# iE 150

4921240688A

Generator marine Core

**Data sheet**

Improve Tomorrow

# 1. iE 150 Core marine



# 2. Technical specifications



# 3. Legal information

# 1. iE 150 Core marine

## 1.1 About the controller

### 1.1.1 About

The iE 150 Core marine (Genset) controller provides flexible protection and control for one genset in non-synchronising applications. The controller contains all the functions needed to protect and control the genset, the genset breaker, and also a tie/mains breaker.

The iE 150 is a compact, all-in-one controller. Each iE 150 contains all necessary 3-phase measuring circuits.

The values and alarms are shown on the LCD display screen, which is sunlight-readable. Operators can easily control the genset and breakers from the display unit. Alternatively, use the communication options to connect to an HMI/SCADA system.

### 1.1.2 Software versions

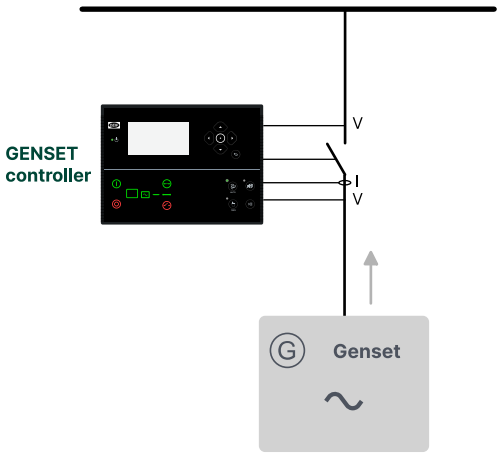
The information in this document relates to software version:

| Software | Details | Version |
|---|---|---|
| iE 150 | Controller application | 1.32.0 |

**NOTE** iE 150 Core marine applications use the Core (S1) software package.

### 1.1.3 Stand-alone (island mode)

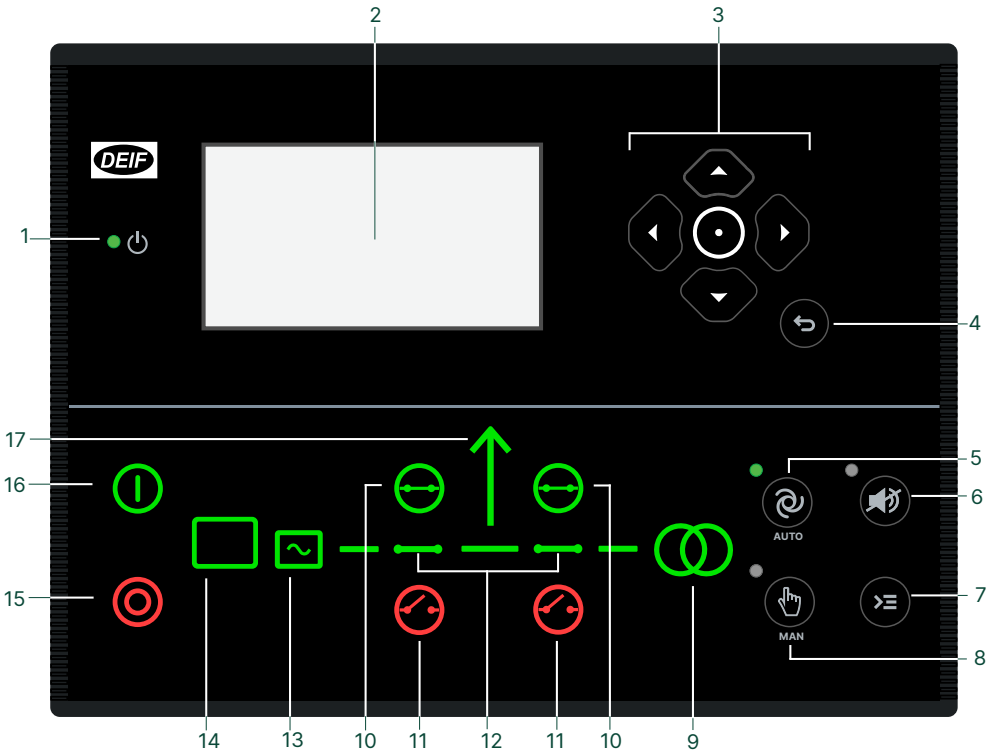
**Stand-alone (island mode)**




Stand-alone (island mode operation) is typically used in power plants that are isolated from other power generation systems.

**NOTE** You can disable breaker control.

### 1.1.3.1 Display layout

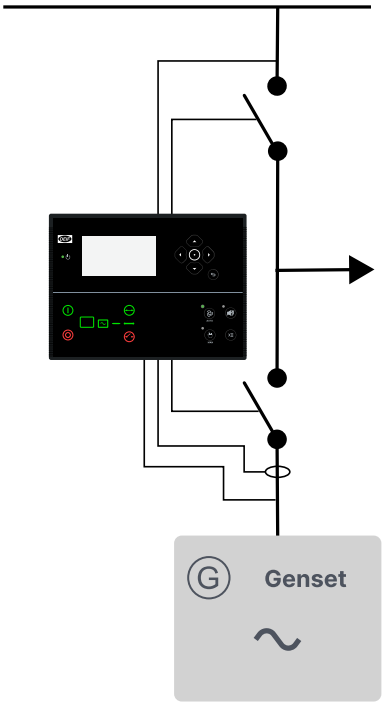



| No. | Name | Function |
|---|---|---|
| 1 | Power | Green: The controller power is ON.<br>OFF: The controller power is OFF. |
| 2 | Display screen | Resolution: 240 x 128 px.<br>Viewing area: 88.50 x 51.40 mm.<br>Six lines, each with 25 characters. |
| 3 | Navigation | Move the selector up, down, left and right on the screen. |
| | Enter button | Go to the Menu system.<br>Confirm the selection on the screen. |
| 4 | Back button | Go to the previous page. |
| 5 | Remote mode | Remote equipment (digital inputs, Modbus commands, AOP-2 commands) controls the iE 150. |
| 6 | Silence horn | Turns off an alarm horn (if configured) and enters the Alarm menu. |
| 7 | Shortcut menu | Access the Jump menu, Mode selection, Test, Lamp test. |
| 8 | Local mode | The operator can use the display buttons to start, stop, connect or disconnect the genset. |
| 9 | Mains symbol | This controller does not use this. It is only lit during a lamp test. |
| 10 | Close breaker | Push to close the breaker. |
| 11 | Open breaker | Push to open the breaker. |
| 12 | Breaker symbols | Green: Breaker is closed.<br>Red: Breaker failure.<br>OFF: The breaker is open. |

| No. | Name | Function |
|---|---|---|
| 13 | Generator | Green: Generator voltage and frequency are OK. The controller can close the breaker.<br>Green flashing: The generator voltage and frequency are OK, but the V&Hz OK timer is still running. The controller cannot close the breaker.<br>Red: The generator voltage is too low to measure. |
| 14 | Engine | Green: There is running feedback.<br>Green flashing: The engine is getting ready.<br>Red: The engine is not running, or there is no running feedback. |
| 15 | Stop | Stops the genset if Local mode is selected. |
| 16 | Start | Starts the genset if Local mode is selected. |
| 17 | Load symbol | Green: The supply voltage and frequency are OK.<br>Red: Supply voltage/frequency failure. |

### 1.1.4 Emergency genset

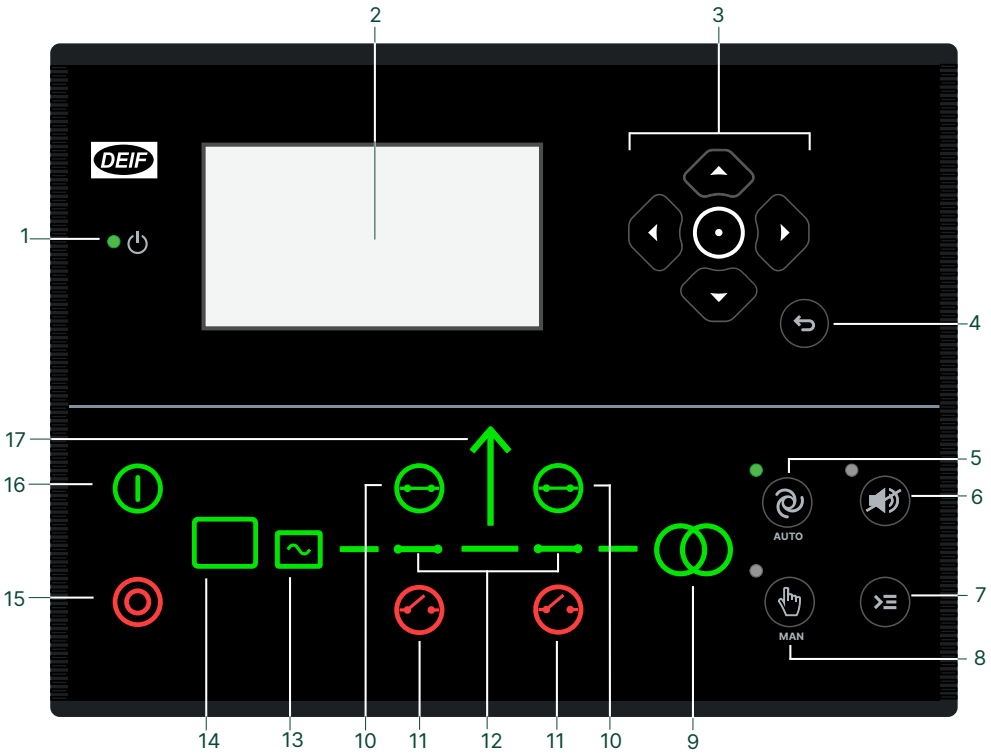
**Emergency genset**




If there is a significant loss of power or a total blackout in the main power generation system, the controller automatically changes the supply to the emergency generator. This makes sure that there is power during a failure and prevents damage to electrical equipment.

**NOTE** Alternatively, the breaker to the busbar can be externally controlled.

### 1.1.4.1 Display layout



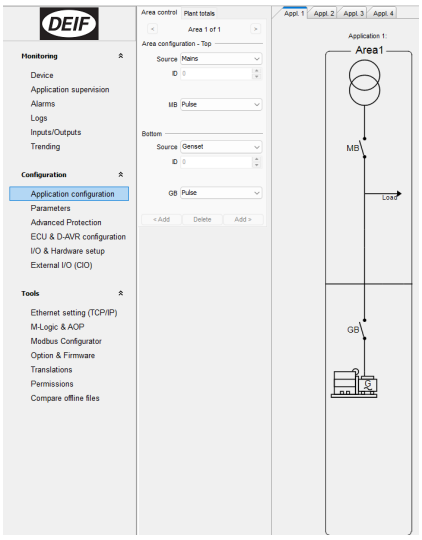

| No. | Name | Function |
|---|---|---|
| 1 | Power | Green: The controller power is ON.<br>OFF: The controller power is OFF. |
| 2 | Display screen | Resolution: 240 x 128 px.<br>Viewing area: 88.50 x 51.40 mm.<br>Six lines, each with 25 characters. |
| 3 | Navigation | Move the selector up, down, left and right on the screen. |
| | Enter button | Go to the Menu system.<br>Confirm the selection on the screen. |
| 4 | Back button | Go to the previous page. |
| 5 | Local mode | If there is a blackout, the controller automatically starts and connects the genset. No operator actions are needed. The controller also automatically opens and closes the tie breaker (open transitions, since there is no synchronisation). |
| 6 | Silence horn | Turns off an alarm horn (if configured) and enters the Alarm menu. |
| 7 | Shortcut menu | Access the Jump menu, Mode selection, Test, Lamp test. |
| 8 | Remote mode | Remote equipment (digital inputs, Modbus commands, AOP-2 commands) controls the controller. The operator can also use the display buttons. |
| 9 | Mains symbol | This controller does not use this. It is only lit during a lamp test. |
| 10 | Close breaker | Push to close the breaker. |
| 11 | Open breaker | Push to open the breaker. |
| 12 | Breaker symbols | Green: Breaker is closed.<br>Red: Breaker failure. |

| No. | Name | Function |
|---|---|---|
| | | OFF: The breaker is open. |
| 13 | Generator | Green: Generator voltage and frequency are OK. The controller can close the breaker.<br>Green flashing: The generator voltage and frequency are OK, but the V&Hz OK timer is still running. The controller cannot close the breaker.<br>Red: The generator voltage is too low to measure. |
| 14 | Engine | Green: There is running feedback.<br>Green flashing: The engine is getting ready.<br>Red: The engine is not running, or there is no running feedback. |
| 15 | Stop | Stops the genset if Remote mode is selected. |
| 16 | Start | Starts the genset if Remote mode is selected. |
| 17 | Load symbol | Green: The supply voltage and frequency are OK.<br>Red: Supply voltage/frequency failure. |

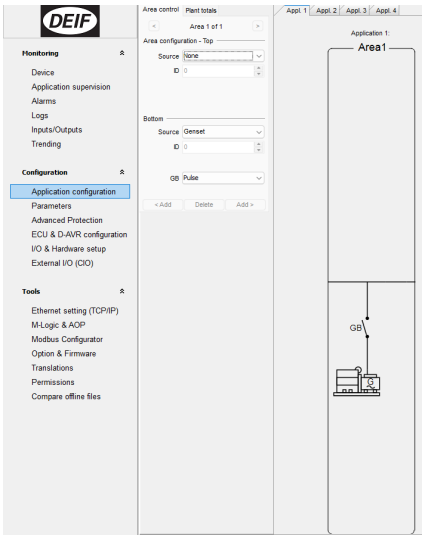
### 1.1.5 Easy configuration with the utility software

Set up an application easily with a PC and the utility software.

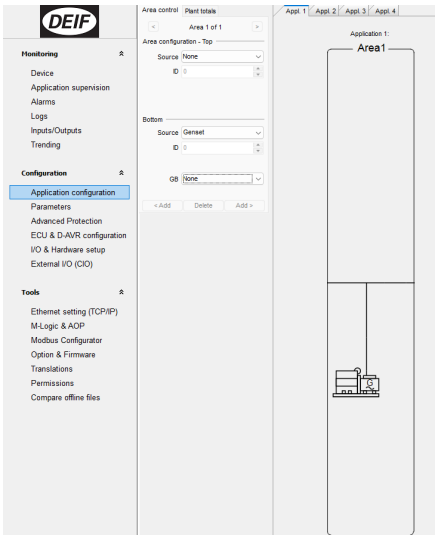
You can also use the utility software to quickly configure the inputs, outputs, and parameters.




**Application with two breakers**




**Application with one breaker**




**Application with no breakers**

## 1.2 Functions and features

### 1.2.1 Controller functions

| Engine features |
|---|
| Start and stop sequences |
| Engine communication |
| Speed sensing using CAN, MPU or frequency |
| Tier 4 final support |
| Temperature-dependent cooling down |
| Time-based cooling down |

| Engine features |
| --- |
| Fuel usage monitoring |
| Fuel pump logics |
| Maintenance alarms |
| Configurable crank and run coil |

| Other engine functions |
| --- |
| Fuel usage monitoring |
| Fuel pump logic and refill |
| Diesel exhaust fluid monitoring |
| Diesel exhaust fluid logic and refill |
| Generic fluid monitoring |
| Generic fluid logic and refill |

| Protection packages |
| --- |
| Engine protection |
| Communication with KWG ISO5 isolation monitor (CAN bus) |

| Operation modes |
| --- |
| Stand-alone (island mode) |
| Emergency genset |

| AC functions |
| --- |
| 4 sets of nominal settings |
| Select the AC configuration:<br>• 3-phase/3-wire<br>• 3-phase/4-wire<br>• 2-phase/3wire (L1/L2/N or L1/L3/N)<br>• 1-phase/2-wire L1 |
| 100 to 690 V AC (selectable) |
| CT -/1 or -/5 (selectable) |
| 4th current measurement (select one)<br>• Mains current (and power)<br>• Neutral current (1 × true RMS)<br>• Ground current (with 3rd harmonic filter) |
| Ground relay |

| General functions |
| --- |
| Built-in test sequences<br>(Simple test, Load test, Full test, and Battery test) |
| 20 lines of PLC logic (M-Logic) |
| Counters, including:<br>• Breaker operations<br>• kWh meter (day, week, month, total) |

| General functions |
|---|
| • kvarh meter (day, week, month, total) |

| Setting and parameter functions |
|---|
| Quick setup |
| User-defined permission level |
| Password-protected setup |
| Trending on USW |
| Event logs with password, up to 500 entries |

| Display and language functions |
|---|
| Supports multiple languages<br>(including Chinese, Russian, 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 |
|---|
| Modbus RS-485 |
| Modbus TCP/IP |
| Configurable Modbus area |

### 1.2.2 Supported controllers and engines

The iE 150 can communicate with the following ECUs and engines.

| Manufacturer | ECU | Engines | Tier 4/Stage V | iE 150 parameter 7561 |
|---|---|---|---|---|
| Generic J1939 | Any ECU that uses J1939 | Any engine that uses J1939 | ● | Generic J1939 |
| | | | | |
| ANGLE | | | - | ANGLE |
| Baudouin | | | - | 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 | | - | Caterpillar ADEM4 |
| Caterpillar | ADEM5 | | - | Caterpillar ADEM5 |

| Manufacturer | ECU | Engines | Tier 4/Stage V | iE 150 parameter 7561 |
|---|---|---|---|---|
| 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 | 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 500, CM 558, CM 570, CM 850, CM 2150 and CM 2250 | - | ECU-dependent | Cummins Generic* |
| Cummins | | | | Cummins Generic Industrial |
| Cummins | CM 2350 | | ● | Cummins CM2350 |
| Cummins | CM 2350 Industrial | | ● | Cummins CM2350 Industrial |
| Cummins | CM 2358 | | ● | Cummins CM2358 |
| Cummins | CM 2850 | | ● | Cummins CM2850 |
| Cummins | CM 2880 | | ● | Cummins CM2880 |
| Cummins | CM 2880 Industrial | | ● | Cummins CM2880 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 | EMR 2, EMR 3 | - | - | Deutz EMR Generic* |
| Deutz | EMR4 | - | - | Deutz EMR 4 |
| Deutz | EMR5 | - | - | Deutz EMR 5 |
| Deutz | EMR4 Stage V | - | ● | Deutz EMR 4 Stage V |
| Deutz | EMR5 Stage V | | ● | Deutz EMR 5 Stage V |
| Doosan | EDC17 | - | - | Doosan G2 EDC17 |
| Doosan | MD1 | - | ● | Doosan MD1 |
| Doosan | G2 EDC17 | | ● | Doosan stage 5 |

| Manufacturer | ECU | Engines | Tier 4/Stage V | iE 150 parameter 7561 |
|---|---|---|---|---|
| FPT Industrial | EDC17 | - | - | FPT EDC17CV41 |
| FPT Industrial | Bosch MD1 | - | ● | FPT stage V |
| Hatz Diesel | - | 3/4H50 TICD | ● | Hatz |
| Hatz Diesel | EDC17 | - | - | Hatz EDC17 |
| Isuzu | ECM | 4JJ1X, 4JJ1T, 6WG1X FT-4 | - | Isuzu |
| Iveco | CURSOR | - | - | Iveco CURSOR |
| Iveco | EDC7 (Bosch MS6.2), | - | - | Iveco EDC7 |
| Iveco | NEF | - | - | Iveco NEF |
| Iveco | Iveco NEF67 | | ● | Iveco Stage V NEF67 |
| Iveco | VECTOR 8 | - | - | Iveco Vector8 |
| Iveco | CURSOR, NEF, EDC7, VECTOR 8 | | ●** | Iveco Generic* |
| Iveco | Bosch MD1 | - | ● | Iveco Stage V |
| JCB | - | ECOMAX DCM3.3+ | ● | JCB |
| 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 |
| 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 and 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 and 4000 (ECU7), MTU PX | - | MTU ADEC |
| MTU | ADEC, ECU7 without SAM module (software module 501) | Series 2000 and 4000 | - | MTU ADEC module 501 |

| Manufacturer | ECU | Engines | Tier 4/Stage V | iE 150 parameter 7561 |
|---|---|---|---|---|
| MTU | ECU7 with SAM module | - | - | MTU ECU7 with SAM |
| MTU | ECU8 | - | - | MTU ECU8 |
| MTU | ECU9 | - | ● | MTU ECU9 |
| MTU | J1939 Smart Connect, ECU8, ECU9 | Series 1600 | ● (ECU9 or later) | MTU J1939 Smart Connect |
| Perkins | ADEM3 | - | - | Perkins ADEM3 |
| Perkins | ADEM4 | - | - | Perkins ADEM4 |
| Perkins | ADEM3 and ADEM4 | Series 850, 1100, 1200, 1300, 2300, 2500 and 2800 | - | Perkins Generic* |
| Perkins | EDC17 | - | - | Perkins EDC17C49 |
| 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 S6 (KWP2000) | Dx9x, Dx12x, Dx16x | - | Scania S6 Industrial |
| Scania | EMS 2 S8 | DC9, DC13, DC16 | ● | Scania EMS 2 S8 |
| Scania | EMS 2 S8 | DC9, DC13, DC16 | ● | Scania S8 Industrial |
| SDEC | F20 | | - | SDEC F20 |
| SDEC | F45 | | - | SDEV F45 |
| Steyr | EDC17 | - | - | Steyr EDC17 |
| Volvo Penta | D12 | | | Volvo Penta D12 |
| Volvo Penta | EDC3 | - | - | Volvo Penta EDC3 |
| Volvo Penta | EDC4 | - | - | Volvo Penta EDC4 |
| Volvo Penta | EDC3, EDC4 | TAD4x, TAD5x, TAD6x, TAD7x | - | Volvo Penta Generic* |
| Volvo Penta | EMS, EMS 2.0 to EMS2.3 | D6, D7, D9, D12, D16 (GE and AUX variants only) | ● | Volvo Penta EMS2 |
| Volvo Penta | EMS2.3 | | ● | Volvo Penta EMS2.3 |
| Volvo Penta | EMS2.4 | - | ● | Volvo Penta EMS2.4 |
| Weichai | WOODWARD PG+ | Diesel | ● | Weichai Diesel |
| Weichai | WOODWARD PG+ | Gas | ● | Weichai Gas |
| Weichai | Wise 10B | - | ● | Weichai Wise10B |
| Weichai | Wise 13 | | | Weichai Wise13 |

| Manufacturer | ECU | Engines | Tier 4/Stage V | iE 150 parameter 7561 |
|---|---|---|---|---|
| Weichai | Wise 15 | - | ● | Weichai Wise15 |
| Weichai | | | - | Weichai Baudouin E6 Gas |
| Xichai | | | | Xichai Gas |
| YANMAR | EDC17 | - | - | YANMAR EDC17 |
| YANMAR | | | | YANMAR Gas 4G |
| YANMAR | - | TN, TNV | - | YANMAR Stage V |
| 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-EDU-A | | | Yuchai YC-ECU-A |

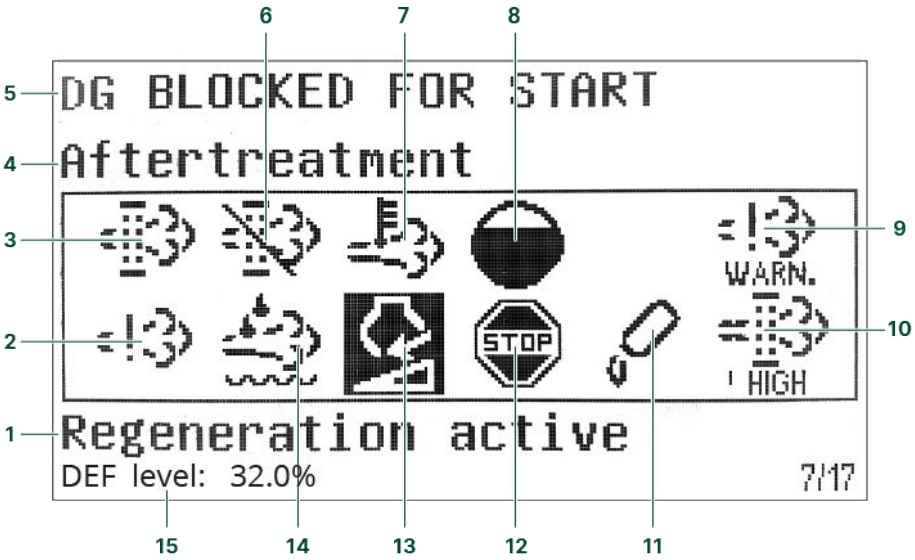
**NOTE** * Generic protocols are included for backward compatibility.
**NOTE** ** If supported by the ECU and engine.
**NOTE** *** Previously *Jichai*

Other EIC protocols: Contact DEIF.

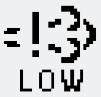
### 1.2.3 Exhaust after-treatment (Tier 4/Stage V)

iE 150 meets the Tier 4 (Final)/Stage V requirements. The user can use the display to monitor (and control) both the engine, and the exhaust after-treatment system.

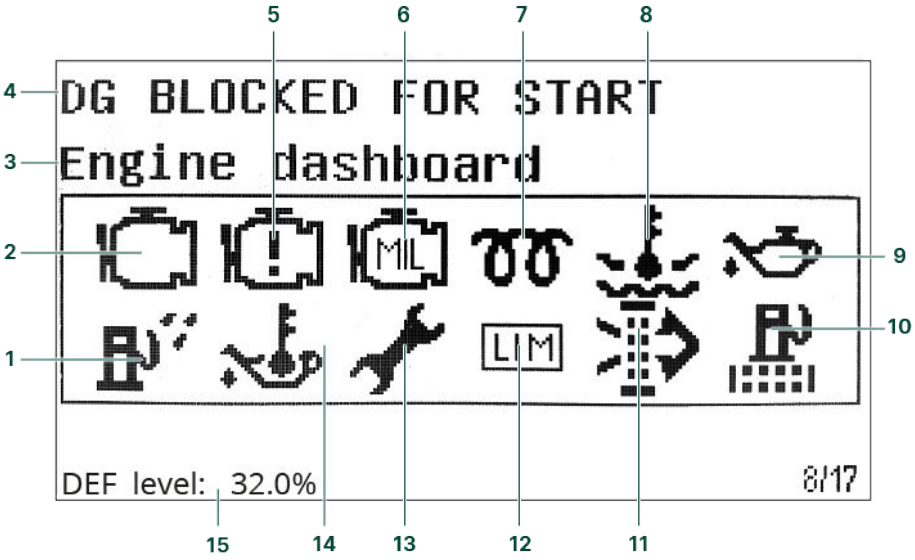
**After-treatment page**

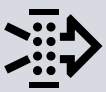



| No. | Referent | Symbol | Description |
|---|---|---|---|
| 1 | After-treatment status | - | |
| 2 | Engine emission system failure |  | Emission failure or malfunction. |
| 3 | Diesel Particle Filter (DPF) |  | Regeneration is needed. |

| No. | Referent | Symbol | Description |
|---|---|---|---|
| 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 |  <br>  <br>  | Emission failure or malfunction, with the severity. |
| 10 | Diesel Particle Filter (DPF) level |  <br>  <br>  | 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. |
| 14 | Diesel Exhaust Fluid (DEF) |  | DEF quality is low. |
| 15 | DEF level | | DEF level. |

### 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. |
| 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. |

| No. | Referent | Symbol | Description |
|---|---|---|---|
| 14 | High engine oil temperature |  | The engine oil temperature is high. |
| 15 | DEF level | | DEF level. |

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

## 1.3 Alarms and protections

| AC protections | Alarms | ANSI | Operate time |
|---|---|---|---|
| Reverse power | 2 | 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 |
| Unbalanced voltage | 1 | 47 | <200 ms |
| Unbalanced 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 | 3 | 81U | <50 ms |
| Emergency stop | 1 | | <200 ms |
| Low auxiliary supply | 1 | 27DC | |
| High auxiliary supply | 1 | 59DC | |
| Generator breaker external trip | 1 | | |
| Tie breaker external trip | 1 | | |
| Breaker open failure | 1/breaker | 52BF | |
| Breaker close failure | 1/breaker | 52BF | |
| Breaker position failure | 1/breaker | 52BF | |
| Phase sequence error | 1 | 47 | |
| Hz/V failure | 1 | | |
| Not in remote | 1 | | |

| 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 | - | |

## 1.4 Compatible products

### 1.4.1 Additional inputs and outputs

iE 150 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 governor and AVR regulation, or general PID control. See www.deif.com/products/iom-200230

### 1.4.2 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.

### 1.4.3 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.

### 1.4.4 Shutdown unit, SDU 104

The SDU 104 is a safety device for the protection of engines. The unit keeps the engine running if the main controller fails. The unit can also safely shut down the engine.

See www.deif.com/products/sdu-104

### 1.4.5 Other equipment

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

- **Synchroscopes**
  - **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)

## 1.4.6 Controller types

### LAND variants

| Parameter | Setting | Controller type | Minimum software |
|---|---|---|---|
| 9101 | Genset unit | Generator Stand-alone controller | S1 |
| | Genset unit | Generator controller | S2 |
| | Mains unit | Mains controller | S2 |
| | Bus Tie Breaker unit | BTB controller | S2 |
| | Genset Hybrid unit | Genset-Solar hybrid controller | S2 |
| | Engine Drive unit | Engine drive controller | S1 |
| | Remote display unit | Remote display | None |
| | Battery unit | Battery storage controller | S4 + S10 |
| | Solar unit | Solar controller | S4 + S10 |
| | ATS unit | Automatic transfer switch (open transition) | S1 |
| | ATS unit | Automatic transfer switch (closed transition) | S2 |
| | Genset PMS lite unit | PMS lite controller | S2 |

### MARINE variants

| Parameter | Setting | Controller type | Minimum software |
|---|---|---|---|
| 9101 | Engine Drive Marine unit | Engine drive controller for marine use | S1 |
| | Genset Marine unit | Core (stand-alone) genset controller for marine use | S1 |
| | Genset Marine unit | Genset controller for marine use | S2 |
| | Shore Marine unit | Shore controller for marine use | S2 |
| | BTB Marine unit | BTB controller for marine use | S2 |
| | Battery Marine unit | Battery controller for marine use | S4 + S10 |
| | Solar Marine unit | Solar controller for marine use | S4 + S10 |

### Software packages and controller types

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

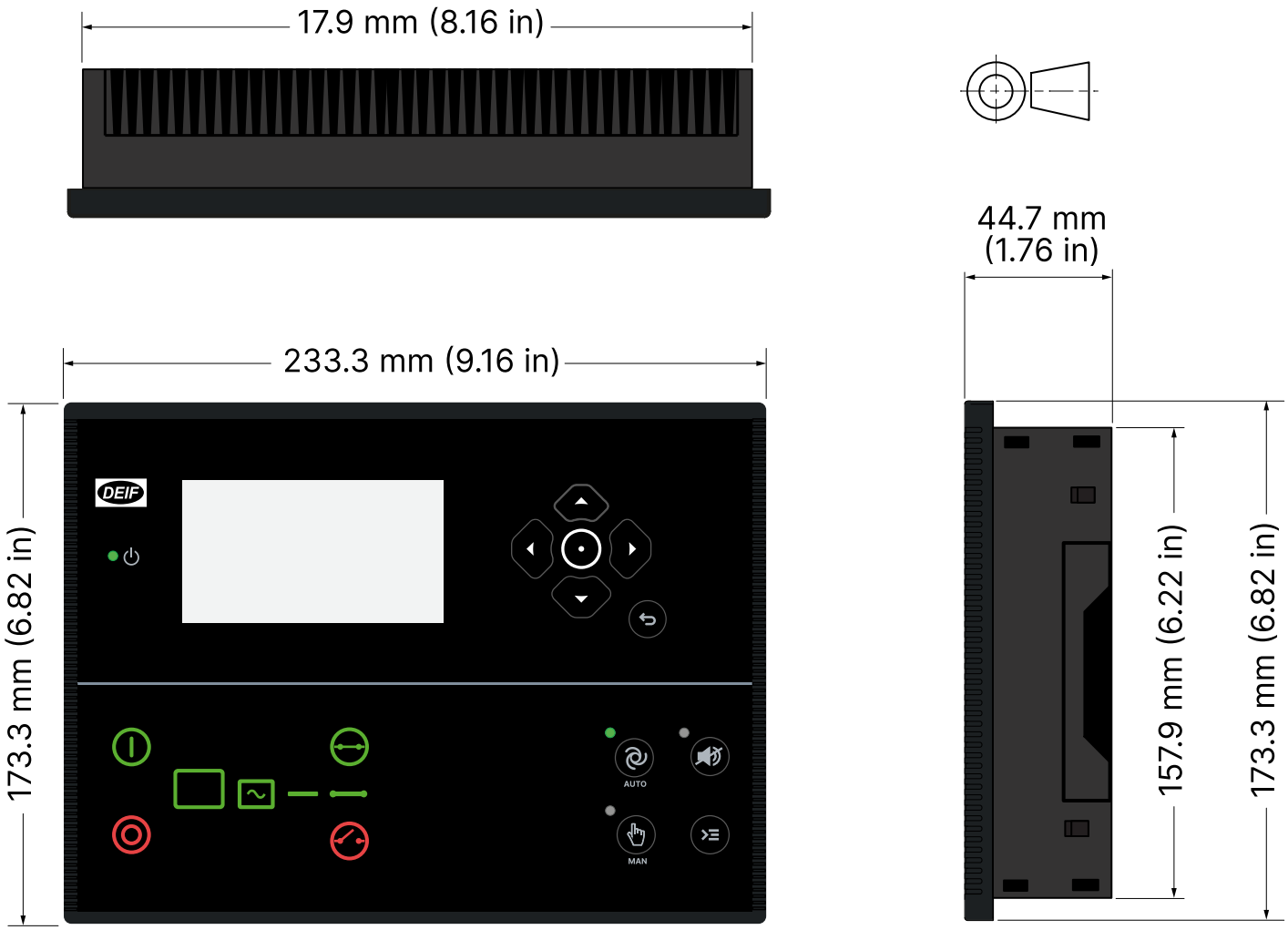
- S1 = Core
  - You can change the controller type to any other controller that uses S1.
- S2 = Sync
  - You cannot change the controller type.
- S4 = PM (power management)

    - You cannot change the controller type.
- S4 + S10 = 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`.

# 2. Technical specifications

## 2.1 Dimensions




| Dimensions and weight | |
|---|---|
| Dimensions | Length: 233.3 mm (9.16 in)<br>Height: 173.3 mm (6.82 in)<br>Depth: 44.7 mm (1.76 in) |
| Panel cutout | Length: 218.5 mm (8.60 in)<br>Height: 158.5 mm (6.24 in)<br>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<br>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:<br>• 10 to 58.1 Hz, 0.15 mmpp |

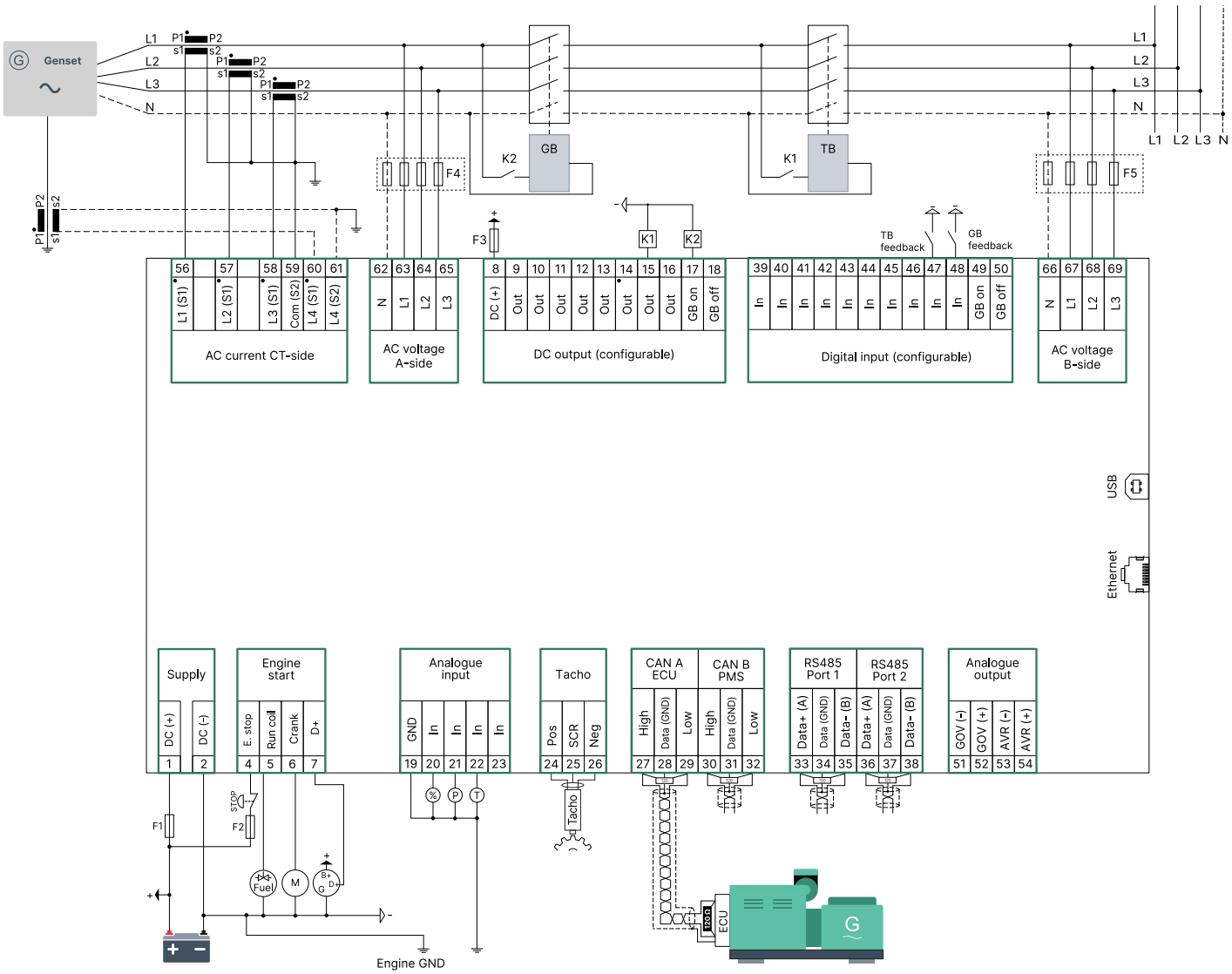
| Operation conditions | |
|---|---|
| | • 58.1 to 150 Hz, 1 *g*. To IEC 60255-21-1 (Class 2)<br>Endurance:<br>• 10 to 150 Hz, 2 *g*. To IEC 60255-21-1 (Class 2)<br>Seismic vibration:<br>• 3 to 8.15 Hz, 15 mmpp<br>• 8.15 to 35 Hz, 2 *g*. To IEC 60255-21-3 (Class 2) |
| Shock | 10 *g*, 11 ms, half sine. To IEC 60255-21-2 Response (Class 2)<br>30 *g*, 11 ms, half sine. To IEC 60255-21-2 Withstand (Class 2)<br>50 *g*, 11 ms, half sine. To IEC 60068-2-27, test Ea<br>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)<br>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<br>RS-485 port 1: 550 V, 50 Hz, 1 minute<br>Ethernet: 550 V, 50 Hz, 1 minute<br>Analogue output 51-52 (GOV): 550 V, 50 Hz, 1 minute<br>Analogue output 54-55 (AVR): 3000 V, 50 Hz, 1 minute<br>Note: No galvanic separation on CAN port 1 (CAN A) and RS-485 port 2 |
| Safety | Installation CAT. III 600 V<br>Pollution degree 2<br>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<br>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<br>• IP65 (front of module when installed into the control panel with the supplied sealing gasket)<br>• IP20 on terminal side |

# 2.4 Controller

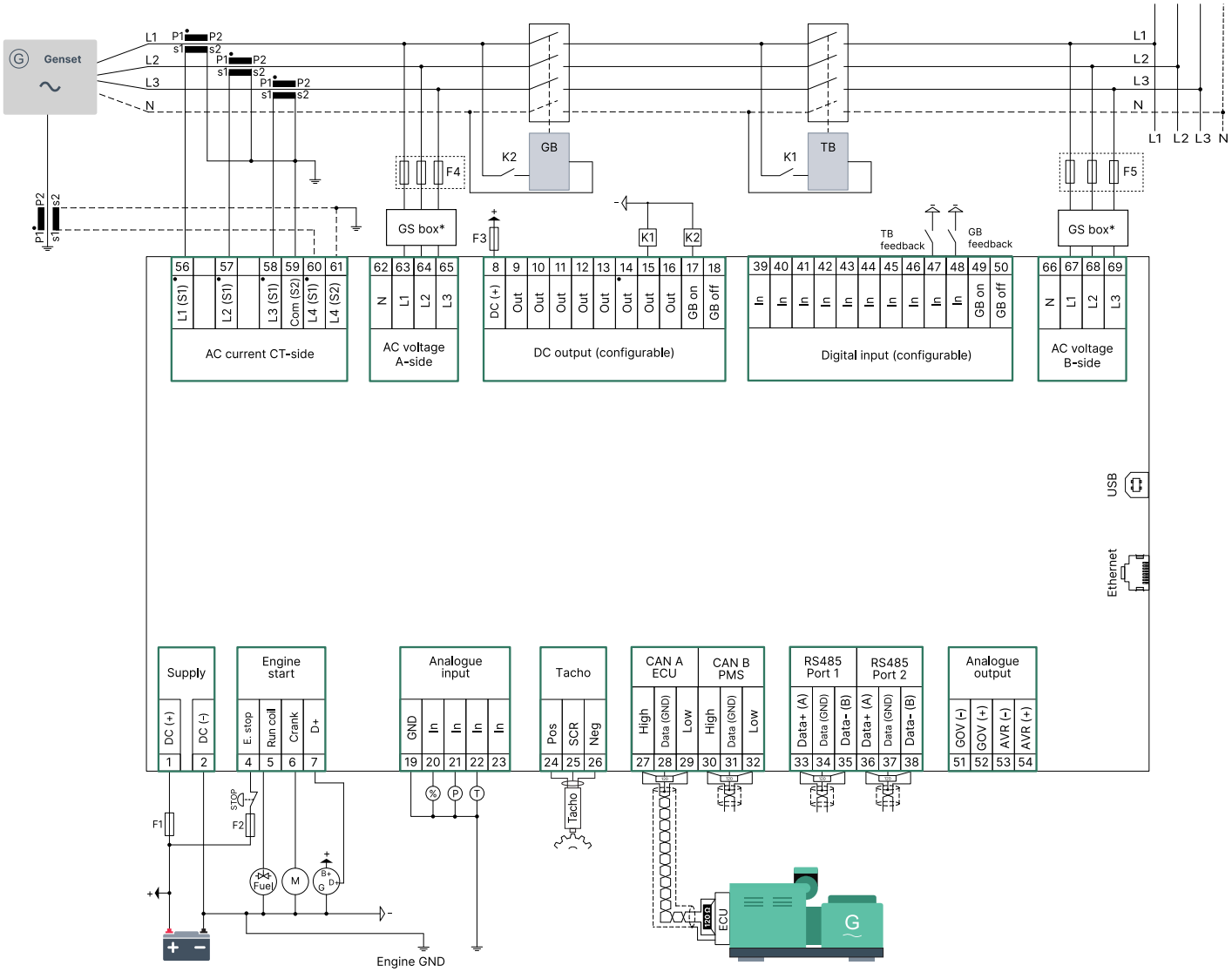
## 2.4.1 Typical wiring for stand-alone marine controller




### 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

**Typical wiring for stand-alone marine controller with GS-box for galvanic separation**




**NOTE** * One GS-box provides galvanic separation for both sets of voltage measurements.

See previous diagram for fuse information.

## 2.4.2 Electrical specifications

| Power supply | |
|---|---|
| Power supply range | Nominal voltage: 12 V DC or 24 V DC<br>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 load dump protection | Load dump protected according to ISO16750-2 test A |
| Power consumption | 5 W typical<br>12 W max. |
| RTC clock | Time and date backup |

| Supply voltage monitoring | |
|---|---|
| Measuring range | 0 V to 36 V DC |

| Supply voltage monitoring | |
|---|---|
| | 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<br>Measuring range of nominal: 10 to 135 %<br>Low range, nominal 100 to 260 V: 10 to 351 V AC phase-to-phase<br>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<br>+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<br>±0.05 Hz within 10 to 60 % of nominal voltage |
| Input impedance | 4 MΩ/phase-to-ground, and 600 kΩ phase/neutral |

| Current measurement | |
|---|---|
| Current range | Nominal: -/1 A and -/5 A<br>Range: 2 to 300 % |
| Number of CT input | 4 |
| Max. measured current | 3 A (-/1 A)<br>15 A (-/5 A) |
| Current withstand | 7 A continuous<br>20 A for 10 seconds<br>40 A for 1 second |
| Current accuracy | From 10 to 75 Hz:<br>• ±1 % of nominal from 2 to 100% current<br>• ±1 % of measured current from 100 to 300 % current<br>From 3.5 to 10 Hz:<br>• +1/-4 % of nominal from 2 to 100 % current<br>• +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<br>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<br>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)<br>15 A DC inrush and 3 A continuous, supply voltage 0 to 36 V DC<br>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<br>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:<br>• Negative switching digital input<br>• 0 V to 10 V sensor<br>• 4 mA to 20 mA sensor<br>• 0 Ω to 2.5 kΩ sensor |
| Accuracy | Current:<br>• Accuracy: ±20 uA ±1.00 % rdg<br>Voltage:<br>• Range: 0 to 10 V DC<br>• Accuracy: ±20 mV ±1.00 % rdg<br>RMI 2-wire LOW:<br>• Range: 0 to 800 Ω<br>• Accuracy: ±2 Ω ±1.00 % rdg<br>RMI 2-wire HIGH:<br>• Range: 0 to 2500 Ω<br>• 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 |

| Voltage regulator output | |
|---|---|
| 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<br>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 these in a daisy chain (and operate them at the same time):<br>• Engine CAN Port<br>• CIO 116, CIO 208, and CIO 308<br>Data connection 2-wire + common, or 3-wire<br>Not isolated<br>External termination required (120 Ω + matching cable)<br>DEIF engine specification (J1939 + CANopen) |
| CAN B | Used for: AOP-2<br>Data connection 2-wire + common, or 3-wire<br>Isolated<br>External termination required (120 Ω + matching cable)<br>PMS 125 kbit and 250 kbit |
| RS-485 Port 1 | Used for: Modbus RTU, PLC, SCADA, Remote monitoring (Insight)<br>Data connection 2-wire + common, or 3-wire<br>Isolated<br>External termination required (120 Ω + matching cable)<br>9600 to 115200 |
| RS-485 Port 2 | Used for: Modbus RTU, PLC, SCADA, Remote monitoring (Insight)<br>Data connection 2-wire + common, or 3-wire<br>Not isolated |

| Communication | |
|---|---|
| | External termination required (120 Ω + matching cable)<br>9600 to 115200 |
| RJ45 Ethernet | Used for:<br>• Modbus to PLC, SCADA, and so on<br>• NTP time synchronisation with NTP servers<br>• PC utility software<br>Isolated<br>Auto detecting 10/100 Mbit Ethernet port |
| USB | Service port (USB-B) |

## 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<br>Unventilated/ventilated with filters for controlled/pollution degree 2 environment |
| Mounting | Flat surface mounting |
| Connections | Use 90 °C copper conductors only |
| 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 |

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