DATA SHEET

LMR-122D

Loss of mains relay

ANSI code 78

DEIF

-power in control

CE

DATA SHEET

Loss of mains relay, LMR-122D

ANSI code 78

- Detection of vector shift and ROCOF (df/dt)
- Generator disconnection on mains failure
- Ensures no asynchronous reconnection
- LED indication of fault condition
- LED indication for activated relay
- 35 mm DIN rail or base mounting

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Application

The loss of mains relay type LMR-122D forms part of a complete DEIF series of relays for protection and control of generators.

This relay is applied for protection of synchronous generators, running in parallel with the mains.

A mains failure will be detected, provided a disconnection at an arbitrary point of the network results in a swift change of the generator frequency. An opening signal is then transmitted to the mains circuit breaker, and the generator will thus be protected against damages caused by an automatic reconnection to the high-voltage network.

The LMR-122D will on the other hand not detect the normal, relatively slow and acceptable changes of the frequency of the network (the mains).

Furthermore, separation of a generator from the mains in case of mains failure is also stipulated as a condition in most national rules for connection of synchronous generators to the mains. Regarding Great Britain, see Engineering Recommendation G59.

Measuring principle

After five periods have passed (after connection to the mains) the relay will thus have performed the first measurement. After this the LMR-122D will within 30 ms for vector shift and 100 ms for ROCOF (df/dt) detect a possible mains failure.

The ROCOF (Rate of change of frequency - df/dt) supervises the change in frequency for every period. If the change in frequency for four periods in a row exceeds the set point, the output is activated. Within 100 ms (inclusive of contact delay), an opening signal is transmitted to mains circuit breaker, and the LED marked “MAINS FAIL” is lit.

The vector shift function supervises the angular velocity of the phases of the mains. The velocity is supervised by comparing the times for the latest two full cycles with the times for the full cycles of the previous 4th and 5th period. If the difference between the measurements exceeds the set point, the output is activated. Within 30 ms (inclusive of contact delay) an opening signal is transmitted to mains circuit breaker, and the LED marked “MAINS FAIL” is lit.

The LMR-122D is provided with one reset input connected to contacts to the generator circuit breaker and to the mains circuit breaker. These two contacts should close when their respective circuit breaker is opened.

When RESET (22-23) is activated, the LMR-122D will not detect a possible mains failure

On receipt of a reset signal (transmitted by the mains circuit breaker auxiliary contact during opening of its circuit breaker), an internal timer is started. When this expires (after 2 s), the opening signal to the mains circuit breaker is cancelled, and the LED “MAINS FAIL” is switched off.

The LMR-122D is provided with an adjustable initialising timer, which is activated on cancellation of the reset signal (closing of circuit breakers). When this timer expires, the LMR-122D is activated and the LED “SUPERVISION” is lit. The time delay is set on the front of the relay by means of a potentiometer.

Furthermore the relay is equipped with a self-check function. This function supervises the micro-processor and will switch the status output (29-30) to position OFF and start flashing with the power LED, should the function detect a fault.

Relay outputs

The LMR-122D is provided with two output contacts – B: vector shift, C: ROCOF,
either normally energised or normally de-energised. The contacts may be set to open or to close on activation.

Normally energised contact
Recommended for warning and alarm purposes. In case of an auxiliary supply drop-out, the contact is immediately activated.

Normally de-energised contact
Recommended for regulating and control purposes. An auxiliary supply failure will not result in an unwanted activation of the contact.

Power-up circuit
The relays are provided with a 200 ms power-up circuit, ensuring the correct function of the relay on connection of the auxiliary voltage.

Note: Normally energised contacts are not activated (contact does not open/close) until 200 ms after connection of the auxiliary voltage.

Technical specifications

Meas. voltage (U_n): See supply voltage - AC ranges
UL/cUL Listed: 57.7 to 450 V AC

Overload: 1.2 × U_n, continuously
2 × U_n for 10 s

Load: 2 kΩ/V

Frequency range: 40 to 45 to 65 to 70 Hz

"RESET" inputs: Input voltage:
18 to 250 V AC/DC for "activated" condition
Input impedance: 100 kΩ

Output: 2 change-over switches

Contact type: Relays B + C:
normally energised ("NE"), or
normally de-energised ("ND")

Contact ratings: 250 V AC/24 V DC, 8 A
(200 × 10^3 change-overs at resistive load)
UL/cUL Listed: Resistive load only

Contact voltage: Max. 250 V AC/150 V DC

Response time: ROCOF (df/dt) <100 ms
Vector shift <30 ms

Optocoupler output: System status off = failure
UL/cUL Listed: 30 V DC, 5 mA

Temperature: -25 to 70 °C (-13 to 158 °F)
(operating)

UL/cUL Listed:
Max. surrounding air temp.
60 °C/140 °F

Temperature drift: Set points:
Max. ±0.2 % of full scale per 10 °C/50 °F

Galv. separation: Between inputs and outputs:
3250 V - 50 Hz - 1 min.

Supply volt. (U_n): 57.7-63.5-100-110-127-200-220-230-240-380-400-415-440-450-480-660-690 V AC ±20 % (max. 4 VA)

24-48-110-220 V DC -25/+30 % (max. 3.5 W)

UL/cUL Listed:
Only 24 V DC and 110 V AC
DC supply must be from a class 2 power source

Climate: HSE, to DIN 40040

EMC: To IEC/EN 61000-6-1/2/3/4

Connections: Max. 4 mm² (single-stranded)
Max. 2.5 mm² (multi-stranded)

Materials: All plastic parts are self-extinguishing to UL94 (V1)

Protection: Case: IP40. Terminals: IP20, to IEC 529 and EN 60529

UL markings: UL Listed only on request

UL Listing will be lost if the product is re-customised outside DEIF DK's production plant

Wiring:
Use 60/75 °C (140/167 °F) copper conductors only

Wire size:
AWG 12-16 or equivalent

Installation:
To be installed in accordance with the NEC (US) or the CEC (Canada)

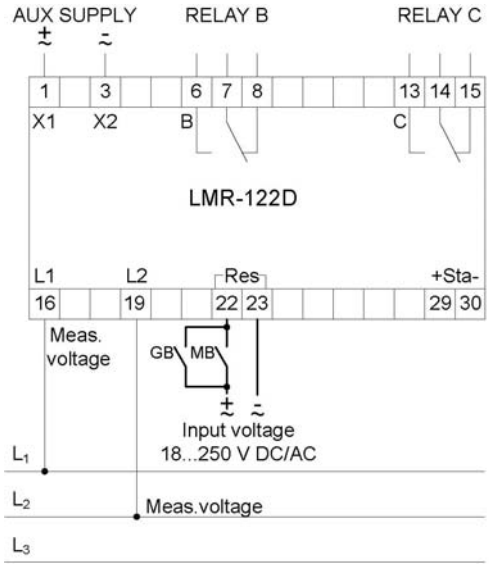
Settings and indication

Setting of	**LED/relay**
Sensitivity: Vector shift set point (2 to 20 elect. degr.)	Red LED "MAINS FAIL" is lit during fault condition.
Sensitivity: ROCOF (df/dt) set point (0.3 to 5) Hz/s	Red LED "MAINS FAIL" is lit during fault condition.
For both initialising delays: (0.5 to 5 s)	Yellow LED "SUPERVISION" is lit after the timer has expired.

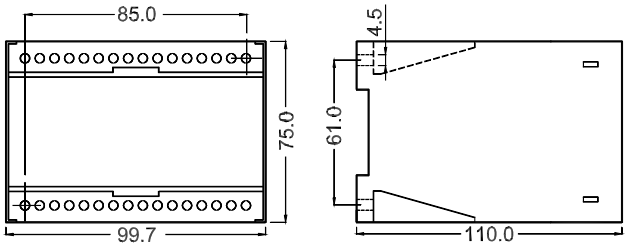
The relay is furthermore equipped with a green LED marked "POWER" for indication of power ON.

Once the relay has been mounted and adjusted, the transparent front cover may be sealed to prevent unwanted change of the setting.

Connections/dimensions (in mm)



Shown contact positions: Aux. voltage not connected
See installation instructions for information about status output (29-30)



Weight: approx. 0.650 kg

Order specifications

Variants:

Mandatory information							
Item no.	**Type**	**Variant no.**	**Measuring voltage**	**Supply**	**Aux. voltage**	**Relay func. B**	**Relay func. C**

Example:

Mandatory information							
Item no.	**Type**	**Variant no.**	**Measuring voltage**	**Supply**	**Aux. voltage**	**Relay func. B**	**Relay func. C**
2913410560	LMR-122D	01	400 V	DC	24 V	ND	NE
2913410560	LMR-122D	02	230 V	AC	230 V	NE	ND

Due to our continuous development we reserve the right to supply equipment which may vary from the described.

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