Regulation modes
- Load sharing
- Fixed frequency
- Fixed power
- Frequency droop

Generator protection (ANSI)
- 2 x reverse power (32)
- 5 x overload (32)
- 6 x overcurrent (50/51)
- 2 x overvoltage (59)
- 3 x undervoltage (27)
- 3 x over-/underfrequency (81)
- Voltage-dependent overcurrent (51V)
- Current/voltage unbalance (60)
- Loss of excitation/overexcitation (40/32RV)
- 9 x NEL groups

M-logic (Micro PLC)
- Simple logic configuration tool
- Selectable input/output events

Busbar protection (ANSI)
- 3 x overvoltage (59)
- 4 x undervoltage (27)
- 3 x overfrequency (81)
- 4 x underfrequency (81)
- Voltage unbalance
- 3 x NEL groups

Display
- Status texts
- Info messages
- Alarm indication
- Prepared for remote mounting
- Prepared for additional remote displays

General
- USB interface to PC
- Free PC utility software for commissioning
- Programmable parameter, timer and alarms
- User-configurable texts
Data sheet

Generator Paralleling Controller, GPC-3

Application
The Generator Paralleling Controller (GPC-3) is a compact all in one microprocessor-based control unit containing all necessary functions for protection and control of a synchronous/asynchronous generator. It contains all necessary galvanically separated 3-phase measuring circuits.

The GPC-3 is intended for land-based applications. It is designed for the following applications (can be combined):
1. Stand-alone
2. Parallel with other generators
3. Parallel to mains

The GPC-3 can synchronise the generator and after synchronisation carry out all necessary generator control and protective functions. It is well-suited for PLC-controlled systems and the interfacing can be done via binary and analogue I/Os or via serial communication.

Display unit
The display unit is separate and can be installed directly on the main unit or in the front of the switchboard door (3 m display cable included). Up to two additional displays can be installed within 200 m.

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

Operation modes
Four different regulation modes can easily be selected through digital inputs on the standard GPC-3, and the governor will be controlled accordingly:

1. Fixed frequency
2. Fixed power (base load)
3. Frequency droop
4. Load sharing

If the automatic voltage regulator is controlled by the GPC-3, the standard operation modes are extended with:

1. Fixed voltage
2. Fixed VAr
3. Fixed power factor
4. Reactive load sharing
5. Voltage droop

AVR control requires option D1.

Self-test
The GPC-3 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 (status output).

M-Logic (Micro PLC)
This configuration tool is part of the PC utility software which is free of charge. With this tool, it is possible to customise the application to your needs. It is possible to dedicate specific functions or logical conditions to different inputs and outputs.

Engine control and protection
With the engine control and protection option added, the GPC-3 will control the start and stop sequences of the engine and furthermore it can be used as engine protection unit providing full back-up of engine shutdown channels in case the main processor fails.

Setup
Setup is easily done via a menu structure in the display (password-protected) or via the USB 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/Download_centre. 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 GPC-3 can be equipped with a number of available options. The options selected by the customer will be integrated in the standard GPC-3, hereby securing the same user interface unaffected by whether the application needs a highly complex or a more basic gen-set controller.

Please refer to pages 5 and 6 for the options available.

Approvals
The GPC-3 is UL/cUL listed.

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

Standard delivery

Engine and GB control (option Y1)

Additional operator's panel - AOP-1 (option X3)

Additional operator's panel - AOP-2 (option X4)
The GPC-3 can be used in simple or complex applications. The above shows some of the applications, but due to the flexible mode selection, the GPC-3 can be used in all applications.

The GPC-3 is also designed to work with the Uni-line components such as the FAS (Full Automatic Synchroniser), should this be preferred.
## Available variants

<table>
<thead>
<tr>
<th>Type</th>
<th>Variant</th>
<th>Description</th>
<th>Item no.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC-3 Diesel</td>
<td>01</td>
<td>GPC-3 with display + A1 + D1</td>
<td>2912010030-01</td>
<td>One 3 m display cable is included as standard</td>
</tr>
<tr>
<td>GPC-3 Diesel</td>
<td>02</td>
<td>GPC-3 with display + A1 + C2 + D1 + H3 + Q1</td>
<td>2912010030-02</td>
<td>One 3 m display cable is included as standard</td>
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<tr>
<td>GPC-3 Diesel</td>
<td>03</td>
<td>GPC-3 with display + A1 + A5 + C2 + D1 + E1 + F1 + H9.2 + K2</td>
<td>2912010030-03</td>
<td>One 3 m display cable is included as standard</td>
</tr>
<tr>
<td>GPC-3 Diesel</td>
<td>04</td>
<td>GPC-3 with display + A1 + D1 + F1 + N</td>
<td>2912010030-04</td>
<td>One 3 m display cable is included as standard</td>
</tr>
</tbody>
</table>

## Available options

### Option A
- **Mains protection package**
  - **A1** Time-dependent undervoltage (2T)
  - Undervoltage and reactive power low (2TQ)
  - Vector jump (7)
  - df/dt (ROCOF) (B)
  - Software

### Option C
- **Generator add-on protection package**
  - **C2** Negative sequence voltage high (47)
  - Negative sequence current high (46)
  - Zero sequence voltage high (59)
  - Zero sequence current high (50)
  - Power dependent reactive power import/export (40)
  - Inverse time overcurrent (51)
  - Software

### Option D
- **Voltage control**
  - **D1** Constant voltage control
  - Constant reactive power control
  - Constant power factor control
  - Reactive load sharing
  - Voltage droop
  - Software

### Option E and F
- **Analogue controller and transducer outputs**
  - **E1** 2 x +/-25 mA (GOV/AVR or transducer)
  - 2 x 0(4)...20 mA (GOV/AVR or transducer)
  - Software
  - Note: Not with E2, EF4 or EF5

### Option H
- **Modbus RTU/ASCII (RS485)**
  - 2 x 0(4)...20 mA (transducer)
  - Software
  - Requires M4
  - Not with H5

### Option H8.X
- **Engine comm.: MTU (ADEC/MDEC) and CANbus J1939 (H7)**
  - 8 x relay outputs (GOV/AVR or configurable)
  - Software
  - Requires M4

### Option H9.2
- **Modbus RTU/ASCII (RS232) and GSM modem connection**
  - 2 x relay outputs (GOV/AVR or configurable)
  - Software
  - Requires M4

---

**DEIF A/S**

Page 5 of 12
Four relays are available as standard in slot #4 for GOV/AVR control. If one of the options E1, E2, EF2, EF4 or EF5 is selected, these options will replace the four relays.

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 HW options in the unit.
### Hardware Overview

#### Slot #1, term. 1-28 (std.)
**Power supply**
- 8-36V DC supply, 11 W
- 1 x status output relay
- 5 x relay outputs
- 2 x pulse outputs (kWh, kVarh)
- 5 x digital inputs

#### Slot #2, term. 29-36
**Communication**
- H2: Modbus RTU (RS485)
- H3: Profibus DP
- H8.2: Ext. I/O modules
- H9.2: Modbus RTU/ASCII (RS232)

#### Slot #3, term. 37-64 (Std.)
**Load sharing**
- 13 x digital inputs
- 4 x relay outputs
- 1 x P load sharing line
- 1 x Q load sharing line
- 2 x input for ext. setpoint (GOV/AVR)

#### Slot #4, term. 65-72
**GOV/AVR/transducer output**
- Std.: 4 x relay outputs
- E1: 2 x +/-20 mA out
- E2: 2 x 0(4)…20 mA out
- EF2: 1 x +/-20 mA out
- EF4: 1 x +/-20 mA out
- EF5: 1 x PWM output

#### Slot #5, term. 73-89 (Std.)
**AC measuring**
- 3 x generator voltage
- 3 x generator current
- 3 x busbar/mains voltage

#### Slot #6, term. 90-97
**In-/outputs**
- N: TCP/IP Modbus comm. and alarm via SMS or e-mail
- F1: 2 x 0(4)…20 mA out
- M13.6: 7 x digital inputs
- M14.6: 4 x relay outputs
- M15.6: 4 x 4…20 mA inputs

#### Slot #7, term. 98-125
**Engine I/F**
- M4: 8-36V DC supply, 5 W
- 1 x magnetic pick-up (MPU)
- 3 x multi-inputs
- 7 x digital inputs
- 4 x relay outputs
- H7: CANbus J1939 (requires M4)

#### Slot #8, term. 126-133
**Engine comm., in-/outputs**
- H5: MTU (MDEC) + J1939
- H6: Cummins GCS
- H8.8: Ext. I/O modules
- M13.8: 7 x digital inputs
- M14.8: 4 x relay outputs
- M15.8: 4 x 4-20 mA input

#### Slot #9, term. 134-161
**Engine comm., in-/outputs**
- M14.9: 4 x relay outputs
- M15.9: 4 x 4-20 mA inputs

---

There can only be one hardware option in each slot. It is e.g. not possible to select option H2 and option H3 at the same time, because both options require a PCB in slot #2.

Besides the hardware options shown on this page, it is possible to select the software options mentioned in the chapter “Available options”.
### Technical specifications

**Accuracy:**
- Class 1.0
- -25…15…30…70°C
- Temperature coefficient: +/-0.2% of full scale per 10°C
- Positive, negative and zero sequence alarms:
  - Class 1 within 5% voltage unbalance
  - Class 1.0 for negative sequence current
- Fast overcurrent: 3% of 350%*Iₚ

**Temperature coefficient:**
+/-0.2% of full scale per 10°C

**Analogue outputs:**
- Class 1.0 according to total range
- Option EF4/EF5: Class 4.0 according to total range
- 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)

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

**Operating altitude:**
- 0-4000 m above sea level
- Derating 2001-4000 m above sea level:
  - Max. 480V AC phase-phase 3W4 measuring voltage
  - Max. 690V AC phase-phase 3W3 measuring voltage

**Meas. voltage:**
- 100-690V AC +/-20% (UL/cUL Listed: 600V AC phase-phase)

**Consumption:**
- Max. 0.25 VA/phase

**Meas. current:**
- -1 or -5A AC (UL/cUL Listed: From CTs 1-5A)

**Consumption:**
- Max. 0.3 VA/phase

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

**Meas. frequency:**
- 30…70 Hz

**Aux. supply:**
- Terminals 1 and 2:
  - 12/24V DC (8…36 V continuously, 6 V 1 sec.)
  - Max. 11 W consumption

**Binary inputs:**
- Optocoupler, bi-directional
  - ON: 8…36V DC
  - Impedance: 4.7 kΩ
  - OFF: <2V DC

**Analogue inputs:**
- 0(4)...20 mA
  - Impedance: 50 Ω
  - Not galvanically separated
- RPM (MPU): 2…70V AC, 10…10000 Hz, 250…3000 Ω

**Multi-inputs:**
- 0(4)...20 mA:
  - 0-20 mA, +/-1%
  - Not galvanically separated
- Binary:
  - Max. resistance for ON detection: 100 Ω
  - Not galvanically separated
- P100/1000:
  - -40…250°C, +/-1%
  - Not galvanically separated
  - To IEC/EN 60751
- VDO:
  - 0…1700 Ω, +/-2%
  - Not galvanically separated
- V DC:
  - 0…40V DC, +/-1%
  - Not galvanically separated

**Relay outputs:**
- Electrical rating:
  - 250V AC/30V DC, 5A
  - (UL/cUL Listed: 250V AC/24V DC, 2A resistive load)
- Thermal rating @ 50°C:
  - 2A: Continuously
  - 4A: tᵪₜₜ = 5 sec., tᵪₒᵩ = 15 sec.
  - (Unit status output: 1A)

**Open collector outputs:**
- Supply: 8…36V DC, max. 10 mA
**Data sheet**

**Generator Paralleling Controller, GPC-3**

**Analogue outputs:**
- 0(4)...20 mA and +/-25 mA
- Galvanically separated
- Active output (internal supply)
- Load max. 500 Ω
  (UL/cUL Listed: Max. 20 mA output)

**Update rate:**
- Transducer output: 250 ms
- Regulator output: 100 ms

**Analogue load sharing lines:**
- -5…0…+5V DC,
- Impedance: 23.5 kΩ

**Galv. separation:**
- Between AC voltage and other I/Os:
  - 3250 V, 50 Hz, 1 min.
- Between AC current and other I/Os:
  - 2200 V, 50 Hz, 1 min.
- Between analogue outputs and other I/Os:
  - 550 V, 50 Hz, 1 min.
- Between binary input groups and other I/Os:
  - 550 V, 50 Hz, 1 min.

**Response times:**
(Delay set to minimum)

**Busbar:**
- Over-/undervoltage: < 50 ms
- Over-/underfrequency: < 50 ms

**Generator:**
- Reverse power: <200 ms
- Overcurrent: <200 ms
- Fast overcurrent: < 40 ms
- Over-/undervoltage: <200 ms
- Over-/underfrequency: <300 ms
- Overload: <200 ms
- Current unbalance: <200 ms
- Voltage unbalance: <200 ms
- React. power import: <200 ms
- React. power export: <200 ms
- Overspeed: <400 ms
- Digital inputs: <250 ms
- Emergency stop: <200 ms
- Multi-inputs: <800 ms
- Wire failure: <600 ms

**Mains:**
- \( \text{df/dt (ROCOF): } <130 \text{ ms (4 periods)} \)
- Vector jump: < 40 ms
- Positive sequence: < 60 ms
- Time-dependent
- undervoltage, \( U_I < \) < 50 ms
- Undervoltage and reactive power low, \( U_O < \) <250 ms

**Mounting:**
- DIN-rail mount or base mount with 6 screws

**Safety:**
- To EN 61010-1, installation category (overvoltage category) III, 600 V, pollution degree 2
- To UL 508 and CSA 22.2 no. 14-05, overvoltage category III, 600 V, pollution degree 2

**EMC/CE:**
- To EN 61000-6-2, EN 61000-6-4, IEC 60255-26

**Vibration:**
- 3…13.2 Hz: 2 mmpp
- 13.2…100 Hz: 0.7 g
- To IEC 60068-2-6 & IACS UR E10
- 10…60 Hz: 0.15 mmpp
- 60…150 Hz: 1 g
- To IEC 60255-21-1 Response (class 2)
- 10…150 Hz: 2 g
- To IEC 60255-21-1 Endurance (class 2)

**Shock (base mount):**
- 10 g, 11 msec, half sine
- To IEC 60255-21-2 Response (class 2)
- 30 g, 11 msec, half sine
- To IEC 60255-21-2 Endurance (class 2)
- 50 g, 11 msec, half sine
- To IEC 60068-2-27

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

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

**Plug connections:**
- **AC current:**
  - 0.2-4.0 mm² stranded wire
    (UL/cUL Listed: AWG 18)
- **AC voltage:**
  - 0.2-2.5 mm² stranded wire
    (UL/cUL Listed: AWG 20)
- **Relays:**
  - (UL/cUL Listed: AWG 22)
- **Terminals 98-116:**
  - 0.2-1.5 mm² stranded wire
    (UL/cUL Listed: AWG 24)
- **Other:**
  - 0.2-2.5 mm² stranded wire
    (UL/cUL Listed: AWG 24)
- **Display:**
  - 9-pole sub-D female
- **Service port:**
  - USB A-B
Protection: Unit: IP20
Display: IP52 (IP54 with gasket: Option L)
(UL/cUL Listed: Type Complete Device, Open Type)
To IEC/EN 60529

Governors: Multi-line 2 interfaces to all governors, including GAC, Barber-Colman, Woodward and Cummins
See interfacing guide at www.deif.com

Approvals: UL/cUL Listed to UL508
UL/cUL Recognized to UL2200

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)

AOP-2: Maximum ambient temperature:
60°C
Wiring:
Use 60/75°C copper conductors only
Mounting:
For use on a flat surface of type 3 (IP54) enclosure
Main disconnect must be provided by installer
Installation:
To be installed in accordance with the NEC (US) or the CEC (Canada)

DC/DC converter for AOP-2: Tightening torque: 0.5 Nm (4.4 lb-in)
Wire size: AWG 22-14

Weight: Base unit: 1.6 kg (3.5 lbs.)
Option J1/J3/J6: 0.2 kg (0.4 lbs.)
Option J2: 0.4 kg (0.9 lbs.)
Display: 0.4 kg (0.9 lbs.)
Unit dimensions in mm (inches)
### Order specifications

**Variants:**

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Type</th>
<th>Variant no.</th>
<th>Option</th>
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</table>

**Example:**

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</thead>
<tbody>
<tr>
<td>2912010030-01</td>
<td>GPC-3 Diesel</td>
<td>01</td>
<td>A1</td>
<td>M4</td>
<td>Y1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accessories:**

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Type</th>
<th>Accessory</th>
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</thead>
<tbody>
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</table>

**Example:**

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<thead>
<tr>
<th>Item no.</th>
<th>Type</th>
<th>Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1022040055</td>
<td>Accessory for GPC-3</td>
<td>Ethernet cable - 3 m crossed (J4)</td>
</tr>
</tbody>
</table>

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