DEIF A/S

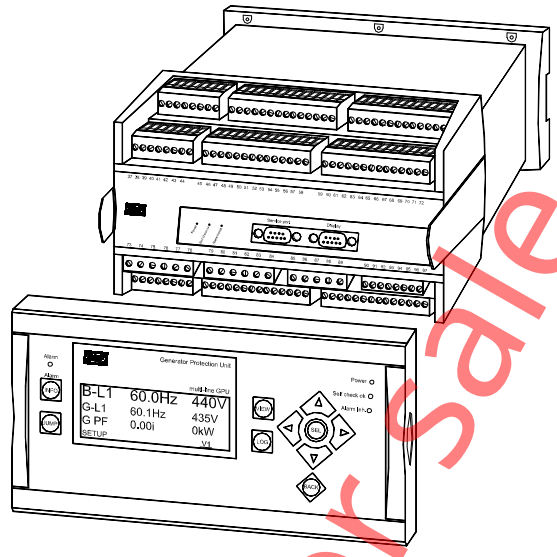
Data sheet

Generator Protection Unit

Multi-line 2

4921240312F

SW version 2.4X.X



CE

Standard functions

Applications

- Generator protection

Functions

- 2 sets of alarm set points
- Alarm inhibit, automatic
- Horn relay
- Language selection
- kWh/kVArh outputs

Protections (ANSI)

- Reverse power (32)
- Overcurrent, 2 levels (51)
- Overcurrent, inverse, 1 level (51)

Display

- Separate mounting
- Easy to read
- Password-protected setup
- Configurable views
- Alarm list
- Event log (150 events)

Measuring system

- 3-phase true RMS
- Galvanically isolated voltage and current inputs
- -/1 or -/5A AC
- 100-25000V AC

GSM communication

- SMS messages at all alarms
- Dial up from PC utility software to control unit

Approvals

- Major marine societies
- Netmanagement
- TÜV Nord
- GOST-R
- UL

Application

The GPU generator protection unit is a compact microprocessor-based protection unit containing all functions necessary to protect a synchronous/ asynchronous generator. It contains all necessary galvanically separated 3-phase measuring circuits.

The GPU is intended to be used on land-based applications as well as marine applications.

Netmanagement and TÜV software must be specified upon ordering.

Display unit

The display unit is separate and can be installed directly on the main unit or in the front of the switchboard door (requires option J# - display cable).

The display unit shows all measured and calculated values as well as alarms and data from the event log.

The displayed values can be configured freely in order to match the customer or application specific requirements.

Self-test

The GPU automatically carries out a cyclical self-test at start-up. If any errors are found, they will be displayed in clear text in the display and indicated with a relay output.

Setup

Setup is easily done via a menu structure in the display (password-protected) or via the RS232 PC connection and the multi-line 2 Windows® based PC utility software. The PC utility software can be downloaded free of charge from www.deif.com. The utility software offers additional features such as monitoring of all relevant information during commissioning, saving and downloading of settings and downloading of software updates.

Options

In order to perfectly match the product solution to specific applications, the functionality of the GPU can be equipped with a number of available options. The options selected by the customer will be integrated in the standard GPU, thus securing the same user interface unaffected by whether the application needs a highly complex or a more basic generator controller.

Synchronising option

The GPU can be used for synchronising a circuit breaker. The speed and voltage set point is controlled by the GPU through relay outputs.

The GPU is only used as synchroniser. After the synchronising, the regulation is switched off but the protection is still active.

AVR control requires option D2.

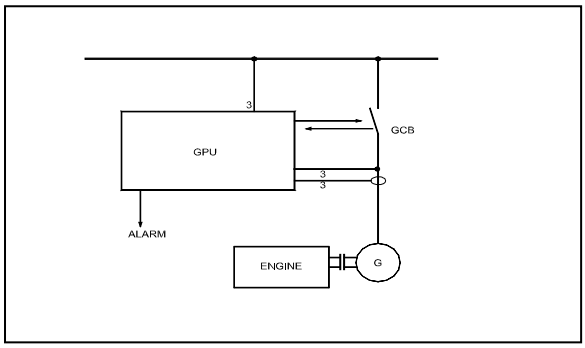
Approvals

The GPU is approved by the following societies and companies:

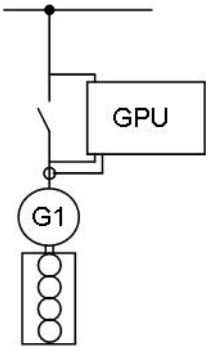
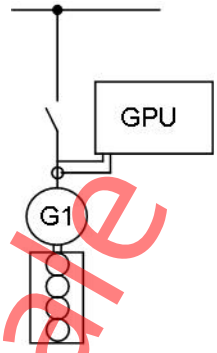
Marine	Land	Other
ABS		GOST-R
BV	Netmanagement	UL
DNV	TÜV Nord	
GL		
LR		
RINA		
RS		

Please refer to www.deif.com for details and certificates.

Principle diagram



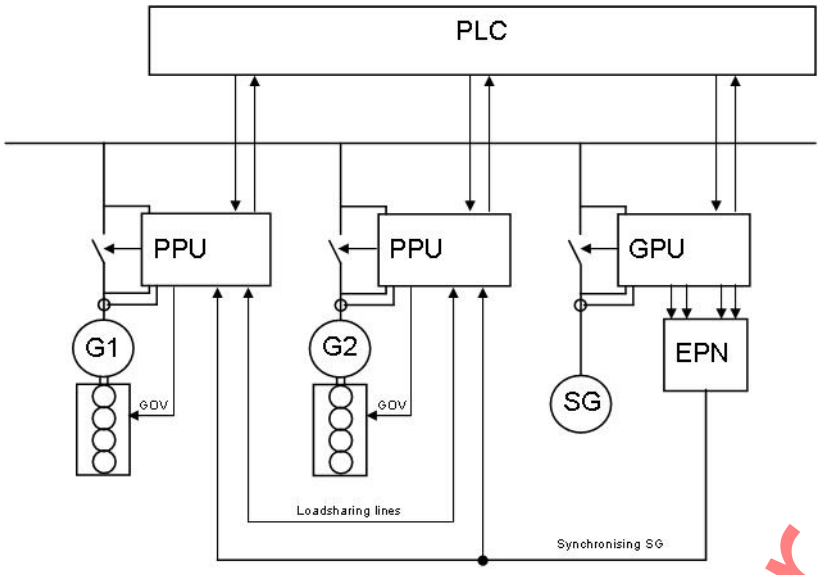
Single line application diagrams

Standard	
Generator protection	***Generator protection***
	

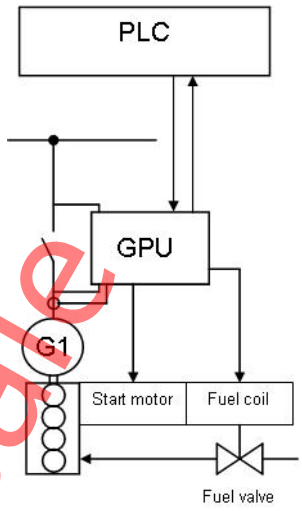
Overcurrent and reverse power alarms are standard.

Optional/PLC controlled

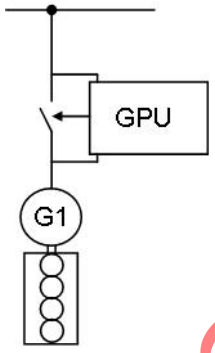
PLC controlled system



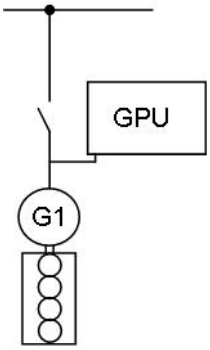
PLC controlled system with start/stop



Generator protection/synchronising



Generator protection



The GPU can be used in simple or complex applications. The above shows very simple applications only.

Available options

Please notice that not all options can be selected for the same unit. Please refer to page 7 in this data sheet for further information about the location of the options in the unit.

Option	Description	Type	Note
A	**Loss of mains protection package**		
A1	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** Vector jump **(78)** df/dt (ROCOF) **(81)**	Software option	
A2	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** df/dt (ROCOF) **(81)**	Software option	
A3	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** Vector jump **(78)**	Software option	
B	**Generator/busbar/mains protection package**		
B1	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)**	Software option	
C	**Generator add-on protection package**		
C1	Over- and undervoltage (generator) **(27/59)** Over- and underfrequency (generator) **(81)** Overload **(32)** Fast overcurrent (<42 ms, 350%, 2 levels) **(50)** Current unbalance **(46)** Voltage asymmetry **(47)** Reactive power import (excitation loss) **(40)** Reactive power export (overexcitation) **(40)**	Software option	
C2	Negative sequence voltage high **(47)** Negative sequence current high **(46)** Zero sequence voltage high **(59)** Zero sequence current high **(50)**	Software option	
D	**Voltage control**		
D2	Constant voltage control (stand-alone)	Software option	Requires option G2
F	**Analogue transducer outputs**		
F1	2 transducer outputs, 0-20mA or 4-20mA	Hardware option	Refer to page 7
F2	4 transducer outputs, 0-20mA or 4-20mA	Hardware option	Refer to page 7
G	**Start/stop/synchronisation outputs**		
G1	2 x relay outputs for starting and stopping of other generators (programmable)	Hardware option	Refer to page 7
G2	Synchronisation with relay speed governor outputs	Hardware option	Refer to page 7 Not with M1/M2
H	**Serial communication**		
H1	CAN-open	Hardware option	Refer to page 7
H2	Modbus RTU	Hardware option	Refer to page 7
H3	Profibus DP	Hardware option	Refer to page 7
H4	CAT CCM	Hardware option	Refer to page 7
H5	**CAN bus (J1939 + MTU) engine communication for** MTU MDEC Detroit Diesel DDEC Deutz EMR John Deere JDEC Volvo Penta D12AUX	Hardware option	Refer to page 7
H6	Cummins GCS or ECM	Hardware option	Refer to page 7
J	**Cables**		
J1	Display cable with plugs, 3 m. UL94 (V1) approved	Other	
J2	Display cable with plugs, 6 m. UL94 (V1) approved	Other	
J3	PC cable for utility software (RS232). UL94 (V1) approved	Other	
J6	Display cable with plugs, 1 m. UL94 (V1) approved	Other	
K	**Documentation**		
K1	Designer's Reference Handbook (hard copy)	Other	
K2	CD-ROM with complete documentation	Other	

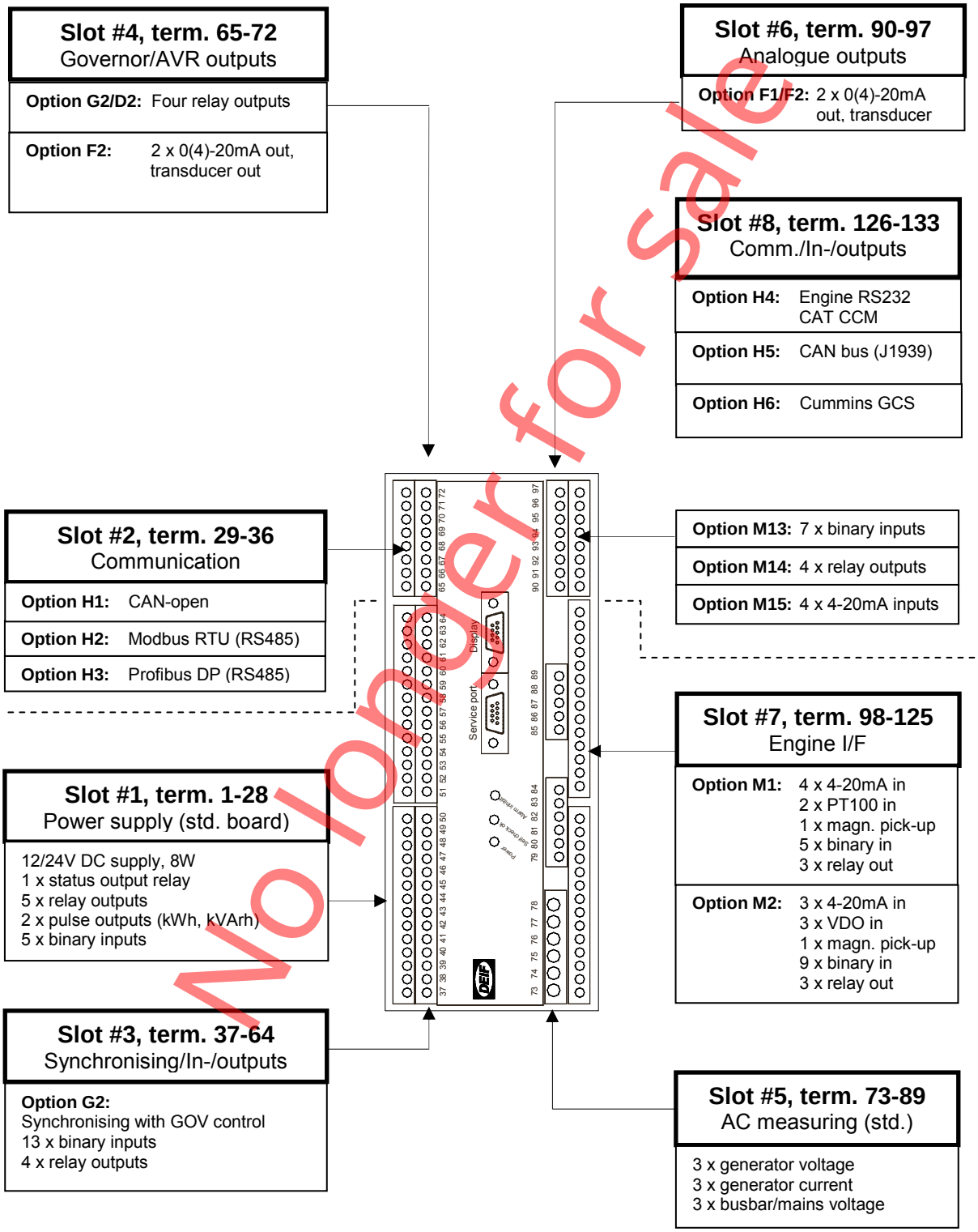
Option	Description	Type	Note
L	**Display gasket for IP54**	Other	Standard is IP52
M	**Configurable engine control cards**		
M1	Engine control card with PT100 sensor inputs 4 x 4-20mA inputs 2 x PT100 inputs 1 x tacho input (magnetic pick-up) 5 x binary inputs 3 x relay outputs	Hardware option	Refer to page 7 Engine start/stop logic can be switched ON/OFF Not with G2
M2	Engine control card with VDO sensor inputs 3 x 4-20mA inputs 3 x VDO (resistor) inputs 1 x tacho input (magnetic pick-up) 9 x binary inputs 3 x relay outputs	Hardware option	Refer to page 7 Engine start/stop logic can be switched ON/OFF Not with G2
M	**Configurable I/O extension cards**		
M13	7 binary inputs, configurable	Hardware option	Refer to page 7
M14	4 relay outputs	Hardware option	Refer to page 7
M15	4 analogue inputs, configurable, 4-20mA	Hardware option	Refer to page 7
Z	**Generator nominal power**		
Z1	Generator nominal power >20MW	Software option	

(ANSI# as per IEEE Std C37.2-1996 (R2001) in parenthesis).

Hardware overview

Each slot can hold no more than one hardware option. For instance, it is not possible to select option H2 and option H3 at the same time because both options require a PCB in slot #2.

Apart from the hardware options shown on this page, it is possible to select the software options mentioned on page Error! Bookmark not defined. **in this data sheet. Options A, B, C and D are software options.**



Technical specifications

Accuracy: Class 1.0
Class 2.0 for neg. seq. current

To IEC/EN 60688

Operating temp.: -25-70°C (-13-158°F)

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

Storage temp.: -40-70°C (-40-158° F)

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

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

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

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

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

Consumption: Max. 0.25VA/phase

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

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

Consumption: Max. 0.3VA/phase

Current overload: 4 x I_n continuously
20 x I_n, 10 sec. (max. 75A)
80 x I_n, 1 sec. (max. 300A)

Meas. frequency: 30-70Hz

Aux. supply: 12/24V DC (8-36V continuously, 6V 1 sec.)
Max. 8W consumption

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

Recommended power supply is DEIF's DCP-2

(UL/cUL Listed: AWG 24)

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

Relay outputs: 250V AC/24V DC, 5A
(Unit status output: 1A)

(UL/cUL Listed: 250V AC/24V DC, 2A resistive load)

Analogue inputs: 4-20mA: Impedance max. 50Ω, not galvanically separated

PT100: According to IEC/EN 60751

VDO: Resistor inputs, internal supply max. 480Ω

Mounting: DIN-rail mount or base mount with 6 screws
(Base mounting in marine applications)

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

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

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

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

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

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

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

To IEC/EN 60529

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

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

10…60Hz: 0.15mmpp
60…150Hz: 1g
To IEC 60255-21-1 Response (class2)

10…150Hz: 2g
To IEC 60255-21-1 Endurance (class2)

Shock (base mount):
10g, 11msec, half sine
To IEC 60255-21-2 Response (class2)

30g, 11msec, half sine
To IEC 60255-21-2 Endurance (class2)

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

Bump:
20g, 16msec, half sine
To IEC 60255-21-2 (class2)

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

Plug connections:
AC current: 4.0 mm^2 multi stranded
(UL/cUL Listed: AWG28-10)
Tightening torque: 0.5-0.6 Nm (4.4-5.3 lb-in)

Other: 2.5 mm^2 multi stranded
(UL/cUL Listed: AWG28-12)
Tightening torque: 0.5-0.6 Nm (4.4-5.3 lb-in)
(UL/cUL Listed: AWG20)

Display: 9-pole Sub-D female

PC: 9-pole Sub-D male

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

See interfacing guide at www.deif.com

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

Weight:
Main unit: 1.6 kg (3.5 lbs.)
Option J1/J3: 0.2 kg (0.4 lbs.)
Option J2: 0.4 kg (0.9 lbs.)

Approval:
The GPU is approved by the major classification societies
Contact DEIF for details

UL/cUL Listed to UL508

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

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

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

Response times:

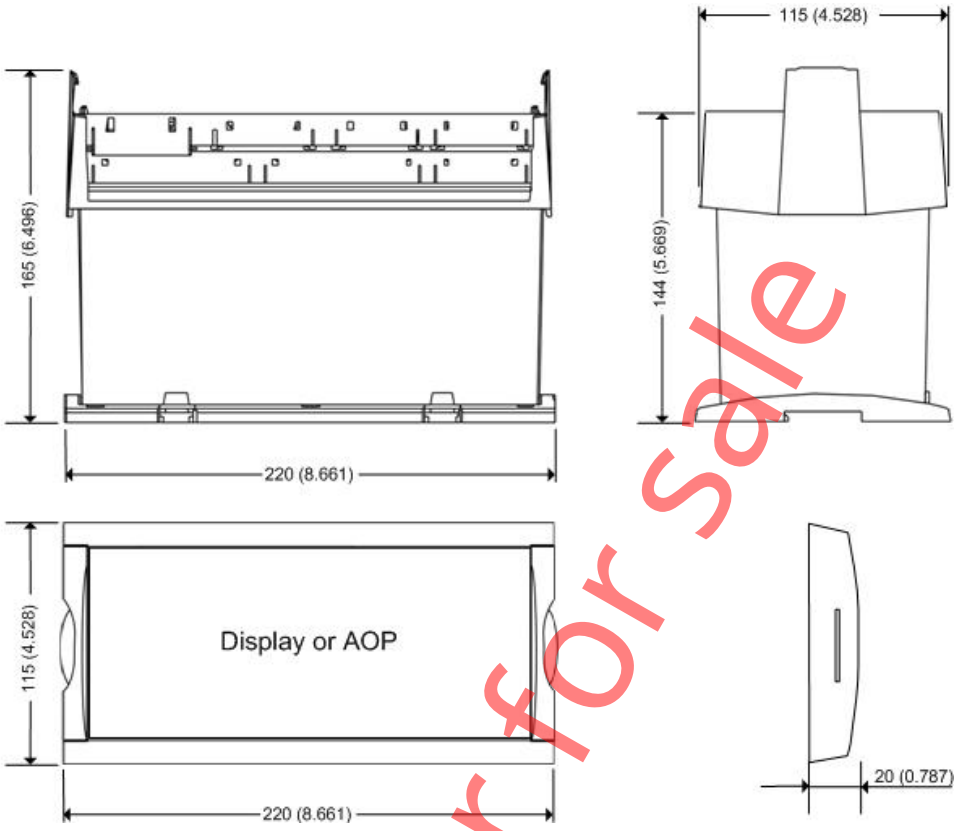
Busbar 1 and 2:

Over-/undervoltage	<50 ms
Over-/underfrequency	<50 ms

Generator:

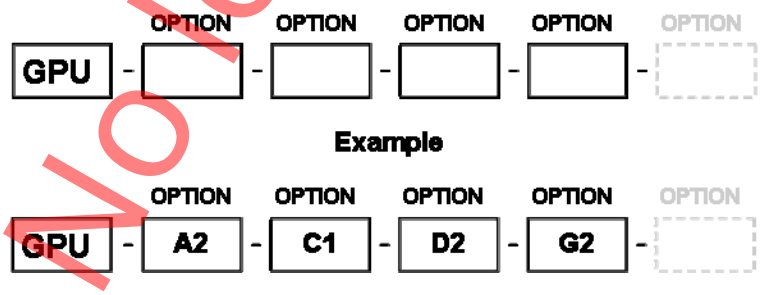
Over-/undervoltage	70-300 ms
Over-/underfrequency	70-300 ms
Current:	100-300 ms
Rocof:	100 ms (4 periods)
Vector jump:	30 ms
Fast overcurrent:	<42 ms

Unit dimensions in mm (inches)



Panel cutout:
H x W = 10 (0.393”) x 30 (1.181”)

Order specifications



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

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