

GAM3.2

Governor and AVR module

Data sheet

4921240638-C



Improve
Tomorrow



1. Series 300

1.1 About the hardware modules.....	3
-------------------------------------	---

2. Technical specifications

2.1 Governor and AVR module GAM3.2.....	4
---	---

3. Legal information

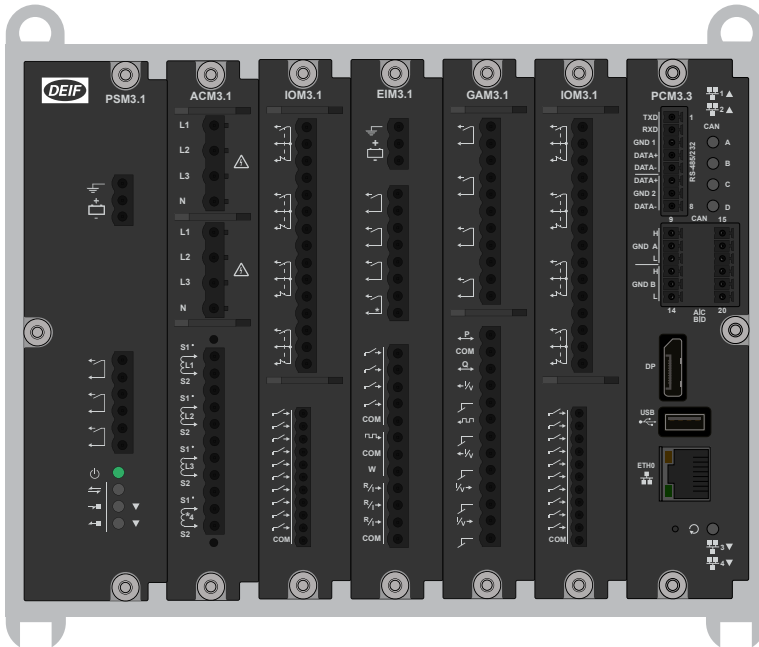
3.1 Disclaimer and copyright.....	7
-----------------------------------	---

1. Series 300

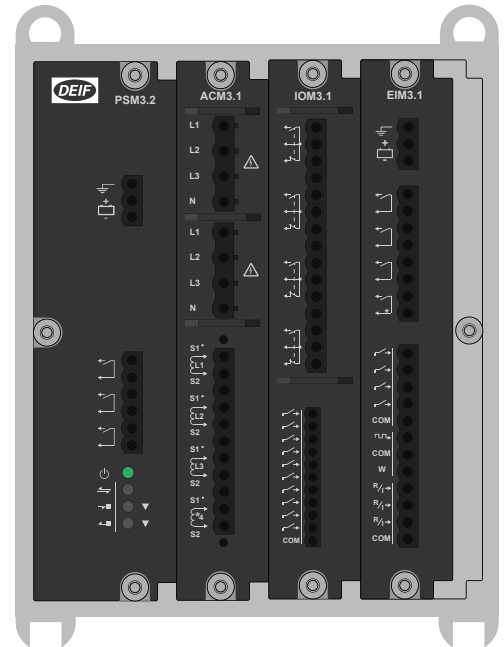
1.1 About the hardware modules

The hardware modules are printed circuit boards that slot in to either a rack R7.1 or rack R4.1. Depending on the type of module, they can provide AC or other measurements, inputs, outputs and give communication indication.

Example rack R7.1



Example rack R4.1



The hardware modules feature:

- Placement flexibility in the rack.
- Add, replace, or remove on-site.
- Automatically recognised.
- Configurable input and output functions (digital and analogue where applicable).

All slots must be covered during operation and blind modules can be used to cover unused slots.

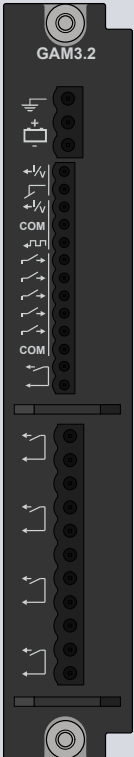







2. Technical specifications

2.1 Governor and AVR module GAM3.2


This governor and AVR module has its own power supply, two analogue outputs and a pulse width modulation output, five digital inputs, a status relay output, and four relay outputs. Apart from the status relay, all these I/Os are configurable.






GAM3.2 has its own microprocessor. If the rack power supply fails, GAM3.2 can continue to be used for manual operation if it has its own, independent power supply. The power supply terminals include circuit protection against load dump transients and JEM177 surge transients (rugged design). These terminals also include battery voltage measurement.

GAM3.2 terminals

Module	Count	Symbol	Type	Name
	1		Ground	Frame ground
	1		12 or 24 V	Power supply
	2		Analogue current or voltage output	GOV/AVR/configurable
	1		Pulse width modulation (PWM) output	PWM output
	5		Digital input	Configurable
	1		Relay output	GAM3.2 status
	4		Relay output	Configurable

GAM3.2 technical specifications

Category	Specification
Auxiliary power supply 	Input voltage: 12 or 24 V DC nominal (8 to 36 V DC continuously) UL/cUL Listed: 10 to 32.5 V DC 0 V DC for 50 ms when coming from at least 8 V DC (cranking dropout) Consumption: Typical 3 W, maximum 5 W Voltage measurement accuracy: ± 0.1 V (measurement range 8 to 36 V DC) Internally protection: 12 A fuse (not replaceable) (fuse size determined by load dump requirements) Voltage withstand: ± 36 V DC Load dump protected by TVS diodes Start current <ul style="list-style-type: none"> • Power supply current limiter <ul style="list-style-type: none"> ◦ 24 V: 0.6 A minimum ◦ 12 V: 1.2 A minimum

Category	Specification
	<ul style="list-style-type: none"> Battery: No limit
Analogue multi-functional outputs 	<p>Current output</p> <ul style="list-style-type: none"> Any custom range between -25 and 25 mA Accuracy: 1 % of the selected range (minimum range: 5 mA) 16-bit resolution Active output (internal supply) Maximum load: 400 Ω <p>Voltage output (DC)</p> <ul style="list-style-type: none"> Any custom range between -10 and 10 V Accuracy: 1 % of the selected range (minimum range: 1 V) 16-bit resolution Minimum load: 600 Ω. Voltage output internal resistance: < 1 Ω. <p>Voltage withstand: ±36 V DC Controller power off: Internal resistance > 10 MΩ</p>
Pulse width modulation (PWM) output 	<p>Frequency: 500 Hz ±50 Hz Resolution: 43,200 levels Voltage:</p> <ul style="list-style-type: none"> Low level: < 0.5 V High level: > 5.5 V Maximum: 6.85 V <p>Output impedance: 100 Ω Nominal temperature range: -40 to 70 °C (-40 to 158 °F) Reference temperature range: 15 to 30 °C (59 to 86 °F) Duty cycle accuracy (5 to 95 %): 0.25 % within reference temperature range 0.2 % of full scale additional error per 10 °C (18 °F) outside the reference range Example: At 70 °C (158 °F) the accuracy of the PWM output is 0.25 % + 4 × 0.2 % = 1.05 % Voltage withstand: ±30 V DC</p>
Digital inputs 	<p>Bipolar inputs</p> <ul style="list-style-type: none"> ON: -36 to -8 V DC, and 8 to 36 V DC OFF: -2 to 2 V DC <p>Minimum pulse length: 50 ms Impedance: 4.7 kΩ Voltage withstand: ±36 V DC</p>
Relay output (GAM3.2 status) 	<p>Relay type: Solid state Electrical rating and UL/cUL Listed: 30 V DC and 1 A, resistive Voltage withstand: ±36 V DC</p>
Relay outputs 	<p>Relay type: Electromechanical Electrical rating and UL/cUL Listed: 250 V AC or 30 V DC, and 6 A, resistive; B300, pilot duty (B300 is a power limit specification for inductive loads) Altitude derating from 2,000 to 4,000 m (6,562 to 13,123 ft): Maximum 150 V AC phase-to-phase Voltage withstand: 250 V AC</p>
Terminal connections	<p>Frame ground and power supply</p> <ul style="list-style-type: none"> Terminals: Standard 45° plug, 2.5 mm² Wiring: 1.5 to 2.5 mm² (16 to 12 AWG), multi-stranded <p>Analogue inputs, PWM, digital inputs and the status relay</p> <ul style="list-style-type: none"> Terminals: Standard 45° plug, 1.5 mm² Wiring: 0.5 to 1.5 mm² (28 to 16 AWG), multi-stranded <p>Relay outputs</p> <ul style="list-style-type: none"> Terminals: Standard 45° plug, 2.5 mm²

Category	Specification
	<ul style="list-style-type: none"> Wiring: 0.5 to 2.5 mm² (22 to 12 AWG), multi-stranded
Torques and terminals	<p>Module faceplate screws: 0.5 N·m (4.4 lb-in)</p> <p>Connection of wiring to frame ground and power supply terminals: 0.5 N·m (4.4 lb-in)</p> <p>Connection of wiring to analogue inputs, PWM, digital inputs, and the status relay terminals: 0.25 N·m (2.2 lb-in)</p> <p>Connection of wiring to relay output terminals: 0.5 N·m (4.4 lb-in)</p> <p>UL/cUL Listed: Wiring must be minimum 90 °C (194 °F) copper conductors only</p>
Galvanic isolation	<p>Between power supply and other I/Os: 600 V, 50 Hz for 60 s</p> <p>Between analogue inputs, PWM, digital inputs, and the status relay, and other I/Os: 600 V, 50 Hz for 60 s</p> <p>The analogue output on terminals 5 and 6 is galvanically connected to the PWM output (terminals 6 and 7)</p> <p>Between relay groups and other I/Os: 2210 V, 50 Hz for 60 s</p>
Ingress protection	<p>Unmounted: No protection rating</p> <p>Mounted in rack: IP20 according to IEC/EN 60529</p>
Dimensions	L×H×D: 28 × 162 × 150 mm (1.1 × 6.4 × 5.9 in)
Weight	246 g (0.5 lb)

3. Legal information

3.1 Disclaimer and copyright

Open source software

This product contains open source software licensed under, for example, the GNU General Public License (GNU GPL) and GNU Lesser General Public License (GNU LGPL). The source code for this software can be obtained by contacting DEIF at support@deif.com. DEIF reserves the right to charge for the cost of the service.

General warranty

The warranty period for the purchased product is defined in the contract and order acknowledgement. In general, DEIF's Terms and Conditions of Sale and Delivery apply.

The product continuously monitors the operating temperature and stores this information in a log file on the device. DEIF uses this information for service purpose and to validate if issues with the product are covered by the warranty.

The software packages supplied are believed to be of the highest quality. Due to the nature of the software development process, it is possible that there are hidden defects in the software which may affect its use, or the operation of any software or device developed with this software package.

DEIF does not undertake responsibility for determining whether this package is suitable for the application, nor for ensuring the correct operation of the application software and hardware.

The warranty does not cover product wear parts, such as:

- Internal flash disc
- If applicable, SD card (purchased separately)
- Replaceable coil-cell battery, used for the real-time clock (available as a spare part)

Trademarks

DEIF and the DEIF logo are trademarks of DEIF A/S.

Bonjour[®] is a registered trademark of Apple Inc. in the United States and other countries.

Adobe[®], *Acrobat*[®], and *Reader*[®] are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

CANopen[®] is a registered community trademark of CAN in Automation e.V. (CiA).

SAE J1939[®] is a registered trademark of SAE International[®].

CODESYS[®] is a trademark of CODESYS GmbH.

EtherCAT[®], *EtherCAT P*[®], *Safety over EtherCAT*[®], are trademarks or registered trademarks, licensed by Beckhoff Automation GmbH, Germany.

VESA[®] and *DisplayPort*[®] are registered trademarks of Video Electronics Standards Association (VESA[®]) in the United States and other countries.

Google[®] and *Google Chrome*[®] are registered trademarks of Google LLC.

Linux[®] is a registered trademark of Linus Torvalds in the U.S. and other countries.

Modbus[®] is a registered trademark of Schneider Automation Inc.

Torx[®], *Torx Plus*[®] are trademarks or registered trademarks of Acument Intellectual Properties, LLC in the United States or other countries.

Windows[®] is a registered trademark of Microsoft Corporation in the United States and other countries.

All trademarks are the properties of their respective owners.

Copyright

© Copyright DEIF A/S. All rights reserved.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.