Digital Voltage Controller, DVC 310

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- Terminals and wiring
- Commissioning, using the EasyReg software
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1. Introduction

1.1 About the Installation and commissioning instructions

1.1.1 General purpose
These are the Installation and commissioning instructions for DEIF’s Digital Voltage Controller, DVC 310. The general purpose is to provide information for the correct installation and commissioning of DVC 310.

⚠️ Read this manual before installing or commissioning the DVC 310. Failure to do this could result in human injury or damage to the equipment.

1.1.2 Intended users
The instructions are mainly intended for the people responsible for installing and commissioning the digital AVR.

1.1.3 Revision information
The letter at the end of the document number on the front page indicates the revision number of this document.

The latest version of this document can be downloaded at www.deif.com. If you click on the revision letter to the right of the document name, the revision history is displayed.

1.1.4 Software version
This document is based on the following software versions:

<table>
<thead>
<tr>
<th>Software type</th>
<th>Software version</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVC 310 firmware</td>
<td>220</td>
</tr>
<tr>
<td>EasyReg for DEIF</td>
<td>2.50</td>
</tr>
</tbody>
</table>

1.1.5 Getting technical support
You can read about service and support options on the DEIF website, www.deif.com. You can also find contact details on the DEIF website.

You have the following options if you need technical support for your controller:

- Technical documentation: All the product technical documentation is available on the DEIF website.
- Training: You can ask for training.
- Support: You can call or email DEIF. DEIF offers 24-hour support. There may also be a local DEIF subsidiary.
- Service: DEIF engineers can help with design, commissioning, operating and optimisation.

1.2 Warnings, safety and legal information

1.2.1 Warnings and notes
A number of warnings and notes are included in this document. These are highlighted, to separate them from the general text.
1.2.2 Safety issues
Installing and operating the unit may require work with dangerous currents and voltages. The installation must only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Hazardous live currents and voltages. Do not touch any terminals, especially the AC measurement inputs. Touching the terminals could lead to injury or death.

1.2.3 Factory settings
The DVC 310 is delivered pre-programmed from the factory with a set of factory settings. These are based on average values and are therefore not necessarily correct for your alternator. All DVC 310 parameters must be checked before running the installation.

1.2.4 Electrostatic discharge awareness
Protect the DVC 310 terminals from static discharge during installation. You must also protect the terminals if you need to remove the AVR.

These precautions are no longer necessary once the controller is correctly installed and connected, as required by the designer's wiring diagram.

1.2.5 Legal information
DEIF takes no responsibility for the installation or operation of the plant. Contact the alternator company if you have any doubt about installing or operating the plant.

The controller must not be opened by unauthorised personnel. If opened, the warranty is void.

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2. Installation, mounting and wiring

2.1 Installation

The DVC 310 is delivered in a sturdy carton to prevent shipping damage.

When you receive a system, check the part number against that of the requisition and packaging list for agreement. Inspect for damage, and if there is evidence of such, immediately file a claim with the carrier and notify the DEIF regional sales office, your sales representative or a sales representative at DEIF’s head office in Skive, Denmark.

If the unit is not installed immediately, store it in the original shipping package in a moisture and dust free environment.

2.2 Mounting

2.2.1 Mounting the DVC 310

The DVC 310 is normally located in the generator terminal box. It is designed for mounting behind the panel. Mounting hardware consists of four thread-forming screws, Ø 6 mm, that pass through the plastic shell of the DVC 310 and go into the terminal box of the alternator.

The recommended torque range for the steel mounting screws is 4.07 to 4.52 newton metres (36 to 40 inch-pounds).

The unit must be mounted where the ambient temperature does not exceed the range (-40 to +65) °C.
2.2.2 Dimensions

![Dimensions Diagram]

2.2.3 Installation for CE compliance

In order for the DVC 310 to be CE (European Community) compliant, the end-user should follow a few recommendations concerning mounting of the unit.

The DVC 310 can be mounted in the terminal box of the alternator (metal enclosure) or directly into the control switchboard.

For mounting in a switchboard, see the picture below for an example.
In this example, the DVC 310 is mounted in the back of a switchboard. The CAN bus cable will need a shielded cable, and this shield will have to be mounted in the included CAN bus connector (2). The included clamp-on ferrit core (1) needs to be mounted on the CAN bus cable between 5-20 mm from the included CAN bus connector (2). The CAN bus cable shield should be terminated to ground (3) as close to the unit as possible. See picture above.

The DVC 310 can also be mounted in the terminal box on an alternator. In this case it is also important to use shielded CAN bus cable and make sure that the above recommendations are followed as well.
2.3 Wiring and terminals

2.3.1 Wiring diagram

The numbers in the diagram above indicate the following:

1 **Power**
   AREP: Yellow wire on X2 - red wire on Z1 - green wire on X1 - black wire on Z2
   PMG: X2, X1 and Z2
   Shunt: X1 and X2

  ⚠️ 10 A fast-blow fuses externally mounted must be used in the three cases

2 **Field excitation**
   The field winding + to the terminal F+
   The field winding - to the terminal F-

3 **Battery**
   Ensure the polarity is correct when connecting

  ⚠️ The battery supply must be protected by a 1 A slow-blow fuse
4 Voltage sensing
   Mains voltage: L1 and L2
   Alternator voltage - single-phase: V and W
   Three-phase: U, V and W

5 Current transformer(s)
   Placing in parallel and measurement: CT on U
   Measurements: CTs on V and W

6 Temperature sensor
   PTC: See Mounting above
   Pt100: See Mounting above

7 USB port

8 Digital I/O
3. Human Machine Interface

3.1 Human Machine Interface (HMI)

The DVC 310 Human Machine Interface (HMI) consists of three elements:

- The USB link
- The I/O
- The LEDs

3.1.1 Communication USB link

The EasyReg software and the DVC 310 communicate via a USB cable (Universal Serial Bus). The connection on the DVC 310 is the B type.

3.1.2 Analogue I/O

This part of the board allows the operator to use the inputs to make manual settings and the outputs to check certain data or to indicate whether certain AVR functions are working correctly or not. An external voltage (0 V to 10 V) is present, which can be used as a reference for an electronic device. The minimum analogue input setting is 0 % and the maximum is 100 %.

The different BIAS types are:
- from an external potentiometer (1 kΩ)
- 4 to 20 mA
- 0 to 10 V
- ±10 V

The two analogue inputs can also be used to achieve digital functions + / -.

NB: Make sure that the voltage applied on analogue inputs does not exceed 10 V.
### 3.1.3 Digital I/O

<table>
<thead>
<tr>
<th>I/O name</th>
<th>Type</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI1</td>
<td>Pull up input</td>
<td>To be connected to 0 V</td>
</tr>
<tr>
<td>DI2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO1</td>
<td>Opened collector</td>
<td>Max. current: 60 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voltage: 0 to 24 V</td>
</tr>
<tr>
<td>DO2</td>
<td>Dry contact</td>
<td>6 A, 30 V&lt;sub&gt;dc&lt;/sub&gt;/250 V&lt;sub&gt;ac&lt;/sub&gt; (on resistor)</td>
</tr>
<tr>
<td>AL1</td>
<td>Opened collector</td>
<td>Max. current: 60 mA</td>
</tr>
<tr>
<td>AL2</td>
<td></td>
<td>Voltage: 0 to 24 V</td>
</tr>
</tbody>
</table>

### 3.1.4 LEDs

<table>
<thead>
<tr>
<th>Name</th>
<th>Colour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power ON</td>
<td>Green</td>
<td>The board is supplied with power</td>
</tr>
<tr>
<td>↓ Hz</td>
<td>Red</td>
<td>Speed drop</td>
</tr>
<tr>
<td>↑ / ↓ Volt</td>
<td>Red</td>
<td>Problem of over-voltage or under-voltage</td>
</tr>
<tr>
<td>↑ / ↓ Exc.</td>
<td>Red</td>
<td>Problem of over-excitation or under-excitation</td>
</tr>
<tr>
<td>Fault</td>
<td>Red</td>
<td>Problem on the exciter field diode bridge</td>
</tr>
<tr>
<td>Manu</td>
<td>Yellow</td>
<td>Manual mode enabled</td>
</tr>
<tr>
<td>PF/KVAR</td>
<td>Yellow</td>
<td>Regulation of the power factor or reactive power enabled</td>
</tr>
<tr>
<td>U = U</td>
<td>Yellow</td>
<td>Alternator voltage = Mains voltage</td>
</tr>
<tr>
<td>USB</td>
<td>Blue</td>
<td>AVR connected to a PC</td>
</tr>
</tbody>
</table>