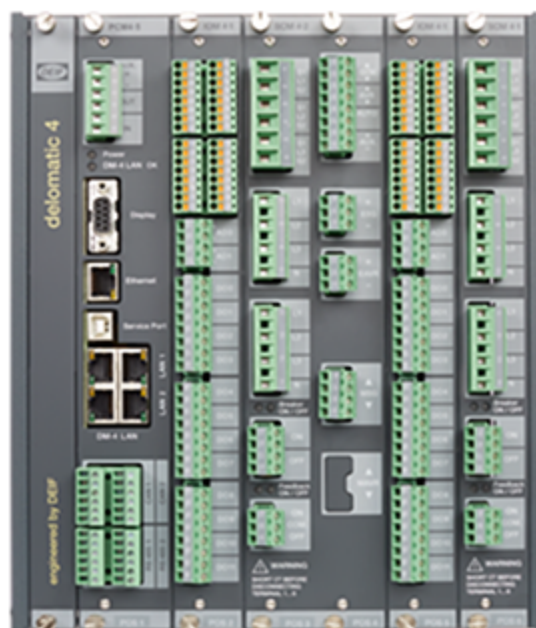




DATA SHEET

DM-4 Land Delomatic 4





-power in control

Delomatic 4, DM-4 Land DATA SHEET



Application

- Power Management control and protection of complex power systems including diesel, gas and turbine generators, as well as mains and tie breakers
- Highly flexible HW and SW – engineered to specification
- Each case handled as a unique project
- Access to our highly qualified know-how to obtain the optimal system solution
- Developed for high reliability and robustness including approvals from well known marine classification societies

Setup

- Modular I/Os (according to need)
- Combi-I/O module for standard-I/O (analogue I/O, digital I/O) (IOM)
- Multi-transducer included (SCM)
- Only 4 module types needed to set up a complex control system
- Double euro format (6HE) rack in 4 standard sizes of 24, 30, 42 and 60TE

Features

Local:

- Start/Stop engine
- Synchronising
- Speed control/active load share
- AVR control/reactive load share (CosPhi)
- Advanced generator protection
- Load shedding
- Mains breaker control and protection
- Tie breaker control and protection
- Programmable parameter, timer and alarms
- Log of 150 alarms
- Engine communication CAN J1939

General:

- Overall power management
- Overall mode handling
- Load-dependant start/stop
- Load group control
- Modbus RTU RS485 com (for external ctrl.)
- Free PC utility software (USB interface to PC)



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Data sheet

Application

The Delomatic 4 Land controller (DM-4 Land) is the basic unit in a highly flexible power management system. It covers the special demands of power production plants regarding reliability, robustness, flexibility, and remote accessibility in an optimal way.

Based on an existing generator control system approved for marine applications and used in thousands of ships and land-based power stations over the last 25 years, DM-4 Land matches the special demands of harsh environments and far-away-locations faced in the off-shore and land-based decentralised power generation.

The range where the DM-4 Land will fit your demand is wide, but among others can be mentioned:

- Power stations (Island, peak shaving, fixed mode)
- Advanced AMF solutions for hospitals and other critical supply
- Combined use of diesel and turbine gen-sets placed on different busbars and different voltage levels – this could be the oil and gas sector.

In many projects, a combination of many different modes are included in the same system.

General design

The system has been designed to carry out *generator control*, *supervision* and *protection* functions of up to 15 generators integrated in one system. Furthermore, the DM-4 Land is able to control tie breakers, mains breakers etc.

The system performs a wide range of PM features, such as load-dependent start/stop, programmable start priority, load group control, load shedding, control/supervision of bus couplers and tie/mains breakers.

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

In addition to the display unit, an additional operator panel (AOP) with 8 push-buttons and 16 LEDs can be added. AOP-1 is delivered as standard for the master DGU but is not limited to the master DGU only. AOP-1 is connected to the display unit with a 0.5 m cable. Using a CANbus connection, an extra AOP (AOP-2) can be connected (max. 500 m from DU). Up to 5 AOPs can be connected to the CANbus line. The AOP delivers status information from the system and includes plant mode control.

Internal communication between DGUs for system calculations, load sharing etc. is performed through ARC net. The total length of the ARC net (without repeaters) depends on the number of DGUs (nodes).

DM-4 Land

Communication to an external alarm and monitoring system can be performed via RS485 Modbus RTU or by CANopen.

DEIF Generator Unit (DGU)

DM-4 Land's HW modules are placed in the DGU rack. 4 different rack sizes are available, depending on the need for IOs and synchronising modules (please refer to the illustrations at the end of the data sheet).

System HW modules

As a quite unique feature, the entire DM-4 Land system is composed of only 4 print modules. All application solutions are based on these 4 modules:

PCM 4-1 (8TE):

Carries the rack system power supply, system main CPU and I/O router in distributed configurations and various external interfaces (3 x CAN, 1 x RS485, ARC net, USB service port).

IOM 4-1 (6 TE):

Universal I/O module for:
16 input channels (selectable as binary or analogue by a jumper)
12 relay outputs
2 analogue outputs (0(4)...20mA)

SCM 4-1 (6 TE):

Multi-transducer for a high precision 3-phase electrical measurement (class 0.5)
Integrated synchroniser/breaker control

SCM 4-2 (12 TE):

Multi-transducer for a high precision 3-phase electrical measurement (class 0.5)
Integrated synchroniser/breaker control
Controller board for GOV and AVR (binary or analogue)

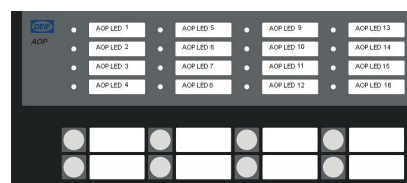
Display possibilities

The display is separate and can be mounted in the switchboard via the display cable. Up to three displays can be connected to each DGU, enabling the user interface to be placed at different locations.

Display Unit (DU)



Additional Operator Panel (AOP)



Power Management

In principle, all DGUs in the system have the same SW. By the node switch on the PCM-4.1, the individual DGUs are able to identify relevant parts of the SW. Therefore, the DM-4 Land is able to function as a distributed Power Management System in which each DGU can perform individual functions.

With this setup, the individual HW modules can be used as spare parts for other DGUs, and hereby it is possible to keep the essential units running in emergency situations.

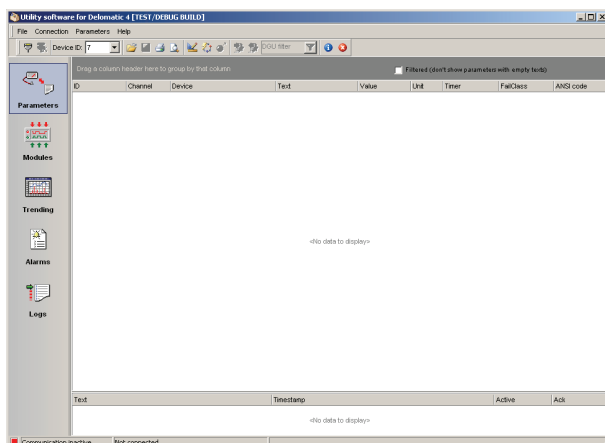
This system's flexibility is also illustrated in the possibility to control up to 4 synchronising modules from each DGU. As an example, this means that one DGU can control 1 GB, 2 TB's and 1 MB, if a very compact solution is requested.

Please note that max. 1 GB is controlled from each DGU. This is due SW design and because we recommend only one GB in each SWBD section (as well as due to class requirements).

Utility Software, USW

USW-supported functions (free at www.deif.com):

- USB direct access to PCM
- Download of software
- Parameter setup
- Monitoring of all modules in the DGU
- Alarm monitoring
- Clock synchronisation
- Trending
- Installation done with a setup wizard



Protection functions

All protection functions have definite time characteristics.

Generator protection

Supervision of generator voltage and frequency
Overcurrent, I> (four-step protection)
Overload, P> (two-step protection, one step supervision)
Reverse power, -P> (two-step protection)
Overload reactive, Q> (two-step protection)
Reverse reactive power, -Q> (two-step protection)

Busbar protection and supervision

- Over- and undervoltage
- Over- and underfrequency

Tie/Mains Breaker protection and supervision

This can be included similarly as above (depending on current inputs to the SCM-module).



Special tailor-made protection functions may be available on request.

Governor and AVR control

The governor control ensures:

- Frequency control
- Active load sharing (symmetric or asymmetric)
- Fixed power, peak shaving

The AVR control ensures:

- Voltage control
- Reactive load sharing
- CosPhi control/TanPhi control

Customised Functions

The flexible IO platform in combination with the integration of all electrical values gives a unique possibility to develop "customised functions".

Examples could be:

- Advanced load shedding algorithms
- Fuel-optimised load sharing
- Advanced customised AMF sequences

Order information

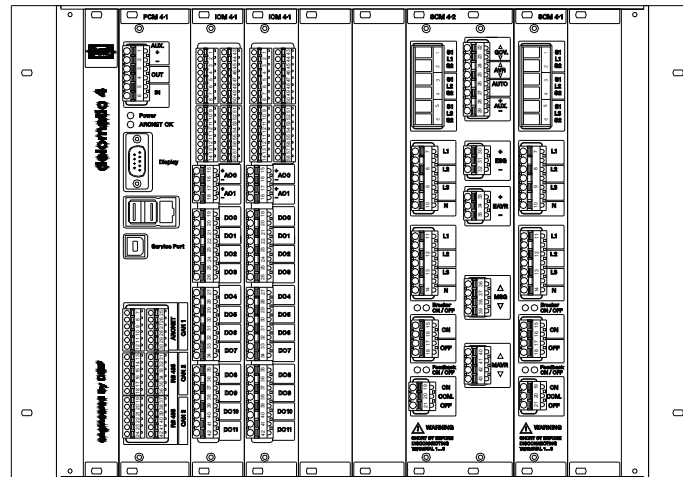
Because of the widespread flexibility of DM-4 Land, DEIF must be contacted directly to order this system. In this way, we will make sure that our customers gain full advantage of DM-4 Land's flexibility.

Our project managers will typically request a single line diagram of the generators and breakers to be controlled and a short description of control philosophy in order to customise the solution perfectly.

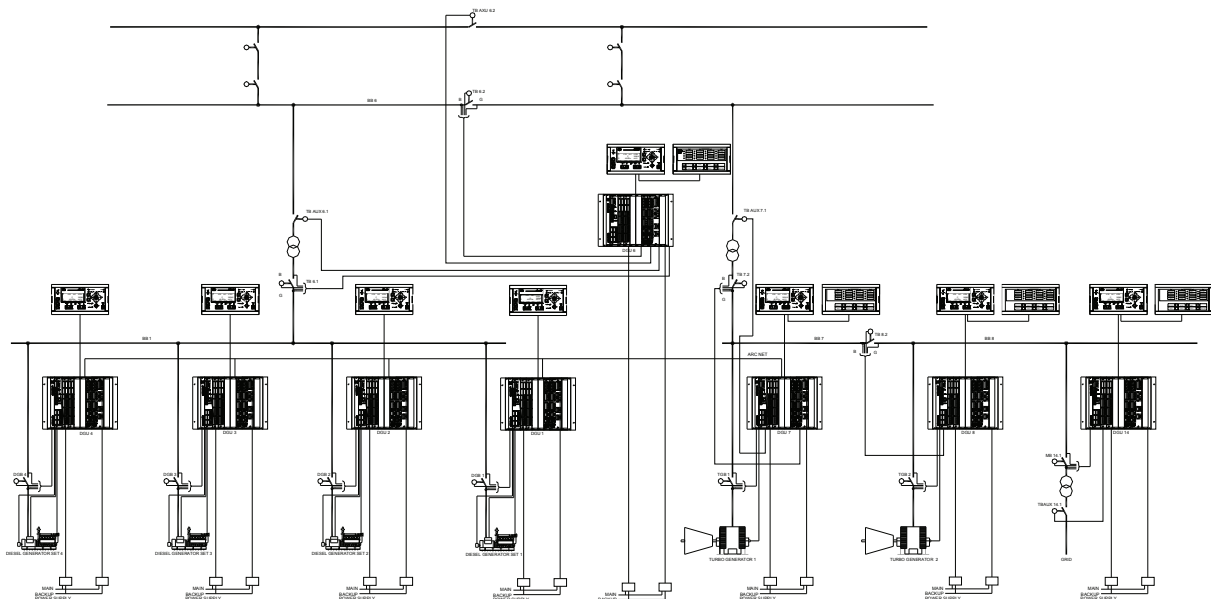
Based on the given information, DEIF will make a quotation for your engineered-to-fit control system.

Application illustrations

All applications are based on individually configured DGUs. This means that the actual HW modules can easily differ between each of the DGUs. Below, a typical DGU configuration is illustrated together with an application example.



60TE DGU rack.



Example from a project containing control of diesel gen-sets, turbine gen-sets, tie breakers and a mains connection. All can be controlled as a common plant, either from the local displays and AOPs, or from a Pro Face/external SCADA solution.

Technical specifications
DGU rack system

Operating temp.:	-25...70°C (-13...158°F)
Vibration class:	DNV A+C 3 mm: 3.0... 13.2Hz, 2.1g: 13.2...50Hz, 0.7g: 50.0...100Hz
Protection class:	IP 20
Climate:	Class E according to DIN 40040
Mounting:	Base mounting
EMC/CE:	To EN 61000-6-1/2/3/4, SS4631503 (PL4)
Material:	Plastic headers according to UL94-V0, Al housing, steel front plates
Connectors:	Self-secure spring cage 6/8/20 Arms Screw terminals 20 Arms
Weight:	Depends on configuration Min.: 3.2 kg Max.: 8.3 kg

PCM module (4.1)

Aux. supply:	24V DC (-25%, +30%) Max. 6A
CAN:	3 independent bus lines 125...250 kbit/sec Terminals for route-through of bus lines
RS485:	1 interface up to 56kbps, RS485 2 or 4 wire Multi-drop or point to point
Safety:	To EN 61010-1 Overvoltage category III 600V AC Pollution degree 2

SCM module

Safety:	To EN 61010-1 Overvoltage category III 600V AC Pollution degree 2
Meas. range (Un):	100...690Vrms direct (phase-phase) Other range with voltage transformer Burden max. 0.5A per phase Overload max. 2*Un for 10s External fuse max. 2A slow-blow
Meas range (In):	Current transformer .../1 Arms or .../5 Arms Burden max. 0.4VA per phase Overload 10 Aeff con- tinuously <75A for 10s < 300A for 1s
Galvanic separation:	2.5kV isolation between voltage measurement inputs and all other potentials
Frequency of grid:	30...70Hz
Accuracy:	Class 0.5 according to IEC 688
Harmonics:	Up to 500Hz are measured

IOM module16 input channels

The IOM 4-1 contains 16 input channels which may be individually configured as a current input (0...20mA), a voltage input (0...10V) or as a binary input (CC/OC). Live zero (offset) of the analogue inputs (e.g. 2...10V or 4...20mA) are available through the application programme. The input channel configuration (analogue/binary) must correspond to the input definitions in the application programme (in the PCM).

The status on the binary input is detected by an active voltage level detector circuit in the IOM 4-1, which may be connected to a potential free contact only.

All "COM" terminals are in all three configurations connected to the internal ground. Cable supervision is optional for channels configured as binary input.

Measurement:

Accuracy: Class 1 (to IEC 688)

Resolution: 10bit (0.1% of full scale)

Impedance: mA - input: 50Ω
V - input: 15kΩ

Binary input:

Max. resistance for
ON detection: 100Ω

Resistance for
cable supervision: 270Ω +/-10%

12 relay output channels

The IOM 4-1 contains 12 relay outputs with programmable active position. The active position may be a Closed Contact (CC) or an Open Contact (OC), dependent on the output channel setup in the application programme (in the PCM). The relay position is a Closed Contact with an energised coil.

All relay outputs are potential free contacts and each output is galvanically insulated from the Delomatic system.

If a power supply or system failure appears, all relay outputs are set to an Open Contact position (OC).

Contact ratings: Max. 250V AC/24V DC, 8A

2 analogue output channels

The IOM 4-1 contains 2 analogue outputs (0...20mA), both galvanically separated. Live zero (offset) of the analogue outputs (e.g. 4...20mA) are available through the application programme (in the PCM).

If a power supply or system failure appears, both analogue output channels are set to zero output (0mA).

Output: 0 .. 20mA

Load: Max. 500Ω

Accuracy: Class 0.5 (to IEC 688)

Resolution: 10bit (0.1% of full scale)

Galvanic separation:

Between analogue outputs and other circuits:

500V AC - 50Hz - 1 min.

Between two analogue outputs:

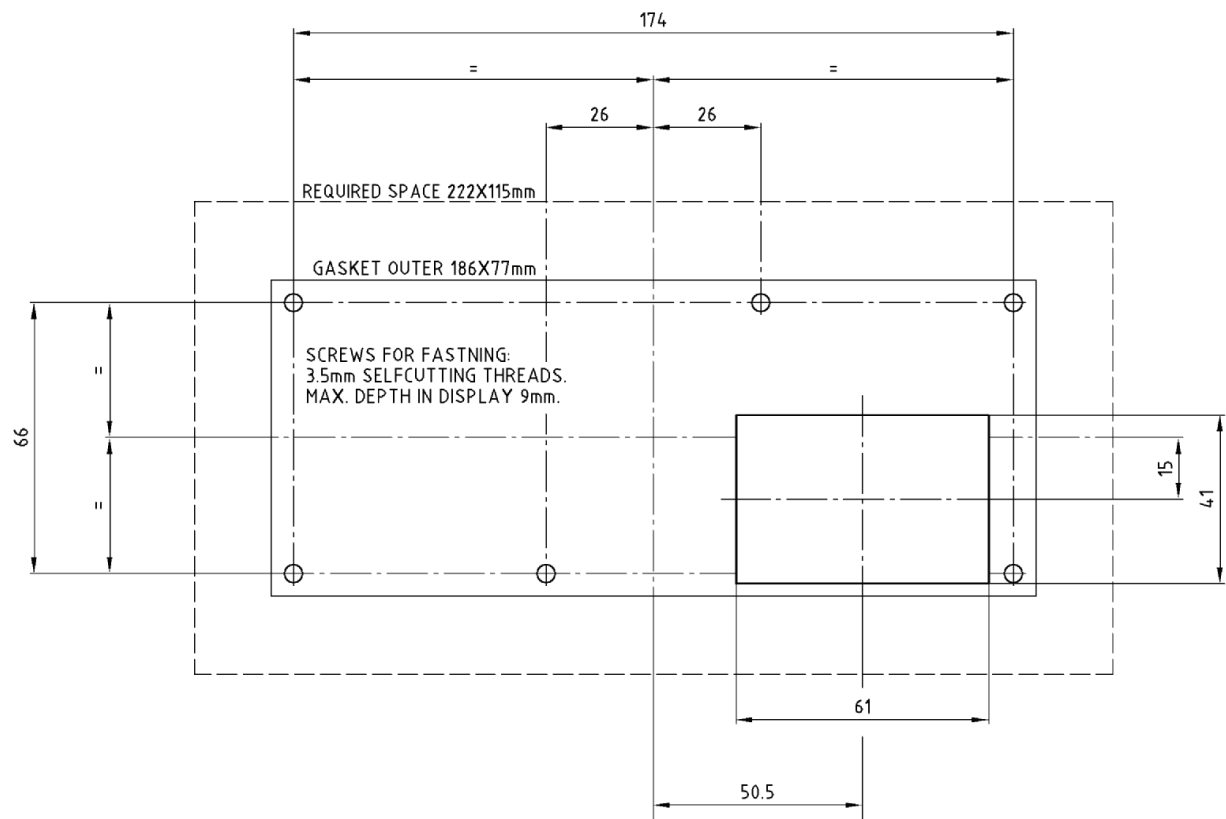
500V AC - 50Hz - 1 min.

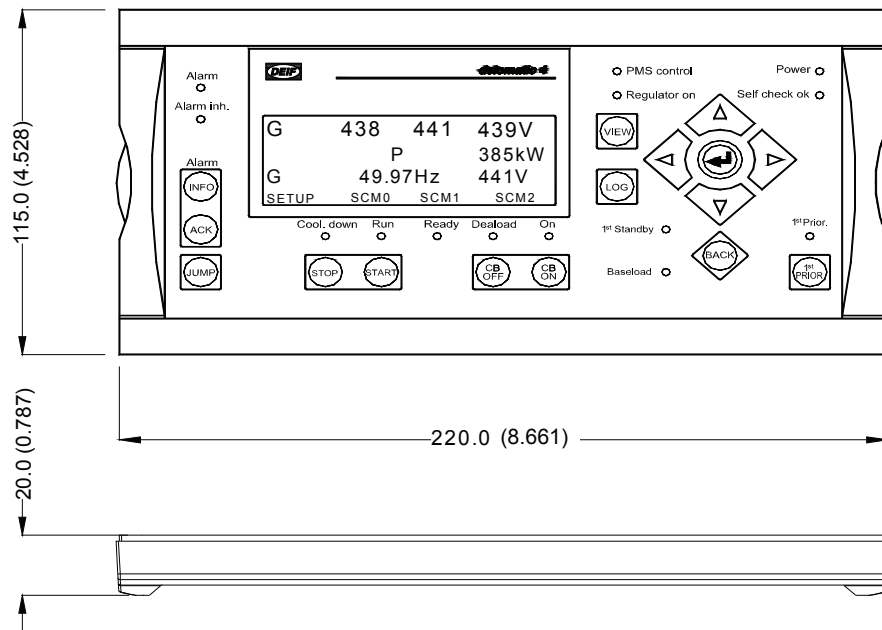
Between analogue outputs and earth (chassis):

500V AC - 50Hz - 1 min.

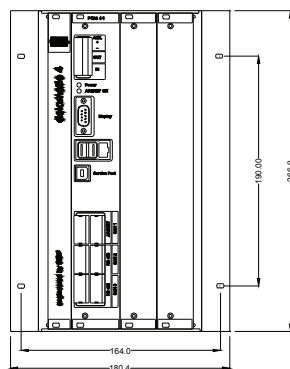
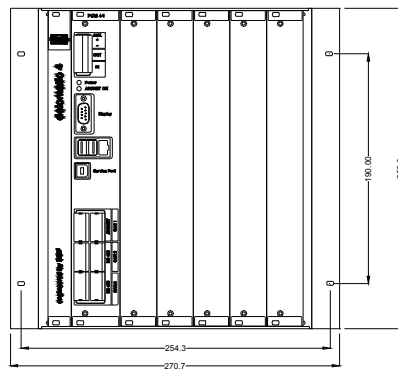
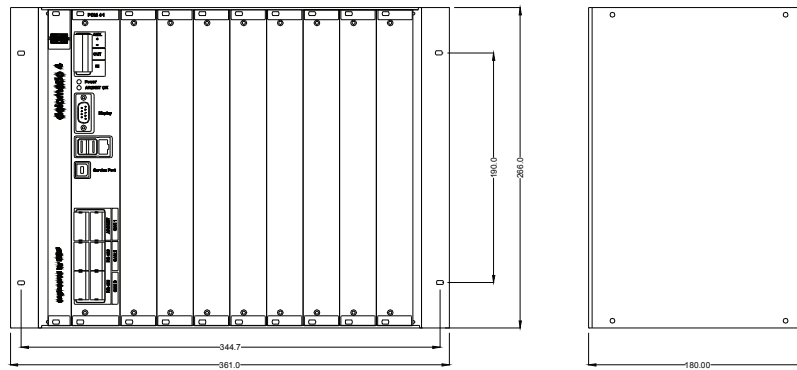
Safety: To EN 61010-1
Overvoltage category III
600V AC
Pollution degree 2

Panel cutout for display unit and AOP (mm)



Unit dimensions of display unit and AOP in mm (inches)

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

Unit dimensions of rack system in mm (inches)

Errors and technical changes reserved.



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