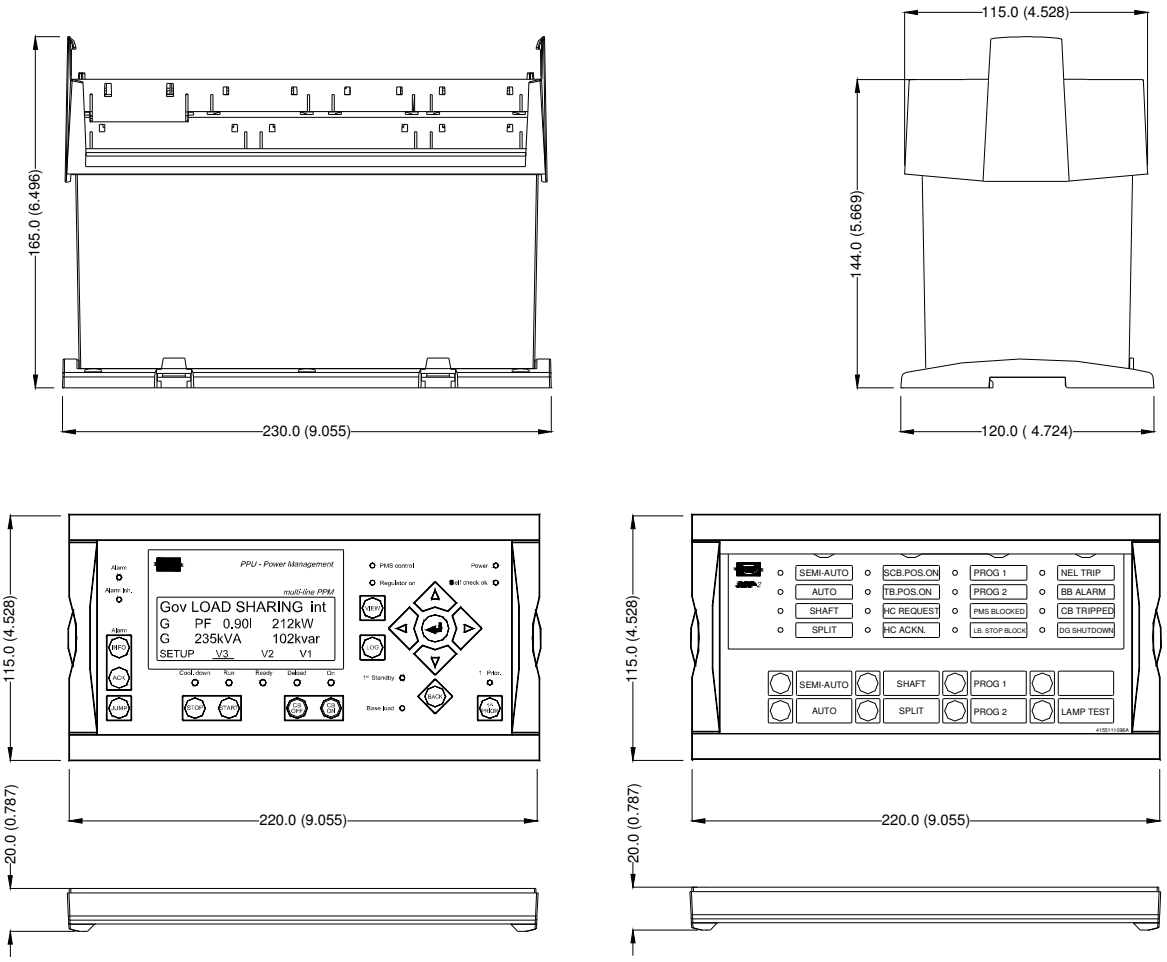
Weight:

Main unit:	1.5 kg (3.40 lbs.)
J1, cable 3 m:	0.2 kg (0.45 lbs.)
Option J2:	0.4 kg (0.90 lbs.)
Option J7:	0.2 kg (0.45 lbs.)

Panel cutout (mm)

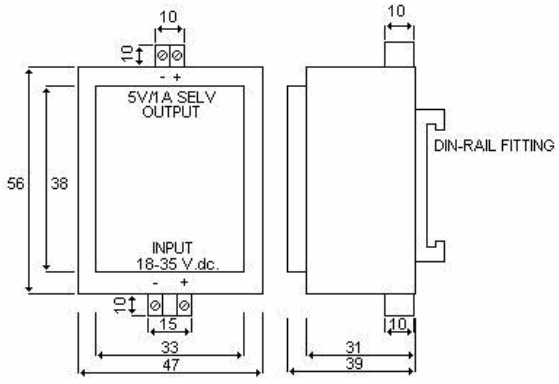


Unit dimensions in mm (inches)



Display size: H x W x D = 115 (4.528”) x 220 (8.661”) x 20 (0.787)

External 24V DC to 5V DC converter for the AOP-2



Order information

The PPM system is ordered in two steps:

Step 1: System information

Please indicate your type of PMS system and the number of DGs:

	1	2	3
PMS system			

Number of DGs (2…8)	

Step 2: Unit option information

Option / Unit	D1	E1	F1	EF2	EF3	EF4	H2	J2	J7	L	M15	M16	M18	N4	N5	N6
DGM																
DG2																
DG3																
DG4																
DG5																
DG6																
DG7																
DG8																
TB																
SG																

Option K1:

	UK
Documentation as hard copy (no. of sets)	

(Only one hard copy is included as standard).

Option X4:

Additional number of AOP-2s (1…4)	

(One AOP-2 is included as standard).

For detailed information about options, please see option list on page 4.

Due to our continuous development we reserve the right to supply equipment which may vary from the described.

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