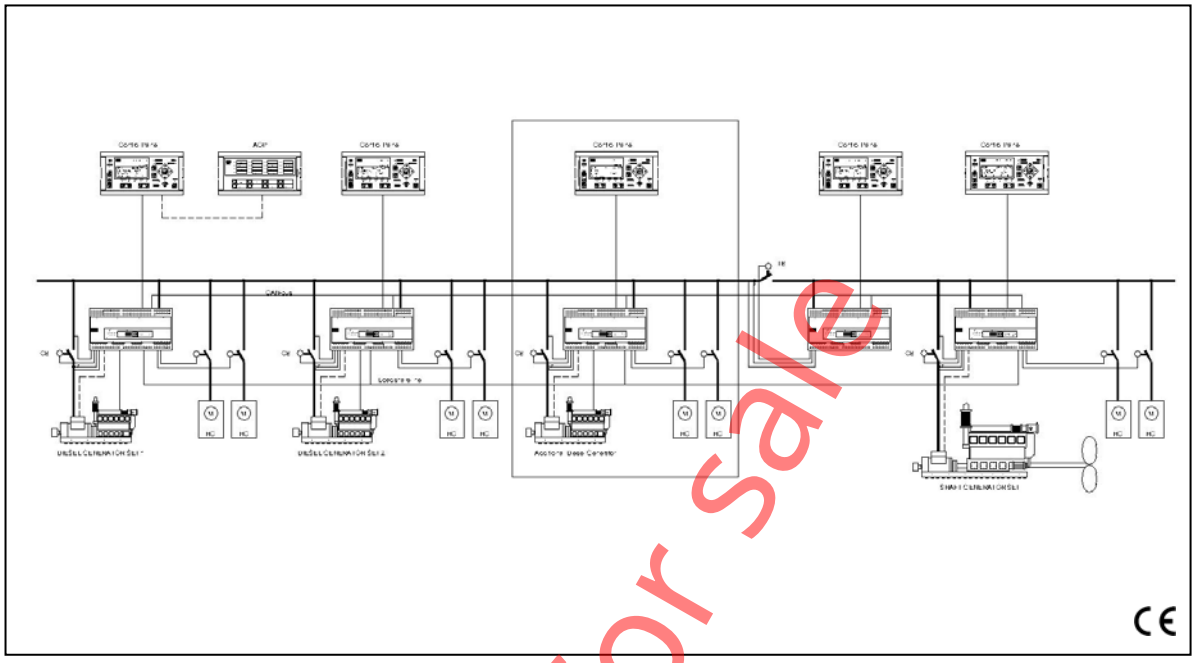
DEIF A/S

Data sheet

PPU Power Management (PPM)

4921240291H



Standard functions

Power management

- Load dependent start/stop
- Programmable start priority
- Heavy consumer control
- Blackout start sequence
- Supervision/control of a shore breaker
- Supervision/control of a bus coupler
- Additional operator panel (AOP)
- 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
- 3 configurable alarm inputs with wire break supervision

Display

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

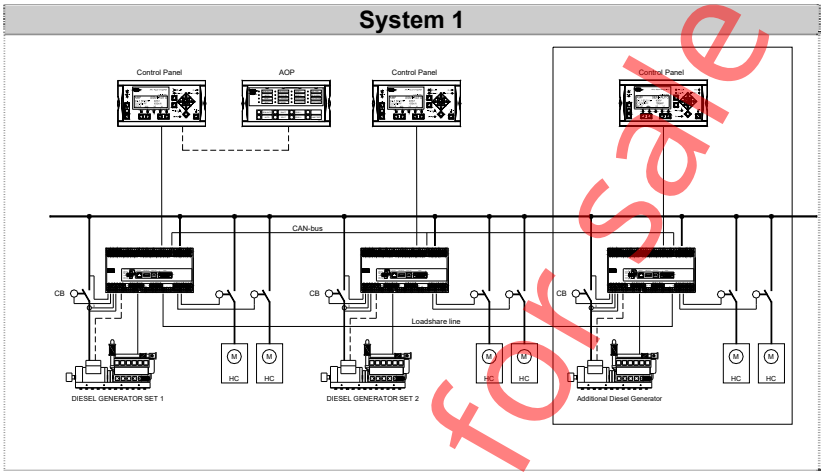
General

- 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)
- USB interface from laptop
- Password protected parameter changes via display or PC software
- PC software as commissioning tool
- Configurable I/Os, set points, timers and alarms

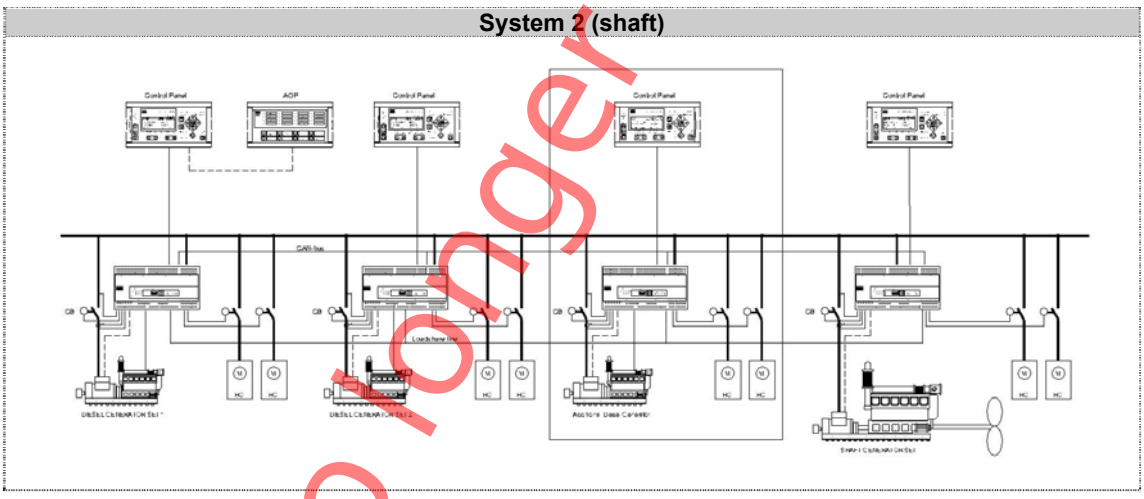
Application illustrations

SYSTEM	SYSTEM OVERVIEW	COMMENTS
SYSTEM 01	DG 1 + DG 2 + DGn	Minimum 2 diesel generators Maximum 8 diesel generators
SYSTEM 02a SYSTEM 02b	DG 1 + DG 2 + DGn + SG DG 1 + DG 2 + DGn + 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

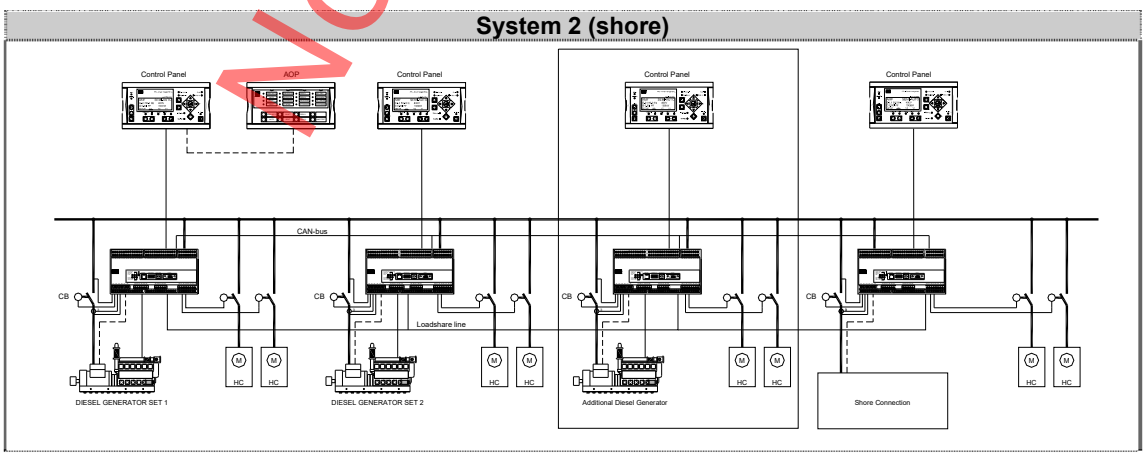
System 1



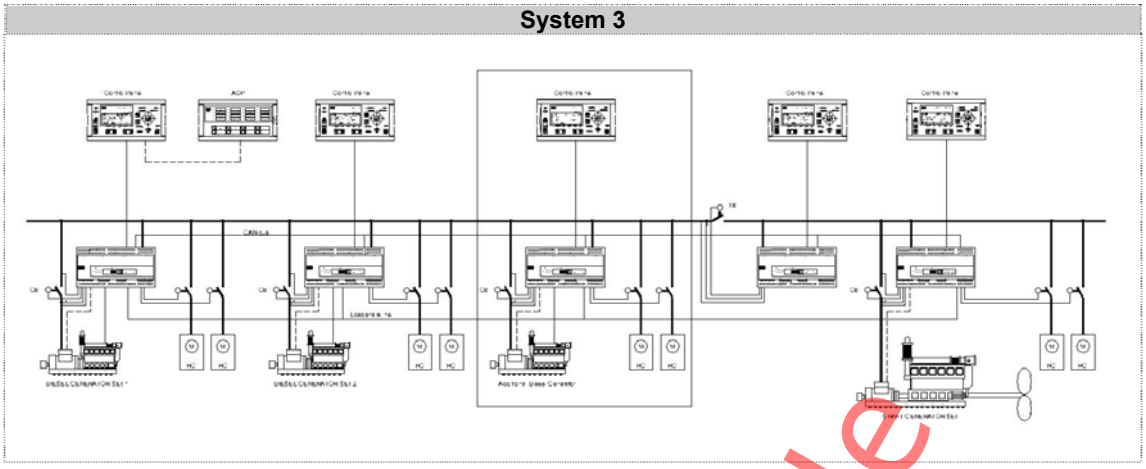
System 2 (shaft)



System 2 (shore)



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 different 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).

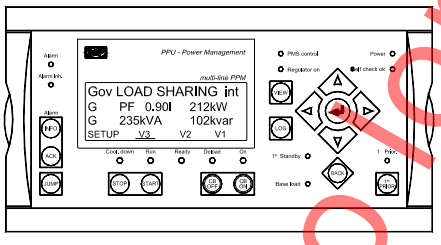
Each unit contains all necessary 3-phase measuring circuits and presents all values and alarms on the LCD display.

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. 200 m from display unit). Multiple AOP-2s can be connected to the CANbus line with parallel operation (X4 option).
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, or RS485 Modbus RTU.

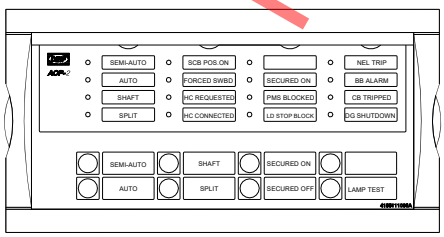
Display

The display is a separate unit and can be mounted directly on the PPM base unit or in the switchboard via the display cable. Up to 3 displays can be connected to the same main unit (X2 option).

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 can automatically be forced into switchboard control. This can 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 (option)
- PF, VAR control (option)

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
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	
J4	PC cable for option N programming (Ethernet cable crossed), 3 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***		
N5	Ethernet TCP/IP Modbus	Software option	
X	***Display***		
X2	Additional display (DU-2)	Other	Max. 3 displays per main unit
X4	Additional operator panel (AOP-2)	Other	With same functions as standard AOP-2 for parallel operations in different locations

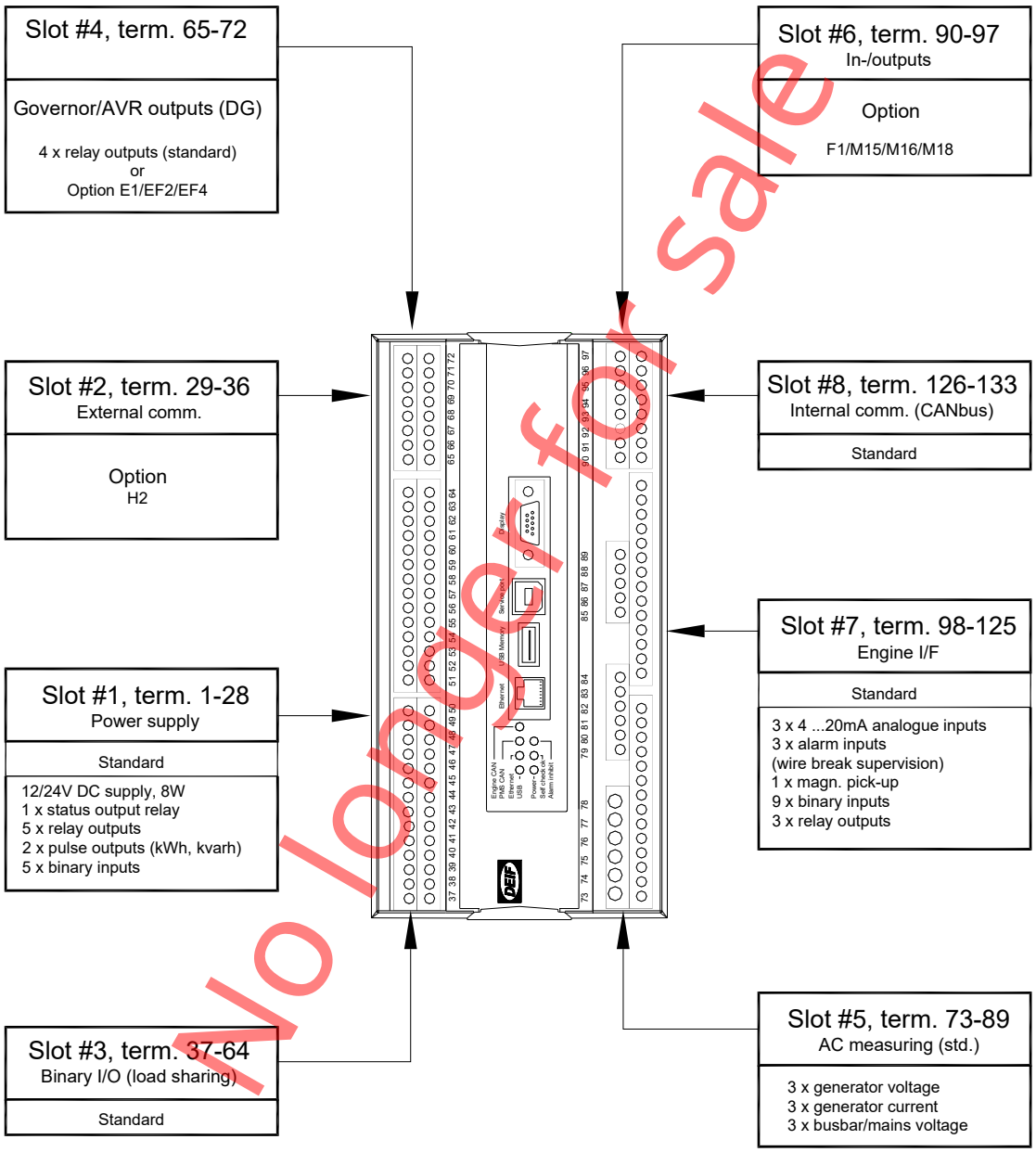
For detailed information about hardware options, please see hardware overview on page 6.

For detailed order information, please see order specifications on page 11.

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 Error! Bookmark not defined. **in this data sheet.**



Technical specifications

Accuracy: Class 1.0, to IEC/EN 60688

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

(UL/cUL Listed: Max. surrounding air temp.: 55°C/131°F)

Storage temp.: -40…70°C (-40...158°F)

Climate: 97% RH to IEC 60068-2-30

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

(UL/cUL Listed: 110-480V AC phase-phase)

Consumption: Max. 0.25VA/phase

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

(UL/cUL Listed: From CTs 1-5A)

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: 8-36V DC
Max. 11W consumption

The aux. supply inputs are to be protected by a 2A slow blow fuse

(UL/cUL Listed: AWG 24)

Binary inputs: Optocoupler, bi-directional
ON: 8…36V DC
Impedance: 4.7kΩ
OFF: <2V DC

Relay outputs: Electrical rating:
250V AC/30V DC, 5A
(UL/cUL Listed: 250V AC/24V DC, 2A resistive load)

Thermal rating @ 50°C
2A: Continuously
4A: t_{ON} = 5 sec., t_{OFF} = 15 sec.
(Unit status output: 1A)

Open collector outputs: Supply 8…36V DC, max. 10mA

Analogue inputs: -10…0…+10V DC
Not galvanically separated
Impedance: 100kΩ

(0)4…20mA
Impedance: 50Ω
Not galvanically separated

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
Impedance: 23.5kΩ

Analogue outputs: 0(4)...20mA and +/-25mA
Galvanically separated
Active output (internal supply)
Load max. 500Ω

(UL/cUL Listed: Max. 20mA output)

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

To UL 508 and CSA 22.2 no. 14-05, overvoltage category III, 300V, pollution degree 2

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

Between analogue outputs and other I/Os: 500V DC, 1 min.

Between binary input groups and other I/Os: 500V DC, 1 min.

EMC/CE: To EN 61000-6-1/2/3/4
IEC 60255-26
IEC 60533 power distr. zone
IACS UR E10 power distr. zone

Vibration: 3…13.2Hz: 2mmpp
13.2…100Hz: 0.7g
To IEC 60068-2-6 & IACS UR E10

10…60Hz: 0.15mmpp
60…150Hz: 1g
To IEC 60255-21-1 Response (class 2)

10…150Hz: 2g
To IEC 60255-21-1 Endurance (class 2)

Shock (base mount): 10g, 11msec, half sine
To IEC 60255-21-2 Response (class 2)

30g, 11msec, half sine
To IEC 60255-21-2 Endurance (class 2)

50g, 11msec, half sine
To IEC 60068-2-27

Bump: 20g, 16msec, half sine
To IEC 60255-21-2 (class 2)

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

Plug connections: AC current:
0.2-4.0 mm^2 stranded wire
(UL/cUL Listed: AWG 18)

AC voltage:
0.2-2.5 mm^2 stranded wire
(UL/cUL Listed: AWG 20)

Relays:
(UL/cUL Listed: AWG 22)

Other:
2.5 mm^2 multi-stranded
(UL/cUL Listed: AWG 24)

Display: 9-pole Sub-D female

PC: USB A-B

Ethernet: RJ45

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

UL and cUL

UL markings: Wiring:
Use 60/75°C copper conductors only

Mounting:
For use on a flat surface of type 1 enclosure

Installation:
To be installed in accordance with the NEC (US) or the CEC (Canada)

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

See interfacing guide at www.deif.com

Weight:

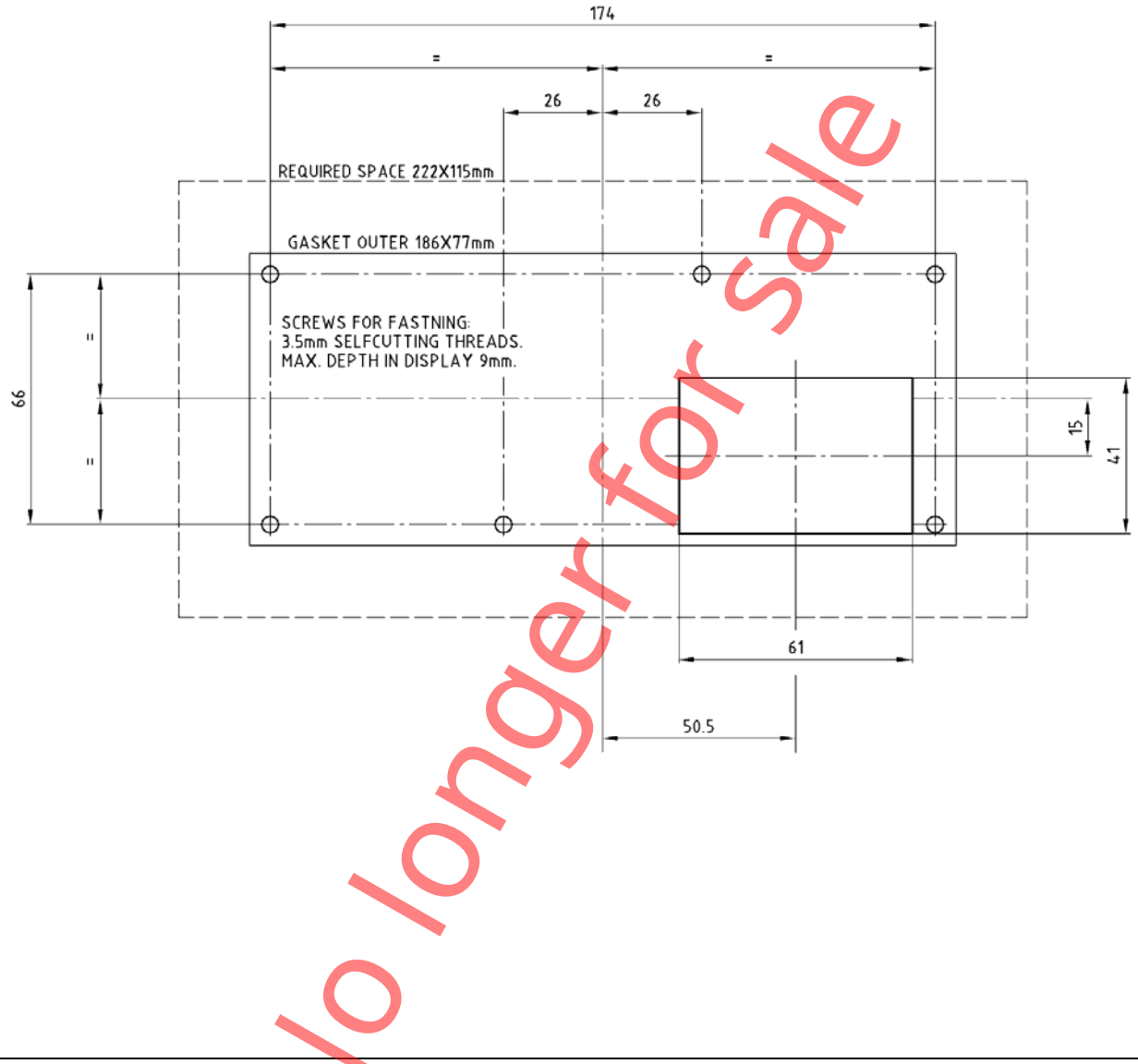
Main unit:	1.5 kg (3.40 lbs.)
J1, cable 3 m:	0.2 kg (0.45 lbs.)
Option J2:	0.4 kg (0.90 lbs.)
Option J7:	0.2 kg (0.45 lbs.)
Display:	0.4 kg (0.90 lbs.)

Protection: Unit: IP20
Display: IP52 (IP54 with gasket: Option L)

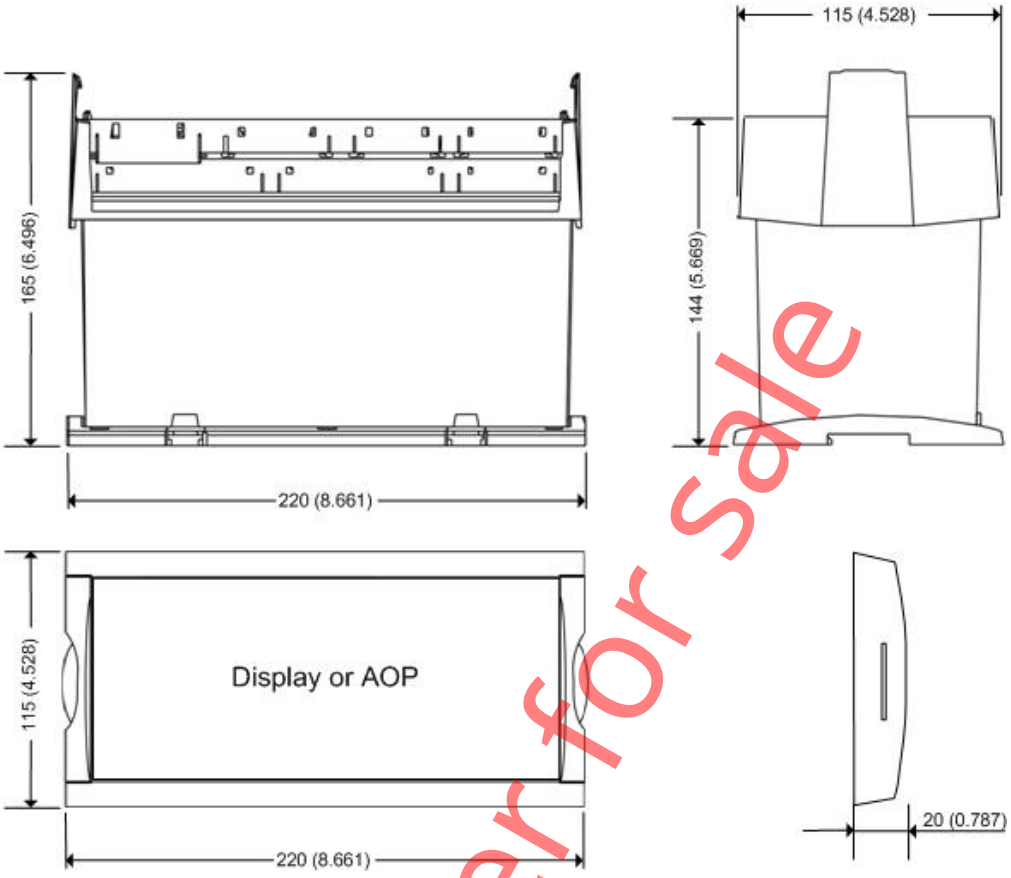
(UL/cUL Listed: Type Complete Device, Open Type)

To IEC 529 and EN 60529

Panel cutout (mm)

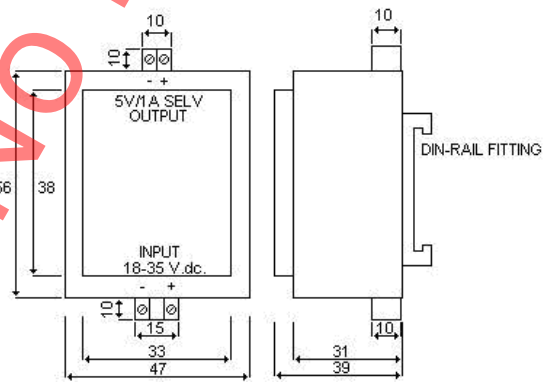


Unit dimensions in mm (inches)



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	2a (Shaft)	2b (Shore)	3
PMS system				

Number of DGs (2…8)	

Step 2: Unit option information

Option / Unit	D1 (X)	E1 (X)	F1 (X)	EF2 (X)	EF4 (X)	H2 (X)	J2 (X)	J4 (X)	J7 (X)	L (X)	M15 (X)	M16 (X)	M18 (X)	N5 (X)	X2 (0..2) @1	X4 (0..4) @2
DGM																
DG2																
DG3																
DG4																
DG5																
DG6																
DG7																
DG8																
TB																
SG																

@1: One display per PPM unit is already included as standard, enter only the number of additional displays here
@2: One AOP-2 is already included as standard, enter only the number of additional AOP-2s here

Option K1:

	UK
Documentation as hard copy (no. of sets)	

(Only one hard copy is included as standard).

For detailed information about options, please see option list on page 5.

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

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