Control and protection components

Catalogue

2010/2011
6 - TeSys protection components:
relays and controllers

TeSys K, thermal overload relays
Adjustable from 0.11 to 15 A

TeSys D, 3-pole thermal overload relays
Description, characteristics
References
Accessories
Dimensions, mounting and schemes

TeSys LR9 D, 3-pole electronic thermal overload relays
Description, characteristics
References
Accessories
Dimensions
Schemes

TeSys LR9 F, 3-pole electronic thermal overload relays
Presentation
Characteristics
References
Accessories
Dimensions, schemes and setting-up

TeSys RM1 XA, single pole magnetic current relays
Presentation, characteristics
References
Dimensions and schemes

LT3, thermistor protection units for use with PTC
thermistor probes
Selection guide
General, characteristics
References
Dimensions, schemes and setting-up
Operation

TeSys LR97 D and LT47, electronic over current relays
Presentation, description
Curves, characteristics
References
Dimensions, mounting and schemes

TeSys U controllers
Presentation
Application example
Characteristics
References
Combinations
Dimensions and mounting
Schemes

TeSys T
Motor Management System
Selection guide
Presentation, description
Functions
Programming
Characteristics
References
Dimensions, mounting
Schemes
## TeSys protection components

### Protection relays and controllers

<table>
<thead>
<tr>
<th>Applications</th>
<th>Motor protection</th>
<th>Thermal motor protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td>- Motor overload</td>
<td>- Shaking</td>
</tr>
<tr>
<td></td>
<td>- Phase failure</td>
<td></td>
</tr>
<tr>
<td>Tripping class</td>
<td>Class 10A</td>
<td>Class 10 A and 20</td>
</tr>
<tr>
<td></td>
<td>Class 10 and 20</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used with contactor type</td>
<td>LC1 K, LP1 K</td>
<td>LC1 D, LC1 F</td>
</tr>
<tr>
<td>Motor current (A)</td>
<td>0.1A - 160A</td>
<td>0.2A - 600A</td>
</tr>
<tr>
<td>Relay or contactor type</td>
<td>LR2 K</td>
<td>LR2D, LR2D and LR9 D</td>
</tr>
<tr>
<td>Pages</td>
<td>6/12</td>
<td>L026 or ST03, SE4 and SE5</td>
</tr>
</tbody>
</table>

### Machine protection

- Protection of switching motors and of circuits without arrester points
- Protection of machines, bearings, escapements
- Specific motor protection
- Protection and control

- Leakage overload protection
- Phase imbalance and phase failure
- Motor starting
- Linear starting times
- Earth fault

- Classes 5 to 30

### Technical information

- All contactors: Unithix, C118, C118n, Advantys 1ST
- Principle TE / PILS

- Rated current: 0.1A - 600A
- 0.3A - 30A
- 0.36 - 600A
- 6.4 - 816A

- RM1 2A: L15 5, L15/1D, LT47
- LT1 5, L026/21
- LTM 03
- 661 and 642
- 663
- 656
- 654
- 685
TeSys protection components
Motor and machine protection

Introduction
Exceeding the operating limits of an electric motor will lead, eventually, not only to destruction of the motor itself but also of the mechanism it drives.

This type of load can be the cause of electrical or mechanical faults.
- Electrical faults:
  - Overvoltages, voltage drop, imbalance and phase failure which cause variations in the current drawn.
  - Short-circuits which cause the current to reach levels capable of destroying the lead.
- Mechanical faults:
  - Locked rotor;
  - Sudden or prolonged overload which leads to an increase in the current drawn by the motor and therefore overheating.

The cost of these faults must take into account the loss of production, loss of raw materials, repair of the production tool, poor quality of production and delays in delivery.

These faults can also have dramatic consequences on the safety of persons in direct or indirect contact with the motor.

To prevent these faults, protection measures are necessary. They make it possible to isolate the equipment to be protected from the mains supply by measuring variations in electrical values (voltage, current, etc.).

Each motor starter must therefore have:
- Short-circuit protection, to detect and break, as quickly as possible, abnormal currents generally greater than 10 times the rated current (Ie).
- Overload protection, to detect increases in current up to about 10 Ie and switch off the starter before overheating of the motor and conductors damage the insulation.

This protection is provided by specific devices such as fuses, circuit-breakers and thermal overload relays, or by more integrated devices offering several types of protection.

Causes, effects and consequences of various faults

<table>
<thead>
<tr>
<th>Faults</th>
<th>Causes</th>
<th>Effects</th>
<th>Consequences on the motor and on the machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-circuit</td>
<td>Common between two phases, or between one phase and neutral or between three phases of the same phase.</td>
<td>Current peak</td>
<td>Destruction of windings</td>
</tr>
<tr>
<td>Overload</td>
<td>Lightning, Electromagnetic discharge, Operation</td>
<td>Electrodynamic forces on the conductors</td>
<td>Destruction of windings due to loss of insulation</td>
</tr>
<tr>
<td>Phase imbalance and phase failure</td>
<td>Opening of a phase, Single-phase load upstream of the motor, Short-circuit between the turns of the same winding</td>
<td>Reduction of serviceable torque, efficiency and speed, Increase in losses</td>
<td>Overheating (J)</td>
</tr>
<tr>
<td>High starting frequency</td>
<td>Failure of the automation system, Interference with the control system</td>
<td>High stator and rotor temperature due to the frequent start current</td>
<td>Overheating (I)</td>
</tr>
<tr>
<td>Voltage variations</td>
<td>Instability of the mains voltage, Connection of heavy loads</td>
<td>Reduction of serviceable torque, Increase in losses</td>
<td>Overheating (J)</td>
</tr>
<tr>
<td>Harmonics</td>
<td>Voltage distortion, Variable speed drives, inverters, etc.</td>
<td>Reduction of serviceable torque, Increase in losses</td>
<td>Overheating (J)</td>
</tr>
<tr>
<td>Long starting time</td>
<td>Resistance too high (load too heavy)</td>
<td>Increase in starting time</td>
<td>Overheating (J)</td>
</tr>
<tr>
<td>Overload</td>
<td>Mechanical problem (cushion, Seizure)</td>
<td>Overcurrent</td>
<td>Overheating (I)</td>
</tr>
<tr>
<td>No-load running</td>
<td>Pump running empty, Mechanical break-in drive to the load</td>
<td>Drop in current drawn</td>
<td>Consequence on the process</td>
</tr>
<tr>
<td>Frequency fluctuations</td>
<td>Overload of a supply powered by independent sources, Faulty alternator speed regulator</td>
<td>Increase in losses, Interference with synchronous devices (clock, recorders, ...)</td>
<td>Overheating (J)</td>
</tr>
<tr>
<td>Overload</td>
<td>Increase in serviceable torque, Voltage drop, Drop in power factor</td>
<td>Increase in current consumption</td>
<td>Overheating (J)</td>
</tr>
<tr>
<td>Loss of machine excitation</td>
<td>Significant drop in excitation current, Break in the winding</td>
<td>Increase in active power, Drop in power factor</td>
<td>Sign of overloading of rotor and cage</td>
</tr>
<tr>
<td>Phase-Phase fault</td>
<td>Accidental Phase-Phase contacts</td>
<td>Overvoltage developed in the mains supply</td>
<td>Overheating of rotor and cage</td>
</tr>
<tr>
<td>Phase-Earth fault</td>
<td>Accidental Phase-Earth contacts</td>
<td>Overcurrent in the winding</td>
<td>Consequence on safety of persons</td>
</tr>
</tbody>
</table>

(1): These, in the long or shorter term, depending on the severity of the fault, may reduce performance, which may result in breakdowns of the windings.
TeSys protection components
Motor and machine protection

Protection functions
Short-circuit protection
General
A short-circuit results in a very rapid rise in current which can reach several hundred times the value of the operational current. The consequences of a short-circuit are dangerous to both equipment and persons. It is therefore imperative to use protection devices to detect the fault and very quickly break the circuit.

Two types of protection are commonly used:
- fuses (circuit breakers) which break the circuit by melting, which then requires their replacement;
- magnetic trip circuit breakers, often more simply called "magnetic circuit-breakers," which only require re-setting to put them back into service.

Short-circuit protection can also be built into multifunction devices such as motor circuit-breakers and contactor breakers.

The main characteristics of short-circuit protection devices are:
- their breaking capacity: this is the highest prospective short-circuit current value that a protection device can break at a given voltage;
- their making capacity: this is the highest current value that the protection device can make at its rated voltage in specified conditions.

The making capacity is equal to 1.5 times the breaking capacity.

Fuses (circuit breakers)
Fuses provide individual phase protection (single-pole), with a high breaking capacity in a compact size:
- mounted either in fuse carriers,
- or in substations, replacing the original fuses or shunt fuses.

For motor protection, all type fuses are used. Their design characteristics allow them to conduct the high magnetizing currents that occur when motors are switched on. They are therefore unsuitable for overload protection (except G type fuses). This is why an overload relay must be included in the motor power supply circuit.

Magnetic circuit-breakers
These circuit-breakers protect installations against short-circuits, within the limits of their breaking capacity.

Magnetic circuit-breakers provide omnipolar breaking as standard. For relatively low short-circuit currents, the operation of a circuit-breaker is faster than that of fuses.

This protection conforms to standard IEC 60947-2. The thermal and electromagnetic effects are also limited, therefore ensuring better protection of cables and equipment.

Protection functions (continued)
Overload protection
General
An overload condition is the most frequently encountered fault. The symptoms are a rise in the current drawn by the motor and thermal effects. A rapid return to normal operating conditions is important.

The actual operating conditions (ambient temperature, operating altitude and type of standard duty) are essential to determine the operating values of the motor (power, current) and to be able to select effective overload protection. These operational values are given by the motor manufacturer.

According to the level required, protection can be provided by:
- overload relays and thermal overload relays (bi-metallic or electronic type) which protect motors in the event of:
  - overload, by monitoring the current drawn by each phase,
  - phase imbalance or fault, by their differential mechanism,
- relays with PTC thermistor probes (Positive Temperature Coefficient),
- torque relays,
- multifunction relays.

Overload relays
These relays protect motors against overload. They must allow the temporary overload that occurs on starting and must only trip if the starting time is abnormally long.
The overload relay will be selected according to the length of the starting time (tripping delay) and the motor rating.

These relays have a thermal memory (except for certain electronic overload relays, indicated by their manufacturer) and can be connected:
- either in series with the load,
- or to a current transformers placed in series with the load.

Bi-metallic thermal overload relays
Combined with a contactor, these relays protect the line and the equipment against serial and prolonged overloads. They must be protected against strong overcurrent by a circuit-breaker or fuses.

These relays may be used on an a.c. or d.c. system and are generally:
- 3 poles,
- compensated, i.e. insensitive to ambient temperature variations,
- with manual or automatic reset,
- graduated with a "motor FLC" scale allowing direct setting to the full load current as shown on the motor rating plate.

They can also be sensitive to phase failure: this is known as "differential". This function conforms to standards IEC 60947-4-1 and 60947-4-2

This type of relay is extremely reliable and is a relatively low cost device.

Electronic thermal overload relays
Electronic thermal overload relays have the advantage of electronics which allow a more compact thermal maps of the motor to be created.

They can be combined with products having complementary functions, such as:
- temperature sensing via PTC probes,
- protection against jamming and overlap,
- protection against phase reversal,
- earth fault protection,
- protection against no-load running,
- alarm function.
TeSys protection components
Motor and machine protection

Protection functions (continued)

Overload protection (continued)
Relays for use with PTC thermistor probes
With direct sensing of the stator windings, these relays can be used to protect motors against:
- overload,
- a rise in ambient temperature,
- a ventilation circuit fault,
- a high starting frequency.
- mechanical shocks, etc...

Overload (or overtorque) relays
These relays protect the drive line in the event of a locked rotor, seized or mechanical shock. This is an additional protection.
Unlike thermal overload relays, these relays do not have a thermal memory. They have specific time characteristics (adjustable current threshold and time delays).
The overtorque relay can be used as overload protection for motors with long starting times or very frequent starting (for example, lifting toilets).

Multifunction relays
Overcurrent and voltage sensors (TeSys T controllers),
- hybrid analog and digital electronic technology,
- the use of communication buses for data exchange and control,
- powerful motor modeling algorithms,
- integrated application programs whose parameters can be set.
These products make it possible to reduce installation and operating costs by reducing maintenance and downtime.

TeSys U starters:
The multifunction relay is incorporated in the motor starter.
This solution is very compact with reduced wiring. It is limited to 32 A.

TeSys U controllers:
The multifunction relay is separate from the power line and uses the function blocks from the TeSys U solution. It can be used in conjunction with a contactor up to 610 A.

TeSys T controllers:
The multifunction relay is separate from the power line and incorporates inputs and outputs. It can be used in conjunction with a contactor up to 610 A.

Protection relay selection table

<table>
<thead>
<tr>
<th>Relay type</th>
<th>Motor protection</th>
<th>Machine protection</th>
<th>Motor and machine protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay type</td>
<td>Motor protection</td>
<td>Machine protection</td>
<td>Motor and machine protection</td>
</tr>
<tr>
<td>Relay type</td>
<td>Motor protection</td>
<td>Machine protection</td>
<td>Motor and machine protection</td>
</tr>
</tbody>
</table>

C3
C2
C1
Causes of overheating
Signs of overload
Locked motor
No-load running
Supply phase failure
Vibration fault
Abnormal temperature rise
Shaft-bearing seizure
Insulation fault
Protracted starting time
Speed control
Voltage variation
Frequency fluctuations
Loss of machine excitation

Suitable
Possible solution
Not suitable (no protection)

(1) for motor circuit-breaker type LVQME
(2) Protection based on current
(3) Protection based on current and voltage
## Characteristics

### TeSys protection components

TeSys K thermal overload relays, adjustable from 0.11 to 16 A

### Environment

- **Conforming to standards**: IEC 60947, NF C 61-850, VDE 0660, BS 1491
- **Product certifications**: UL, CSA
- **Protective treatment**: Conforming to IEC 60947, (SIN 0011) (T3C (Rahmfeucht, Klimaschutz))
- **Degree of protection**: Conforming to VDE 0106
- **Rated ambient air temperature around the device**
  - Storage: °C -40...+70
  - For normal operation (IEC 60947-1): °C -20...+50
  - Operating limit: °C -30...+60 (with derating) (1)
- **Maximum operating altitude**: m 2000
- **Operating positions**
  - Vertical axis: Without derating
  - Horizontal axis: Without derating (7)

### Flame resistance
- Conforming to UL 94
- Self-extinguishing material (V1)

### Shock resistance, hot state
- Conforming to IEC 68-2-16 and 16-102
- 10 g
- Conforming to requirement 2

### Vibration resistance, hot state
- Conforming to IEC 68-2-6 and 27-14
- 2 g

### Safe separation of circuit

#### Cable screen compartments

<table>
<thead>
<tr>
<th>Type</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Maximum to IEC 60947</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid cable</td>
<td>1 x 1.5</td>
<td>2 x 4</td>
<td>1 x 1.5 + 1 x 2.5</td>
</tr>
<tr>
<td>Flexible cable without cable-end</td>
<td>1 x 0.75</td>
<td>2 x 4</td>
<td>1 x 1.5 + 1 x 2.5</td>
</tr>
<tr>
<td>Flexible cable with cable-end</td>
<td>1 x 0.75</td>
<td>2 x 4</td>
<td>1 x 1.5 + 1 x 2.5</td>
</tr>
</tbody>
</table>

### Tightening torque
- Philips head m 2 x ø6: N m: 0.4

### Mounting

- Directly under the contactor or reversing contactor

### Connections

- Mode automatically when mounted on the operator; see figure
- Contactor terminal A2 connects to universal relay terminal terminal 18H on all products
- Contactor terminal A4 connects to overload relay terminal US on products with 3 P + N: ENC
- When using 3 P + N: ENC or 4 P: ENC, the N terminal is connected to the line marked 14, at a voltage other than the coil voltage, break off the box marked 14

### Auxiliary contact characteristics

#### Number of contacts
- Conventional thermal current A: 1 NC + 1 NC
- Short-circuit protection: Conforming to IEC 60947, VDE 0660, G30-43 or circuit-breaker G30 CB6A
- Maximum power of the controlled contactor coils operated (VAC) 60 Hz: V 24 48 110 220/230 415/440 500/690
- Maximum power of the controlled contactor coils operated (VDC): V 24 48 110 220/230 415/440 500/690
- Maximum operational voltage:
  - a.c. category AC-15: 690
  - d.c. category DC-13: V 250

### Electrical characteristics of the power circuit

- **Rated operational voltage (VAC)**: 230 V | 400 V
- **Rated insulation voltage (VDC)**: 250 V
- **Rated impulse withstand voltage (MV)**: 1 kV
- **Frequency limits of the operational current**: Hz Up to 400
- **Power dissipated per pole**: W 2

### Operating characteristics

#### Sensitivity to phase failure
- Conforming to IEC 60947
- Yes

#### Reset
- Manual or automatic
- Selected by means of a lockable and sealable switch on the front of the relay

#### Signalling
- On front of relay
- Trip indicator

#### Reset-Stop function
- Pressing the Reset-Stop button
- activates the NC contact
- has no effect on the NO contact

#### Test function
- By pushbutton
- Pressing the Test button will cause:
  - checking of the control circuit wiring
  - simulation of overload tripping (activation of both NC and NO contacts, and of the trip indicator)

#### Short-circuit protection and coordination

- See pages 5/18 and 5/12

### Tripping curves

- Average operating times related to multiples of the current setting (Class 18 A)
- Balanced 3-phase operation, from cold state
- Balanced operation with 2 phases only, from cold state

---

<table>
<thead>
<tr>
<th>Setting at lower end of scale</th>
<th>Setting at upper end of scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>I, A</td>
<td>600</td>
</tr>
<tr>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>120</td>
</tr>
<tr>
<td>4</td>
<td>120</td>
</tr>
</tbody>
</table>

References: page 0/17
Dimensions: page 0/13
Schematics: page 0/27

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(S) Very low safety voltage.
TeSys protection components
TeSys K thermal overload relays, adjustable from 0.11 to 16 A

3-pole relays with screw clamp terminals

Thermal overload relays are designed for the protection of motors. They are compensated and phase failure sensitive. Resetting can be either manual or automatic.

Direct mounting: under the contactor for versions with screw clamp terminals only; pre-wired terminals, see pages 9/10 and 9/11.

Separate mounting, using terminal block LA7 K0064 (see below).

On the front face of the overload relay:
- selection of reset mode: Manual (marked M) or Automatic (marked A),
- red pushbutton: Trip Test function,
- blue pushbutton: Stop and manual Reset,
- yellow trip flag indicator: overload relay tripped.

Protection by magnetic circuit-breaker GV2 LE, see pages 1/18 and 1/28.

<table>
<thead>
<tr>
<th>Class 10 A (the standard specifies a tripping time of between 2 and 10 seconds at 7.2 kV)</th>
<th>Relay setting range</th>
<th>Maximum rating</th>
<th>Reference</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>kg</td>
</tr>
<tr>
<td>0.11 .0.16</td>
<td>0.25</td>
<td>0.5</td>
<td>–</td>
<td>LR2K0301</td>
</tr>
<tr>
<td>0.16 .0.23</td>
<td>0.25</td>
<td>0.5</td>
<td>–</td>
<td>LR2K0302</td>
</tr>
<tr>
<td>0.29 .0.36</td>
<td>0.36</td>
<td>1</td>
<td>–</td>
<td>LR2K0303</td>
</tr>
<tr>
<td>0.30 .0.54</td>
<td>1</td>
<td>1.6</td>
<td>–</td>
<td>LR2K0304</td>
</tr>
<tr>
<td>0.54 .0.8</td>
<td>1</td>
<td>2</td>
<td>–</td>
<td>LR2K0305</td>
</tr>
<tr>
<td>0.8 .1.2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>LR2K0306</td>
</tr>
<tr>
<td>1.2 .1.8</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>LR2K0307</td>
</tr>
<tr>
<td>1.8 .2.8</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>LR2K0308</td>
</tr>
<tr>
<td>2.8 .3.7</td>
<td>4</td>
<td>10</td>
<td>16</td>
<td>LR2K0310</td>
</tr>
<tr>
<td>5.7 .5.5</td>
<td>6</td>
<td>16</td>
<td>16</td>
<td>LR2K0312</td>
</tr>
<tr>
<td>5.5</td>
<td>8</td>
<td>20</td>
<td>20</td>
<td>LR2K0314</td>
</tr>
<tr>
<td>8 .11.5</td>
<td>10</td>
<td>20</td>
<td>29</td>
<td>LR2K0316</td>
</tr>
<tr>
<td>10 .14</td>
<td>16</td>
<td>32</td>
<td>25</td>
<td>LR2K0321</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>32</td>
<td>32</td>
<td>LR2K0322</td>
</tr>
</tbody>
</table>

Overload relays for unbalanced loads

Class 19 A: To order, replace the parts LR2 to LR7 in the references selected above (only applicable to overload relays LR2 K0205 to LR2 K0322).

Example: LR7 K0308.

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
<th>Type of connection</th>
<th>Reference</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block for separate coil/mounting of the overload relay</td>
<td>0.16 mm², rail</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TeSys protection components
3-pole thermal overload relays
TeSys D

**Presentation**

TeSys D thermal overload relays are designed to protect a.c. circuits and motors against:
- Overloads.
- Phase failure.
- Excessively long starting times.
- Prolonged stalled motor condition.

**Power connection**

- LRD 91 to LRD 25
- LRD 01 to 35 relays are designed for connection by screw clamp terminals.
- They can be supplied for connection by spring terminals or by lugs (1).

- LRD 313 to LRD 365
- These relays are also available for connection by lugs (1).

**Description**

TeSys D3-pole thermal overload relays are designed to protect a.c. circuits and motors against overloads, phase failure, long starting times and prolonged stalling of the motor.

1. **Adjustment dial**
2. **Test button**
3. **Operation of the Test button allows:
   - Checking of control circuit wiring.
   - Simulation of relay tripping (activates both the NO and NC contacts).
4. **Stop button**
5. **Trip indicator**
6. **Setting locked by sealing the cover**
7. **Selector for manual or automatic reset**

LRD 01 to 35 and LRD 313 to LRD 365 relays are supplied with the selector in the manual position, protected by a cover. Deliberate action is required to move it to the automatic position.

**Environment**

- **Compliance with standards**
  - IEC/EN 60947-4-1.
  - IEC/EN 60947-5-1.
  - UL 508.
  - CSA C22.2 n° 14.
  - ATEX directive 99/92/EC (7).

- **Proof tests certifications**
  - UL, CSA, OCS, CQST.
  - ATICA member (7).
  - CE, CEMES, RIAM, SIE, IEC/IECEx (8).

- **Degree of protection**
  - Conforming to VSE 0196.

- **Protective treatment**
  - Conforming to IP 0056.
  - Type “TH”.

- **Ambient air temperature around the device**
  - Storage: -50°C to 70°C.
  - Normal operation: without derating: 0°C to 40°C.
  - Maximum/minimum operating temperatures with derating: -40°C to 70°C.

- **Operating positions without testing**
  - In relation to normal vertical mounting plane.
  - Any position.

- **Flame resistance**
  - Conforming to UL 69.
  - Conforming to IEC 60669-2-1: 98°C.

- **Flash resistance**
  - Conforming to IEC 60601-1-1.
  - 15 g-nm.

- **Vibration resistance (3)**
  - Conforming to IEC 68-2-6. 6 g.

- **Dielectric strength at 50 Hz**
  - Conforming to IEC 60255-5: 6 kV.

- ** Surge withstand**
  - Conforming to IEC 60661-1-1: 6 kV.

**Electrical characteristics of power circuit**

<table>
<thead>
<tr>
<th>Relay type</th>
<th>LRD 01 9</th>
<th>LRD 109...10</th>
<th>LRD 1800...1832</th>
<th>LRD 2100...2132</th>
<th>LRD 313</th>
<th>LRD 365...3665</th>
<th>LRD 510</th>
<th>LRD 565...5665</th>
<th>LRD 3200...3265</th>
<th>LRD 3202...3262</th>
<th>LRD 4200...4202</th>
<th>LRD 4200...4202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip rating</td>
<td>Conforming to UL 609, 60947-4-1.</td>
<td>10 A</td>
<td>20 A</td>
<td>10 A</td>
<td>20 A</td>
<td>10 A</td>
<td>20 A</td>
<td>10 A</td>
<td>20 A</td>
<td>10 A</td>
<td>20 A</td>
<td></td>
</tr>
<tr>
<td>Rated insulation voltage (V)</td>
<td>Conforming to IEC 60068-1:4-1.</td>
<td>690</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated impulse withstand voltage (kV)</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency limits</td>
<td>OFF/OFF and current</td>
<td>Hz</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting range</td>
<td>Depending on model</td>
<td>A</td>
<td>0.1…1.0</td>
<td>2.0…30</td>
<td>12…20</td>
<td>0.05…0.6</td>
<td>0.6…17</td>
<td>17…140</td>
<td>17…140</td>
<td>0.05…the range of the contact.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Auxiliary contact characteristics**

- **Connection thermal current**
  - A.

- **Max. allowed current of the opening arms of controlled contactors**
  - A.
  - A.

- **Max. allowed operating cycle of the contactor**
  - A.

- **Protection against short-circuits**
  - By g7, 6S fuses.

---

(1) Connection by lugs meets the requirements of certain Asian markets and is suitable for applications subject to strong vibration, such as vehicle traction.

(2) Creep rupture resulting from use of rubber conductors, that is accentuated over time.
TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 D

**Description**
LR9 D electronic thermal overload relays are designed for use with contactors LC1 D115 and D155.
In addition to the protection provided by TeSys D thermal overload relays (see page 5/14), they offer the following special features:
- Protection against phase imbalance
- Choice of starting class
- Protection of unbalanced circuits
- Protection of single-phase circuits
- Alarm function to avoid tripping by load shedding

**Environment**
Conforming to standards
IEC 60947-4-1, 255-8, 255-17, VDE 0660 and EN 60947-4-1
Degree of protection
Conforming to IEC 60529 and VDE 0160
Protective treatment
Standard version
Ambient air temperature
Storage
°C -10...+55
Normal operation
°C 20...+55 (1)
Maximum operating altitude
Without derating
m 2000
Operating positions
In relation to normal vertical mounting plane
Any position
Shock resistance
Permissible acceleration, conforming to EN 60068-2-7
13g–111ms
Vibration resistance
Permissible acceleration, conforming to EN 60068-2-7
3g – 5...500Hz
Electrical characteristics of auxiliary contacts
Conventional thermal current
A 5
Max. allowed consumption of the operating coil of connected contactors (Occasional operating cycle of nominal life 8000)
V 24 48 110 220 380 600 1000
A 100 200 400 600 800 1000
Protection against short circuits
A 5
Calling
Freezeable
1 or 2 conductors
²mm² Minimum: 1.0
Maximum: 2.5
Freezeable without cable end
Nm 1.0

**Characteristics (continued)**
LR9 D

**Electrical characteristics of power circuit**
- **Tripping currents**
  - Configuration: Conforming to UL 508
  - IEC 60947-4-1
  - LR9 D
  - A 10 or 20
- **Rated insulation voltage (VI)**
  - Conforming to IEC 60947-4-1
  - V 1050
- **Rated impulse withstand voltage (Uimp)**
  - V 600
- **Frequency limits**
  - On-line operating current Hz 50...60 (1)
- **Setting range**
  - Depending on model
  - A 60...150
- **Power circuit connections**
  - Width of terminal lug: mm² 20
  - Clearing torque: Nm 1.0
  - Tightening torque: Nm 16

**Operating characteristics**
- **Temperature compensation**
  - °C -20...+70
- **Temperature limits**
  - Alarm A 1.05 x 0.96 In
  - Trip A 1.12 x 0.96 In
- **Sensitivity to phase failure**
  - Conforming to IEC 60947-4-1
  - Trip 0.02 in

**Alarm circuit characteristics**
- **Rated supply voltage**
  - V 24
- **Supply voltage limits**
  - V 17...32
- **Current consumption**
  - No-load mA 4.5
  - Switching capacity mA 0.192

**Design**
- **Voltage drop**
  - Closed case V 2.5
- **Casing**
  - Flexible cable without cables end
- **Tightening torque**
  - Nm 0.45

**LR9 D trip curves**
- Average operating time related to multiples of the setting current

(1) For other frequencies and for applications involving the use of these overload relays with soft starters or variable speed drives, please consult your Regional Sales Office.

References:
- page 603 to 621
- Dimensions, mounting:
- pages 604 to 628
- Schema:
- pages 629
### Differential thermal overload relays

**Class 10 A (1) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 01</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 02</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 03</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 04</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 05</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 06</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (2) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 22</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 23</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 24</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 25</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (3) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 31</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 32</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (4) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 33</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (5) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 34</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 35</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (6) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 36</td>
<td>0.124</td>
</tr>
</tbody>
</table>

### References

**TeSys D, 3-pole thermal overload relays**

- Composed relays with manual or automatic reset.
- For use with fuses or magnetic circuit-breakers GV2 L and GV3 L.
- For use with relay trip indicator.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.
- For use with contactor LC1.

**Class 10 A (1) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 01</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 02</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 03</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 04</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 05</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 06</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (2) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 22</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 23</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 24</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 25</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (3) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 31</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 32</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (4) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 33</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 34</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 35</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Class 10 A (5) for connection by screw clamp terminals or connectors.**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 36</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Thermal overload relays for use with unbalanced loads**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 01</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 02</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 03</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 04</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 05</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 06</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Thermal overload relays for use with 1000 V supplies**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD 01</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 02</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 03</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 04</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 05</td>
<td>0.124</td>
</tr>
<tr>
<td>LRD 06</td>
<td>0.124</td>
</tr>
</tbody>
</table>

---

(1) Standard IEC 507-4-1, specified at 1000 V, 50 Hz, 1.25 kA, each relay rated at 10 A for 30 seconds.

(2) BTR relay, high-speed tripping relay.

(3) BTR relay, high-speed tripping relay.

(4) BTR relay, high-speed tripping relay.

(5) BTR relay, high-speed tripping relay.

(6) BTR relay, high-speed tripping relay.

(7) BTR relay, high-speed tripping relay.

(8) BTR relay, high-speed tripping relay.

(9) BTR relay, high-speed tripping relay.

(10) BTR relay, high-speed tripping relay.

(11) BTR relay, high-speed tripping relay.

(12) BTR relay, high-speed tripping relay.

(13) BTR relay, high-speed tripping relay.

(14) BTR relay, high-speed tripping relay.

(15) BTR relay, high-speed tripping relay.

(16) BTR relay, high-speed tripping relay.

(17) BTR relay, high-speed tripping relay.
### Differential thermal overload relays

**TeSys D, thermal overload relays**

**For use with fuses or magnetic circuit-breakers GV2 L and GV3 L**

- Compenated relays with manual or automatic reset.
- With relay trip indicator.
- For a.c. or d.c.

**Relay setting ranges (A)**

<table>
<thead>
<tr>
<th>Classes 20 (1) for connection by screw clamp terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay setting range (A)</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>2.5...4</td>
</tr>
<tr>
<td>4...6</td>
</tr>
<tr>
<td>5.5...8</td>
</tr>
<tr>
<td>7...10</td>
</tr>
<tr>
<td>9...13</td>
</tr>
<tr>
<td>12...18</td>
</tr>
<tr>
<td>17...25</td>
</tr>
<tr>
<td>23...28</td>
</tr>
<tr>
<td>25...32</td>
</tr>
<tr>
<td>Class 20 (1) for connection by Ever.in Extreme® screw connectors (2)</td>
</tr>
<tr>
<td>Relay setting range (A)</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>9...13</td>
</tr>
<tr>
<td>12...18</td>
</tr>
<tr>
<td>17...25</td>
</tr>
<tr>
<td>23...32</td>
</tr>
<tr>
<td>30...40</td>
</tr>
<tr>
<td>37...50</td>
</tr>
<tr>
<td>48...65</td>
</tr>
<tr>
<td>Classes 20 (1) for connection by screw clamp terminals</td>
</tr>
<tr>
<td>Relay setting range (A)</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>17...20</td>
</tr>
<tr>
<td>23...32</td>
</tr>
<tr>
<td>30...40</td>
</tr>
<tr>
<td>37...50</td>
</tr>
<tr>
<td>48...65</td>
</tr>
<tr>
<td>56...70</td>
</tr>
<tr>
<td>63...80</td>
</tr>
</tbody>
</table>

(1) Power transformers can be protected according to fusing current by the addition of already in situ thermal elements, to be inferred separately (see page 554).

(2) Standard IEC 60947-4-1 specifies a tripping time for 7.2 times the setting current Iₚ.

Other versions:
- Thermal overload relays for all circuits in category AC-1.
- Please consult your Regional Sales Office.
**TeSys protection components**

**TeSys D thermal overload relays**

**Dimensions, mounting (continued)**

<table>
<thead>
<tr>
<th>LRD 16e</th>
<th>LRD 30e and LRD 30e D50e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent mounting on 50 mm centres or on rail AM1 DP200 or DE300</td>
<td>Remote tripping or electrical reset</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AM1</th>
<th>DP200</th>
<th>DE200</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

(1) Can be mounted on FR1 or LF side of relay LRD 015

<table>
<thead>
<tr>
<th>LRD 15 and LRD 30e D50e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter for door mounted operator</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LA7 D1050</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

(1) Can be mounted on FR1 or LF side of relay LRD 30e, LRD 30e D50e or LRD 015.

**Schemes**

<table>
<thead>
<tr>
<th>LRD 30e, LRD 30e and LRD 30e D50e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-wiring kit LA7 TC1, LA7 TC2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LRD 9 D97 and LRD 9 D99</th>
</tr>
</thead>
<tbody>
<tr>
<td>39 A</td>
</tr>
</tbody>
</table>

**TeSys protection components**

**TeSys D thermal overload relays**

**Characteristics**

- Pages 6.14 to 6.17
- Pages 6.21 to 6.22

**References**

- Pages 6.25 to 6.27
- Pages 6.31 to 6.33

**Dimensions**

- Pages 6.25 to 6.28
TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 F

Presentation

TeSys-LR9-F electronic protection relays are especially suited to the operating conditions of motors.
They provide protection against:
- thermal overload of 3-phase or single-phase balanced or unbalanced circuits.
- phase failure and large phase unbalance,
- protection starting times,
- prolonged stalled rotor condition.

LR9 F electronic protection relays are mounted directly below an LC1 F type contactor. They cover a range from 20 to 500 A, in eight ratings.
The settings can be locked by sealing the transparent protective cover.
A reset button is mounted on the front of the relay.
Two versions are available:
- simplified version: class 10, 10 A or class 20, LR9 F.
- complete version: class 10, 10 A or class 20, selectable, conforming to
EN 60947-4-1: LR9 F.

This latter version includes an alarm function which makes it possible to forestall tripping by load shedding.

Simplified version: class 10 or 20

Complete version: class 10, 16 A or class 20, selectable, and alarm circuit

Characteristics

TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 F

Environment

Conforming to standards
IEC 60947-4-1, IEC 60295-8, IEC 60295-17, EN 60947-4-1 and VDE 0660

Product certifications
UL 508, CSA 22.2

Degree of protection
Conforming to VDE 0660
Conforming to IEC 60947-4-1

IP 20
IP 20 on front of relay with accessories LA3 F103 or LA3 F77, see page 077

Protective treatment
Standard version
“TH”

Ambient air temperature around the device
Storage °C -40° to 65°
Normal operation °C -20° to 60° (A)

Maximum operating altitude
Without derating
m 2000

Operating positions
In relation to normal vertical mounting plane
Any position

Shock resistance
Permissible acceleration conforming to IEC 60068-2-27
12 g - 11 ms

Vibration resistance
Permissible acceleration conforming to IEC 60068-2-6
2 g - 6 to 300 Hz

Dielectric strength at 50 Hz
Conforming to IEC 233-5
KV 6

Surge withstand
Conforming to IEC 61000-4-4
KV 4

Resistance to electrostatic discharge
Conforming to IEC 61000-4-2
KV 3 (air)
6 (medium mode)

Resistance to radiated radio-frequency disturbance
Conforming to IEC 61000-4-3
Vms 10

Resistance to fast transient currents
Conforming to IEC 61000-4-4
KV 2

Electromagnetic compatibility
EN50081-1 and 2, EN50082-2
Conforming

1) For operating temperatures up to 40 °C, please consult your Regional Sales Office.
### Characteristics (continued)

#### TeSys protection components

3-pole electronic thermal overload relays, TeSys LR9 F

### Electrical characteristics of power circuit

<table>
<thead>
<tr>
<th>Power circuit connections</th>
<th>LR9</th>
<th>Pfu72, Pfu73, Pfu74, Pfu75, Pfu76, Pfu78, Pfu79, Pfu81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage</td>
<td>Conforming to IEC 60947-4-1</td>
<td>690 V</td>
</tr>
<tr>
<td>Rated operational voltage</td>
<td>Conforming to VDE 0110 (2)</td>
<td>1900 V</td>
</tr>
<tr>
<td>Rated impulse withstand voltage</td>
<td>Conforming to IEC 60094-1</td>
<td>5 kV</td>
</tr>
<tr>
<td>Rated operational current</td>
<td>A</td>
<td>30 to 630</td>
</tr>
<tr>
<td>Short-circuit protection and coordination</td>
<td>See pages: 519, 520, 521, 522, 523</td>
<td></td>
</tr>
<tr>
<td>Frequency limits</td>
<td>Hz</td>
<td>50 to 60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power circuit connections</th>
<th>Width of terminal lug</th>
<th>M6</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of terminal lug</td>
<td>mm</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Clamping screw</td>
<td>M6</td>
<td>M8</td>
<td>M10</td>
<td>M12</td>
<td></td>
</tr>
<tr>
<td>Tightening torque</td>
<td>N.m</td>
<td>13</td>
<td>18</td>
<td>26</td>
<td>35</td>
</tr>
</tbody>
</table>

### Auxiliary contact electrical characteristics

#### Conventional thermal current

<table>
<thead>
<tr>
<th>Auxiliary contact correlation</th>
<th>A</th>
<th>5</th>
</tr>
</thead>
</table>

#### Short-circuit protection

| By d.c. or B.S. fuse or by current breaker 6084/019 | A | 5 |

<table>
<thead>
<tr>
<th>Control circuit connections</th>
<th>Flexible cable with cable end</th>
<th>1 conductor</th>
<th>2 conductors</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm²</td>
<td>1 x 0.75</td>
<td>1 x 1.5</td>
<td></td>
</tr>
<tr>
<td>mm²</td>
<td>2 x 1</td>
<td>2 x 1.5</td>
<td></td>
</tr>
<tr>
<td>Flexible cable without cable end</td>
<td>1 conductor</td>
<td>2 conductors</td>
<td></td>
</tr>
<tr>
<td>mm²</td>
<td>1 x 0.75</td>
<td>1 x 1.5</td>
<td></td>
</tr>
<tr>
<td>mm²</td>
<td>2 x 1</td>
<td>2 x 2.5</td>
<td></td>
</tr>
<tr>
<td>Solid cable</td>
<td>1 conductor</td>
<td>2 conductors</td>
<td></td>
</tr>
<tr>
<td>mm²</td>
<td>1 x 0.75</td>
<td>1 x 2.5</td>
<td></td>
</tr>
<tr>
<td>mm²</td>
<td>2 x 1</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Tightening torque</td>
<td>N.m</td>
<td>1.2</td>
<td></td>
</tr>
</tbody>
</table>

### Maximum locked current consumption of the coils of associated contacts (continuous operating cycles of contact 95/65)

<table>
<thead>
<tr>
<th>d.c. supply</th>
<th>24</th>
<th>48</th>
<th>110</th>
<th>220</th>
<th>380</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>900</td>
<td>1600</td>
</tr>
<tr>
<td>d.c. supply</td>
<td>24</td>
<td>48</td>
<td>110</td>
<td>220</td>
<td>380</td>
<td>600</td>
</tr>
<tr>
<td>VA</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>900</td>
<td>1600</td>
</tr>
</tbody>
</table>

### Operating characteristics

<table>
<thead>
<tr>
<th>Trip class</th>
<th>Conforming to IEC 60847-4-1</th>
<th>10, 10A and 20A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature compensation</td>
<td>°C</td>
<td>–20 to +70</td>
</tr>
<tr>
<td>Reset</td>
<td>Manual on front of relay</td>
<td></td>
</tr>
<tr>
<td>Fault indication</td>
<td>On front of relay</td>
<td></td>
</tr>
<tr>
<td>Test function</td>
<td>On front of relay</td>
<td></td>
</tr>
<tr>
<td>Stop function</td>
<td>Actuation of NC contact, without affecting NO contact</td>
<td></td>
</tr>
<tr>
<td>Tripping thresholds</td>
<td>Conforming to IEC 60847-4-1</td>
<td>0.15 x ± 0.36</td>
</tr>
<tr>
<td>Sensitivity to phase-failure</td>
<td>Conforming to IEC 60847-4-4</td>
<td>Tripping in 4 ± 20% in the event of phase failure</td>
</tr>
</tbody>
</table>

### Alarm circuit characteristics

| Rated supply voltage | d.c. supply | V | 24 |
| Supply voltage limits | V | 17 | 32 |
| Current consumption | No-load | mA | ≤ 5 |
| Switching current | mA | 0 | 160 |
| Protection | Short-circuit and overload | Auto-protected |
| Voltage drop | Open state | V | 6.25 |
| Connection | Flexible cable without cable end | mm² | 0.5 | 1.5 |
| Tightening torque | N.m | 0.45 |

### LR9 F tripping curve

#### Average operating times depending on multiples of the setting current

| Class of protection | 1 | 2 |

1. Cold state curve
2. Hot state curve

---

(1) For applications involving the use of these overload relays with slow starters or variable speed drives, please consult your Regional Sales Office.
Compensated and differential overload relays

- Thermal overload relays:
  - compensated and differential,
  - with relay trip indicator.
- for a.c.
- for d.c.
- for direct mounting on contactor or independent mounting (1).

<table>
<thead>
<tr>
<th>Relay setting range</th>
<th>Fuses to be used with selected relay</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Class 10 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30...60</td>
<td>50...80</td>
<td>0.885</td>
</tr>
<tr>
<td>45...60</td>
<td>80...120</td>
<td>0.900</td>
</tr>
<tr>
<td>60...100</td>
<td>100...200</td>
<td>0.920</td>
</tr>
<tr>
<td>90...160</td>
<td>160...240</td>
<td>0.965</td>
</tr>
<tr>
<td>150</td>
<td>250...315</td>
<td>0.965</td>
</tr>
<tr>
<td>200...300</td>
<td>400...500</td>
<td>2.320</td>
</tr>
<tr>
<td>300...500</td>
<td>500...800</td>
<td>2.320</td>
</tr>
<tr>
<td>600...800</td>
<td>800...900</td>
<td>4.160</td>
</tr>
</tbody>
</table>

| Class 20 (2)        |                                      |        |
| 30...60             | 50...80                               | 0.885  |
| 45...60             | 80...120                              | 0.900  |
| 60...100            | 100...200                             | 0.920  |
| 90...160            | 160...240                             | 0.965  |
| 150                 | 250...315                             | 0.965  |
| 200...300           | 400...500                             | 2.320  |
| 300...500           | 500...800                             | 2.320  |
| 600...800           | 800...900                             | 4.160  |

(1) When mounting overload relays up to LR9 F5777, the fuses beneath the contactor, they may be additionally supported by mounting plates (see page 677). Allow this size if this always necessary to use the mounting plates.

Power terminals can be protected against direct finger contact by the addition of insulators and/or insulated terminal blocks, to be ordered separately (see page 677).

(2) Standard data 949 947-4 specifies a tripping time for 7.2 times the setting current to:
- class 10, between 2 and 10 seconds.
- class 20, between 4 and 20 seconds.
TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 F
Accessories (as to be ordered separately)

Control accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in</th>
<th>UUT Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote electronic device (1)</td>
<td>1</td>
<td>LAT D01a</td>
<td>0.080</td>
</tr>
<tr>
<td>Remote reset function control</td>
<td>1</td>
<td>LAT D01</td>
<td>0.015</td>
</tr>
<tr>
<td>Remote stop and/or reset function control</td>
<td>1</td>
<td>LAT D110</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Connection accessories

For mounting an LRS FxaT71 thermal overload relay together with an LC1 F185 contactor

<table>
<thead>
<tr>
<th>Description</th>
<th>Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set of 3 bushbars</td>
<td>LAT F467</td>
<td>0.100</td>
</tr>
</tbody>
</table>

For mounting a thermal overload relay beneath a reversing contactor or inter-delta contactor

<table>
<thead>
<tr>
<th>Application</th>
<th>Width of terminal lug (mm)</th>
<th>Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR89 Fxa67, Fxa63, Fxa63, LC1 F115</td>
<td>15</td>
<td>LAT F061</td>
<td>0.110</td>
</tr>
<tr>
<td>LR89 Fxa57, Fxa63</td>
<td>20</td>
<td>LAT F062</td>
<td>0.110</td>
</tr>
<tr>
<td>LR89 Fxa61, LR99 F71</td>
<td>25</td>
<td>LAT F067</td>
<td>0.100</td>
</tr>
<tr>
<td>LR99 Fxa71, LR99 F71</td>
<td>25</td>
<td>LAT F063</td>
<td>0.100</td>
</tr>
<tr>
<td>LR99 Fxa7, LR99 F79</td>
<td>25</td>
<td>LAT F064</td>
<td>0.100</td>
</tr>
<tr>
<td>LR99 Fxa7, LR99 F81</td>
<td>25</td>
<td>LAT F064</td>
<td>0.100</td>
</tr>
<tr>
<td>LR99 Fxa7, LR99 F79</td>
<td>30</td>
<td>LAT F065</td>
<td>0.270</td>
</tr>
<tr>
<td>LR99 Fxa71, LR99 F71</td>
<td>40</td>
<td>LAT F066</td>
<td>0.300</td>
</tr>
</tbody>
</table>

(1) The time for which the coil of a remote overload device LAT Q63 can remain energized depends on its resistance: 1 pulse duration with 8 mA current, 3 pulses duration with 8 mA current, 10 pulses duration with 10 mA current for 30 s with real time of 300 s. Maximum pulse duration of 30 s with real time of 300 s.
(2) Reference to be completed by adding the coil voltage code.

Mounting plates for overload relay

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR89 Fxa67, Fxa63, Fxa63, LC1 F115, LR99 F37, F37, F09</td>
<td>LR99 F001</td>
</tr>
<tr>
<td>LR99 Fxa7, Fxa63, Fxa63, LC1 F115, LR99 F37, F37, F09</td>
<td>LR99 F002</td>
</tr>
</tbody>
</table>

Sets of power terminal protection shrouds, single-pole

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR89 Fxa67, Fxa7, Fxa63, LR99 F37, F37, F09</td>
<td>LR99 F003</td>
</tr>
<tr>
<td>LR99 Fxa7, LR99 F71</td>
<td>LR99 F004</td>
</tr>
<tr>
<td>LR99 Fxa7, Fxa7, Fxa7, LR99 F37, F37, F09</td>
<td>LR99 F005</td>
</tr>
</tbody>
</table>

Power terminal protection shrouds, 3-pole

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR89 Fxa67, Fxa7, Fxa63, LR99 F37, F37, F09</td>
<td>LR99 F006</td>
</tr>
<tr>
<td>LR99 Fxa7, LR99 F71</td>
<td>LR99 F007</td>
</tr>
<tr>
<td>LR99 Fxa7, Fxa7, Fxa7, LR99 F37, F37, F09</td>
<td>LR99 F008</td>
</tr>
</tbody>
</table>

Insulated terminal blocks

<table>
<thead>
<tr>
<th>Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR89 Fxa67, Fxa63, Fxa63, LC1 F115, LR99 F37, F37, F09</td>
<td>LR99 F009</td>
</tr>
</tbody>
</table>

Marking accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Sold in</th>
<th>Unit Reference</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clip-in marker holder</td>
<td>100</td>
<td>LAT D803</td>
<td>0.001</td>
</tr>
<tr>
<td>Bag of 400 blank self-adhesive legends</td>
<td>1</td>
<td>LAT D81</td>
<td>0.001</td>
</tr>
</tbody>
</table>

TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 F
Accessories (as to be ordered separately)
TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 F

Dimensions

TeSys protection components
3-pole electronic thermal overload relays, TeSys LR9 F

Schemes, setting-up

Setting up the special functions of TeSys LR9 F thermal overload relays

Setting the relay:
- Lift the transparent cover F to gain access to the various settings.
- Adjustment is achieved by turning dial 1, which is graduated directly in Ampères.
- The setting can be locked by sealing the cover F.

Stop" function 1

"Test" function 2

"Trip Indicator"

Presentation page 63
Characteristics pages 63 to 65
References pages 63A to 63D
Schemes page 63E

Setting the special functions of TeSys LR9 F thermal overload relays

Setting the relay:
- Lift the transparent cover F to gain access to the various settings.
- Adjustment is achieved by turning dial 1, which is graduated directly in Ampères.
- The setting can be locked by sealing the cover F.

"Stop" function 1

"Test" function 2

"Trip Indicator"

Presentation page 63
Characteristics pages 63 to 65
References pages 63A to 63D
Schemes page 63E

6/38

6/39