<table>
<thead>
<tr>
<th>ANSI code 27, 59</th>
<th>ANSI code 59</th>
<th>ANSI code 27</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RMV-112D</strong></td>
<td><strong>RMV-122D</strong></td>
<td><strong>RMV-132D</strong></td>
</tr>
<tr>
<td><strong>Main functions:</strong></td>
<td><strong>Under-/overvoltage protection:</strong></td>
<td><strong>Overvoltage protection (2 levels):</strong></td>
</tr>
<tr>
<td></td>
<td>• timer controlled tripping</td>
<td>• timer controlled tripping</td>
</tr>
<tr>
<td></td>
<td>• adjustable hysteresis</td>
<td>• adjustable hysteresis</td>
</tr>
<tr>
<td><strong>Aux. voltage (U&lt;sub&gt;v&lt;/sub&gt;):</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>57.7…690V AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-48-110-220V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meas. voltage (U&lt;sub&gt;m&lt;/sub&gt;):</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>57.7…690V AC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meas. current (I&lt;sub&gt;m&lt;/sub&gt;):</strong></td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>0.4…5.0A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency range:</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>40.45…65.70Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outputs:</strong></td>
<td>1 minimum and 1 maximum relay output</td>
<td>2 maximum relay outputs</td>
</tr>
<tr>
<td>Settings: ±20% of U nom</td>
<td>Settings: 0…+20% of U nom</td>
<td>Settings: 0…-20% of U nom</td>
</tr>
<tr>
<td>Delay: 0.5…10 s</td>
<td>Delay: 0.5…10 s</td>
<td>Delay: 0.5…10 s</td>
</tr>
<tr>
<td>Hysteresis: 1…10% of U nom</td>
<td>Hysteresis: 1…10% of U nom</td>
<td>Hysteresis: 1…10% of U nom</td>
</tr>
<tr>
<td><strong>Measuring system:</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>∆, 3 phase 3 wire, Y, 3 phase 4 wire</td>
<td>∆, 3 phase 3 wire, Y, 3 phase 4 wire</td>
<td>∆, 3 phase 3 wire, Y, 3 phase 4 wire</td>
</tr>
<tr>
<td><strong>Approved by classification societies:</strong></td>
<td>✓</td>
<td>✓</td>
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</table>

<table>
<thead>
<tr>
<th>ANSI code 27, 59</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RMV-142D</strong></td>
</tr>
<tr>
<td><strong>Main functions:</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Aux. voltage (U&lt;sub&gt;v&lt;/sub&gt;):</strong></td>
</tr>
<tr>
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</tr>
<tr>
<td>24-48-110-220V DC</td>
</tr>
<tr>
<td><strong>Meas. voltage (U&lt;sub&gt;m&lt;/sub&gt;):</strong></td>
</tr>
<tr>
<td>57.7…690V AC</td>
</tr>
<tr>
<td><strong>Meas. current (I&lt;sub&gt;m&lt;/sub&gt;):</strong></td>
</tr>
<tr>
<td>0.4…5.0A</td>
</tr>
<tr>
<td><strong>Frequency range:</strong></td>
</tr>
<tr>
<td>40.45…65.70Hz</td>
</tr>
<tr>
<td><strong>Outputs:</strong></td>
</tr>
<tr>
<td>Settings: ±20% of U nom</td>
</tr>
<tr>
<td>Delay: 0.5…10 s</td>
</tr>
<tr>
<td>Hysteresis: 1…10% of U nom</td>
</tr>
<tr>
<td><strong>Measuring system:</strong></td>
</tr>
<tr>
<td><strong>Approved by classification societies:</strong></td>
</tr>
</tbody>
</table>
### Uni-line

<table>
<thead>
<tr>
<th>ANSI code</th>
<th>Main functions</th>
<th>RMC-111D</th>
<th>RMC-121D</th>
<th>RMC-122D</th>
</tr>
</thead>
<tbody>
<tr>
<td>50, 51</td>
<td><strong>Short circuit relay:</strong>&lt;br&gt;• short circuit protection&lt;br&gt;• timer controlled tripping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ьянк</td>
<td><strong>Short circuit current relay:</strong>&lt;br&gt;• short circuit protection&lt;br&gt;• timer controlled tripping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>50, 51</td>
<td><strong>Overcurrent and short circuit relay:</strong>&lt;br&gt;• short circuit/overcurrent protection&lt;br&gt;• timer controlled tripping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ANSI code 87</td>
<td><strong>Differential current relay:</strong>&lt;br&gt;• protection against short circuits and leakage current in the generator winding&lt;br&gt;• timer controlled tripping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ANSI code 50, 51</td>
<td><strong>Dual overcurrent relay:</strong>&lt;br&gt;• overcurrent protection&lt;br&gt;• timer controlled tripping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ANSI code 50N, 51N</td>
<td><strong>Stator earth fault relay:</strong>&lt;br&gt;• earth fault protection at 2 level&lt;br&gt;• built-in filter for 3rd harmonic&lt;br&gt;• timer controlled tripping</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Specifications:

- **Aux. voltage (U):** 57.7...690V AC, 24-48-110-220V DC
- **Meas. voltage (U):** 57.7...690V AC
- **Meas. current (I):** 0.4...5.0A
- **Frequency range:** 40...45...65...70Hz

### Outputs:

- **1 maximum relay output with 2 sets of contacts**
  - Setting: 100...400% of I nom<br>  - Delay: 0.1...1/5/10 s
- **2 maximum relay outputs**
  - Setting: 50...150% of I nom, 100...400% of I nom<br>  - Delay: 0.1...1/5/10 s, 0.5...20/60/120 s
- **2 maximum relay outputs**
  - Setting: 2...20%, 10...110% of I nom<br>  - Delay: 0.5...20/60/120 s

### Measuring system:

- 3 phase
- Single phase

### Approved by classification societies:

- ✓
- ✓
- ✓
<table>
<thead>
<tr>
<th>Model</th>
<th>ANSI code</th>
<th>Main functions</th>
<th>Aux. voltage (U&lt;sub&gt;n&lt;/sub&gt;):</th>
<th>Meas. voltage (U&lt;sub&gt;n&lt;/sub&gt;):</th>
<th>Meas. current (I&lt;sub&gt;n&lt;/sub&gt;):</th>
<th>Frequency range:</th>
<th>Outputs:</th>
<th>Approved by classification societies:</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMP-111D</td>
<td>ANSI code 32</td>
<td>Overload relay: • overload protection of generator and prime mover • real power relay • timer controlled tripping</td>
<td>57.7…690V AC</td>
<td>57.7…690V AC</td>
<td>0.4…5.0A</td>
<td>40..45…65..70Hz</td>
<td>1 maximum relay output Settings: 25…125% of P nom Delay: 0.4…20 s</td>
<td>✓</td>
</tr>
<tr>
<td>RMP-112D</td>
<td>ANSI code 32</td>
<td>Overload/reverse power relay: • combined overload and reverse power protection • protection against “motoring” • timer controlled tripping</td>
<td>24-48-110-220V DC</td>
<td>24-48-110-220V DC</td>
<td>0.4…5.0A</td>
<td>40..45…65..70Hz</td>
<td>1 max. + 1 min. relay output Settings: 25…125%,-0…-25% of P nom Delay: 0.4…20 s</td>
<td>✓</td>
</tr>
<tr>
<td>RMP-121D</td>
<td>ANSI code 32</td>
<td>Reverse power relay: • “motoring” protection of generator and prime mover • timer controlled tripping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 minimum relay output Settings:0…-25% of P nom Delay: 0.4…20 s</td>
<td>✓</td>
</tr>
<tr>
<td>RMQ-111D</td>
<td>ANSI code 32</td>
<td>Loss of excitation relay: • protection of generators against loss of excitation • timer controlled tripping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1W, single phase 1W3, 3 phase 3 wire bal. load 1W4, 3 phase 4 wire bal. load</td>
<td>✓</td>
</tr>
<tr>
<td>RMQ-121D</td>
<td>ANSI code 32</td>
<td>Overexcitation relay: • protection of generator against overexcitation (over var) • timer controlled tripping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1W3, 3 phase 3 wire unbal. load 1W4, 3 phase 4 wire unbal. load</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Main functions for RMP-111D
- Overload relay:
  - Overload protection of generator and prime mover
  - Real power relay
  - Timer controlled tripping

### Main functions for RMP-112D
- Overload/reverse power relay:
  - Combined overload and reverse power protection
  - Protection against “motoring”
  - Timer controlled tripping

### Main functions for RMP-121D
- Reverse power relay:
  - “Motoring” protection of generator and prime mover
  - Timer controlled tripping

### Main functions for RMQ-111D
- Loss of excitation relay:
  - Protection of generators against loss of excitation
  - Timer controlled tripping

### Main functions for RMQ-121D
- Overexcitation relay:
  - Protection of generator against overexcitation (over var)
  - Timer controlled tripping
### Uni-line

#### ANSI code 81

**RMF-112D**

- **Main functions:**
  - Frequency relay:
    - Combined underfrequency/overfrequency protection
    - Timer controlled tripping

- **Aux. voltage (U):**
  - 57.7…690V AC
  - 24-48-110-220V DC

- **Meas. voltage (U):**
  - 57.7…690V AC

- **Meas. current (I):**
  - 0.4…5.0A

- **Frequency range:**
  - 40…45…65…70Hz

- **Outputs:**
  - 1 min. and 1 max. relay output
    - Settings: ±10% of f nom, ±20% of f nom at f nom = 55Hz
    - Delay: 0…10 s

- **Measuring system:**
  - 2 phase, single phase

- **Approved by classification societies:**
  - ✓

#### ANSI code 78

**LMR-111D**

- **Loss of mains relay:**
  - Detection of vector shift
  - Generator disconnection on mains failure

- **Frequency range:**
  - 40…45…65…70Hz

- **Outputs:**
  - 2 relay outputs
    - Settings: 2…20 electr. deg.
    - Delay: 0.5…5 s

- **Measuring system:**
  - 2 phase, single phase

- **Approved by classification societies:**
  - ✓

#### ANSI code 78

**LMR-122D**

- **Loss of mains relay:**
  - Detection of vector shift
  - Detection of ROCOF (df/dt)

- **Frequency range:**
  - 40…45…65…70Hz

- **Outputs:**
  - 2 relay outputs
    - Settings: 2…20 electr. deg.
    - Delay: 0.5…5 s

- **Measuring system:**
  - 2 phase, single phase

- **Approved by classification societies:**
  - ✓

---

#### ANSI code 27, 59, 78, 81

**G59**

- **Main functions:**
  - Protection relay package:
    - Combined vector shift and ROCOF
    - Protection of over-/underfrequency
    - 3 phase protection of over-/undervoltage

- **Aux. voltage (U):**
  - 57.7…690V AC
  - 24-48-110-220V DC

- **Meas. voltage (U):**
  - 57.7…690V AC

- **Meas. current (I):**
  - 0.4…5.0A

- **Frequency range:**
  - 40…45…65…70Hz

- **Outputs:**
  - 4 relay outputs, setting of set point:
    - 2…20 electr. deg.
    - 0.3…5 Hz/s
    - 90…100% of f uns
    - 100…110% of f uns
    - 80…100% of U uns
    - 100…120% of U uns
    - Hysteresis: 1…10% of U uns

- **Measuring system:**
  - 2 phase, single phase: Vector shift, ROCOF, frequency, 3 phase 3 wire, U, 3 phase 4 wire: Voltage

- **Approved by classification societies:**
  - –
### FAS-113DG and FAS-115DG

<table>
<thead>
<tr>
<th>Main functions:</th>
<th>Synchroniser:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• synchronisation of generator to busbar</td>
</tr>
<tr>
<td></td>
<td>• circuit breaker time compensation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary voltage (U&lt;sub&gt;a&lt;/sub&gt;):</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.7…690V AC, 24-48-110-220V DC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measured voltage (U&lt;sub&gt;meas&lt;/sub&gt;):</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.7…690V AC</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Measured current (I&lt;sub&gt;meas&lt;/sub&gt;):</th>
<th>—</th>
</tr>
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<tbody>
<tr>
<td>0.4…5.0A</td>
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</table>

<table>
<thead>
<tr>
<th>Frequency range:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>40…45…65…70Hz</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Outputs:</th>
<th>Synch. pulse output: 1 relay output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq. control outputs: 2 relay outputs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring system:</th>
<th>2 phase, single phase</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Approved by classification societies:</th>
<th>✓</th>
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</thead>
</table>

### HAS-111DG and EPN-110DN

<table>
<thead>
<tr>
<th>Main functions:</th>
<th>Paralleling relay:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• synchronisation of generator to busbar</td>
</tr>
<tr>
<td></td>
<td>• setting of phase angle</td>
</tr>
<tr>
<td></td>
<td>• setting of maximum frequency and voltage difference</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary voltage (U&lt;sub&gt;a&lt;/sub&gt;):</th>
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</tr>
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<tbody>
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<td></td>
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<th>Measuring system:</th>
<th>2 phase, single phase</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Approved by classification societies:</th>
<th>✓</th>
</tr>
</thead>
</table>
## LSU-112DG

### Main functions:
- Load sharing unit:
  - built-in power and freq. transducer
  - constant power or isochronous mode

### Specifications:
- Aux. voltage (U): 57.7…690V AC
- Meas. voltage (U): 57.7…690V AC
- Meas. current (I): 0.4…5.0A
- Frequency range: 40..45…65..70Hz

### Outputs:
- Speed control: 2 relay outputs

### Measuring system:
- 1W3, 3 phase 3 wire bal. load

### Approved by classification societies:
- ✓

## LSU-113DG

### Main functions:
- Load sharing unit:
  - reverse power protection and low power detection
  - built-in power and freq. transducer
  - constant power or isochronous mode

### Specifications:
- Aux. voltage (U): 57.7…690V AC
- Meas. voltage (U): 57.7…690V AC
- Meas. current (I): 0.4…5.0A
- Frequency range: 40..45…65..70Hz

### Outputs:
- Speed control: 2 relay outputs
- Reverse power protection: 1 relay output, fixed settings: 
  - P> 5% / 5 s
  - P> 5% / 10 s
  - P> 10% / 5 s or -P> 10% / 10 s
- Low power detect.: 1 relay output, fixed setting: P<5%

### Measuring system:
- 1W3, 3 phase 3 wire bal. load

### Approved by classification societies:
- ✓

## LSU-114DG

### Main functions:
- Load sharing unit:
  - automatic start/stop outputs
  - built-in power and freq. transducer
  - constant power or isochronous mode

### Specifications:
- Aux. voltage (U): 57.7…690V AC
- Meas. voltage (U): 57.7…690V AC
- Meas. current (I): 0.4…5.0A
- Frequency range: 40..45…65..70Hz

### Outputs:
- Speed control: 2 relay outputs
- Start/stop: 2 relay outputs, fixed settings: P>80%, P<20%

### Measuring system:
- 1W3, 3 phase 3 wire bal. load

### Approved by classification societies:
- ✓

## LSU-122DG

### Main functions:
- Var load sharing unit:
  - built-in reactive power transducer
  - control of AVR
  - input for external voltage transducer

### Specifications:
- Aux. voltage (U): 57.7…690V AC
- Meas. voltage (U): 57.7…690V AC
- Meas. current (I): 0.4…5.0A
- Frequency range: 40..45…65..70Hz

### Outputs:
- Voltage control: 2 relay outputs

### Measuring system:
- 1var3, 3 phase 3 wire bal. load

### Approved by classification societies:
- ✓