

1. iE 150 PMS lite

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1. iE 150 PMS lite

1.1 About the controller

About

PMS lite operation

The PMS lite controllers are for off-grid plants with up to 254 generators and/or bus tie breakers. PMS lite operation is only for generators - no other power sources are possible. Each PMS lite controller protects and controls a genset, and the genset breaker. Each bus tie breaker is controlled by a bus tie breaker controller. The operator can easily configure the plant from the display, without needing to use a PC with utility software. When the plant is running, the operator can see the total available and consumed power on each display, along with an overview of the operating information for all the generators in the plant.

The power management system makes sure that generators are started or stopped according to the load and priority. The controllers make sure that the generators share the load equally. The plant set up is quick because the controllers use the CAN bus connections to automatically detect each other and assign IDs.

Single controller operation

Alternatively, for maximum flexibility, the PMS lite controller can be used as a single controller. The controller can protect and control a genset, a genset breaker, and a mains breaker in single-controller applications.

General

The controller is a compact, all-in-one controller. Each controller contains all necessary 3-phase measuring circuits.

Values and alarms are shown on the LCD display screen, which is sunlight-readable. Operators can easily control the plant, gensets, and breakers from the display units. Alternatively, use the communication options to connect to a PLC. The PLC can then control the plant.

PMS lite overview page

The PMS lite overview shows an overview of the operating information for all the generators. The operator can also see the total available power and the consumer power. Use the *left arrow*  and *right arrow*  buttons on the controller to change between the Power (kW) page and the Reactive power (kvar) page.

Service View > PMS lite overview

ISLAND

AUTO

P Consumed

300 kW

P Plant

2880 kW

P Available

1440 kW

ID	PRI0	GB	%P	P LOAD	MODE	STATUS	MS
1	1	ON	20	100 kW	AUTO	ACTIVE	OFF
2	2	ON	20	100 kW	AUTO	ACTIVE	OFF
3	3	ON	20	100 kW	AUTO	ACTIVE	OFF
4	4	OFF	0	0 kW	AUTO	READY	OFF

➡

⬅

ISLAND

AUTO

P Consumed

300 kW

P Plant

2880 kW

P Available

1440 kW

ID	PRI0	GB	%P	Q LOAD	MODE	STATUS	MS
1	1	ON	1	6 kvar	AUTO	ACTIVE	OFF
2	2	ON	1	6 kvar	AUTO	ACTIVE	OFF
3	3	ON	1	6 kvar	AUTO	ACTIVE	OFF
4	4	OFF	0	0 kvar	AUTO	READY	OFF

NOTE MS is the multi-start function. OFF means the function is not enabled and ON means the function is enabled.

1.1.1 Software versions

The information in this document relates to software version:

Software	Details	Version
iE 150	Controller application	1.38.0

The controller comes with the **Sync** software package.

1.1.2 Emulation

The controller includes an emulation tool to verify and test the functionality of the application, for example breaker handling and generator operation.

Application emulation is useful for training, customising plant requirements, and for testing basic functionality that needs to be set up or verified.

1.1.3 Easy configuration with or without the utility software

You can easily set up an application without the utility software.

You can also use the utility software to quickly configure the inputs, outputs, parameters, and settings.

1.2 Power management applications (multiple gensets)

1.2.1 Suitable controllers

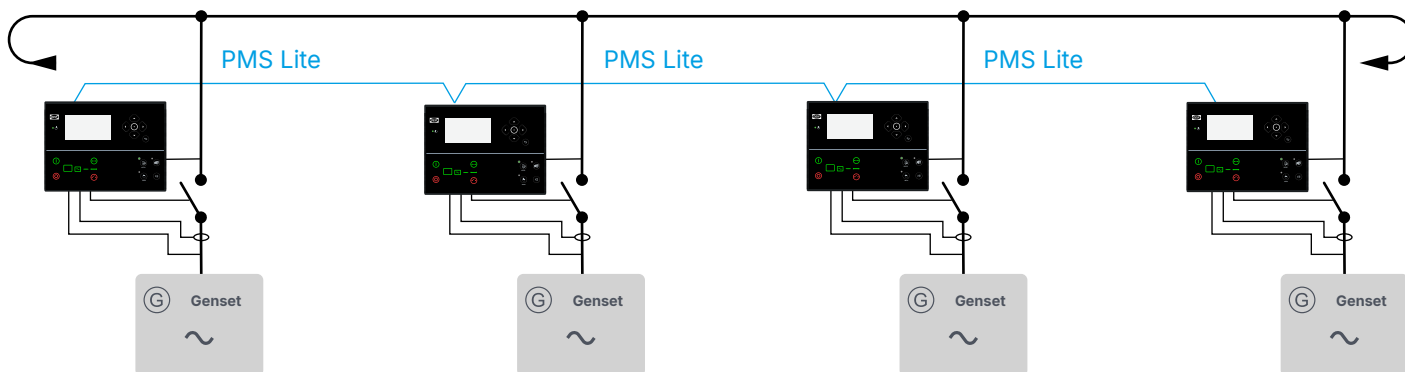
PMS lite controllers can only be used with other PMS lite controllers. PMS lite controllers includes both iE 150 and AGC 150 PMS lite controllers, as well as iE 150 and AGC 150 Generator controllers configured for PMS lite. AGC-4 Mk II Genset controllers can also be configured for PMS lite.

The PMS lite controllers can be used with the standard BTB controllers. However, they cannot be used with the other power management system controllers. To control gensets in a standard power management system, use iE 150 Generator or AGC 150 Generator controllers.

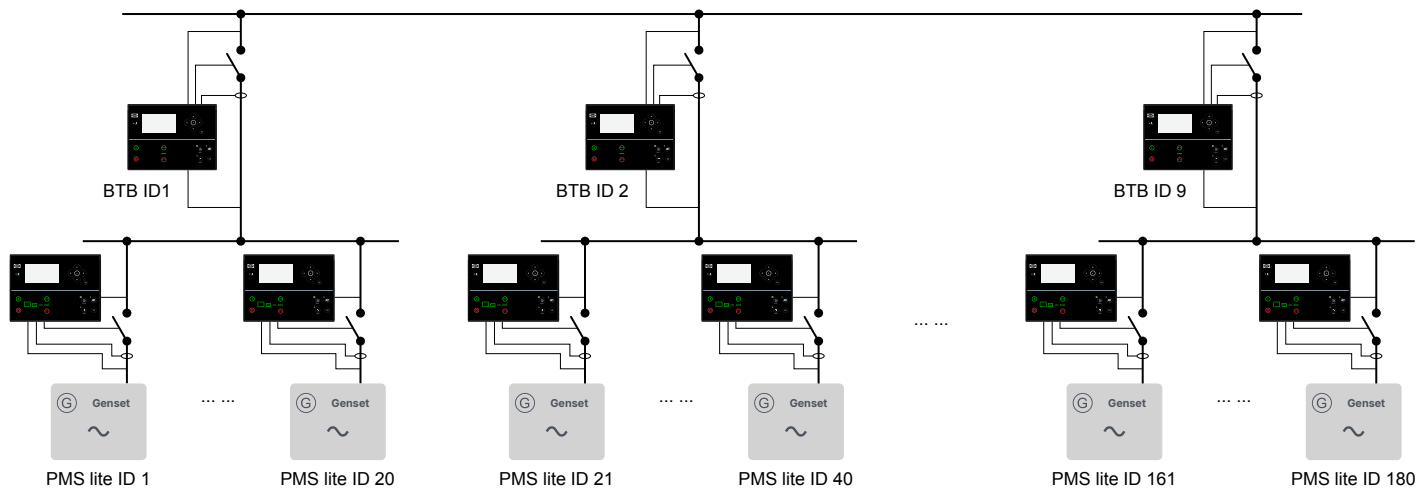
NOTE For up to 254 gensets and/or bus tie breakers, all controllers must have software version 1.34 or later. For older software (versions 1.16 to 1.33), the limit is 127 gensets. For older software, bus tie breakers are not possible. Older software is not compatible with software version 1.34 or later.

1.2.2 Single-line drawings

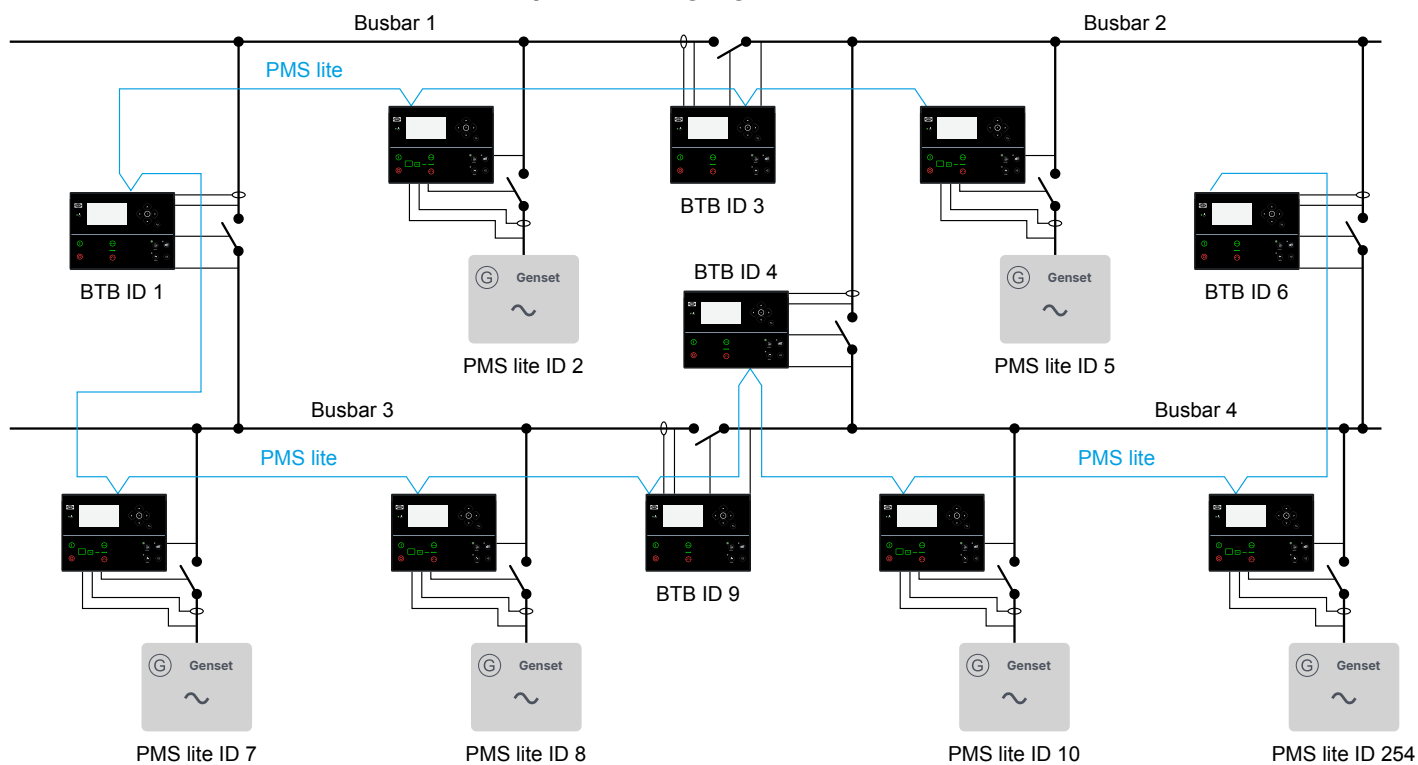
PMS lite, with gensets only



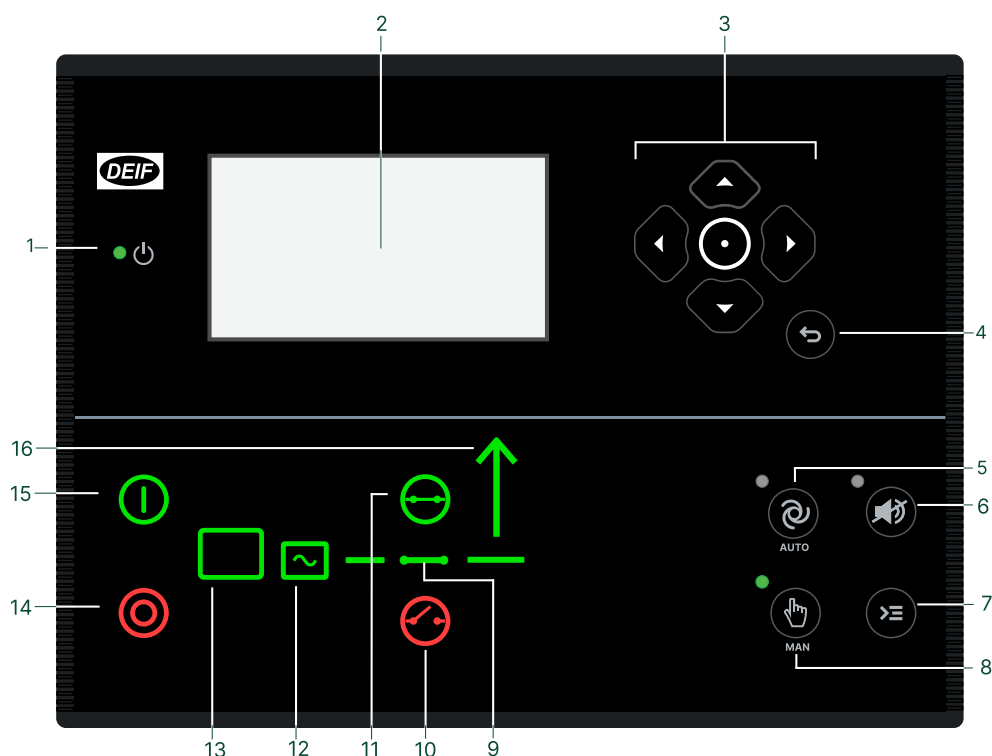
PMS lite, with genset groups



PMS lite, with interlinked busbars, and up to 254 single gensets and/or bus tie breakers



1.2.3 Display layout



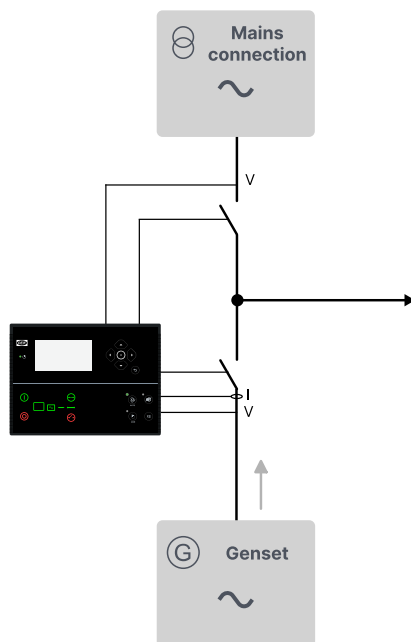
No.	Name	Function
1	Power	Green: The controller power is ON. OFF: The controller power is OFF.
2	Display screen	Resolution: 240 x 128 px. Viewing area: 88.50 x 51.40 mm. Six lines, each with 25 characters.
3	Navigation	Move the selector up, down, left, and right on the screen.
	 Enter button	Go to the Menu system. Confirm the selection on the screen.
4	 Back button	Go to the previous page.
5	 AUTO mode	Use to switch to AUTO mode. The controller automatically starts and stops (and connects and disconnects) gensets. No operator actions are needed. The controllers use the power management configuration to automatically select the power management action.
6	 Silence horn	Stops an alarm horn (if configured) and enters the Alarm menu.
7	 Shortcut menu	Access the Jump menu, Mode selection, Test, and Lamp test.
8	 MANUAL mode	Use to switch to MANUAL mode. The operator or an external signal can start, stop, connect or disconnect the genset. The generator controller cannot automatically start, stop, connect or disconnect the genset. The controller automatically synchronises before closing a breaker, and automatically deloads before opening a breaker.
9	Breaker symbols	Green: Breaker is closed. Green flashing: Synchronising or deloading. Red: Breaker failure.
10	 Open breaker	Push to open the breaker.

No.	Name	Function
11	 Close breaker	Push to close the breaker.
12	Generator	Green: Generator voltage and frequency are OK. The controller can synchronise and close the breaker. Green flashing: The generator voltage and frequency are OK, but the V&Hz OK timer is still running. The controller cannot close the breaker. Red: Generator voltage and/or frequency are not OK
13	Engine	Green: There is running feedback. Green flashing: The engine is getting ready. Red: The engine is not running, or there is no running feedback.
14	 Stop	Stops the genset if MANUAL mode is selected.
15	 Start	Starts the genset if MANUAL mode is selected.
16	Load symbol	OFF: Power management application. Green: The supply voltage and frequency are OK. Red: Supply voltage/frequency failure.

1.3 Single-controller applications

1.3.1 Single-line drawings

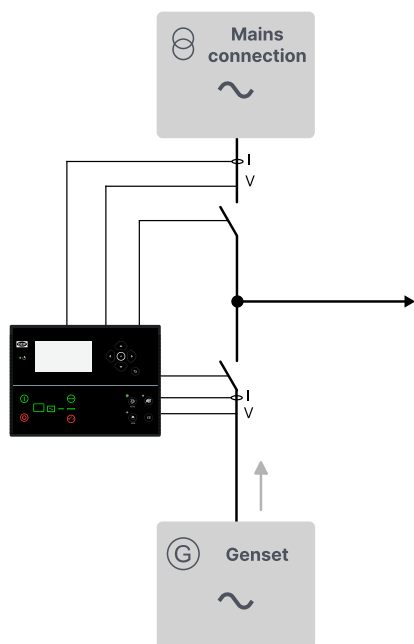
Automatic mains failure (AMF) and fixed power



Automatic Mains Failure (AMF): If there is a significant loss of mains power or a total blackout, the controller automatically changes the supply to the emergency generator. This makes sure that there is power during a mains failure and prevents damage to electrical equipment.

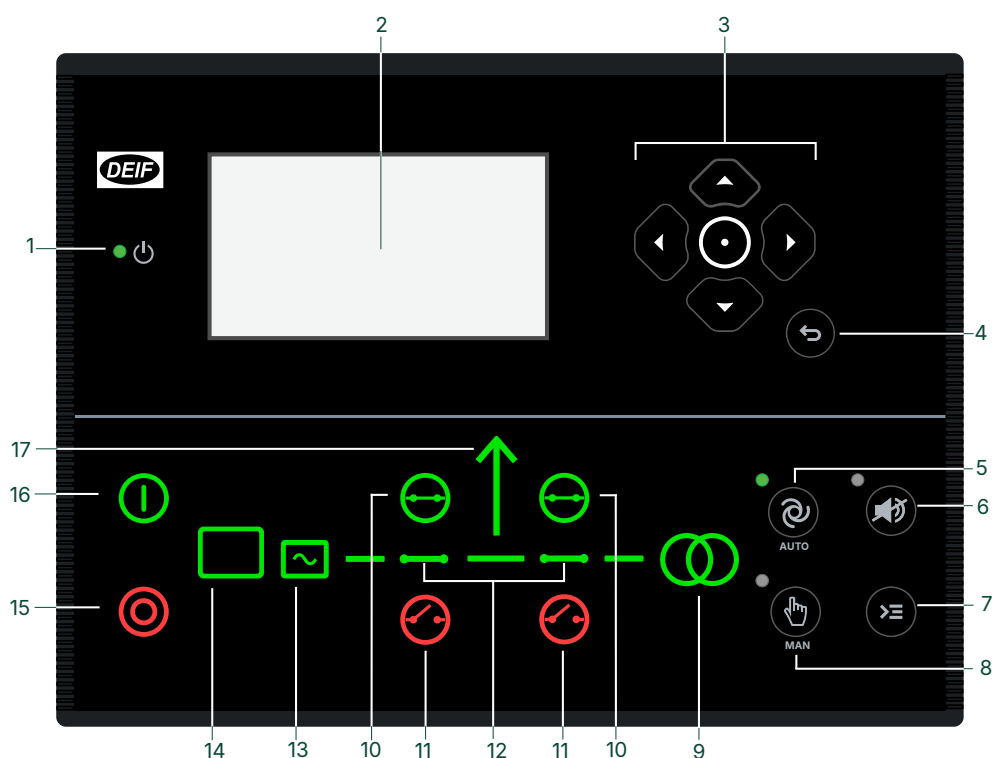
Fixed power: When given a signal, the controller automatically starts the genset and synchronises to the mains. After the generator breaker closes, the controller ramps up the load to the set point level. When the stop command is given, the genset is de-loaded and stopped after the cooling down period.

Peak shaving, load take-over, and mains power export



- **Peak shaving:** Power plant where the generator supplies the peak load demand and runs parallel to mains.
- **Load take-over:** Plant mode where the load is moved from mains to generator, for example, during peak demand periods or periods with a risk of power outages.
- **Mains power export:** Power plant with fixed kW set point (excluding increasing load).

1.3.2 Display layout



No.	Name	Function
1	Power	Green: The controller power is ON. OFF: The controller power is OFF.
2	Display screen	Resolution: 240 x 128 px. Viewing area: 88.50 x 51.40 mm. Six lines, each with 25 characters.
3	Navigation	Move the selector up, down, left, and right on the screen.
	 Enter button	Go to the Menu system.

No.	Name	Function
		Confirm the selection on the screen.
4	 Back button	Go to the previous page.
5	 AUTO mode	Use to switch to AUTO mode. The controller automatically starts and stops (and connects and disconnects) the genset. No operator actions are needed. The controller also automatically opens and closes the mains breaker (open transitions, since there is no synchronisation).
6	 Silence horn	Stops an alarm horn (if configured) and enters the Alarm menu.
7	 Shortcut menu	Access the Jump menu, Mode selection, Test, and Lamp test
8	 MANUAL mode	Use to switch to MANUAL mode. The controller cannot automatically start, stop, connect or disconnect the genset, or open and close the mains breaker. The operator or an external signal can start, stop, connect or disconnect the genset, or open or close the mains breaker.
9	Mains symbol	Green: Mains voltage and frequency are OK. The controller can close the breaker. Red: Mains voltage and/or frequency are not OK.
10	 Close breaker	Push to close the breaker.
11	 Open breaker	Push to open the breaker.
12	Breaker symbols	Green: Breaker is closed. Red: Breaker failure.
13	Generator	Green: Generator voltage and frequency are OK. The controller can close the breaker. Green flashing: The generator voltage and frequency are OK, but the V&Hz OK timer is still running. The controller cannot close the breaker. Red: Generator voltage and/or frequency are not OK.
14	Engine	Green: There is running feedback. Green flashing: The engine is getting ready. Red: The engine is not running, or there is no running feedback.
15	 Stop	Stops the genset if MANUAL mode is selected.
16	 Start	Starts the genset if MANUAL mode is selected.
17	Load symbol	Green: The supply voltage and frequency are OK. Red: Supply voltage/frequency failure.

1.4 Functions and features

1.4.1 PMS lite controller functions

Power management system functions

Plant
Each display shows operating information for all the generators
Each display shows the total plant load and available power
Automatic detection and ID assignment
The operator can use the display to manually assign IDs
PMS settings

Plant

- Different settings in each controller supported
- Supports sharing the PMS lite configuration between controllers

Configurable baud rate for PMS lite communication (125/250 kbps)

PMS lite load sharing

- Equal load sharing for active (P) and reactive (Q) power

Select number of generators to run

Select start all (generators)

Start timer (suspends LDSS)

Busbar section management

Generator priority

Assigned automatically

Assigned manually (multiple controllers can have the same priority)

Based on running hours

Load-dependent start and stop (LDSS)

Automatically start the next generator for high load

Automatically stop the next generator for low load

Manual start and stop available

Select the minimum number of running generators

PLC start-stop

- Disable load-dependent start and stop
- PLC controls start and stop using digital inputs, Modbus and/or M-Logic

Genset functions

Synchronising functions

Dynamic synchronisation

Continuous parallel operation

Short-time parallel

Generator functions

Built-in analogue AVR control

External analogue AVR control via IOM 230

Digital AVR control: Remote configuration, DVC - DEIF

Communication with KWG ISO5 isolation monitor (CAN bus)

Engine functions

Start and stop functions

Engine start and stop sequences

Temperature-dependent cooling down

Time-based cooling down

Configurable crank and run coil

Regulation functions

Governor regulation using:

- Engine communication
- Built-in analogue control
- External analogue control using IOM 230
- Relays

Manual speed control using:

- Digital inputs
- Display screen menu (by the operator)
- Analogue input
- Modbus
- Configured set point

Speed sensing using CAN, MPU or frequency

Power ramp up and down

Engine protections	Alarms	ANSI	Operate time
Overspeed	2	12	<400 ms
Crank failure	1	48	
Running feedback error	1	34	
MPU wire break	1	-	
Start failure	1	48	
Stop failure	1	-	
Stop coil, wire break alarm	1	-	
Engine heater	1	26	
Max. ventilation/radiator fan	1	-	
Fuel fill check	1	-	
Maintenance alarms	Multiple		

Other engine functions

Fuel usage monitoring

Fuel pump monitoring, logic, and refill

Diesel exhaust fluid monitoring, logic, and refill

Generic fluid monitoring, logic, and refill

Single controller functions

Operation modes

Automatic mains failure (AMF)

Fixed power

Peak shaving

Load take-over

Mains power export (MPE)

1.4.2 General functions

AC functions	Sync
Sets of nominal settings	6
Select the AC configuration: 3-phase/3-wire 3-phase/4-wire 2-phase/3-wire (L1/L2/N or L1/L3/N) 1-phase/2-wire L1	●
100 to 690 V AC (selectable)	●
CT -/1 or -/5 (selectable)	●
4th current measurement (select one) - Neutral current (1 × true RMS) - Ground current (with 3rd harmonic filter) - Single controller: Mains current (and power)	●

General functions	Sync
Emulation	●
Test sequences - Simple test - Load test - Full test	●
PLC logic (M-Logic)	20 lines
Counters, including: - Genset starts, start attempts, and maintenance - Breaker operations - kWh meter (day, week, month, total) - kvarh meter (day, week, month, total)	●
Command schedulers	●

Setting and parameter functions	Sync
User-defined permission level	●
Password-protected setup	●
Trending with the USW	●
Event logs with password, up to 500 entries	●

Display and language functions	Sync
Supports multiple languages (including Chinese and other languages with special characters)	●
20 configurable graphical screens	●
Graphical display with six lines	●
Parameters can be changed on the display unit	●
3 engine function shortcuts	●
20 configurable shortcut buttons	●
5 configurable display screen "LED lamps" (on/off/blink)	●

Modbus functions	Sync
Modbus RS-485	●
Modbus TCP/IP	●
Configurable Modbus area	●

1.4.3 Supported ECUs and engines

The controller can communicate with the following ECUs and engines.

Manufacturer	ECUs	Engines	Tier 4/Stage V	Controller setting Engine I/F [7561]
Generic J1939	Any ECU that uses J1939	Any engine that uses J1939	●	Generic J1939
ANGLE	-	-	-	ANGLE
Baudouin	CPCB IV	-	-	Baudouin CPCB IV
Baudouin	WOODWARD PG+	-	-	Baudouin Gas
Baudouin	Wise 10B	-	-	Baudouin Wise10B
Baudouin	Wise 15	-	●	Baudouin Wise15
Bosch	EDC17	-	-	Bosch EDC17CV54TMTL
Caterpillar	ADEM3	C4.4, C6.6, C9, C15, C18, C32, 3500, 3600	-	Caterpillar ADEM3
Caterpillar	ADEM4	C4.4, C6.6, C9, C15, C18, C32, 3500, 3600	-	Caterpillar ADEM4
Caterpillar	ADEM5	-	-	Caterpillar ADEM5
Caterpillar	ADEM6	-	-	Caterpillar ADEM6
Caterpillar	ADEM3, ADEM4	C4.4, C6.6, C9, C15, C18, C32, 3500, 3600	-	Caterpillar Generic*
Caterpillar	-	-	-	Caterpillar with C7.1 AT
Cummins	CM 500	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	-	Cummins CM500
Cummins	CM 558	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	-	Cummins CM558
Cummins	CM 570	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	-	Cummins CM570
Cummins	CM 570 Industrial	-	●	Cummins CM570 Industrial
Cummins	CM 850	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	-	Cummins CM850
Cummins	CM 2150	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	●	Cummins CM2150
Cummins	CM 2250	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	●	Cummins CM2250
Cummins	CM 2350	-	●	Cummins CM2350
Cummins	CM 2350 Industrial	-	●	Cummins CM2350 Industrial
Cummins	CM 2358	-	●	Cummins CM2358

Manufacturer	ECUs	Engines	Tier 4/Stage V	Controller setting Engine I/F [7561]
Cummins	CM 2850	-	●	Cummins CM2850
Cummins	CM 2880	-	●	Cummins CM2880
Cummins	CM 2880 Industrial	-	●	Cummins CM2880 Industrial
Cummins	CM 500, CM 558, CM 570, CM 850, CM 2150, and CM 2250	QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	ECU-dependent	Cummins Generic*
Cummins	-	Industrial	-	Cummins Generic Industrial
Cummins	-	KTA19	-	Cummins KTA19
Cummins	PGI	-	●	Cummins PGI
Detroit Diesel	DDEC III	Series 50, 60, and 2000	-	DDEC III
Detroit Diesel	DDEC IV	Series 50, 60, and 2000	-	DDEC IV
Detroit Diesel	DDEC III, DDEC IV	Series 50, 60, and 2000	-	DDEC Generic*
Deutz	EMR2	-	-	Deutz EMR 2
Deutz	EMR3	-	-	Deutz EMR 3
Deutz	EMR4	-	-	Deutz EMR 4
Deutz	EMR4 Stage V	-	-	Deutz EMR 4 Stage V
Deutz	EMR5	-	-	Deutz EMR 5
Deutz	EMR5 Stage V	-	●	Deutz EMR 5 Stage V
Deutz	EMR2, EMR3	-	-	Deutz EMR Generic*
Doosan	EDC17	-	-	Doosan G2 EDC17
Doosan	MD1	-	●	Doosan MD1
Doosan	G2 EDC17	-	●	Doosan stage 5
Farizon				Farizon
Force MTU				ACU CPCB IV
FPT Industrial	EDC17	-	-	FPT EDC17CV41
FPT Industrial	Bosch MD1	-	●	FPT Stage V
Guascor	GCS-e ECU	-	-	Guascor GCS
Hatz Diesel	-	3/4H50 TICD	●	Hatz
Hatz Diesel	EDC17	-	-	Hatz EDC17
Isuzu	ECM	4JJ1X, 4JJ1T, 6WG1X FT-4	-	Isuzu
Iveco	CURS0R	-	-	Iveco CURS0R
Iveco	EDC7 (Bosch MS6.2),	-	-	Iveco EDC7
Iveco	CURS0R, NEF, EDC7, VECTOR 8	-	●**	Iveco Generic*
Iveco	NEF	-	-	Iveco NEF
Iveco	Bosch MD1	-	●	Iveco Stage V
Iveco	Iveco NEF67	-	●	Iveco Stage V NEF67
Iveco	VECTOR 8	-	-	Iveco Vector8
JCB	-	ECOMAX DCM3.3+	●	JCB

Manufacturer	ECUs	Engines	Tier 4/Stage V	Controller setting Engine I/F [7561]
JCB	-	P745 & P740 DieselMax Stage V Version 7	●	JCB 430/448 Stage V
Jichai	JC15D-ECU22	-	-	JC15D Weifu***
Jichai	JC15D WYS	-	-	JC15D WYS
Jichai	JC190	-	-	JC190
Jichai	JC15T JG	-	-	Jichai JC15T JG
Jing Guan	-	Gas	-	Jing Guan
John Deere	JDEC	PowerTech M, E, and Plus	●	John Deere
John Deere	FOCUS controls (version 2.1)	-	●	John Deere Stage V
Kingbang			●	Kingbang
Kirloskar				Kirloskar
Kohler	ECU2-HD	KD62V12	●	Kohler KD62V12
Kohler	-	KDI 3404	-	Kohler KDI 3404
Kubota	KORD3	-	●	Kubota Stage V
MAN	EDC17	-	-	MAN EDC17
MAN	EMC 2.0	-	-	MAN EMC Step 2.0
MAN	EMC 2.5	-	-	MAN EMC Step 2.5
MAN	EMC 2.0, EMC 2.5	-	-	MAN Generic*
MTU	MDEC module M.201	-	-	MDEC 2000/4000 M.201
MTU	MDEC module M.302	Series 2000 and 4000	-	MDEC 2000/4000 M.302
MTU	MDEC module M.303	Series 2000 and 4000	-	MDEC 2000/4000 M.303
MTU	MDEC module M.304	-	-	MDEC 2000/4000 M.304
MTU	ADEC	Series 2000 (ECU7), Series 4000 (ECU7), and MTU PX	-	MTU ADEC
MTU	ADEC, ECU7 without SAM module (software module 501)	Series 2000 and 4000	-	MTU ADEC module 501
MTU	ECU7 with SAM module	Series 2000 (ECU7), Series 4000 (ECU7), and MTU PX	-	MTU ECU7 with SAM
MTU	ECU8	-	-	MTU ECU8
MTU	ECU9	-	●	MTU ECU9
MTU	ECU9 EMINOX	-	●	MTU ECU9 EMINOX
MTU	J1939 Smart Connect, ECU8, ECU9	Series 1600	● (ECU9 or later)	MTU J1939 Smart Connect
Perkins	ADEM3	-	-	Perkins ADEM3
Perkins	ADEM4	-	-	Perkins ADEM4
Perkins	CPCB IV			Perkins CPCB IV
Perkins	EDC17	-	-	Perkins EDC17C49

Manufacturer	ECUs	Engines	Tier 4/Stage V	Controller setting Engine I/F [7561]
Perkins	ADEM3, ADEM4	Series 850, 1100, 1200, 1300, 2300, 2500, and 2800	-	Perkins Generic*
Perkins	-	Series 400 and 1200	●	Perkins Stage V
Perkins	-	Series 400 Model IQ IR IW IY IF	●	Perkins StV 400
Perkins	-	Series 1200F Model MT, MU, MV, MW, BM, and BN	●	Perkins StV 1200
Perkins	-	Series 1200J Model SU, VM	●	Perkins StV 120xJ (SU/VM)
PSI/Power Solutions	-	PSI/Power Solutions	●	PSI/Power Solutions
QiYao	-	-	-	QiYao Gas
Scania	EMS	-	-	Scania EMS
Scania	EMS S6 (KWP2000)	Dx9x, Dx12x, Dx16x	-	Scania EMS 2 S6
Scania	EMS 2 S8	DC9, DC13, DC16	●	Scania EMS 2 S8
Scania	EMS S6 (KWP2000)	Dx9x, Dx12x, Dx16x industrial engines	-	Scania S6 Industrial
Scania	EMS 2 S8	DC9, DC13, DC16 industrial engines	●	Scania S8 Industrial
SDEC	F20	-	-	SDEC F20
SDEC	F31	-	-	SDEC F31
SDEC	F36	-	-	SDEC F36
SDEC	F45	-	-	SDEV F45
Steyr	EDC17	-	-	Steyr EDC17
VECV	E694	-	-	VECV E694
Volvo Penta	CPCB4			Volvo Penta CPCB4
Volvo Penta	D12 marine	-	-	Volvo Penta D12
Volvo Penta	EDC3	-	-	Volvo Penta EDC3
Volvo Penta	EDC4	-	-	Volvo Penta EDC4
Volvo Penta	EMS, EMS2.0 to EMS2.3	D6, D7, D9, D12, D16 (GE and AUX variants only)	● (ECU v 2.3 or later)	Volvo Penta EMS2
Volvo Penta	EMS2.3	-	●	Volvo Penta EMS2.3
Volvo Penta	EMS2.4	-	●	Volvo Penta EMS2.4
Volvo Penta	EDC3, EDC4	TAD4x, TAD5x, TAD6x, TAD7x	-	Volvo Penta Generic*
Weichai	-	-	-	Weichai Baudouin E6 Gas
Weichai	WOODWARD PG+	Diesel	●	Weichai Diesel
Weichai	WOODWARD PG+	Gas	●	Weichai Gas
Weichai	Wise 10B	-	●	Weichai Wise10B
Weichai	Wise 15	-	●	Weichai Wise15
Weichai	Wise 10			Wise10

Manufacturer	ECUs	Engines	Tier 4/Stage V	Controller setting Engine I/F [7561]
Weichai	Wise 13	-	-	Wise13
Weichai	Wise 18B	-	●	Wise18B
Xichai	-	-	-	Xichai Gas
YANMAR	EDC17	-	-	YANMAR EDC17
YANMAR	-	Gas 4G	-	YANMAR gas 4G
YANMAR	-	TN, TNV	●	YANMAR Stage V
YANMAR	X11			YANMAR X11
Yuchai United	YCGCU (Version 4.2)	Diesel	●	Yuchai United Diesel
Yuchai United	YCGCU (Version 4.2)	Gas	●	Yuchai United Gas
Yuchai United	YC-BCR	-	-	Yuchai YC-BCR
Yuchai United	YC-ECU	-	-	Yuchai YC-ECU
Yuchai United	YC-ECU		●	Yuchai YC-ECU Tier IV
Yuchai United	YC-ECU-A	-	-	Yuchai YC-ECU-A
Yunnei				Yunnei

NOTE * Generic protocols are included for backward compatibility.

NOTE ** If supported by the ECU and engine.

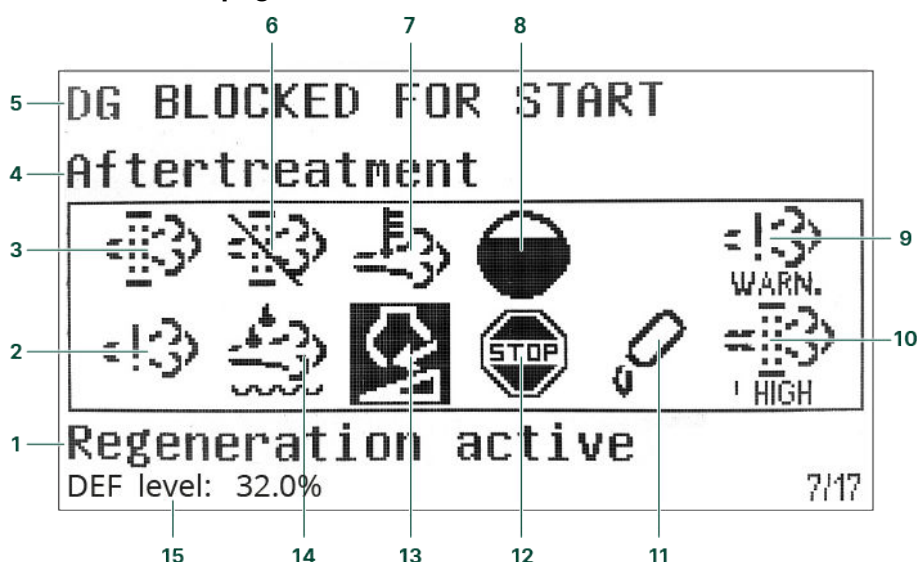
NOTE *** Previously *Jichai*.

Other EIC protocols: Contact DEIF.

1.4.4 Exhaust after-treatment (Tier 4/Stage V)

The controller meets the Tier 4 (Final)/Stage V requirements. Use the display to monitor and control the engine and the exhaust after-treatment system.

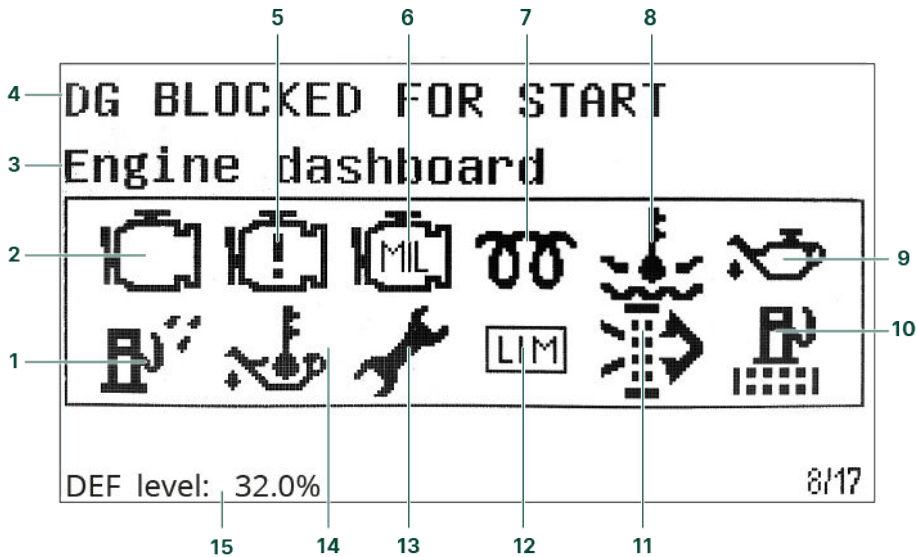
After-treatment page



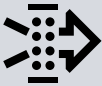
No.	Referent	Symbol	Description
1	After-treatment status	-	
2	Engine emission system failure		Emission failure or malfunction.
3	Diesel Particle Filter (DPF)		Regeneration is needed.
4	Page name	-	
5	Controller status	-	
6	Diesel Particle Filter (DPF) Inhibit		Regeneration is inhibited.
7	High temperature - Regeneration		There is a high temperature and regeneration is in process.
8	HC burn-off		Hydrocarbon accumulation that requires burn-off.
9	Engine emission system failure level	 	Emission failure or malfunction, with the severity.
10	Diesel Particle Filter (DPF) level	 	Regeneration needed, with the severity.
11	DEF level warning		Low DEF level.
12	DEF shutdown		DEF problem stops normal operation.
13	DEF level inducement	 	Mid-level inducement. Severe inducement.

No.	Referent	Symbol	Description
14	Diesel Exhaust Fluid (DEF)		DEF quality is low.
15	Diesel Exhaust Fluid (DEF) % level		Shows the level (%) of the Diesel Exhaust Fluid.

Engine dashboard



No.	Referent	Symbol	Description
1	Water in fuel		There is water in the fuel.
2	Engine interface status		An engine warning.
3	Page name	-	-
4	Controller status	-	-
5	Engine interface status		An engine shutdown.
6	Engine interface status		An engine malfunction.
7	Cold start		The engine is cold.
8	High engine coolant temperature		The engine coolant temperature is high.
9	Low engine oil pressure		The engine oil pressure is low.
10	Fuel filter clogging		The fuel filter is blocked.

No.	Referent	Symbol	Description
11	Air filter clogging		The air filter is blocked.
12	LIMIT lamp		Only for MTU engines.
13	Oil change		The engine needs an oil change.
14	High engine oil temperature		The engine oil temperature is high.
15	Diesel Exhaust Fluid (DEF) % level		Shows the level (%) of the Diesel Exhaust Fluid.

NOTE Grey symbols show that communication is available for the referent. An engine type might not support all of the referents.

1.5 Alarms and protections

Protections	Alarms	ANSI	Operate time
Reverse power	3	32R	<200 ms
Fast over-current	2	50P	<40 ms
Over-current	4	50TD	<200 ms
Voltage dependent over-current	1	50V	
Over-voltage	2	59	<200 ms
Under-voltage	3	27P	<200 ms
Over-frequency	3	81O	<300 ms
Under-frequency	3	81U	<300 ms
Unbalance voltage	1	47	<200 ms
Unbalance current	1	46	<200 ms
Under-excitation or reactive power import	1	32RV	<200 ms
Over-excitation or reactive power export	1	32FV	<200 ms
Overload*	5	32F	<200 ms
Inverse time earth over-current	1	50G	<100 ms
Inverse time neutral over-current	1	50N	<100 ms
Busbar over-voltage	3	59P	<50 ms
Busbar under-voltage	4	27P	<50 ms
Busbar over-frequency	3	81O	<50 ms
Busbar under-frequency	4	81U	<50 ms
Emergency stop	1		<200 ms
Low auxiliary supply	1	27DC	
High auxiliary supply	1	59DC	
Generator breaker external trip	1		
Synchronisation failure alarms	1		

Protections	Alarms	ANSI	Operate time
Breaker open failure	1	52BF	
Breaker close failure	1	52BF	
Breaker position failure	1	52BF	
Phase sequence error	1	47	
De-load error	1		
Hz/V failure	1		
Not in Auto	1		
ROCOF (df/dt)	1	81R	<130 ms
Power-dependent reactive power	2	40	
Single-controller applications: Mains over-current (4th CT)	2		
Single-controller applications: Mains reverse power (4th CT)	2		
Single-controller applications: Mains overload (4th CT)	2		

NOTE * You can configure these protections for overload or reverse power.

1.6 Compatible products

1.6.1 PMS lite system

You can use these controllers together in a PMS lite system:

- **iE 150 PMS lite, BTB, and Generator** (www.deif.com/products/ie-150)
- **AGC 150 PMS lite** (<https://www.deif.com/products/agc-150-pms-lite>)
- **AGC 150 BTB** (www.deif.com/products/agc-150-btb)
- **AGC 150 Generator** (www.deif.com/products/agc-150-generator)
- **AGC-4 Mk II Genset, BTB** (www.deif.com/products/agc-4-mk-ii)

1.6.2 Remote monitoring service: Insight

Insight is a responsive remote monitoring service (www.deif.com/products/insight). It includes real-time genset data, a customisable dashboard, GPS tracking, equipment and user management, email and/or SMS alerts, and cloud data management.

1.6.3 Digital voltage controllers

DVC 350 is a digital AVR designed for alternators with SHUNT, AREP, or PMG excitation. The DVC 350 monitors and regulates the alternator output voltage. The controller can control the DVC 350 features and receive fault information directly with the CAN bus communication. For more information, see www.deif.com/products/dvc-350

DVC 550 is an advanced digital AVR designed for alternators with SHUNT, AREP, or PMG excitation. The DVC 550 monitors and regulates the alternator output voltage. The controller can control all the DVC 550 features and receive fault information directly with the CAN bus communication. For more information, see www.deif.com/products/dvc-550

1.6.4 Additional inputs and outputs

The controller uses CAN bus communication with these:

- **CIO 116** is a remote input expansion module. See www.deif.com/products/cio-116
- **CIO 208** is a remote output expansion module. See www.deif.com/products/cio-208

- **CIO 308** is a remote I/O module. See www.deif.com/products/cio-308
- **IOM 220** and **IOM 230** each have two analogue outputs. These can be used for general PID control. See www.deif.com/products/iom-200230

1.6.5 Additional operator panel, AOP-2

The controller uses CAN bus communication to the additional operator panel (AOP-2). Configure the controller using M-Logic. On the AOP-2, the operator can then:

- Use the buttons to send commands to the controller.
- See LEDs light up to show statuses and/or alarms.

You can configure and connect two AOP-2s if the controller has the premium software package.

1.6.6 Remote display: iE 150

The remote display is an iE 150 that only has a power supply and an Ethernet connection to an iE 150 controller. The remote display allows the operator to see the controller's operating data, as well as operate the controller remotely.

1.6.7 Other equipment

DEIF has a wide variety of other equipment that is compatible. Here are some examples:

- **Synchrosopes**
 - **CSQ-3** (www.deif.com/products/csq-3)
- **Battery chargers/power supplies**
 - **DBC-1** (www.deif.com/products/dbc-1)
- **Current transformers**
 - **ASK** (www.deif.com/products/ask-asr)
 - **KBU** (www.deif.com/products/kbu)
- **Transducers**
 - **MTR-4** (www.deif.com/products/mtr-4)

1.6.8 Controller types

Parameter	Setting	Controller type	Minimum software
9101	Genset unit	Non-sync generator controller	Core
	Genset unit	Generator controller	Sync
	Mains unit	Mains controller	Sync
	Bus Tie Breaker unit	BTB controller	Sync
	Genset Hybrid unit	Hybrid Genset-Solar controller	Core
	Engine Drive unit	Engine drive controller	Core
	Remote display unit	Remote display	None
	Battery unit	Battery storage controller	Premium
	Solar unit	Solar controller	Premium
	ATS unit	Automatic transfer switch (open transition)	Core
	ATS unit	Automatic transfer switch (closed transition)	Sync
	Genset PMS lite unit	PMS lite controller	Sync

Software packages and controller types

The controller software package determines which functions the controller can use.

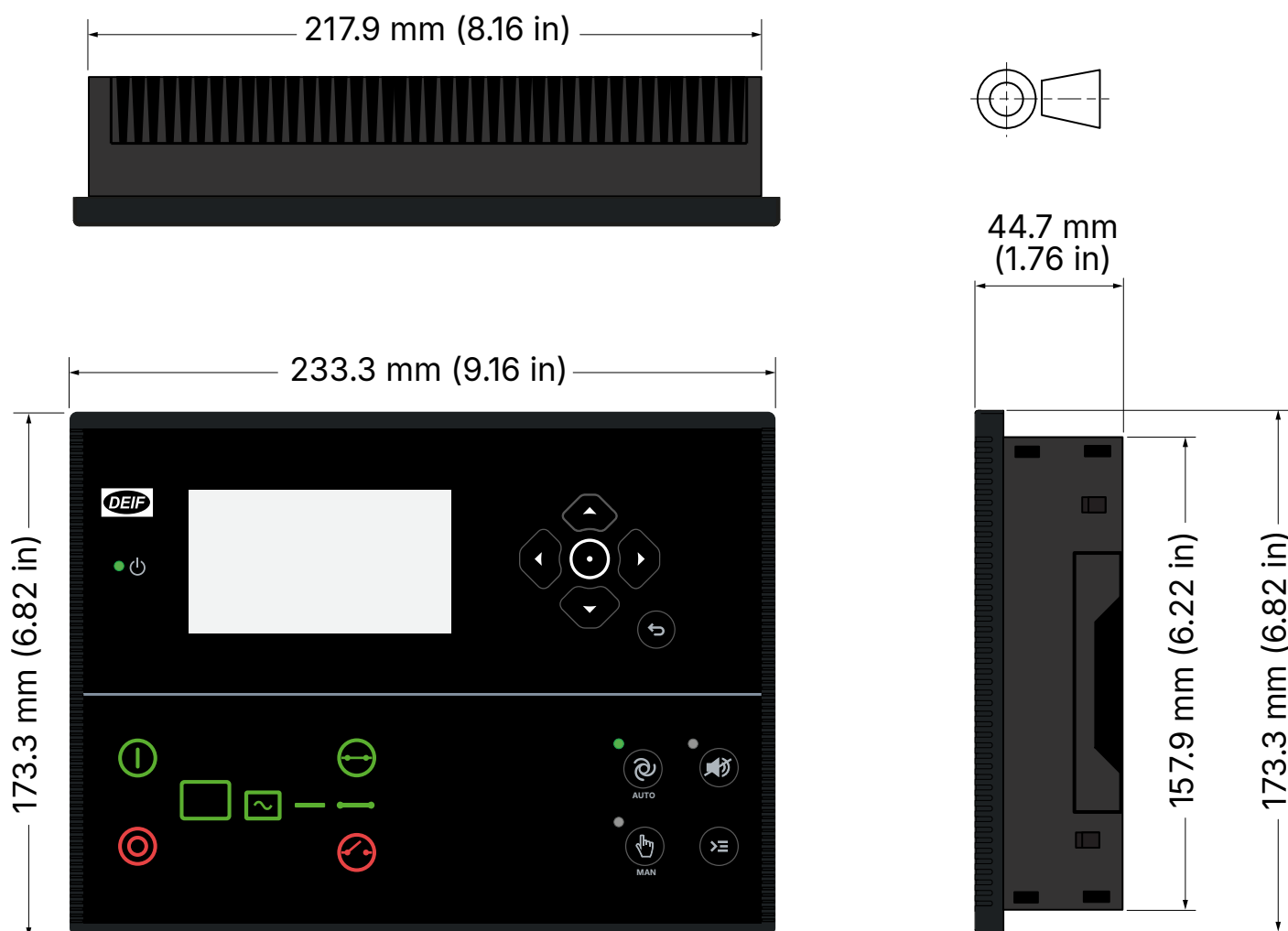
- **Core**
 - You can change the controller type to any other controller that uses **Core**.
 - **Core** software only supports non-synchronisation applications.
- **Sync**
 - You cannot change the controller type.
 - **Sync** software supports synchronisation applications.
- **PM** (power management)
 - You cannot change the controller type.
- **Premium**
 - You can change the controller type to any other controller type.
 - All functions are supported.

You can select the controller type under `Basic settings > Controller settings > Type`.

NOTE For the iE 150 Marine controllers, see www.deif.com/products/ie-150-marine.

2. Technical specifications

2.1 Dimensions



Dimensions and weight

Dimensions	Length: 233.3 mm (9.16 in) Height: 173.3 mm (6.82 in) Depth: 44.7 mm (1.76 in)
Panel cutout	Length: 218.5 mm (8.60 in) Height: 158.5 mm (6.24 in) Tolerance: ± 0.3 mm (0.01 in)
Max. panel thickness	4.5 mm (0.18 in)
Mounting	UL/cUL Listed: Type complete device, open type 1 UL/cUL Listed: For use on a flat surface of a type 1 enclosure
Weight	0.79 kg

2.2 Mechanical specifications

Operation conditions

Vibration	Response: 10 to 58.1 Hz, 0.15 mmpp
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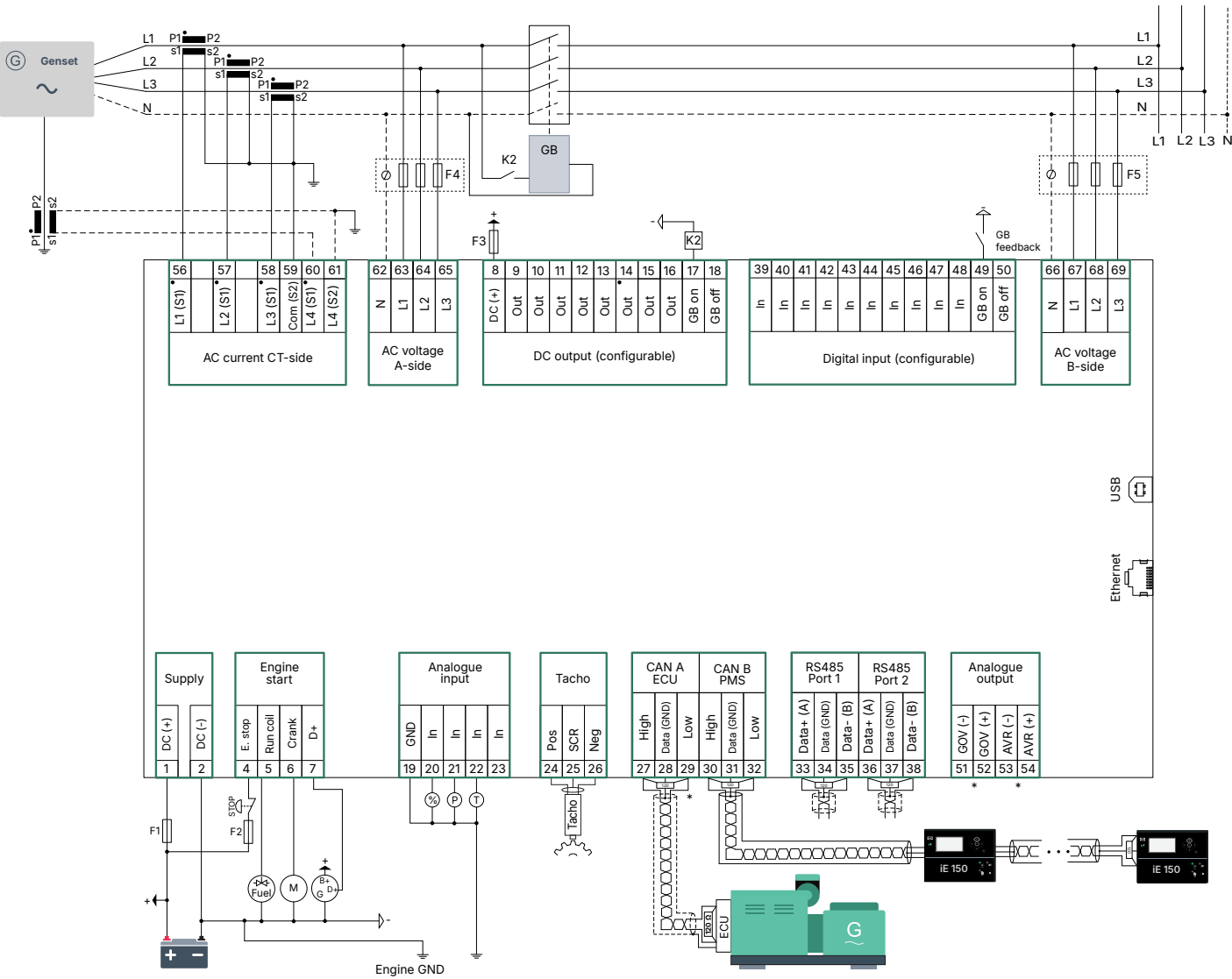
Operation conditions	
	58.1 to 150 Hz, 1 g. To IEC 60255-21-1 (Class 2) Endurance: 10 to 150 Hz, 2 g. To IEC 60255-21-1 (Class 2) Seismic vibration: 3 to 8.15 Hz, 15 mmpp 8.15 to 35 Hz, 2 g. To IEC 60255-21-3 (Class 2)
Shock	10 g, 11 ms, half sine. To IEC 60255-21-2 Response (Class 2) 30 g, 11 ms, half sine. To IEC 60255-21-2 Withstand (Class 2) 50 g, 11 ms, half sine. To IEC 60068-2-27, test Ea Tested with three impacts in each direction in three axes (total of 18 impacts per test)
Bump	20 g, 16 ms, half sine IEC 60255-21-2 (Class 2) Tested with 1000 impacts in each direction on three axes (total of 6000 impacts per test)
Galvanic separation	CAN port 2 (CAN B): 550 V, 50 Hz, 1 minute RS-485 port 1: 550 V, 50 Hz, 1 minute Ethernet: 550 V, 50 Hz, 1 minute Analogue output 51-52 (GOV): 550 V, 50 Hz, 1 minute Analogue output 54-55 (AVR): 3000 V, 50 Hz, 1 minute Note: No galvanic separation on CAN port 1 (CAN A) and RS-485 port 2
Safety	Installation CAT. III 600 V Pollution degree 2 IEC/EN 60255-27
Flammability	All plastic parts are self-extinguishing to UL94-V0
EMC	IEC/EN 60255-26

2.3 Environmental specifications

Operation conditions	
Operating temperature (incl. display screen)	-40 to +70 °C (-40 to +158 °F)
Storage temperature (incl. display screen)	-40 to +85 °C (-40 to +185 °F)
Accuracy and temperature	Temperature coefficient: 0.2 % of full scale per 10 °C
Operating altitude	0 to 4000 m with derating
Operating humidity	Damp Heat Cyclic, 20/55 °C at 97 % relative humidity, 144 hours. To IEC 60255-1 Damp Heat Steady State, 40 °C at 93 % relative humidity, 240 hours. To IEC 60255-1
Change of temperature	70 to -40 °C, 1 °C / minute, 5 cycles. To IEC 60255-1
Protection degree	IEC/EN 60529 - IP65 (front of module when installed into the control panel with the supplied sealing gasket) - IP20 on terminal side

2.4 Controller

2.4.1 Typical wiring for PMS lite controller



Fuses

- F1: 2 A DC max. time-delay fuse/MCB, c-curve
- F2: 6 A DC max. time-delay fuse/MCB, c-curve
- F3: 4 A DC max. time-delay fuse/MCB, b-curve
- F4, F5: 2 A AC max. time-delay fuse/MCB, c-curve

NOTE * The diagram shows EIC governor regulation. Alternatively, the governor and AVR can be regulated using the analogue outputs.

2.4.2 Electrical specifications

Power supply	
Power supply range	Nominal voltage: 12 V DC or 24 V DC Operating range: 6.5 to 36 V DC
Voltage withstand	Reverse polarity
Power supply drop-out immunity	0 V DC for 50 ms (coming from min. 6 V DC)

Power supply	
Power supply load dump protection	Load dump protected according to ISO16750-2 test A
Power consumption	5 W typical 12 W max.
RTC clock	Time and date backup

Supply voltage monitoring	
Measuring range	0 V to 36 V DC Max. continuous operating voltage: 36 V DC
Resolution	0.1 V
Accuracy	± 0.35 V

Voltage measurement	
Voltage range	Nominal range: 100 to 690 V phase-to-phase (above 2000 m derate to max. 480 V)
Voltage withstand	$U_n + 35$ % continuously, $U_n + 45$ % for 10 seconds Measuring range of nominal: 10 to 135 % Low range, nominal 100 to 260 V: 10 to 351 V AC phase-to-phase High range, nominal 261 to 690 V: 26 to 932 V AC phase-to-phase
Voltage accuracy	± 1 % of nominal within 10 to 75 Hz $+1/-4$ % of nominal within 3.5 to 10 Hz
Frequency range	3.5 to 75 Hz
Frequency accuracy	± 0.01 Hz within 60 to 135 % of nominal voltage ± 0.05 Hz within 10 to 60 % of nominal voltage
Input impedance	4 M Ω /phase-to-ground, and 600 k Ω phase/neutral

Current measurement	
Current range	Nominal: -/1 A and -/5 A Range: 2 to 300 %
Number of CT input	4
Max. measured current	3 A (-/1 A) 15 A (-/5 A)
Current withstand	7 A continuous 20 A for 10 seconds 40 A for 1 second
Current accuracy	From 10 to 75 Hz: ± 1 % of nominal from 2 to 100% current ± 1 % of measured current from 100 to 300 % current From 3.5 to 10 Hz: $+1/-4$ % of nominal from 2 to 100 % current $+1/-4$ % of measured current from 100 to 300 % current
Burden	Max. 0.5 VA

Power measurement	
Accuracy power	± 1 % of nominal within 35 to 75 Hz
Accuracy power factor	± 1 % of nominal within 35 to 75 Hz

D+	
Excitation current	210 mA, 12 V 105 mA, 24 V
Charging fail threshold	6 V

Tacho input	
Voltage input range	+/- 1 V _{peak} to 70 V _{peak}
W	8 to 36 V
Frequency input range	10 to 10 kHz (max.)
Frequency measurement tolerance	1 % of reading

Digital inputs	
Number of inputs	12 x digital inputs Negative switching
Maximum input voltage	+36 V DC with respect to plant supply negative
Minimum input voltage	-24 V DC with respect to plant supply negative
Current source (contact cleaning)	Initial 10 mA, continuous 2 mA

DC outputs	
Number of 3 A outputs	2 x outputs (for fuel and crank) 15 A DC inrush and 3 A continuous, supply voltage 0 to 36 V DC Endurance tested according to UL/ULC6200:2019 1.ed: 24 V, 3 A, 100000 cycles (with an external freewheeling diode)
Number of 0.5 A outputs	10 x outputs 2 A DC inrush and 0.5 A continuous, supply voltage 4.5 to 36 V DC
Common	12/24 V DC

Analogue inputs	
Number of inputs	4 x analogue inputs
Electrical range	Configurable as: - Negative switching digital input 0 V to 10 V sensor 4 mA to 20 mA sensor 0 Ω to 2.5 kΩ sensor
Accuracy	Current: - Accuracy: ±20 uA ±1.00 % rdg Voltage: - Range: 0 to 10 V DC - Accuracy: ±20 mV ±1.00 % rdg RMI 2-wire LOW: - Range: 0 to 800 Ω - Accuracy: ±2 Ω ±1.00 % rdg RMI 2-wire HIGH: - Range: 0 to 2500 Ω - Accuracy: ±5 Ω ±1.00 % rdg

Voltage regulator output	
Output types	Isolated DC voltage output
Voltage range	-10 to +10 V DC
Resolution in voltage mode	Less than 1 mV
Maximum common mode voltage	±3 kV
Minimum load in voltage mode	500 Ω
Accuracy	±1 % of setting value

Speed governor output	
Output types	Isolated DC voltage output Isolated PWM output
Voltage range	-10 to +10 V DC
Resolution in voltage mode	Less than 1 mV
Maximum common mode voltage	±550 V
Minimum load in voltage mode	500 Ω
PWM frequency range	1 to 2500 Hz ±25 Hz
PWM duty cycle resolution (0-100%)	12 bits (4096 steps)
PWM voltage range	1 to 10.5 V
Voltage accuracy	±1% of setting value

Display unit	
Type	Graphical display screen (monochrome)
Resolution	240 x 128 pixels
Navigation	Five-key menu navigation
Log book	Data log and trending function
Language	Multi-language display

2.4.3 Communication

Communication	
CAN A	You can connect some combinations* of these: • Engine CAN Port* • DVC 550* • CIO 116, CIO 208, and CIO 308* • IOM 220 and IOM 230* • AOP2* • PMS lite • CANshare • 3rd party load sharing Data connection 2-wire + common, or 3-wire Not isolated External termination required (120 Ω + matching cable) DEIF engine specification (J1939 + CANopen)
CAN B	You can connect some combinations* of these:

Communication	
	• Engine CAN Port* • DVC 550* • CIO 116, CIO 208, and CIO 308* • IOM 220 and IOM 230* • AOP2* • PMS lite • CANshare • 3rd party load sharing Data connection 2-wire + common, or 3-wire Isolated External termination required (120 Ω + matching cable) PMS 125 kbit and 250 kbit
RS-485 Port 1	Used for: Modbus RTU, PLC, SCADA, Remote monitoring (Insight) Data connection 2-wire + common, or 3-wire Isolated External termination required (120 Ω + matching cable) 9600 to 115200
RS-485 Port 2	Used for: Modbus RTU, PLC, SCADA, Remote monitoring (Insight) Data connection 2-wire + common, or 3-wire Not isolated External termination required (120 Ω + matching cable) 9600 to 115200
RJ45 Ethernet	Used for: • Modbus to PLC, SCADA, and so on • NTP time synchronisation with NTP servers • PC utility software Isolated Auto detecting 10/100 Mbit Ethernet port
USB	Service port (USB-B)

NOTE * These can be daisy chained and connected to the same CAN port. However, when PMS lite, CANshare, or 3rd party sharing is selected, the port is used exclusively for that (any other use is not possible).

2.5 Approvals

Standards
CE
UL/cUL Listed to - UL/ULC6200:2019 1.ed. Controllers for Use in Power Production

NOTE Refer to www.deif.com for the most recent approvals.

2.5.1 UL/cUL Listed

Requirements	
Installation	To be installed in accordance with the NEC (US) or the CEC (Canada)
Enclosure	A suitable type 1 (flat surface) enclosure is required Unventilated/ventilated with filters for controlled/pollution degree 2 environment
Mounting	Flat surface mounting
Connections	Use 90 °C copper conductors only

Requirements	
Wire size	AWG 30-12
Terminals	Tightening torque: 5-7 lb-in.
Current transformers	Use Listed or Recognized isolating current transformers
Communication circuits	Only connect to communication circuits of a listed system/equipment

3. Legal information

3.1 Disclaimer and copyright

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