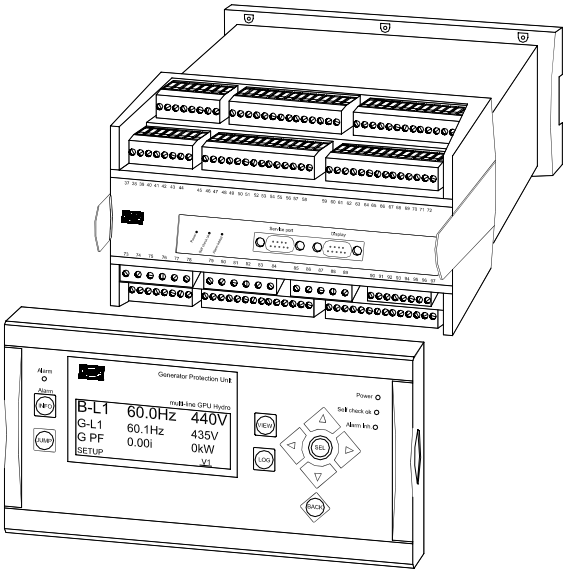
Data sheet

Generator Protection Unit, GPU Hydro

Multi-line 2

4921240335A

SW version 2.4X.X



CE

Standard functions

Applications

- Generator protection for hydro turbine driven generators

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

- Netmanagement
- TÜV Nord
- GOST-R
- UL

DEIF A/S

Application

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

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 Hydro 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 Hydro can be equipped with a number of available options. The options selected by the customer will be integrated in the standard GPU Hydro, 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 Hydro can be used for synchronising a circuit breaker. The speed and voltage set point is controlled by the GPU Hydro through relay outputs.

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

AVR control requires option D2.

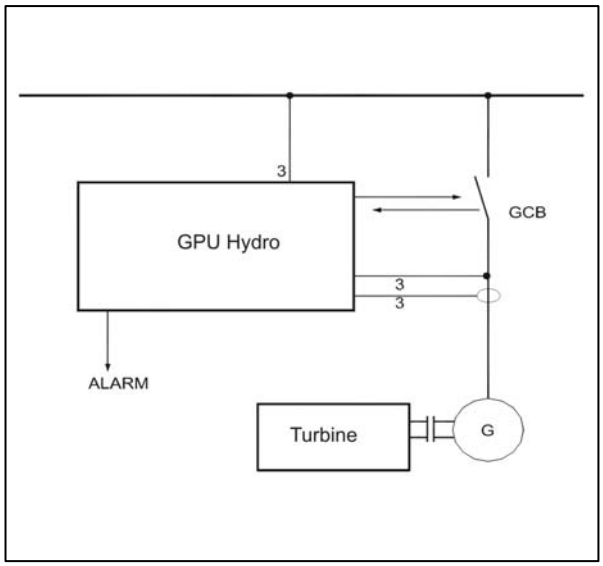
Approvals

The GPU Hydro is approved by the following societies and companies:

Land	**Other**
	GOST-R
Netmanagement	UL
TÜV Nord	

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

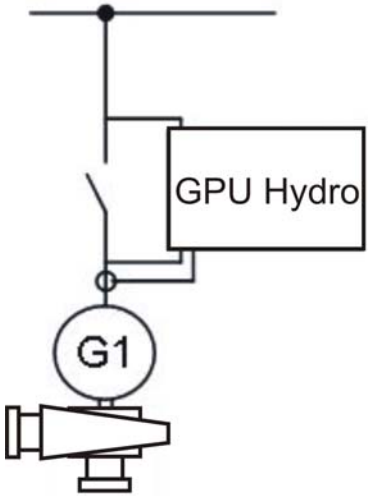
Principle diagram



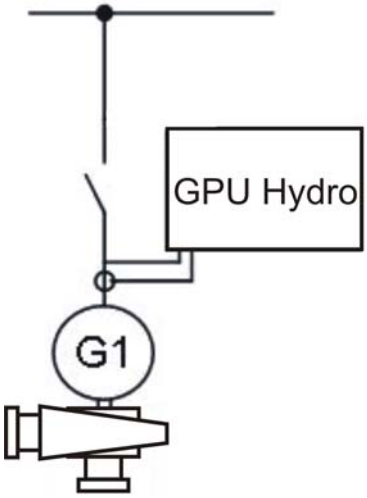
Single line application diagrams

Standard

Generator protection



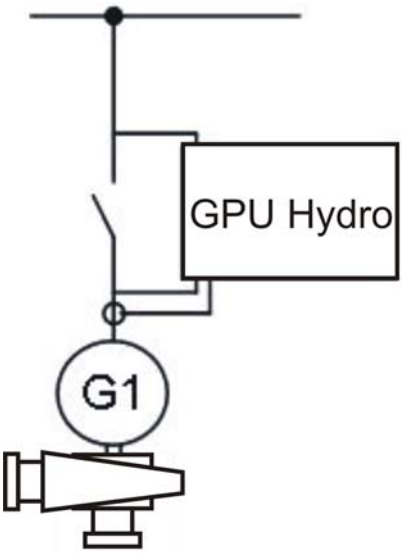
Generator protection



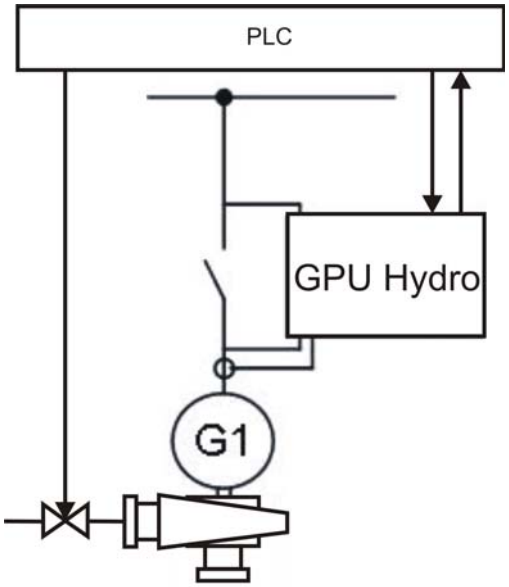
Overcurrent and reverse power alarms are standard.

Optional/PLC controlled

Generator protection/synchronising



PLC controlled system with start/stop



The GPU Hydro 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 5 in this data sheet for further information about the location of the options in the unit.

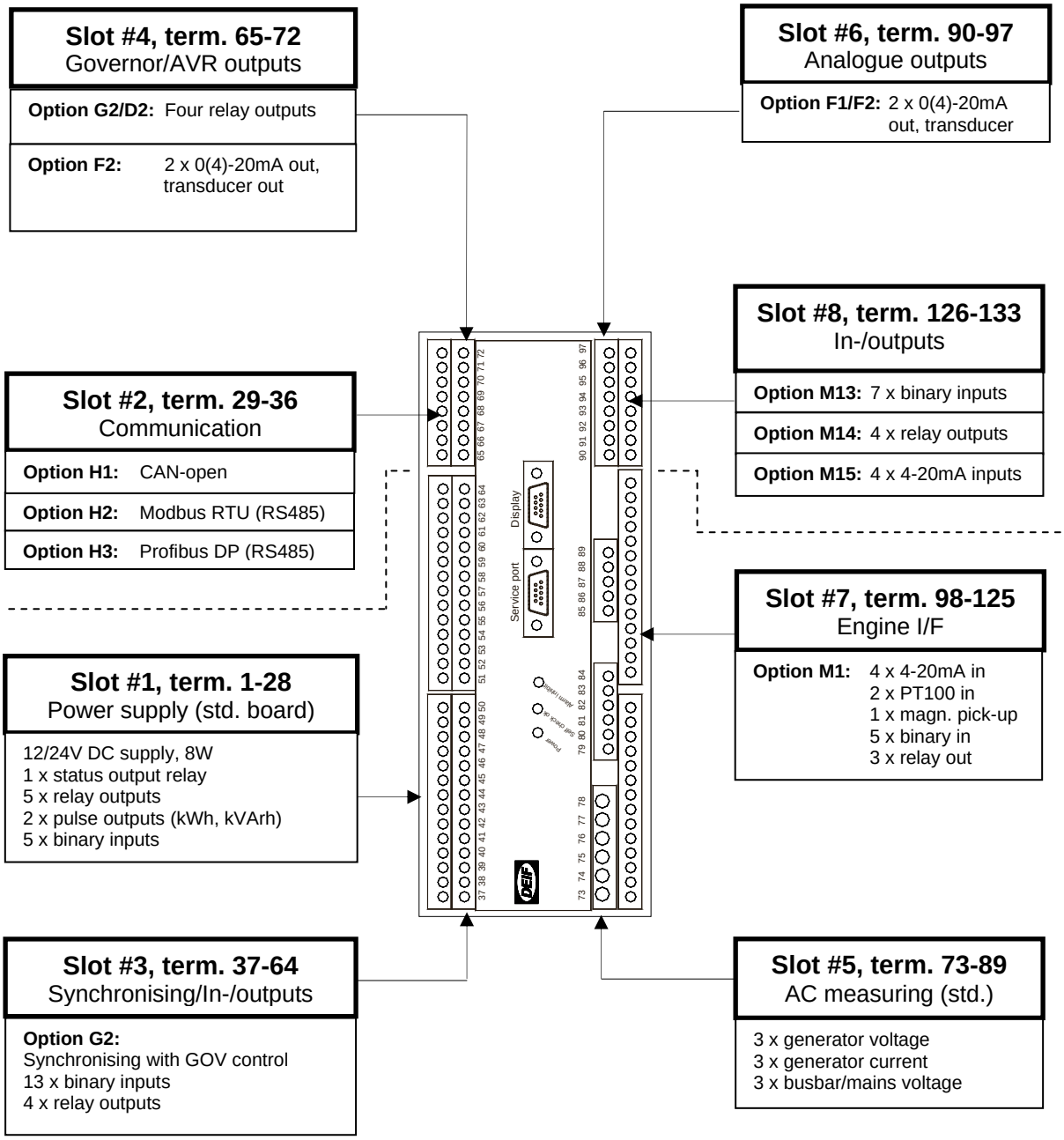
Option		Description	Type	Note
A		**Loss of mains protection package**		
	A1	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** Vector jump **(78)** df/dt (ROCOF) **(81)**	Software option	
	A2	Over- and undervoltage (generator 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 5
	F2	4 transducer outputs, 0-20mA or 4-20mA	Hardware option	Refer to page 5
G		**Start/stop/synchronisation outputs**		
	G2	Synchronisation with relay speed governor outputs	Hardware option	Refer to page 5
H		**Serial communication**		
	H1	CAN-open	Hardware option	Refer to page 5
	H2	Modbus RTU	Hardware option	Refer to page 5
	H3	Profibus DP	Hardware option	Refer to page 5
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	
L		**Display gasket for IP54**	Other	Standard is IP52
M		**Configurable engine control cards**		
	M1	Turbine 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 5 Start/stop logic can be switched ON/OFF
M		**Configurable I/O extension cards**		
	M13	7 binary inputs, configurable	Hardware option	Refer to page 5
	M14	4 relay outputs	Hardware option	Refer to page 5
	M15	4 analogue inputs, configurable, 4-20mA	Hardware option	Refer to page 5

(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 4 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 688)

Operating temp.: -25-70°C (-13-158° F)

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

Between analogue outputs: 500V DC, 1 min.

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

Consumption: Max. 0.25VA/phase

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

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

Recommended power supply is DEIF's DCP-2

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

Relay outputs: 250V AC/24V DC, 8A
(Unit status output: 1A)

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

PT100: According to EN/IEC 60751 + A2

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

Climate: Class HSE, to DIN 40040

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

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

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

To IEC 529 and EN 60529

EMC/CE: To EN 50081-1/2, EN 50082-1/2 SS4631503 (PL4) and IEC 255-3

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

Plug connections:

AC current:	4.0 mm^2 multi stranded
Other:	2.5 mm^2 multi stranded
Display:	9-pole Sub-D female
PC:	9-pole Sub-D male

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: UL 508

Response times:

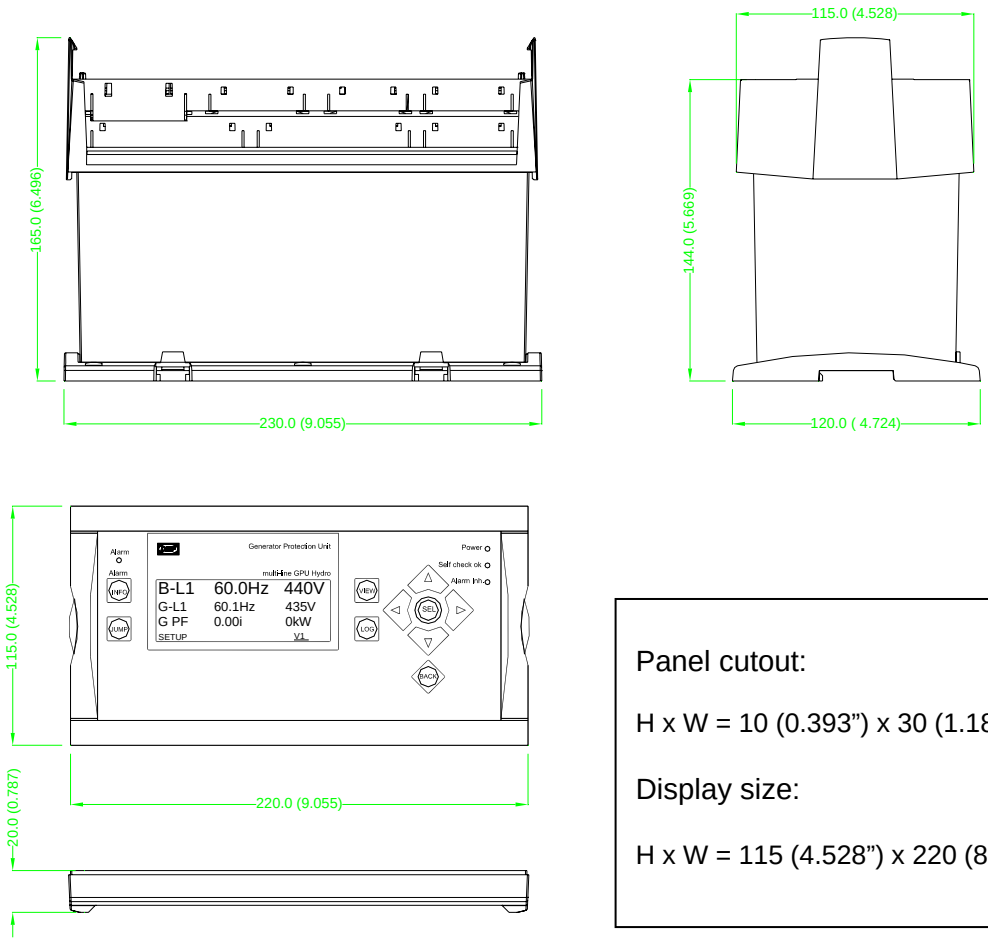
Busbar 1 and 2:

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”)

Display size:

H x W = 115 (4.528”) x 220 (8.661”)

Order specifications

	OPTION	OPTION	OPTION	OPTION	OPTION
GPU Hydro					

Example

	OPTION	OPTION	OPTION	OPTION	OPTION
GPU Hydro	A2	C1	D2	G2	

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

***DEIF A/S**, Frisenborgvej 33*
DK-7800 Skive, Denmark

Tel.: 9614 9614, Fax: 9614 9615
E-mail: deif@deif.com, URL: www.deif.com