Universal, retrofit and replacement
VOLTAGE REGULATORS
AVRs

GENERATOR SPARE PARTS
PROTECTION RELAYS
INSULATION GUARDS
Contents:
- Voltage regulators
  - Universal AVRs
  - Direct replacement AVRs
  - Genuine AVRs
- Options for voltage regulators
- Protections
- Parts for excitation systems
# Voltage regulators

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### Universal automatic EMRI voltage regulators

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<td>Universal avr, 5 Amps</td>
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<tr>
<td>KASR20</td>
<td>Universal avr 10 Amps,</td>
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<tr>
<td>LX4V2</td>
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<td>LX10.1</td>
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<td>LX20</td>
<td>Universal avr 15 Amps</td>
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<tr>
<td>LX500</td>
<td>Universal avr volt per hertz avr</td>
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<td>Universal avr, static exciter 35-350 Amps</td>
</tr>
<tr>
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</tr>
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<td>LX10.1_GSR28.5</td>
<td>DC sensing AVR 28 Volt</td>
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<td>EVA</td>
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<td>GSR</td>
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<td>LASR11DC.1</td>
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<td>Static Exciters</td>
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<tr>
<td>LASR11.1</td>
<td>as long stock lasts</td>
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<td>3FLASR11</td>
<td>as long stock lasts</td>
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<td>Caterpillar avr</td>
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<tr>
<td>KASR10</td>
<td>Stamford Replacement</td>
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<tr>
<td>LX342</td>
<td>Stamford Replacement</td>
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<tr>
<td>LX4V2</td>
<td>AvK, EM E R260,274,280,290 Ti7.5D replacement</td>
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<tr>
<td>Piller400</td>
<td>Piller NKT generator avr</td>
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<tr>
<td>EMRI2490</td>
<td>Siemens, Uljanik replacement 6GA2490</td>
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<tr>
<td>EMRI2491</td>
<td>6GA2491, 6GA2492</td>
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<tr>
<td>Av Kaick 7.4, 7.5</td>
<td>7.4, 7.5 avr</td>
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<td>REG 112</td>
<td>TO1112</td>
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<tr>
<td>REG01</td>
<td>T01 avr</td>
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<tr>
<td>VEM REG</td>
<td>VEM, FIMAG TR4 avr</td>
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<tr>
<td>RBC</td>
<td>Replacement for Uhelec, Alstohm LS derative avr.</td>
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<tr>
<td>Type A</td>
<td>Jeumont Schneider ESCA, saturation choke</td>
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<tr>
<td>Type A</td>
<td>Jeumont Schneider ERTC, reverse</td>
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<tr>
<td>SMUX</td>
<td>Stromberg SMUX replacement</td>
</tr>
</tbody>
</table>
- SF7  NEBB SF7 replacement
- MAGREG  Makita, Honda replacement.

Options for universal AVRs

- LX_VPH  Softstart and V/Hz option
- COSPHI3.2  Power factor controller
- KOMPONDBOOSTER  Compounding/Booster system incl. transformer
- SERIES BOOSTER  Booster system for serial sustained short circuit
- POTUNIT3  Electronic potmeter voltage control reference
- TSV VOLTMATCH  Voltage match unit (generators, grid)

Protection relays

- LX_OVSCN  Overvoltage suicide protection unit
- EX_CHECK  Over - excitation relay Excitation value alarm
- IB1  Insulation guard for TN circuits
- IB40  Insulation guard for TN circuits
- FREQ_REL & F_MEET(N)  Frequency guard relay F_MEET(N)
- AKKUWACHTER  Battery voltage monitor
- THERMAX  Thermostat relay
- SPANMAX  Under/over-voltage relay

Generator excitation system spare parts

- Diodes, suppressors, rectifiers

AVRs cross reference / replacement list

AEG
- DKBL/LDW  SUBLX20

Alconza
- GR21

AVK
- R280/290,R274  EVA  Analogue avr aux. windings
- R280-290,R274  LX4V2  Digital avr for AvK/EME canbus
- Ti7.3, Ti7.4  7PUNT3, 7PUNT4  AvK Ti 7.4 and identical models
- Ti7.5
- TO1  REG01  AvK T01 replacement
- TO12, TO112  REG112  AvK TO112 replacement
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<thead>
<tr>
<th>Manufacturer</th>
<th>Model</th>
<th>Replacement Description</th>
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<tr>
<td>Caterpillar</td>
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<td>CATAVR(EMRI) Universal AVR VR3,VR6</td>
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<td>EVA / LX4V2</td>
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<td>FUJI</td>
<td>HIREX</td>
<td>SUBLX20</td>
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<td>INDAR</td>
<td>LCB, LSB</td>
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<td>Jeumont Schneider</td>
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<td>Leroy Somer</td>
<td>15075/1100 series</td>
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<td>NEBB</td>
<td>NEBB SF7 AVR</td>
<td>SF7 3TX20</td>
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<td>PILLER400</td>
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<td>ANTON PILLER avr</td>
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<td><strong>Genuine AVRs</strong></td>
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<td>Cosimat N+</td>
<td>DSG, DKBN avr</td>
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<td>Marelli</td>
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<td>M25FA502</td>
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- M25FA600
- M25FA603

Siemens
- 6GA2490
- GA2492
- 6GA2492

- Spring 2010 available

Digital replacement version of COSIMAT N (© Cummins Generator Techn.)
## Selection table universal avr’s

<table>
<thead>
<tr>
<th>Output</th>
<th>Supply range</th>
<th>Sensing range</th>
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<td></td>
<td>Amps</td>
<td>Volts</td>
<td>max. Volt</td>
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<td>KASR10</td>
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<td>115-260</td>
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<td>150-260</td>
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<td>LX4V2/50</td>
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<td>20-100</td>
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<td>10</td>
<td>220</td>
<td>15-260</td>
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<td>3TX20</td>
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<td>180</td>
<td>30-400</td>
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<td>ASR35-250</td>
<td>35-250</td>
<td>180</td>
<td>230</td>
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<td>LX10.1 GSR28.5VDC</td>
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<td>220</td>
<td>15-260</td>
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<td>LX10.1 GSR750VDC</td>
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<td>EVA</td>
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<td>22-100</td>
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<tr>
<td>SUBLX20</td>
<td>-20</td>
<td>100</td>
<td>120-480</td>
</tr>
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</table>

For other values, contact EMRI Electronics bv.
T:+31(0)318620427
T:+31(0)318620427
@:info@emri.nl
UNIVERSAL AVRs

KASR10

The KASR10 is an electrically robust AVR with SCR technology. The KASR10 can be applied in brushless generators up to approx. 150 kVA, where the sensing voltage is 230 V or 115 V between phase / neutral or phase / phase. The KASR10 is fully encapsulated rugged AVR.

Specifications
- Maximum field current: 5 A (unfused)
- Maximum field voltage: 35% of the voltage between U and 0.
- Supply / Sensing input: 110-260 VAC (terminals U and 0), 50/60 Hz, 1-phase (jumper selectable)
- Accuracy: < 1 %
- Ambient temperature: Max. 50 °C
- Dimensions: 100 x 135 x 45 mm

Features
- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Potentiometer input for external voltage adjustment

KASR20

The KASR20 is an electrically robust AVR with SCR technology. The KASR20 can be applied in brushless generators where the sensing voltage is 230 V or 400 V, enhanced P and I stability adjustments. Suitable for parallel operation. Sensing and supply voltages are separated and isolated for various applications.

Specifications
- Maximum field current: 12.5 A (fused)
- Maximum field voltage: 35% of the supply voltage.
- Supply: 150-260 VAC (terminals LH), 50/60 Hz
- Sensing input: 1 phase 230 / 480 Volt
- Accuracy: < 1 %
- Ambient temperature: Max. 50 °C
- Dimensions: 100 x 135 x 75 mm

Features
- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Potentiometer input for external voltage adjustment
- Parallel operation
- Isolated supply and sensing input
- Option connector for additional features
**LX321**

The LX321 enhanced MX321 AVR (Newage). The LX321 features several special functions for a wide variety of generator control. It is 1:1 suitable to replace the Newage MX321 and equivalent models. It has the power factor controller PFC3 integrated.

The AVR is completely digital and is equipped with special control features such as current limiting, remote full scale voltage control or current control, in single as well as in parallel operation.

Protection options and fault contact. Equipped with Can interface and also re-programmable to meet special customs applications.

The LX321 is completely encapsulated in PUR to improve thermal as well mechanical reliability.

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**LX342 (2010 available)**

The LX342 is an enhanced MX341 (Newage). The LX342 features several special functions for a wide variety of generator control. It is 1:1 suitable to replace the Newage MX341 and MX342 equivalent models.

The AVR is completely digital and is equipped with special control features as well as integrated power factor controller.

Equipped with Can interface and also re-programmable to meet special customs applications.

The LX321 is completely encapsulated in PUR to improve thermal as well mechanical reliability.
**LX4V2**

The LX4V2 is a replacement AVR for AvK DKB, WKB and EME DR generators and AVRs type R260/R261, R260.3/R274, and R280/290.

The wide input and excitation output range enables application in many other generators.

The LX4V2 is an completely digital AVR with multiple selectable protections and operating modes.

- A CAN interface and re-programmable microprocessor enables custom adaptation and on line value monitoring.

**Specifications**

- Maximum field current: 3 A / 6 A (10 sec) (fused)
- Maximum field voltage: 75% of the supply voltage
- Supply input: 20 - 100 VAC 1~, (15 – 100 VAC 3~)
- Sensing input: 165 - 480 VAC max. 50/60 Hz, 3-phase
- Ambient temperature: -20 - 50°C isolated heatsink
- Dimensions: 130 x 115 x 76 mm

**Features**

- V/Hz operation or constant voltage
- Isolated and separate supply and sensing voltage
- Various protection, with error code LED
- Self excitation circuit from 10 V residual voltage
- Potentiometer input for external voltage adjustment
- Temperature limiting / protection
- Exciter field limitation
- Parallel operation possible with optional external droopkit (sold separately)

**LX10.1**

The LX10.1 is a universal and very compatible AVR for brushless generators. Its unique characteristics allows it to replace virtually any other brand of AVR. The LX10 has a wide supply voltage range which can be applied in almost any generator, from PMG generators to simple phase supplied AVR systems or generators with auxiliary windings etc. The use of modern high power IGBT technology makes the LX10.1 widely applicable and with excellent performance for any kind of generator load.

**Specifications**

- Maximum field current: 10 A (fused)
- Maximum field voltage: 100% of the supply voltage or limited by potentiometer max.
- Supply input: 22 - 260 VAC 1- or 3-phase or DC
- Sensing input: 140 - 480 VAC 50/60 Hz (400 Hz for LX10_XFR or 3 x 660 V)
- Ambient temperature: Max. 50°C isolated heatsink
- Dimensions: 160 x 145 x 110 mm

**Features**

- Isolated and separate supply and sensing voltage
- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Parallel operation possible with optional external droopkit (sold separately)
- Connector for optional control systems
LX20

The LX20 is the increased powerful version of the LX10.1. Due to the higher current specifications and larger suppressor parts, the AVR is applicable in larger generators or generator with greater pole number such as 6, 8 or 10 pole generators.

**Specifications**
- Maximum field current: 15A (20 A fused)
- Maximum field voltage: 100% of the supply voltage or limited by potentiometer max.
- Supply input: 15 - 140 VAC 1- or 3-phase or DC
- Sensing input: 170 - 480 VAC 50/60 Hz
- Accuracy: < 1 %
- Ambient temperature: Max. 50 °C isolated heatsink case (cold plate technology)
- Dimensions: 160 x 145 x 110 mm

**Features**
- Isolated and separate supply and sensing voltage
- Underspeed trip in VpH mode as well shut down mode with LED indicator
- Self excitation circuit from 3 V residual voltage
- Parallel operation possible with optional external droopkit (sold separately)
- Connector for optional control systems

LX500

The LX500 is a universal and very compatible AVR for brushless generators. Its unique characteristics allows it to replace virtually any other brand of AVR. Due to modern high power and micro controller technology, several operational modes can be selected. Unlike the LX10, the LX500 has a proportional V/Hz mode from 35 Hz up to 60 Hz.

**Specifications**
- Maximum field current: 10 A (fused)
- Maximum field voltage: 100% of the supply voltage or limited by potentiometer max.
- Supply input: 22 - 260 VAC 1- or 3-phase or DC
- Sensing input: 140 - 480 VAC 50/60 Hz, 3-phase
- Accuracy: < 1 %
- Ambient temperature: Max. 50 °C isolated heatsink case (cold plate technology)
- Dimensions: 160 x 145 x 110 mm

**Features**
- Isolated and separate supply and sensing voltage
- V/Hz operation
- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Parallel operation possible with optional external droopkit (sold separately)
- Potentiometer input for external voltage adjustment
- Connector for optional control systems
**3TX20**

The 3TX20 is an extremely powerful and universal AVR for brushless or slipring generators. The use of high power SCR technology makes the 3TX20 an excellent choice for generators with rather high excitation values. The 3TX20 has a wide AC supply voltage range which makes it applicable for many generators.

**Specifications**

- **Maximum field current**: 20 A (fused)
- **Maximum field voltage**: 75% of the voltage between the terminals LH1 - LH2
- **Supply input**: 40 - 480 VAC 50/60 Hz
- **Sensing input**: 3 x 200 - 3 x 500 VAC 50/60 Hz
- **Accuracy**: < 1%
- **Ambient temperature**: Max. 50 °C isolated heatsink case (cold plate technology)
- **Dimensions**: 160 x 145 x 110 mm

**Features**

- Isolated and separate supply and sensing voltage
- Underspeed trip with LED indicator
- Self excitation circuit from 10 V residual voltage
- Parallel operation possible with optional external droopkit (sold separately)
- Potentiometer input for external voltage adjustment
- Connector for optional control systems

**ASR35/100/150/250 (static exciter)**

The ASR range of AVRs are designed for slipring generators. The excitation currents are dependent upon the ASR type maximum 40, 100, 150 and 250 amps. The ASR AVRs are IP00 and may need to be built into cabinets or inside the generators.

**Specifications**

- **Maximum field current**: 40, 100, 150 and 250 A (fused)
- **Maximum field voltage**: 75% of the voltage U and 0
- **Supply input**: 230 VAC 50/60 Hz
- **Sensing input**: 3 x 200 - 3 x 480 VAC 50/60 Hz
- **Accuracy**: < 1%
- **Ambient temperature**: Max. 50 °C isolated heatsink
- **Dimensions**
  - ASR35: 200 x 200 x 115 mm
  - ASR100/150: 300 x 300 x 190 mm
  - ASR250: 600 x 300 x 300 mm

**Features**

- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Parallel operation possible with optional external droopkit (sold separately)
- Potentiometer input for external voltage adjustment
- Connector for optional control systems
NOZERO 35, 100, 150, 250 and 350 (static exciter)

The NOZERO range of AVRs like the ASR series avr’s. The difference between the ASR avr’s is that the NOZERO avr’s are designed generators which do not a neutral available for the excitation power. The excitation currents are dependent upon the NOZERO type maximum 40, 100, 150, 250 and 350 Amps. The NOZERO AVRs are IP00 and may need to be built into cabinets or inside the generators.

Specifications

- Maximum field current: 40, 100, 150, 250 and 350 A (fused)
- Maximum field voltage: 40% of the voltage U and V
- Supply / Sensing input: 3 x 400 - 460 VAC 50/60 Hz without neutral
- Accuracy: < 1%
- Ambient temperature: Max. 50°C isolated heatsink

Dimensions

- NOZERO35: 200 x 200 x 140 mm
- NOZERO100/150: 300 x 300 x 190 mm
- NOZERO250/350: 600 x 300 x 300 mm

Features

- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Parallel operation possible with optional external droopkit (sold separately)
- Potentiometer input for external voltage adjustment
- Connector for optional control systems

NOZERO250 and NOZERO350

NOZERO100 and NOZERO150
The LX10_GSR750 is a special AVR with the output excitation specifications as the LX10.1. The sensing voltage range is 750 Volt dc or 28 Volt dc for the 28 V version. The AVR is equipped with exciter current limitation. The AVRs are used in avionics starter and traction supply generator sets.

**EVA**

The EVA is a specially designed replacement AVR for AvK DKB, WKB and EME generators and AVR’s type R260/R261, R260.3/R274, and R280/290. The EVA is both electrically and dimensionally compatible and uses the compound and auxiliary winding system from the generators.

**Specifications**

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<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tr>
<td>Maximum field voltage</td>
<td>75 % of the supply voltage</td>
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<td>Supply input</td>
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</tr>
<tr>
<td>Sensing input</td>
<td>165 - 480 VAC max. 50/60 Hz, 3-phase</td>
</tr>
<tr>
<td>Accuracy</td>
<td>&lt; 1 %</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Max. 50 °C isolated heatsink</td>
</tr>
<tr>
<td>Dimensions</td>
<td>130 x 150 x 76 mm</td>
</tr>
</tbody>
</table>

**Features**

- Isolated and separate supply and sensing voltage
- Underspeed trip with LED indicator
- Self excitation circuit from 10 V residual voltage
- Potentiometer input for external voltage adjustment
**SUBLX20**

The SUBLX20 is a derivative / subtractive avr. It replaces many other avr’s in excitation systems where the surplus of excitation power is reduced by the avr to control the generators output. Examples of the derivative system are the Leroy Somer ACT, Reliance, Siemens and others. Transient peak indicator for advise of use of additional RC filters are available to reduce possible transients. The avr has wide supply and sensing values and an option connector for additional functions such as power factor controller.

**Specifications**

- **Maximum derivate current:** -20 A (unfused)
- **Supply input:** 120–480 VAC
- **Sensing input:** 230–480 VAC max. 50/60 Hz
- **Accuracy:** < 1 %
- **Ambient temperature:** Max. 50 °C isolated heatsink case
- **Dimensions:** 160 x 145 x 110 mm

**Features**
- VPH and constant voltage mode

---

**GSR**

The GSR is an AVR for controlling DC-generators. A DC droopkit is available for parallel operation between two GSR controlled DC generators.

**Specifications**

- **Maximum field current:** 10A (fused)
- **Maximum field voltage:** 100 % of the supply voltage
- **Supply / Sensing input:** 220–110 VDC depending upon type
- **Accuracy:** < 1 %
- **Ambient temperature:** Max. 50 °C isolated heatsink
- **Dimensions:** 200 x 200 x 115 mm

**Features**
- Self excitation circuit from 3 V residual voltage
- Parallel operation possible with optional DC droopkit (sold separately)
- Overvoltage protection
- Potentiometer input for external voltage adjustment
- Field current limitation
GLDR - AC / DC / RPM

GLDR

The GLDR type AVRs are used for battery charging generators. They are available for AC generators with rectifiers as well as for DC generators and asynchronous generators which are controlled by RPM. The GLDR AVRs act according to U charge characteristics and have current limitation.

Specifications
- Maximum field current: Upon request
- Maximum field voltage: 100% of the supply voltage
- Supply/Sensing input: Upon request
- Accuracy: < 1%
- Ambient temperature: Max. 50°C isolated heatsink

Features
- To be determined upon ordering

For special battery charging applications or additional functions, please contact EMRI.

LASR11.1 (as long stock lasts)

The LASR11 is a very electrically robust AVR with SCR technology. The LASR11 can be applied in brushless generators and slipring generators where the sensing voltage is 230 V between phase/neutral or phase/phase. The LASR11 is an epoxy coated printed circuit board.

Specifications
- Maximum field current: 10 A (fused)
- Maximum field voltage: 75% of the voltage between U and O
- Supply/Sensing input: 100-280 VAC (terminals U and O), 50/60 Hz, 1-phase
- Accuracy: < 1%
- Ambient temperature: Max. 50°C
- Dimensions: 115 x 150 x 38 mm

Features
- Underspeed trip with LED indicator
- Self excitation circuit from 2 V residual voltage
- Potentiometer input for external voltage adjustment
- Parallel operation possible with optional external droopkit (sold separately)
The LASR11DC.1 is a specially designed AVR for use in the offshore industry where 110 VDC is used for safety reasons. The AVR controls an AC generator and senses a transformed and rectified DC voltage to obtain the necessary accuracy demanded for these power supplies. The AVR contains an over voltage protection which first performs a self diagnostic test in order to obtain intrinsically safe operation. The DC output voltage must be switched by an external circuit breaker.

Specifications
- Maximum field current: 10 A (fused)
- Maximum field voltage: 75% of the voltage between U and 0
- Supply / Sensing input: 100-150 DC
- Accuracy: < 1 %
- Ambient temperature: Max. 50 °C
- Dimensions: 115 x 175 x 38 mm
- Capacity: 2 A 120 VDC 1-pole contact (circuit breaker control)

Features
- LED indicator for CB enable contact
- Self excitation circuit from 2 V residual voltage
DIRECT OEM REPLACEMENT

VR3/CATAVR2.3

The CATAVR is a voltage regulator which replaces the original VR3 240 VSE-, the VR3 240 VPM- and the 480VPM-VR3 avr’s. The avr is easy to mount due to 1:1 size and electrical compatibility. The CATAVR has an additional mode for constant voltage, enabling trouble free parallel operation between Caterpillar and other brand generators with voltage droop, which is a common Caterpillar problem.

Specifications
- Maximum field current: 12 A (fused)
- Maximum field Voltage: 90 % of supply voltage
- Supply input: 20 - 270 VAC (or VDC)
- Sensing input: 240 - 480 VAC max. 50/60 Hz
- Accuracy: < 1 %
- Ambient temperature: Max. 60 °C isolated heatsink case (cold plate technology)
- Dimensions: Cat compatible

Features
- VPH and constant voltage mode
- Underspeed trip with LED indicator
- Self excitation circuit function selectable

SERIES BOOSTER

The SERIES BOOSTER is a current transformer supplied unit to give generators sustained short circuit characteristics. The unit is for one CT and handles 230 Volt or 400 Volt sensing range. The unit replaces the Caterpillar Booster unit 1:1

Specifications
- Sensing Voltage: 230 – 400 Volt 50-60 Hz range
- Input current: 12 AAC
- Output current: 15 ADC
- Ambient temperature: Max. 50 °C
- Dimensions: Cat compatible
SX460/KASR10

The KASR10 is an electrically robust AVR with SCR technology. The KASR10 can be applied in brushless generators up to approx. 150 kVA, where the sensing voltage is 230 V or 115 V between phase / neutral or phase / phase. The KASR10 is fully encapsulated rugged AVR.

Specifications
- Maximum field current: 5 A (unfused)
- Maximum field voltage: 35% of the voltage between U and 0.
- Supply / Sensing input: 110-260 VAC (terminals U and 0), 50/60 Hz, 1-phase (jumper selectable)
- Accuracy: < 1%
- Ambient temperature: Max. 50 °C
- Dimensions: 100 x 135 x 45 mm

Features
- Underspeed trip with LED indicator
- Self excitation circuit from 3 V residual voltage
- Potentiometer input for external voltage adjustment

LX321

The LX321 enhanced MX321 AVR (Newage). The LX321 features several special functions for a wide variety of generator control. It is 1:1 suitable to replace the Newage MX321 and equivalent models. The AVR is completely digital and is equipped with special control features such as current limiting, remote full scale voltage control or current control, in single as well as in parallel operation. Protection options and fault contact. Equipped with Can interface and also re-programmable to meet special customs applications. The LX321 is completely encapsulated in PUR to improve thermal as well mechanical reliability.
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The LX321 is completely encapsulated in PUR to improve thermal as well mechanical reliability.
LX4V2

The LX4V2 is a replacement AVR for AvK DKB, WKB and EME DR generators and AVRs type R260/R261, R260.3/R274, and R280/290.
The wide input and excitation output range enables application in many other generators.
The LX4V2 is an completely digital AVR with multiple selectable protections and operating modes.
- Can interface and re-programmable microprocessor enables custom adaptation and on line value monitoring.

Specifications
- Maximum field current : 3 A / 6 A (10 sec) (fused)
- Maximum field voltage : 75% of the supply voltage
- Supply input : 20 - 100 VAC 1~, (15 - 100 VAC 3~)
- Sensing input : 165 - 480 VAC max. 50/60 Hz, 3-phase
- Ambient temperature : -20 - 50 °C isolated heatsink
- Dimensions : 130 x 115 x 76 mm

Features
- V/Hz operation or constant voltage
- Isolated and separate supply and sensing voltage
- Various protection, with error code LED
- Self excitation circuit from 10 V residual voltage
- Potentiometer input for external voltage adjustment
- Temperature limiting / protection
- Exciter field limitation
- Parallel operation possible with optional external droopkit (sold separately)

PILLER400 (NKT)

The PILLER400 is a replacement AVR for Anton Piller voltage regulators used in PILLER NKT generators. It replaces AVRs such as no: 49.2.777, -036 etc.

Specifications
- Shunting AVR which is electrically and dimensionally compatible with Piller AVRs
- The PILLER400 replaces a multiple number of Piller AVRs due to its wide sensing range from 300 - 450 VAC.

Features
- The AVR is equipped with a droop system which makes it possible to run Piller generators in parallel with other generators.
Thyripart replacements
6GA2490 and 6GA2491 6GA2492

Both versions of the Siemens excitation systems are fitted into 1:1 equivalent models with use of EMRIs know how and experience. The unit are solid build and protected by epoxy coating.
7punt3 and 7punt4

The 7punt3 is a replacement AVR for AvK AVRs type Ti7.4D and Ti7.5D.
The 7punt4 is a replacement AVR for AvK AVRs type Ti7.1D, Ti7.2D and Ti7.3.

Specifications
Printed circuit board for controlling external transistor using auxiliary voltages from the original excitation system.

REG01

The REG01 is a replacement AVR for AvK AVR type T01.

Specifications
Printed circuit board for controlling external transistor using auxiliary voltages from the original excitation system.
REG112

The REG112 is a replacement AVR for AvK AVR type TO112. The wide adjustment range makes the REG112 AVR a suitable replacement for 380 VAC 50 Hz units as well as for 440 VAC 60 Hz units.

Specifications
Printed circuit board for controlling external transistor using auxiliary voltages from the original excitation system.
The PCB contains a connector as used by AvK.
A plug and cable assembly is also available as a replacement part.

VEMREG

The VEMREG is a replacement AVR for VEM, FIMAG and AEM TR4 voltage regulators.

Specifications
AVR for shunt operation. Sensing via measuring transformers which are originally fitted (deliverable under item VEM400), excited via compound system.

Leroy/Unelec RBC1100 replacement

The AVR’s RBC1100 (150 74 1100) and other derivative AVR’s can be replaced by the assembly LX10.1_RBC1100 replacement.
Jeumont Schneider
Type A ERTCR
Type A ESCA

The AVR’s model TYPE A from the older Jeumont Schneider generator are obsolete and can be replaced by the EMRI TYPE A avr’s.
Note that there are at least two types of this system. Upon order, care must be taken for ordering the right model, since their mode of operation is different.

STROMBERG SMUX Replacement

The AVR’s SMUX2R3 and SMUX2R5 can be replaced by the NEBB SMUX REPLACEMENT (plug compatible)
NEBB SF7 Replacement
AFSNOEP

The AFSNOEP is a shunting AVR controlling generators equipped with a compound system such as Siemens, Uljanik, Hyundai, WUXI, EFA etc. The existing excitation systems must always be approximately 10% over excited so the AFSNOEP can shunt the excitation down.

Specifications
- Maximum shunt current: 40A (unfused)
- Supply / Sensing input: 3 x 230 V or 3 x 400 V AC 50/60 Hz
- Accuracy: < 1%
- Ambient temperature: Max. 50 °C isolated heatsink
- Dimensions: 200 x 200 x 115 mm

Features
- Parallel operation possible with optional external droopkit (sold separately)
- Potentiometer input for external voltage adjustment
- Connector for optional control systems

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MAGREG

The MAGREG is an AVR designed for the more often used principle, dividing the main 230 V AC windings into two windings of 115 Volt AC each, used in small portable generator sets like MAKITA, HONDA etc. The AVR has separate (non-isolated) sensing and supply inputs from 100 to 150 V. The maximum excitation current is 4 amps.

Specifications
- Maximum field current: 4 A
- Supply voltage: 1x 110 V AC 50/60 Hz
- Sensing voltage: 1x 110 V AC 50/60 Hz
- Accuracy: < 3%
- Ambient temperature: Max. 50 °C isolated heatsink

Features
- Self excitation circuit
OPTIONS FOR AVRs

LX_VPH / ASR_VPH

The LX_VPH is an option unit which enables starting of large E-motors on generators. The generator is current controlled until the moment that the driven E-motor is at (near) synchronous speed. When in voltage mode the generator is proportionally V/Hz controlled enabling perfect speed control by the prime mover (i.e. bow thrusters, pumps etc.).

Specifications
- Sensing input voltage: 1 x 230 - 460 VAC 30-70 Hz
- Sensing input current: 0.5 A
- Accuracy: < 1 %
- Ambient temperature: Max. 40 °C isolated heatsink
- Dimensions: 160 x 145 x 110 mm

Features
- Start / Stop command
- V/Hz or constant voltage mode selection
- Selectable start-up delay

Note: The LX_VPH is for use with LX-series AVRs with connector for optional control systems.

The ASR_VPH is for use with the ASR series AVRs.

COSPHI3.2

The COSPHI3 is a power factor control board for optional use with an AVR when running in parallel to the mains utility. The COSPHI controls the EMRI AVRs perfectly by means of the optional systems connector.

Controlling of other AVRs is also possible by means of a current output (Caterpillar potentiometer input) or voltage correction signals (AvK, Newage).

Specifications
- Sensing input voltage: 3 x 400 VAC 50/60 Hz
- Sensing input current: By means of shorted rectifier bridge on CT
- Ambient temperature: Max. 50 °C
- Dimensions: 160 x 110 x 110 mm

Features
- Potentiometer input for external power factor adjustment
- Voltage and current source output for controlling other brands of AVRs
- Voltage match option
- Wide stability range adjustment possibilities
**EBC KOMPOUND250 BOOSTER**

The KOMPOUND250 BOOSTER is a unit which can be used to make excitation systems perform optimumly in overload and sustained short circuit situations. The KOMPOUND250 can be used in combination multiple current transformers and is to use in series or parallel with other avrs.

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
<td>400 VA</td>
</tr>
<tr>
<td>Forward current</td>
<td>250 A max.</td>
</tr>
<tr>
<td>No load voltage winding</td>
<td>400 VAC</td>
</tr>
<tr>
<td>Secondary current</td>
<td>5 A max</td>
</tr>
<tr>
<td>Secondary voltage</td>
<td>20/40/60/80/100 VAC</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Max. 50 °C</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
</tbody>
</table>

**SERIES BOOSTER**

The SERIES BOOSTER is a current transformer supplied unit to give generators sustained short circuit characteristics. The unit is for one CT and handles 230 Volt or 400 Volt sensing range. The unit replaces the Caterpillar Booster unit 1:1.

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing Voltage</td>
<td>230 – 400 Volt 50-60 Hz range</td>
</tr>
<tr>
<td>Input current</td>
<td>12 AAC</td>
</tr>
<tr>
<td>Output current</td>
<td>15 ADC</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Max. 50 °C</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Cat compatible</td>
</tr>
</tbody>
</table>
POTUNIT

The POTUNIT is an electronic (motorized) potentiometer or 0-10 Volt (or adjustable) reference source, variable by means of contacts. Operation direction, rampspeed as well as minimum, maximum and preset values are selectable.

Specifications
Supply Voltage : 230 Volt 50-60 Hz range (other on request)
Dimensions : Din rail mounting

TSV VOLTAGE MATCH

The TSV Voltage match unit matches two voltages by means of adjusting the electronic or motorized potentiometer of avr’s. Adjusting speed and matching window are adjustable. Contact for equal.

Specifications
Supply Voltage : 230 Volt 50-60 Hz or 400 Volt range (other on request)
Dimensions : Din rail mounting
OPTIONS FOR AVRs

LX_OVSCN

The LX_OVSCN option is a unit which protects the AVR, the generator and the load of the generator for over voltage due to defects in the excitation or generator systems. The unit disconnects the supply to the excitation systems after a chosen delay from 20 milliseconds to 5 seconds and a selectable (or adjustable) threshold from 520 V or 585 V.

Specifications
- Sensing input voltage: 3 x 400 V 50/60 Hz
- Excitation supply: Max 260 VAC / DC
- Excitation current: Max. 16 A
- Ambient temperature: Max. 50 °C
- Dimensions: 160 x 145 x 110 mm

Features
- Suitable for 1 or 3-phase excitation supply voltage systems
- Dip switches for selection of threshold and delay
- LED indications for fuse disconnection and presence of generator voltage

IB1

The IB1 is an intrinsically insulation guard designed to continuously monitor the insulation of portable generators where no protective earth conductor is present.

Specifications
- Sensing input voltage: 1 x 230 VAC 50/60 Hz (Sinusoidal voltage)
- Capacity: 2 A 230 VAC 1-pole contact
- Ambient temperature: Max. 40 °C
- Dimensions: 70 x 100 x 60 mm (w x h x d)

Features
- Approved circuit diagram design by Dutch Ministry of Labour
- DIN rail mounted
IB40

The IB40 insulation guard is designed to continuously monitor the insulation of portable generators where no protective earth conductor is present. The IB40 performs a self diagnostic test and closes its integrated circuit breaker automatically upon correct diagnostics and insulation and input voltage. An optional self adhesive front display with 3 LEDs and a reset button connected by a flexible circuit simplifies the installation of the IB40 and continuously displays the status.

Specifications
- Sensing input voltage: 1 x 230 VAC 50/60 Hz
- Capacity: 16 A 230 VAC 2-pole contact (AC1)
- Over voltage limit: 300 V +/- 5% (Sinusoidal voltage)
- Isolation check: Default 25 kOhm (adjustable)
- Ambient temperature: Max. 50 °C
- Dimensions: 125 x 70 x 65 mm (w x h x d)

FREQ_REL & F_MEET(N)

The FREQ_REL and F_MEET(N) are frequency monitoring relays for monitoring over and under frequency at generator busses. The units have a display which continuously shows the measured frequency. The FREQ_REL has an over and under frequency threshold and can be DIN rail mounted.

The F_MEET(N) is an instrument with two fixed (selectable) thresholds and has a digital front panel housing, 96 x 48 mm.

The F_MEET is an instrument without thresholds in digital front panel housing, 96 x 96 mm.

Specifications
- Sensing input voltage: 1 x 10 - 500 V 10-100 Hz (other voltages available by special ordering)
- Supply voltage: 24 VDC
- Capacity: 2 A, 230 VAC 1-pole contact
- Temperature: Max. 40 °C
- Dimensions: FREQ_REL din rail mounting 100 x 70 x 110 mm (w x h x d)
  F_MEET(N) 96 x 48 mm instrument housing
  F_MEET 96 x 96 mm instrument housing
EX_CHECK

The EX_CHECK is an excitation monitoring relay. On high excitation values an adjustable delay starts, after which a contact closes and the failure may be stored. Reset can be done by an auxiliary contact or automatically upon the disappearance of the high excitation.

Specifications

- Sensing input voltage: 1 -100 / 1 - 200 VDC (specify upon ordering)
- Supply voltage: 24 VDC, 230 VAC or 400 VAC (specify upon ordering)
- Capacity: 2 A, 230 V AC 1-pole contact
- Ambient temperature: Max. 50 °C
- Dimensions: DIN rail mounted
  100 x 70 x 110 mm (w x h x d)

AKKUWACHTER (BATTERY GUARD)

The AKKUWACHTER (battery monitor) is a monitoring guard for starter batteries for generator sets. The unit senses low battery voltage and generates an alarm.

Specifications

- Sensing input voltage: 10-30 VDC (specify threshold upon order)
- Capacity: 2 A 230 VAC 1-pole contact
- Ambient temperature: Max. 40 °C
- Dimensions: DIN rail mounted
  70 x 100 x 60 mm (w x h x d)

Features

- LED indicator for direct status
- Delayed contact
- Self adjustable

PT100 MONITOR / ALARM RELAY

The PT100 relay displays and monitors the RTD temperature. Available with one or two free programmable threshold. Model for 24 V / 230 V ac or 24 VDC voltage. Available.
**THERMAX**

The THERMAX is a thermistor relay used for winding temperature protection with single or three string thermistors. The THERMAX contains a test button and a reset button. Failures may be stored for forced reset or reset automatically upon the cooling down of the thermistors. The THERMAX checks the thermistor wiring continuously for open or short circuit.

**Specifications**
- Sensing input voltage: 24 VDC / 24 VAC / 230 VAC (specify upon ordering)
- Capacity: 2 A 1-pole contact 230 VAC
- Ambient temperature: Max. 40 °C
- Dimensions: DIN rail mounted 75 x 80 x 60 mm (w x h x d)

**Features**
- LED status indicator
- Selectable auto reset or manual reset
- Thermistors not included

**SPANMAX**

The SPANMAX is a voltage relay used for detecting over- and undervoltage. Dip switches can be used to set an over- and under threshold from 65 % up to 135 % of the nominal voltage. Three LEDs indicate the status.

**Specifications**
- Sensing input voltage: 230 VAC or other (specify upon ordering)
- Capacity: 2 A 1-pole contact 230 VAC
- Ambient temperature: Max. 40 °C
- Dimensions: DIN rail mounted 100 x 80 x 60 mm (w x h x d)

**Features**
- LED status indicator
- Selectable threshold in steps from 5 % of the nominal voltage
Generator excitation system spare parts
**Miscellaneous**

**DIM16 (PM)/DIM25/3FD**

**AC Controller**

The DIM16, DIM16PM and DIM25 are triac controllers for ohmic as well as inductive loads. The DIMs can be used for the dimming of lighting as well as for 1-phase induction motor control. The DIMs have a built-in on/off function coupled to the potentiometer or analog input value.

The 3FD is a 3-phase triac control unit which is dimensioned upon request.

**Specifications**

- **Supply voltage**: 230 VAC
- **Capacity**
  - DIM16: 16 A
  - DIM25: 25 A
- **Ambient temperature**: Max. 40 °C
- **Dimensions**
  - DIM16: 164 x 99 x 67 mm (w x h x d)
  - DIM16_PM: 150 x 90 x 60 mm (w x h x d)
  - DIM25: 160 x 145 x 110 mm

**Features**

- DIM16 PM, DIM25 and 3FD units without housing (IP00)
- Potentiometer on/off or always on
- Option for short period maximum output for use with fans
NEN 3140 Distribution box and cable assembly and equipment Tester

The NEN3140 cable and equipment tester is a designed product for periodical test of the condition of mobile installations against normative values. The installation is in use at rental companies or equipment departments of larger companies. The tester is always custom built to the equipment range of the specific customer.

Completely digitized,
Auto report,
auto archive,
windows network compatible,
self calibrating,
easy to operate,
computer network integrated.
Winding and Repair Workshop

Our experience in the generator control field is a result of the combination of various disciplines which are combined within EMRI.

EMRI's DISCIPLINES

Rewinding Workshop Test Facilities Electronic Department

World wide services