iE 150 Marine

4921240680C

Generator, Shore, and BTB

Data sheet

Improve Tomorrow

6. Legal information

1. iE 150 Marine Generator, Shore, and BTB

1.1 About the controllers

1.1.1 About the controller types

The iE 150 Marine controllers provide reliable asset control and power/energy management on pleasure crafts and non-ocean going vessels, for example, tugs, workboats, crew boats, and riverboats. Several iE 150 Marine controllers can work together to make a power management system (PMS).

The iE 150 Marine is a compact, all-in-one controller. Each controller 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 gensets and breakers from the display. Alternatively, use the communication options to connect to an HMI/SCADA system. The HMI/SCADA system can then control the system.

Controller type	Controls and protects
iE 150 Marine Generator	An engine, a generator, and a generator breaker.
iE 150 Marine Shore	The system and a shore connection breaker, when a shore connection is connected.
iE 150 Marine BTB	A bus tie breaker.

You can have up to seven controllers in your energy/power management system: two generator controllers, two BTB controllers, one shore connection controller, and two sustainable controllers (storage or solar).

1.1.2 Software versions

The information in this document relates to software version:

Software	Details	Version
iE 150	Controller application	1.32.0

1.1.3 Emulation

iE 150 includes an emulation tool to verify and test the functionality of the application, for example breaker handling, shore and generator operation. Application emulation is useful for training, customising system requirements and for testing basic functionality that needs to be set up or verified.

In a power management system it is possible to control the entire system, when connected to just one of the controllers.

1.1.4 Easy configuration with the utility software

Set up an application easily with a PC and the utility software. This includes shore connection handling and operation of the generators.

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

1.2 Functions and features

1.2.1 General controller functions

AC functions	Power management
Sets of nominal settings	4
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) • Emergency busbar current • Neutral current (1 × true RMS) • Ground current (with 3rd harmonic filter)	●

General functions	Power management
Emulation for testing and front load commissioning	●
Built-in test sequences (Engine test, Load test, and Full test) for stand-alone emergency generator	●
PLC logic (M-Logic)	20 lines
Counters, including: • Breaker operations • kWh meter (day, week, month, total) • kvarh meter (day, week, month, total)	●
General purpose PID regulators (2 x built-in analogue outputs)	●
Simple load shedding and adding	●
Blackout prevention and recovery	●
Configure and connect an AOP-2 (additional operator panel)	●

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

Display and language functions	Power management
Supports multiple languages (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	●
2 engine function shortcuts	●

Display and language functions	Power management
20 configurable shortcut buttons	●
5 configurable display screen "LED lamps" (on/off/blink)	●

Modbus functions	Power management
Modbus RS-485	●
Modbus TCP/IP	●
Configurable Modbus area	●

1.3 Alarms and protections

Protections	Alarms	ANSI	Operate time	Genset*	Shore	BTB
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	●	●	●
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	●	●	●
Busbar/shore over-voltage	3	59P	<50 ms	●	●	●
Busbar/shore under-voltage	4	27P	<50 ms	●	●	●
Busbar/shore over-frequency	3	81O	<50 ms	●	●	●
Busbar/shore 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			●		
Shore breaker external trip	1				●	
Synchronisation failure alarms	1/breaker			●	●	●
Breaker open failure	1/breaker	52BF		●	●	●
Breaker close failure	1/breaker	52BF		●	●	●
Breaker position failure	1/breaker	52BF		●	●	●
Phase sequence error	1	47		●	●	●
De-load error	1			●		
Hz/V failure	1			●		

Protections	Alarms	ANSI	Operate time	Genset*	Shore	BTB
Not in Auto	1			●	●	●
IEC/IEEE inverse time over-current	1	51		●	●	
Neutral inverse time over-current (4th CT)	1	51N		●	●	●
Earth fault inverse time over-current (4th CT)	1	51G		●	●	●
Neutral over-current (4th CT)	2			●	●	●
Earth fault over-current (4th CT)	2			●	●	●

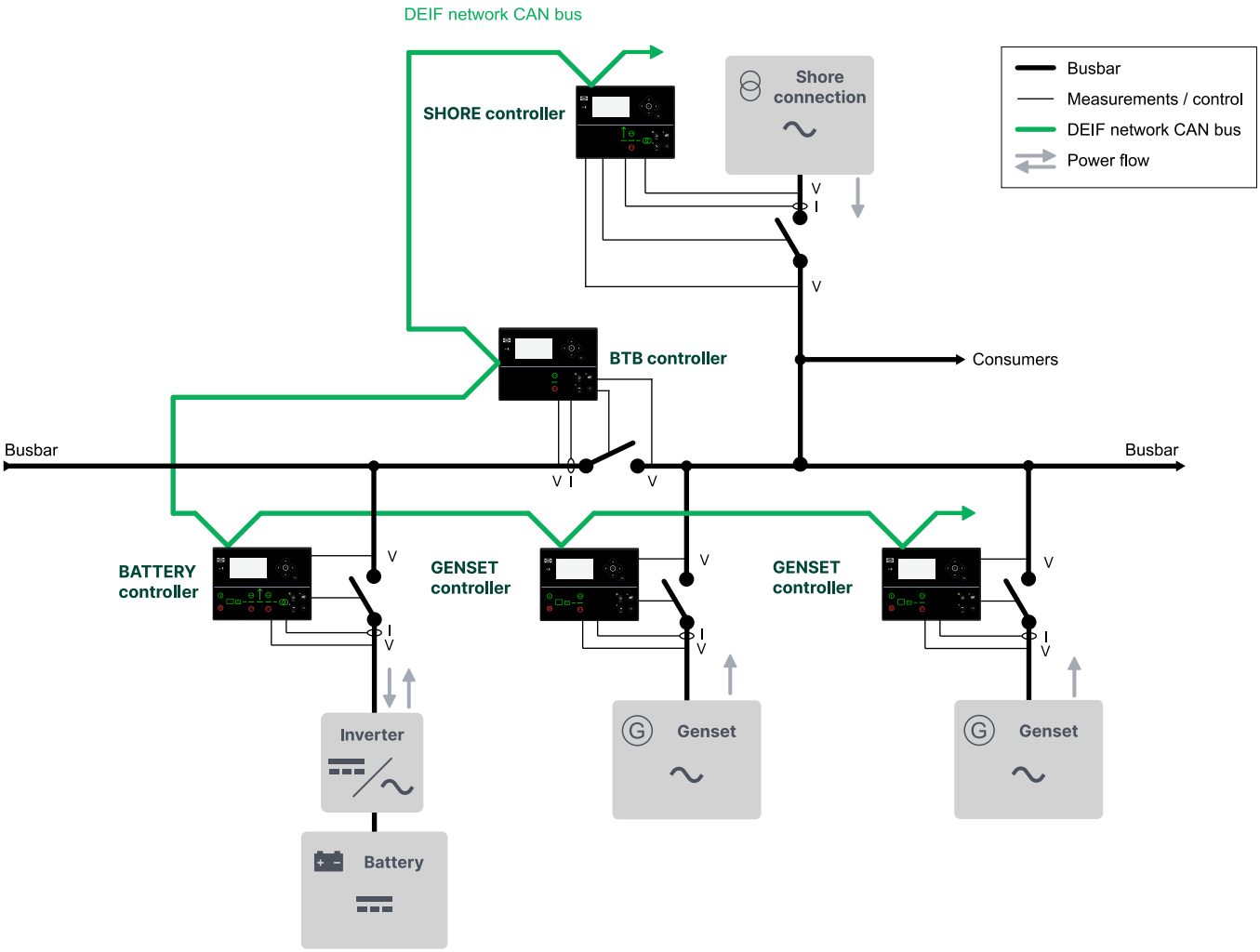
NOTE * See Generator controller functions for engine protections.
NOTE **You can configure these protections for overload or reverse power.

1.4 Applications

1.4.1 Power management applications

With power management, the controller can handle simple or advanced applications for a variety of marine and offshore industry projects. The controllers have the information that they need to automatically start, stop, connect and disconnect generators or a shore connection. See Power management for more information.

iE 150 Marine in power management with a battery controller



1.5 Power management

1.5.1 Introduction

The power management system automatically supplies the power that is necessary for the load efficiently, safely and reliably.

The power management system:

- Automatically starts and stops generators
- Automatically closes and opens breakers
- Optimises the fuel consumption
- Balances the loads in the system
- Prevents blackouts
- Makes sure that the system is safe

You can monitor the complete power management system from a graphical supervision page in the utility software. You can also see running status, hours in operation, breaker status, the condition of the busbars, and fuel consumption.

Multi-master system

The power management system is a multi-master system, for increased reliability. In a multi-master system all vital data is transmitted between the controllers, so that all the controller know the power management status (calculations and position) in the application. As a result, the application does not have a single master controller.

Busbar sections

The system can be divided by up to two bus tie breakers. This makes it possible to control one section of the busbar without affecting the other sections.

1.5.2 Power management features

Power management features	Power management
Power management operation: • Number of generator controllers • Number of shore controllers • Number of BTB controllers • Number of solar controllers • Number of storage (BESS) controllers	 2 1 2 2* 2*
Genset load-dependent start and stop	●
Secured mode	●
Genset priority selection: • Manual • Running hours	●
Safety stop of genset	●
PLC-controlled power management possible	●

NOTE * The iE 150 Solar and Battery controllers must have the Sustainability (S10) option. Select the Premium software, which has S10 included. You can have a maximum of two sustainable controllers in the system. For example, if you have two battery controllers in the system, you cannot add a solar controller. If you have one battery controller in your system, you can add another battery controller or a solar controller.

1.6 Compatible products

1.6.1 Power management

You can use these controllers together in a power management system:

- **iE 150 Marine Generator**
- **iE 150 Marine Shore**
- **iE 150 Marine BTB**
- **iE 150 Marine Battery**
- **iE 150 Marine Solar**

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 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

1.6.4 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.

1.6.5 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.

1.6.6 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

1.6.7 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)

1.6.8 Controller types

MARINE configurations

Parameter	Setting	Controller type	Minimum software package
9101	Engine Drive Marine unit	Engine drive controller for marine use	Core
	Genset Marine unit	Core genset controller for marine use	Core
	Genset Marine unit	Genset controller for marine use	Power management
	Shore Marine unit	Shore controller for marine use	Power management
	BTB Marine unit	BTB controller for marine use	Power management
	Battery Marine unit*	Battery controller for marine use	Premium
	Solar Marine unit*	Solar controller for marine use	Premium

Software packages and controller types

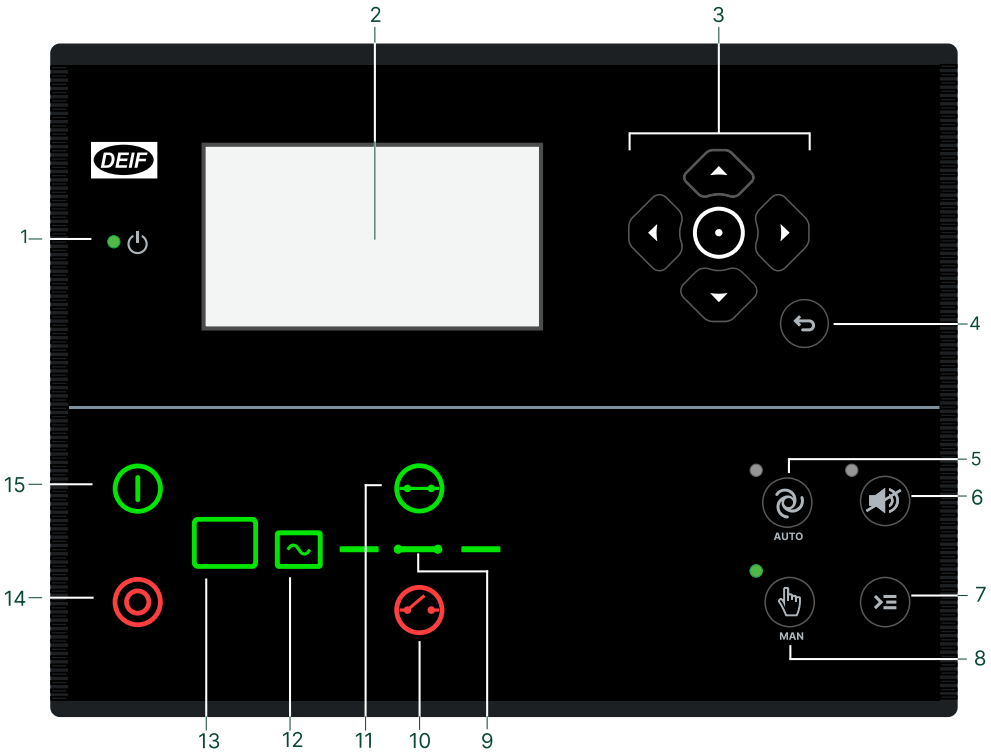
The controller software package determines which functions the controller can use.

- S1 = Core
- S4 = Power management (PM)
  - You cannot change the controller type to any other controller type.
- S4 + S10 = Premium
  - You can change the controller type to any other controller type.
  - All functions are supported.
  - * To change to an iE 150 Battery or iE 150 Solar, the controller must have the sustainability option (S10).

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

2. iE 150 Marine Generator controller

2.1 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 buttons	Move the selector up, down, left and right on the screen.
	Enter button	Confirms the selection
4	Back button	Go to the previous page.
5	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 Engine and General shortcuts, Jump menu, Mode selection, Test, Lamp test, First priority selection, Store common settings, and Regulator shortcut.
8	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.

No.	Name	Function
		Red: Breaker failure.
10	 Open breaker	Push to open the breaker.
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: The generator voltage is too low to measure.
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.

2.2 Generator controller functions

Genset functions

Synchronising functions	Power management
Synchronising (dynamic)	●
Synchronising (static)	●

Generator functions	Power management
Built-in analogue AVR control	●
Communication with KWG ISO5 isolation monitor (CAN bus)	●

4th current transformer measurement	Power management
High current alarms	2
High reverse alarms	2
High power alarms	2

Load sharing	Power management
Equal load sharing via power management	●

Engine functions

Start and stop functions	Power management
Engine start and stop sequences	●
Temperature-dependent cooling down	●
Time-based cooling down	●
Configurable crank and run coil	●

Regulation functions	Power management
Governor regulation using: • Engine communication • Built-in analogue control • 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	●
Derate engine	●
Ventilation fan control	●
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	Power management
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	●

2.3 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
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

Manufacturer	ECU	Engines	Tier 4/Stage V	iE 150 parameter 7561
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
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

Manufacturer	ECU	Engines	Tier 4/Stage V	iE 150 parameter 7561
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
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

Manufacturer	ECU	Engines	Tier 4/Stage V	iE 150 parameter 7561
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
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

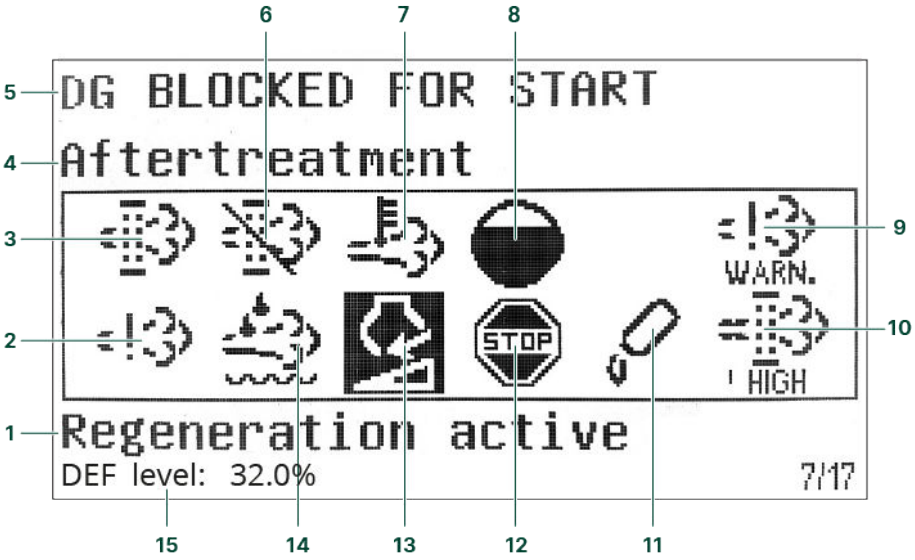
NOTE * Generic protocols are included for backward compatibility.
NOTE ** If supported by the ECU and engine.
NOTE *** Previously *Jichai*

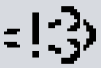
Other EIC protocols: Contact DEIF.

2.4 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.

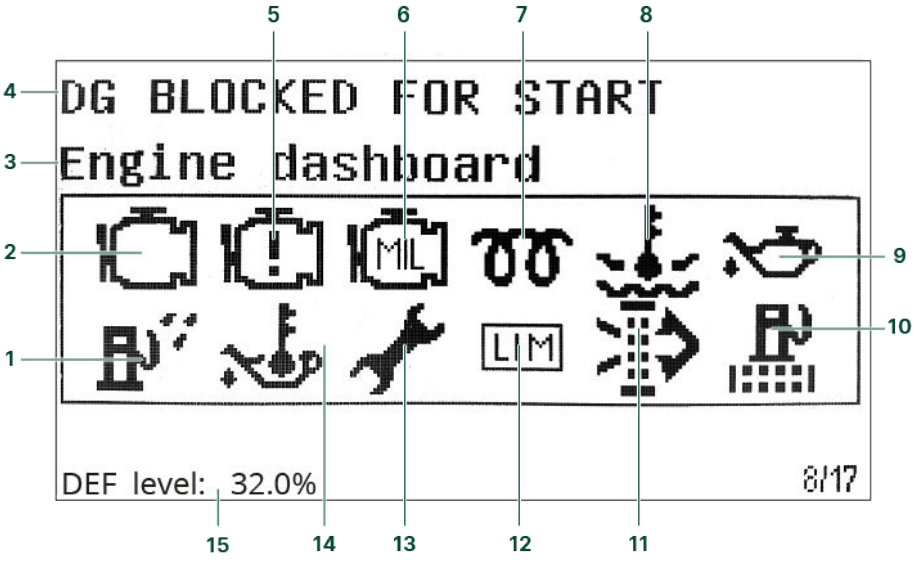
After-treatment page

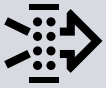


No.	Referent	Symbol	Description
1	After-treatment status	-	
2	Engine emission system failure		Emission failure or malfunction.
3	Diesel Particle Filter (DPF)		Regeneration is needed.
4	Page name	-	
5	Controller status	-	
6	Diesel Particle Filter (DPF) Inhibit		Regeneration is inhibited.
7	High temperature - 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.

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

Engine dashboard

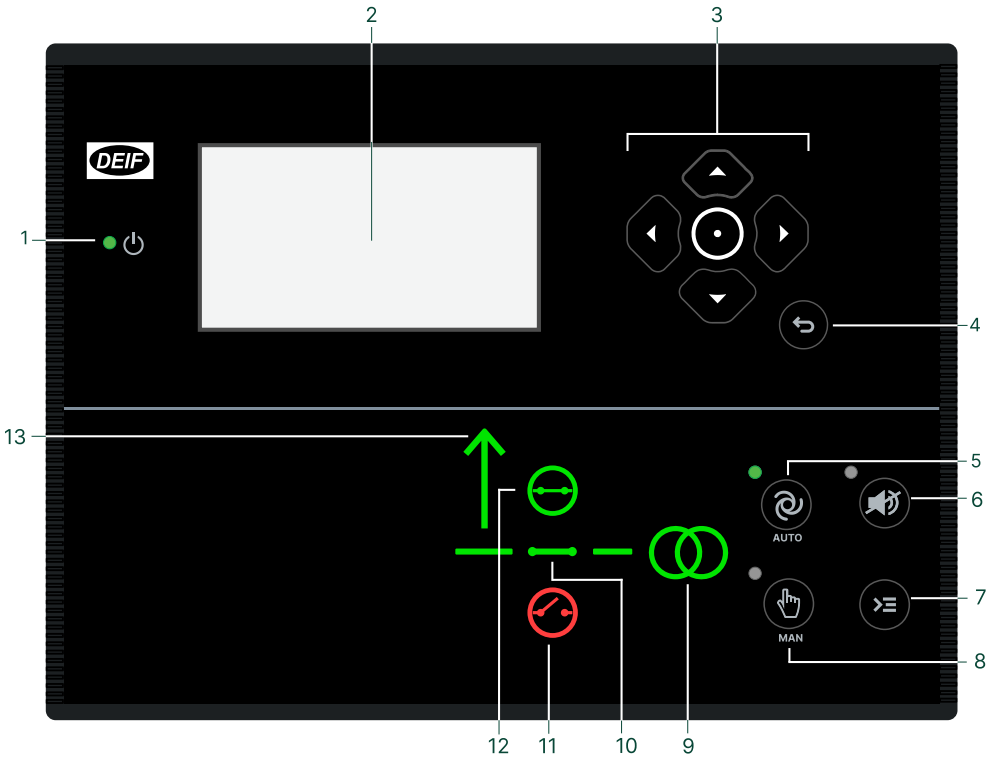


No.	Referent	Symbol	Description
1	Water in fuel		There is water in the fuel.
2	Engine interface status		An engine warning.
3	Page name	-	-
4	Controller status	-	
5	Engine interface status		An engine shutdown.
6	Engine interface status		An engine malfunction.
7	Cold start		The engine is cold.
8	High engine 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.
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.

3. iE 150 Marine Shore controller

3.1 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 buttons	Move the selector up, down, left and right on the screen.
	Enter button	Confirms the selection
4	Back button	Go to the previous page.
5	AUTO mode button	The controller automatically connects and disconnects the shore connection. No operator actions are needed. The controllers use the power management configuration to automatically select the power management action.
6	Silence horn button	Stops an alarm horn (if configured) and enters the Alarm menu.
7	Shortcut menu button	Access the General shortcuts, Jump menu, Mode selection, Test, and Lamp test.
8	Manual mode button	The operator or an external signal can connect or disconnect the shore connection. The shore controller cannot automatically connect or disconnect the shore connection. The controller automatically synchronises before closing a breaker, and automatically deloads before opening a breaker.
9	Shore symbol	Green: The voltage and frequency are OK. The controller can synchronise and close the breaker.

No.	Name	Function
		Red: Shore connection failure.
10	Breaker symbols	Green: Breaker is closed. Green flashing: Synchronising or deloading. Red: Breaker failure.
11	 Open breaker	Push to open the breaker.
12	 Close breaker	Push to close the breaker.
13	Load symbol	OFF: Power management application. Green: The supply voltage and frequency are OK. Red: Supply voltage/frequency failure.

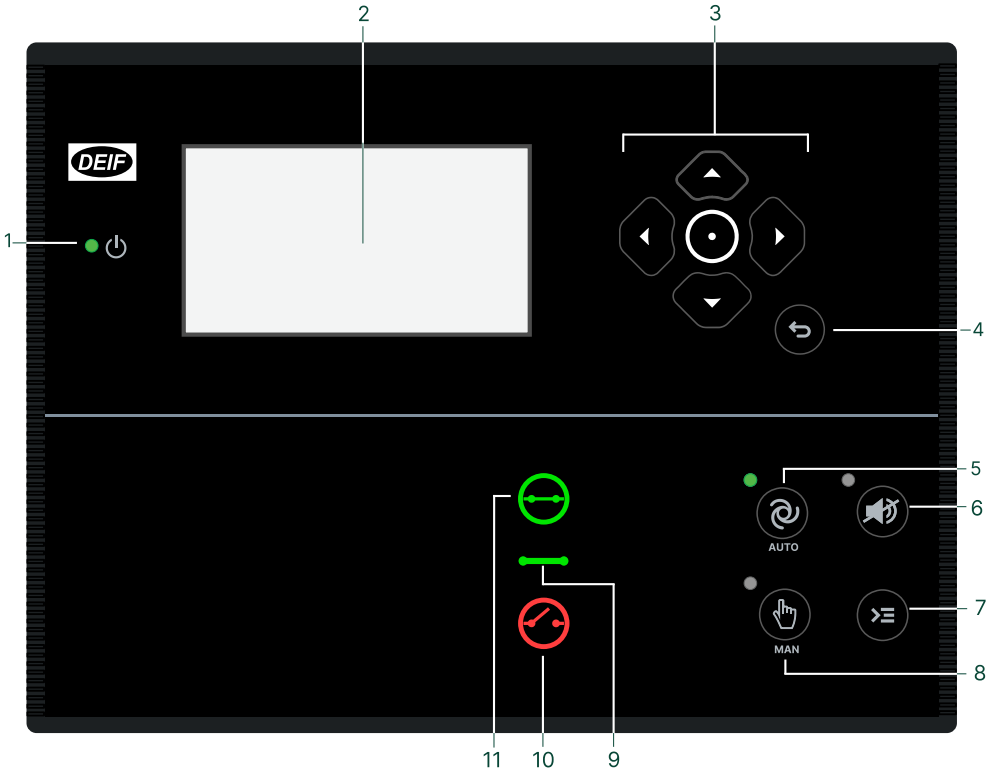
3.2 Shore controller functions

Synchronising functions
Synchronising (dynamic)
Synchronising (static)

Shore functions
Shore current (3 × true RMS)
Shore/busbar voltage (3-phase/4-wire)
Phase angle compensation generator/busbar/shore synchronising over a transformer
ATS control
Load management

4. iE 150 Marine BTB controller

4.1 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 buttons	Move the selector up, down, left and right on the screen.
	Enter button	Confirms the selection
4	Back button	Go to the previous page.
5	AUTO mode button	The controller automatically joins and splits the busbar. No operator actions are needed. The controllers use the power management configuration to automatically select the power management action.
6	Silence horn button	Stops an alarm horn (if configured) and enters the Alarm menu.
7	Shortcut menu button	Access the General shortcuts, Jump menu, and Lamp test.
8	Manual mode button	The operator or an external signal can join or split the busbar. The BTB controller cannot automatically join or split the busbar. 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.

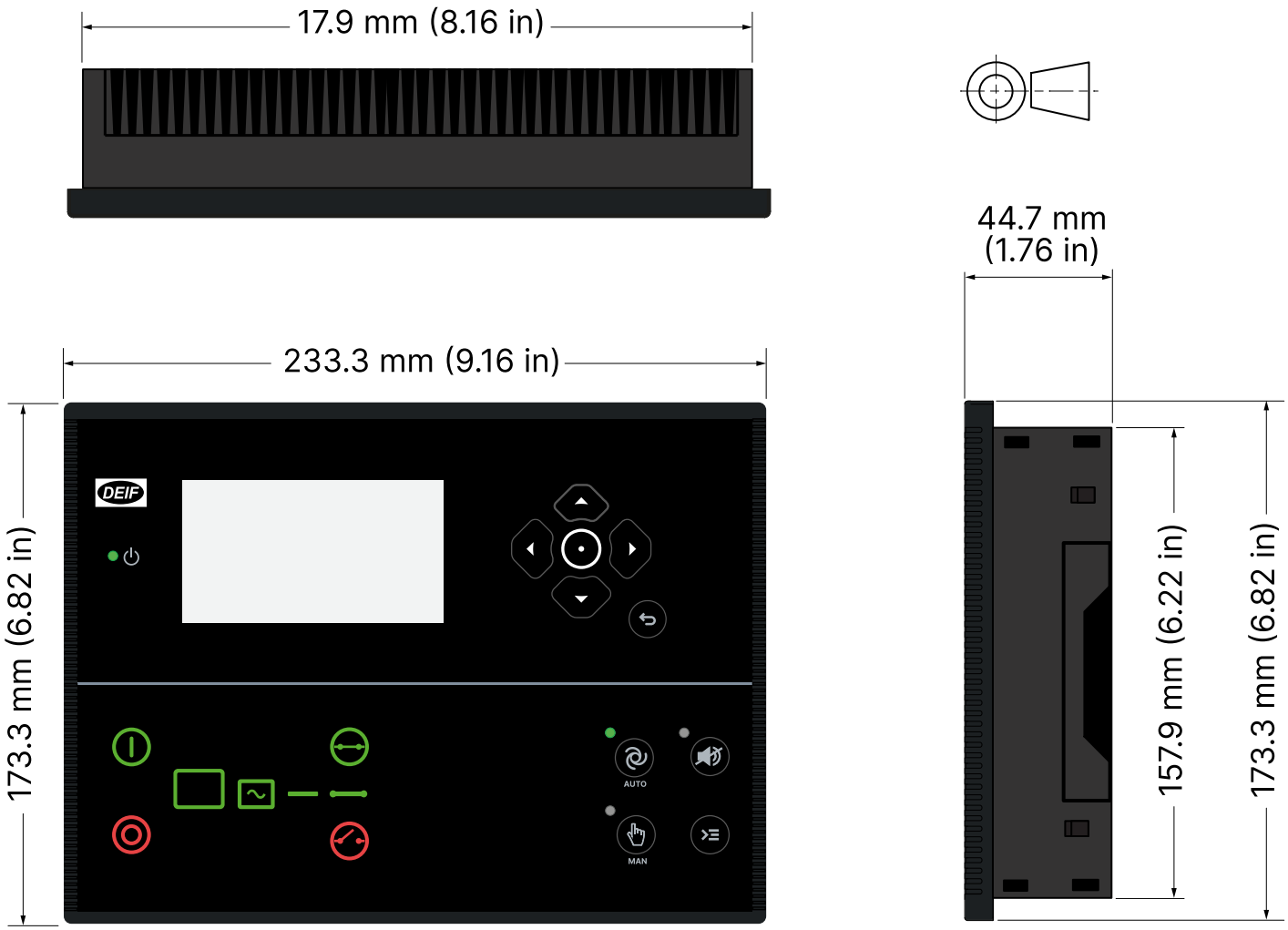
No.	Name	Function
		Red: Breaker failure.
10	 Open breaker	Push to open the breaker.
11	 Close breaker	Push to close the breaker.

4.2 BTB controller functions

BTB controller functions
Synchronising
Section power control
Phase angle compensation generator/busbar/shore synchronising over a transformer

5. Technical specifications

5.1 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

5.2 Mechanical specifications

Operation conditions	
Vibration	Response: • 10 to 58.1 Hz, 0.15 mmpp

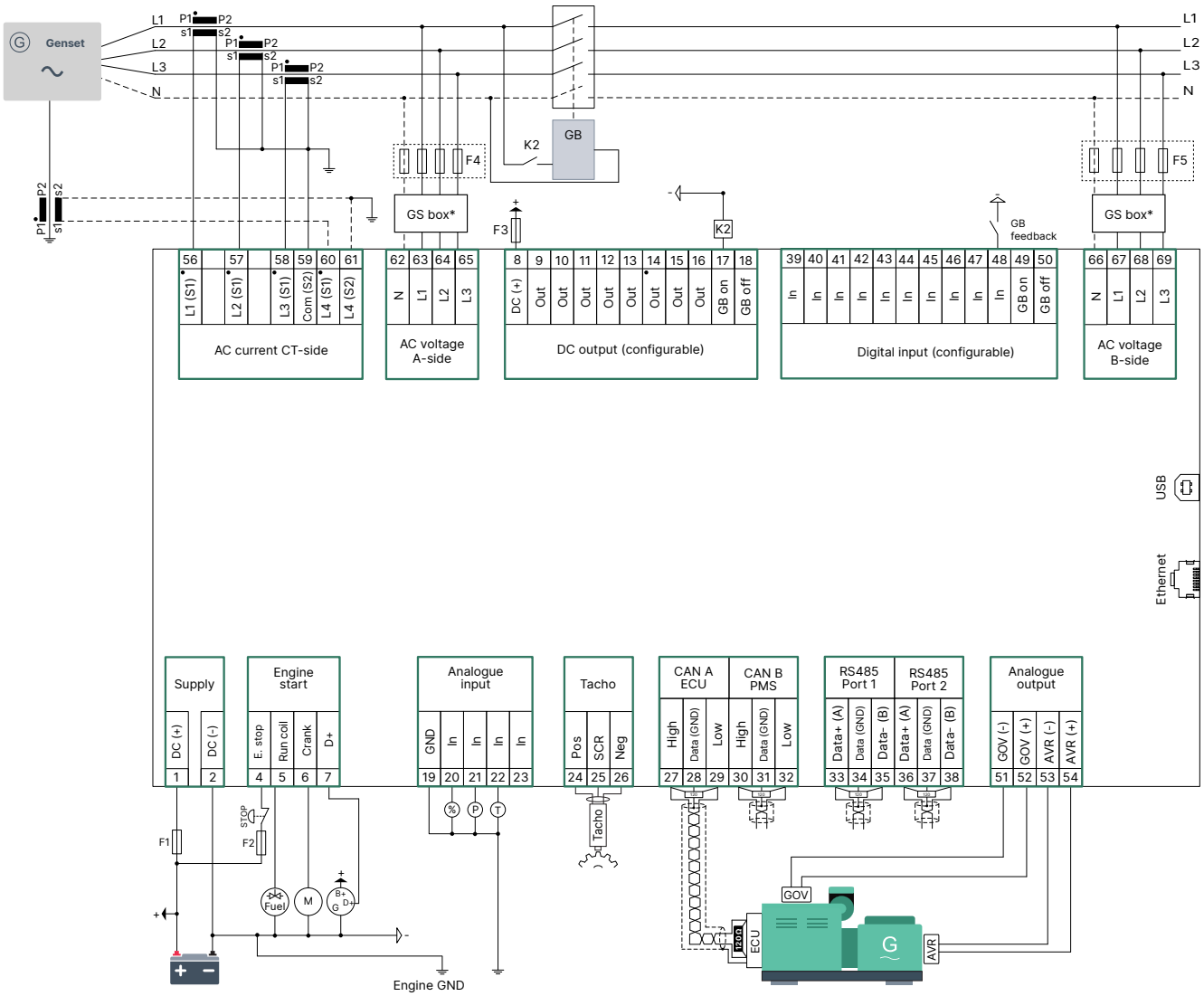
Operation conditions	
	• 58.1 to 150 Hz, 1 *g*. To IEC 60255-21-1 (Class 2) Endurance: • 10 to 150 Hz, 2 *g*. To IEC 60255-21-1 (Class 2) Seismic vibration: • 3 to 8.15 Hz, 15 mmpp • 8.15 to 35 Hz, 2 *g*. To IEC 60255-21-3 (Class 2)
Shock	10 *g*, 11 ms, half sine. To IEC 60255-21-2 Response (Class 2) 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

5.3 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

5.4 Controller

5.4.1 Typical wiring for generator controller

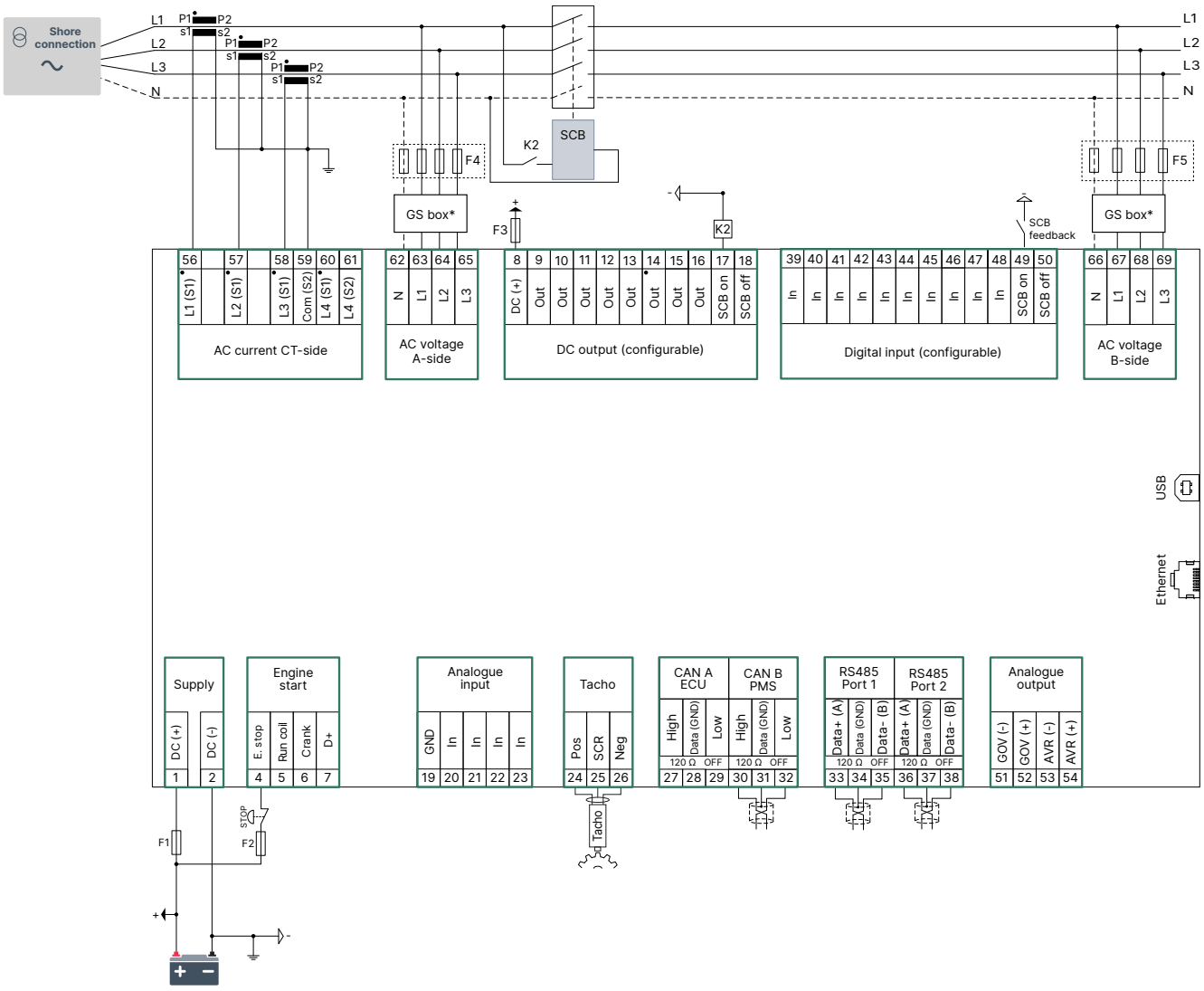


NOTE * One GS box provides galvanic separation for both sets of voltage measurements.

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

5.4.2 Typical wiring for shore controller

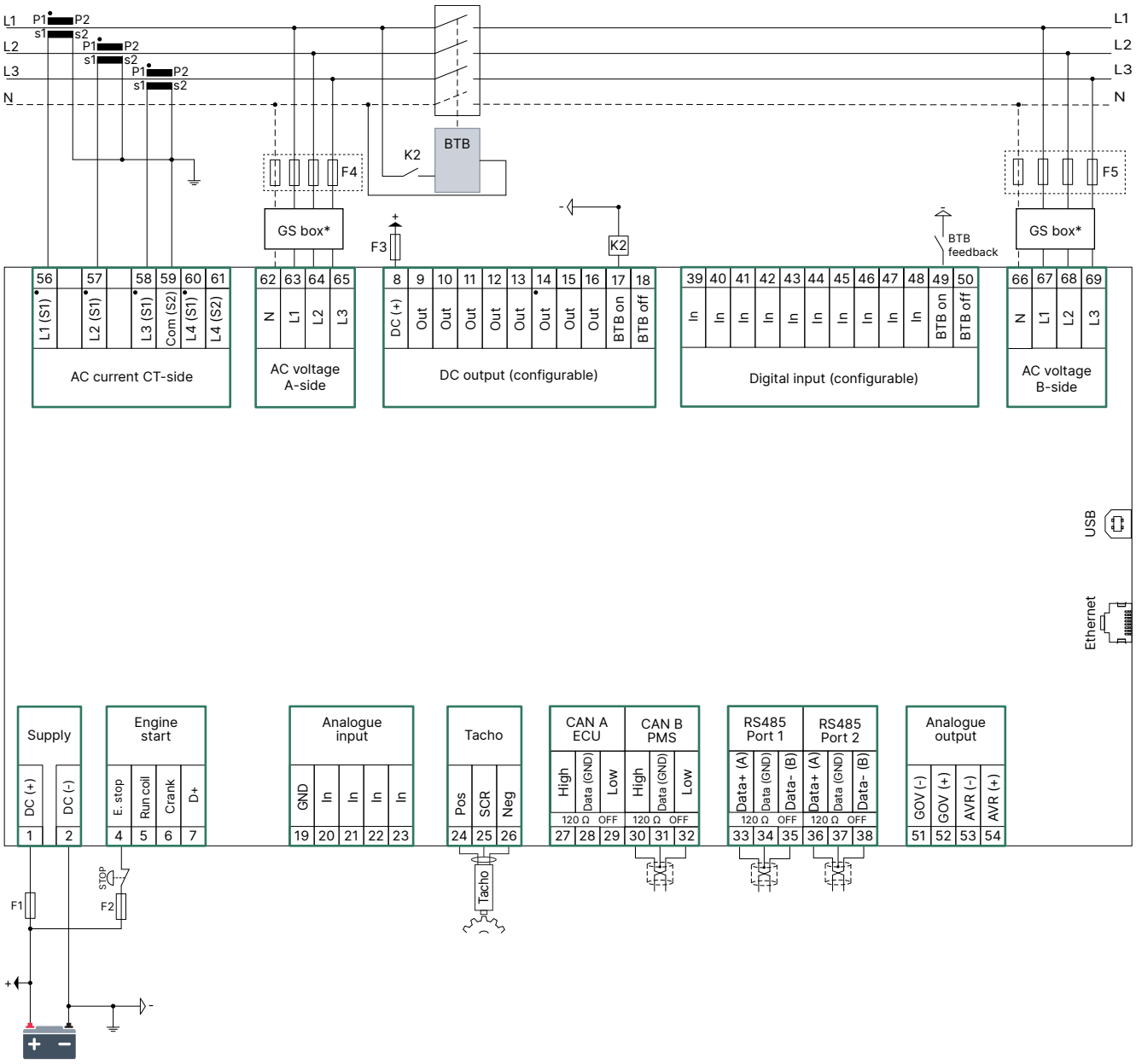


NOTE * One GS box provides galvanic separation for both sets of voltage measurements.

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

5.4.3 Typical wiring for BTB controller



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

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

5.4.4 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 load dump protection	Load dump protected according to ISO16750-2 test A

Power supply	
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 MΩ/phase-to-ground, and 600 kΩ 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

5.4.5 Communication specifications

Communication	
CAN A	You can connect these in a daisy chain (and operate them at the same time): • Engine CAN Port • CIO 116, CIO 208, and CIO 308 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 one of these: • Power management • CANshare • AOP-2 Data connection 2-wire + common, or 3-wire Isolated External termination required (120 Ω + matching cable) PMS 125 kbit and 250 kbit

Communication	
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 • Backup power management system (PMS) communication between controllers • NTP time synchronisation with NTP servers • PC utility software Isolated Auto detecting 10/100 Mbit Ethernet port
USB	Service port (USB-B)

5.5 Approvals

Standards
CE
Pending: DNV approval

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

5.5.1 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
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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