

# DIGITAL VOLTAGE REGULATOR

## AVR-10-D



### FEATURES

- *Supports both AREP-PMG-SHUNT operations*
- *10 Amps continuous current output capability*
- *20 Amps forcing for 10 seconds*
- *Requires only 3VAC for build-up*
- *Microprocessor controlled*
- *3 phase network connection*
- *Phase-phase or phase-neutral voltage control*
- *Selectable voltage regulation modes*
- *Single phase or 3 phase operation capability*
- *Compatible with 50 and 60Hz alternators*
- *Wide voltage range (42-277VAC Ph-N)*
- *1 phase alternator load current connection*
- *Automatic reactive load sharing capability*
- *Automatic droop capability (positive or negative)*
- *Automatic alternator power limiting*
- *Analog load sharing inputs ( $\pm 3V$  and 0-10V)*
- *LAM for low frequency protection, knee function*
- *Soft recovery from severe overloads*
- *Exciter over current protection*
- *High Temperature protection*
- *Sensing loss protection*
- *Programmable parameters*
- *All parameters programmable on the unit*
- *Optional non-isolated USB port*
- *Optional isolated RS-485 port*
- *Optional isolated CANBUS port*
- *Wide supply voltage range, 35-305VAC*
- *Wide voltage regulation range, 42-277VAC*
- *Resin molded design against vibration*

### DESCRIPTION

DATAKOM AVR-10-D is a microprocessor controlled digital voltage regulator designed for synchronous brushless alternators. It features high static and dynamic voltage stability in a compact and low-cost package.

The device has open chassis, resin molded design and is intended to be mounted inside the alternator's terminal box. The output stage of the device is a Half Wave thyristor output associated with a freewheeling diode. The unit does not include moving parts; therefore, it is able to operate in highly vibrating environments.

The unit regulates the alternator voltage by adjusting the DC voltage applied to the excitation winding. It uses digital PID algorithms for the maximum precision and the best dynamic response.

The unit supports both AREP, PMG or shunt regulated alternators. It has separate inputs for voltage measurement and the excitation supply.

The internal supply is derived from excitation supply inputs and has an operating range of 35-300VAC. Thus, the output voltage regulation range is as wide as 42-277VAC Ph-N (73-480VAC Ph-Ph) in SHUNT mode and 15-277V in AREP or PMG modes.

The required minimum residual voltage for build-up is 3 VAC.

The standard unit comes ready for flawless operation with most alternators; however, it also provides a complete set of programmable parameters allowing precise adaptation to the alternator and the application in question.

Thanks to the led display and key switches, all parameters are programmable on the unit itself without the need for an additional instrument. This adds ease of use to the unit.



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## DESCRIPTION (continued)

The device has 3 phase network connection and measures both phase-to-neutral and phase-to-phase voltage of the alternator. It is also able to handle single phase alternators.

The regulation can be selected for PH-N or Ph-Ph. The unit offers various regulation modes as:

- single phase regulation
- average of 3 phases regulation
- minimum of 3 phases regulation
- maximum of 3 phases regulation

The unit has a CT input which allows an automatic droop to be inserted in the output voltage. The droop may be selected positive or negative, for the widest range of possible applications.

Using the CT input, the unit also measures active, reactive and apparent powers. This allows automatic reactive load sharing between alternators and alternator overload protection.

The unit continually monitors the alternator frequency and provides a LAM (load acceptance module) function (also known as knee-function) for protection against overloading of the engine. When the engine rpm drops, the alternator voltage is proportionally reduced in order to protect the diesel engine from stopping.

The soft-recovery function intervenes in severe overload conditions. It allows a slowed-down recovery of the output voltage preventing voltage oscillations.

The unit provides a soft-start feature preventing excessive excitation currents and voltage oscillations at startup phase.

The sensing loss protection feature limits the excitation current and protects the windings if no voltage is present on the sensing inputs after 10 seconds.

The unit continually measures the excitation current and the heatsink temperature, providing protection against overexcitation and overheating.

The unit supports multiple gensets parallel operation. Both  $\pm 3V$  and 0-10V analog load sharing inputs are provided.

## TECHNICAL SPECIFICATIONS

### CONNECTION: AREP, PMG, SHUNT SENSING INPUT

Voltage: 15-300 V-AC (L-N)  
26-520 V-AC (L-L)

Frequency range: 10Hz to 100Hz  
Measurement method: True RMS  
Sampling rate: 8192 samples/sec  
Voltage accuracy:  $\pm 0.2\%$   
Frequency accuracy:  $\pm 0.1\%$

### POWER INPUT

Voltage: 35-300 V-AC  
Frequency: 35 to 300 Hz

### POWER CONSUMPTION: 2W (output not loaded)

### EXCITATION OUTPUT

Voltage max: 45% of power input voltage  
Current max: 10 A-DC (continuous),  
20 A-DC (10 sec forcing)

Winding impedance: 2 to 50 ohms.

### LOAD REGULATION (Static)

$\pm 0.2\%$  (with 0% to 100% load change)

### FREQUENCY DRIFT

$\pm 0.02\%$  per Hz change

### THERMAL DRIFT

$\pm 0.01\%$  per  $^{\circ}C$  change in AVR ambient

### SOFT START: adjustable 0-20 sec

### LAM (Load Acceptance Module)

Detection threshold (knee point):

Adjustable 0 to 100Hz

Voltage Slope: 10 to 50%/Hz (adjustable)

### UNIT POWER DISSIPATION: 26 watts maximum

### BUILD UP VOLTAGE: 3.0 V-AC min

### ANALOGUE INPUTS

$\pm 10\%$  with  $\pm 3$  V-DC (must be isolated)

$\pm 10\%$  with 0-10 V-DC (must be isolated)

### QUADRATURE DROOP INPUT

Max. input: 5A

Droop range: adjustable 0 to 300V for 0 to 5A

Measuring accuracy: 0.5% (excluding CT accuracy)

### INSTALLATION

Dimensions: 98x133x43mm (LxWxH)

Weight: 360gr

Mounting type: Screw mounted to base

Mounting holes: 79x114mm (M5 bolts & screws)

### ENVIRONMENTAL

Operating temperature:  $-40$  to  $+70$   $^{\circ}C$

Maximum humidity: 95% non-condensing.

Storage temperature:  $-55$  to  $+85$   $^{\circ}C$

### PROTECTION DEGREE

IP20

### SHOCK & VIBRATIONS

Shocks: 9 g each axis.

- Vibrations: 8g or  $\pm 2$ mm (whichever is smaller).

### PROGRAMMING:

- On-board display and pushbuttons
- USB port through computer (optional)
- RS-485 port through computer (optional)

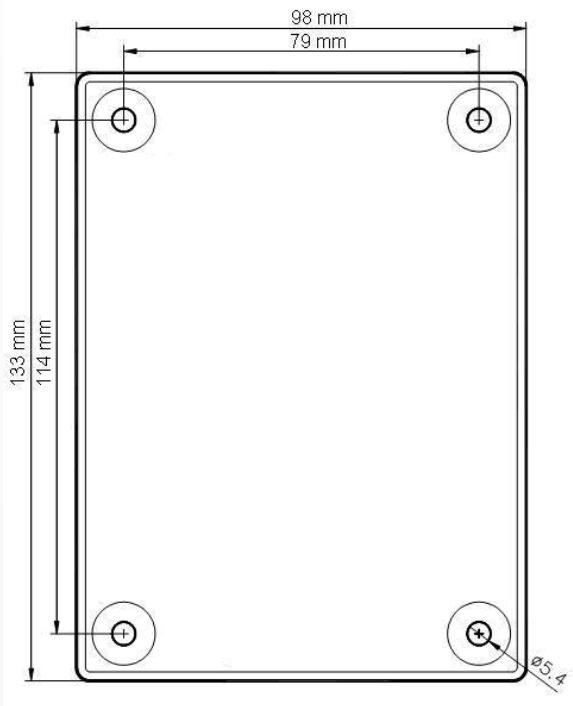
## COMMUNICATION PORTS

**USB-C type (optional):** it is used for computer connection. Warning: The AVR may be live! A USB-isolator module should be used between the AVR and the computer.

**RS-485 (optional):** it is used for PLC and automation systems connections.

**CANBUS (optional):** It is used for remote control of the AVR in synchronizing applications. Through CANBUS, the unit is directly connected to D-series synchronizing control modules.

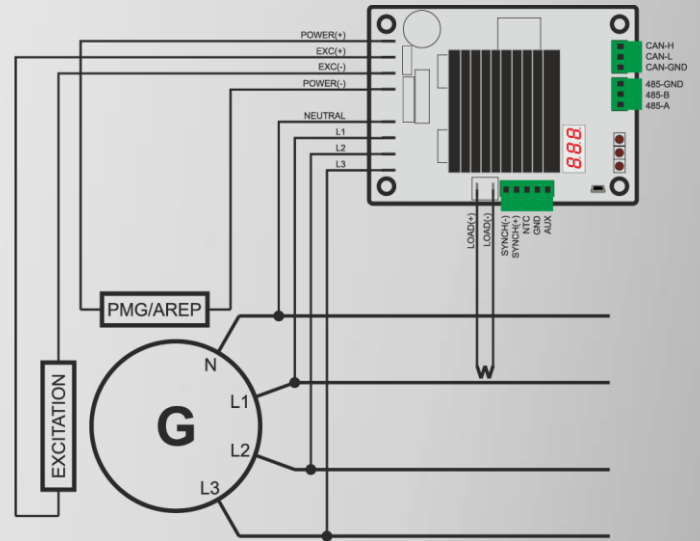
## MECHANICAL DRAWING



## WIRING

1. POWER(+) : Supply input
2. EXC(+): Excitation winding, positive
3. EXC(-) : Excitation winding, negative
4. POWER(-) : Supply input
5. NEUTRAL: Voltage sensing input
6. L1: Voltage sensing input
7. L2: Voltage sensing input
8. L3: Voltage sensing input
9. LOAD(+): Droop CT input terminal.
10. LOAD(-): Droop CT input terminal
11. SYNCH(-): Analogue control input
11. SYNCH(+): Analogue control input

## CONNECTION DIAGRAM AREP ALTERNATOR



## CONNECTION DIAGRAM SHUNT ALTERNATOR

