



Measuring rail MEgML



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1/ PURPOSE AND USE

The MEgML measuring rail is to be installed between the busbars and fuse rail or fuse disconnecter in low voltage switchgears. It allows the measurement of phase currents at the output feeder and measurement of busbar phase voltages, and optionally also measurement of the voltage at the output feeder. This allows the identification of the condition of fuses. The optional voltage measurement at the output feeder is done via a 3-phase ballast connected to the voltage beyond the fuses.

If the fuse disconnecter is equipped with indication of interruption of fuses and indication of handling the draw bar, such indication can be transferred through the measuring rail.

The measuring rail is equipped with current sensors with a high accuracy limit factor and electronic protection in case of disconnection of their secondary circuits. The measuring rail is characterized by its low profile, so that it can be additionally installed into LV switchgears which are already in operation. It is designed for the most demanding operating conditions with overvoltage category CAT IV.

2/ DESIGN

The base of the MEgML measuring rail (on Fig. 1) is a fiberglass board with a masked motive of printed circuit board, on which three sensors S1, S2 and S3, are soldered for measuring phase currents IL1, IL2 and IL3 and phase voltages US1, US2 and US3 of busbars. The sensors are labelled with labels L1, L2 and L3 located on the fiberglass board, on which there is also a label of the MEgML measuring rail with basic identification data.

The sensor contains a ring-type current transformer with a wide range of the measured current up to 10 times the nominal value, equipped with protection even during permanent disconnection of the secondary circuit. The sensor also contains a voltage ballast formed by a series of resistors. The sensor is embedded to a plastic housing which is resistant to high ambient temperatures.

At the upper end of the MEgML measuring rail (see Fig. 2), connectors X1, X2 and X3 are located, their conductors are led out using direct (X1) and angled (X2 and X3) connectors parallelly and at a different level respectively.

When there is a need to perform measurement at the LV output feeder of a fuse rail or fuse disconnector, a 3-phase ballast is screwed onto terminals X4 and X5, which is, as shown in Fig. 3, connected to the fiberglass board with a band. The 3-phase ballast with embedded rows of resistors is connected through frost-resistant flexible red 25 cm-long voltage cables with double insulation terminated with a fastening mechanisms to phase cables L1, L2 and L3.

A coupling with an M12 screw (see Fig. 4) is used for connection of busbars and power contacts of fuse rail or fuse disconnector. Voltage connection from busbars to the input of voltage ballast is ensured via contact springs.

Fig. 1 MEgML assembly

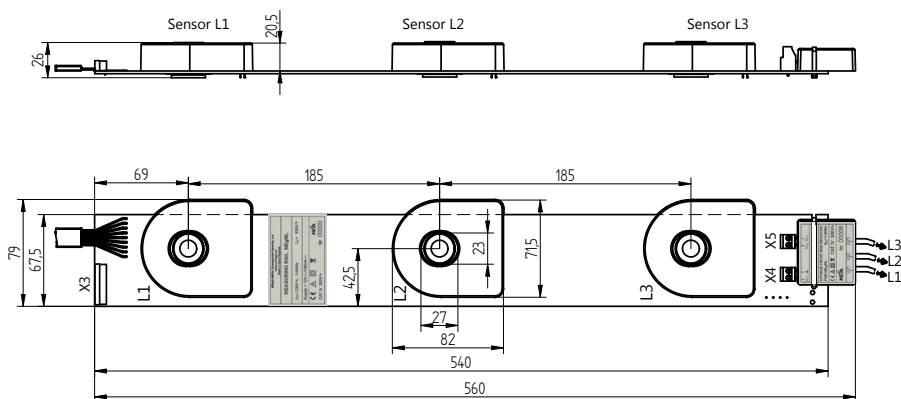


Fig. 2: Detailed placement of connectors on the MEgML

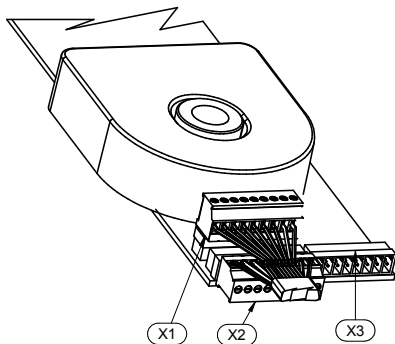


Fig. 3: Detailed placement of the 3-phase ballast on the MEgML

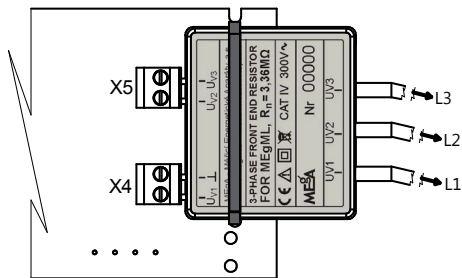
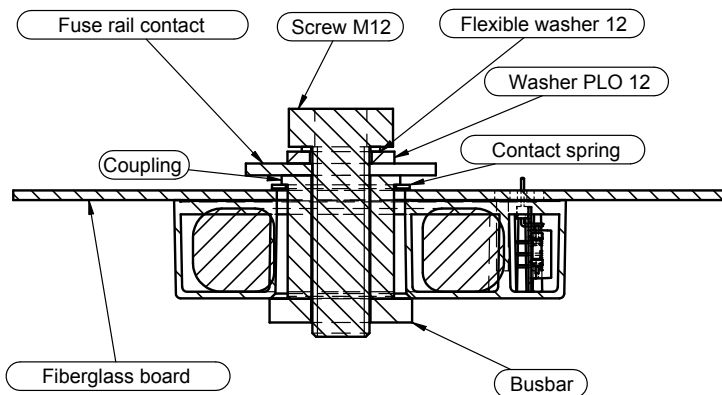


Fig. 4 Detail of the coupling assembly of the MEgML



The electrical connection of LV busbars and fuse rails or fuse disconnectors without signalling contacts via the measuring rail is schematically shown on Fig. 5. In that case, there are available on output connectors X1 and X2 signals of current transformers and safe voltage signals, derived from phase voltages on outputs UV and busbars US. If the fuse disconnector is equipped with signalling contacts of fuse condition and handling contact with the drawbar, then, as shown on Fig. 6, these contacts are led to connector X3 of the measuring rail. On its output connector X1, the signals of current transformers and safe voltage signals are derived from phase voltages on outputs UV. On output connector X2, signals of fuse interruption and handling with the disconnector draw bar are grouped.

Fig. 5 MEGML wiring diagram without signalling contacts

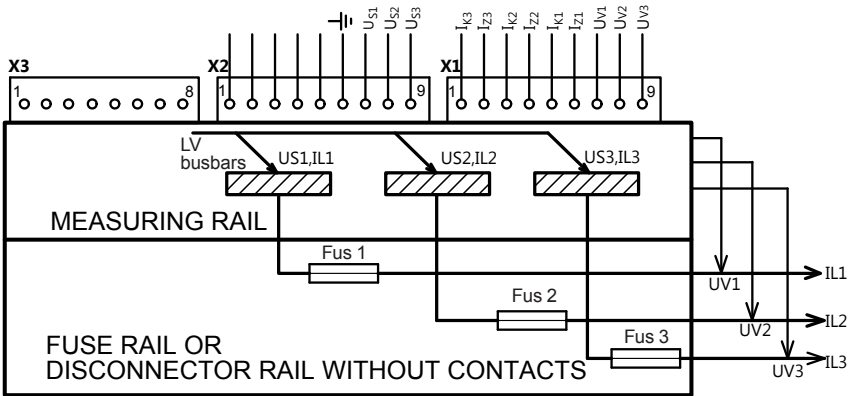
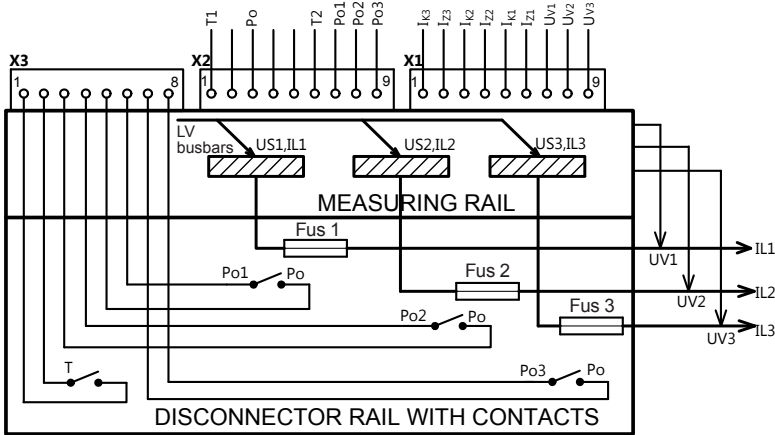


Fig. 6 MEGML wiring diagram with signalling contacts



Explanation of marking in Fig. 5 and Fig. 6:

- | | |
|--------------------------|--|
| IL1, IL2, IL3 | phase currents L1, L2, L3 |
| I_{Z1}, I_{K1} | begining and end terminal of secondary current of phase L1 |
| I_{Z2}, I_{K2} | begining and end terminal of secondary current of phase L2 |
| I_{Z3}, I_{K3} | begining and end terminal of secondary current of phase L3 |
| UV1, UV2, UV3 | phase voltages L1, L2, L3 on cable output feeder (beyond the fuse) |
| U_{V1}, U_{V2}, U_{V3} | safe phase voltages L1, L2, L3 beyond the 3.36MΩ ballast |

US1, US2, US3	phase voltages of busbars L1, L2, L3 (before the fuse)
U_{S1} , U_{S2} , U_{S3}	safe phase voltages of busbars L1, L2, L3 behind the 3.36 M Ω ballast
Fus1, Fus2, Fus3	fuses of phase L1, L2, L3
Po1, Po2, Po3	terminals of fuse switching contacts Fus1, Fus2, Fus3
Po	common terminal for switching contacts Po1, Po2, Po3
T1, T2	terminals of switching contact of fuse disconnecter draw bar

3/ INSTALLATION

Safety Information. Please, pay highest attention to the following information.



Warnings draw you attention to a circumstance that pose a safety risk to the operator.



Cautions give conditions and circumstances that may damage the measuring rail.

The meaning of the symbols used in the user manual and descriptions of the measurement rail MEgML:



Caution, risk of electric shock



Note in the documentation / Warning, risk of danger

CAT IV

Overvoltage category, characterizing transient overvoltage condition. Generally, LV distribution network from a transformer station to fuses in the electricity meter.



Safety class II, double or increased insulation



Ground, grounding terminal

IP code

Degree of ingress protection



Product intended for recycling and for collection points



Declaration of Conformity – European Community


Warning

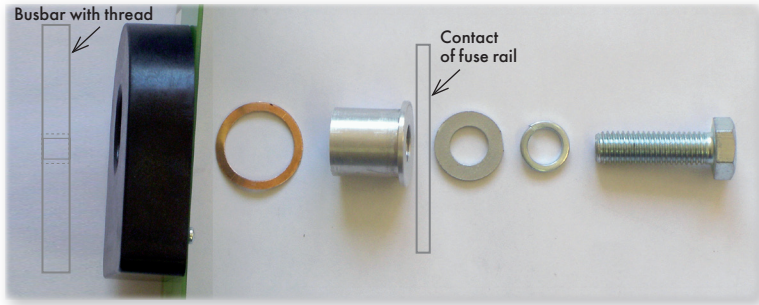
- **Note that the personnel performing the installation must be well equipped and must use personal protective equipment and other safety devices during the installation.**
- **When using the measuring rail MEgML in a manner which was not intended by the manufacturer, the protection provided by the measuring rail MEgML may be impaired.**
- The operator performing the installation and removal of the measuring rail MEgML must be qualified to work under and near hazardous voltages. The operator must also be trained in first aid.
- The measuring rail can only be operated by qualified personnel equipped with personal protection against electric shock.
- It is not allowed to connect the measuring rail to voltages higher than $300 V_{AC}$ in LV networks between LV/HV transformers and electricity meters rated in overvoltage category **CATIV**, otherwise there is a risk of electric shock.
- Maintenance and repair of the measuring rail must be performed only by the manufacturer or by a service organization trained by the manufacturer.
- It is not allowed to use accessories other than those supplied with the measuring rail.


Caution

- The measuring rail must always be installed in de-energized state. The measuring rail can be installed into new switchgears prior to their installation or into switchgears which are already in operation. The measuring rail is installed between a LV busbar and a fuse rail or a fuse disconnecter.
- The measuring rail may also be installed additionally into a LV switchgear which is already in operation with fuse rail or fuse disconnecter, if safe distances from live parts of conductive structural elements of LV switchgear are adhered. The fuse rail or fuse disconnecter is elevated by 25.5 mm.
- The conformity of the nominal current of the measuring rail with the nominal current of the fuse rail or fuse disconnecter must be verified.

1. Before installing the measuring rail into a LV switchgear which is already in operation, V terminals must be disconnected from the LV output feeder and the installed fuse rail or fuse disconnecter must be removed from the switchgear.
2. If the fuse disconnecter is made to allow additional installation of signalling contacts for fuse interruption and handling the draw bar, those contacts can be installed onto the fuse disconnecter.
3. To measure phase voltages on the LV output feeder or to identify condition of a fuse - if the fuse rail or fuse disconnecter is not equipped with signalling contacts - output contacts of the 3-phase ballast are screwed into double terminals X4 and X5 and the 3-phase ballast is mechanically attached to the measuring rail using a 300 × 3.6 mm cable tie, as shown on Fig. 1.
4. Loose counterparts of connectors X1, X2 and X3 are removed from the measuring rail.
5. Contact springs are inserted onto the couplings. Flexible washers followed by flat washers are slid onto the M12×40 screws. If present, fuses are removed from fuse rail or fuse disconnecter.
6. Couplings with contact spring are inserted into oval holes in the measuring rail from the side of the fiberglass board with insulation free contact surfaces, see Fig. 4.
7. Couplings with contact springs are inserted into the measuring rail from the side of the printed circuit board on the fiberglass board. Contacts of the fuse rail are placed on couplings in the measuring rail and the screws with washers are placed into contact holes of the fuse rail.
8. The complete assembly of the measuring and fuse rail is screwed to the busbars.
9. Onto the measuring rail, which is placed on the busbar, is attached a fuse rail or a fuse disconnecter with no fuses installed and using M12×40 screws with fitted washers are together connected busbars, a measuring rail with couplings and fuse rail or fuse disconnecter.
10. Conductors of the LV output feeder are connected to V terminals of fuse rail or fuse disconnecter.
11. Flexible cords L1, L2, L3 of the measuring rail are connected to the appropriate contact of the clips of V terminals L1, L2, L3.
12. If the measuring rail is not equipped with a 3-phase ballast and there are signalling contacts of fuse interruption or even a contact of handling the draw bar on the connected fuse disconnecter, these contacts are connected to input connector X3, as shown on Fig. 3.
13. Loose counterparts of output connectors X1 and X2 are connected according to Fig. 5 or Fig. 6 for the installation of measuring devices and are inserted into connectors X1 and X2.

Fig. 7: The assembly of MEgML components



4/ LIST OF COMPONENTS OF THE MEASURING RAIL

- 1 pc Measuring rail MEgML
- 1 pc counterpart for each connector X1, X2 and X3
- 3 pcs coupling
- 3 pcs contact spring under coupling
- 3 pcs screw M12×40 hexagon head
- 3 pcs washer PLO 12 (flat)
- 3 pcs washer flexible 12

Optional

- 1 pc 3-phase ballast for MEgML
- 1 pc cable tie GT-300 ICB (292 × 3.6 mm)

5/ ORDERING INFORMATION

Number of measuring rails MEgML with accessories

- $I_n = 250\text{ A}$ or $I_n = 400\text{ A}$ or $I_n = 630\text{ A}$
- with 3-phase ballast
(fuse rail or fuse disconnecter without fuse contacts)
- without 3-phase ballast (fuse disconnecter with fuse contacts)

6/ MANUFACTURER

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7/ BASIC TECHNICAL DATA

Measuring rail

Nominal voltage:	230 V _{AC} , 50 Hz
Dimensions ⁴⁾ :	540 × 79 × 25.5 mm (without 3-phase ballast) 560 × 79 × 25.5 mm (with 3-phase ballast)
Hole spacing:	185 mm
Attachment screws:	M12×40 6HR, washer PLO 12 (flat), flexible washer 12
Maximum conductor section in the terminal box:	1.5 mm ²
Temperature range:	-25 °C, +100 °C
Ingress protection:	IP 00
Maximum humidity:	95 %
Overvoltage category:	CAT IV

Current transformer

Rated primary current I _n ¹⁾ :	250 A _{AC} , 400 A _{AC} , 630 A _{AC}
Rated secondary current:	1 A _{AC}
Rated load:	0.25 Ω
Accuracy limit factor:	10
Current error ²⁾	range 0.02 I _n to 1.2 I _n : ± 0.3 % M.V. ³⁾ ± 0.2 % I _n range 1.2 I _n to 5 I _n : ± 2 % M.V. ³⁾ range 5 I _n to 10 I _n : ± 5 % M.V. ³⁾ (maximum duration of current passage is 3 sec)
Angle error in the range 0.02 I _n to 1.2 I _n :	± 0.5 °
Nominal short-term (thermal) current:	20 I _n for the period of 1 sec
Nominal frequency:	50 Hz
Frequency range:	40 Hz to 60 Hz

Secondary circuit of the current transformer can be permanently disconnected.

Voltage ballasts (3-phase - outlet U_v, in sensors - busbars U_s)

Nominal resistance R _n :	3.36 MΩ
Resistance precision:	± 1 % R _n
Nominal voltage U _n :	230 V _{AC}
Measuring range:	1.2 U _n
Nominal frequency:	50 Hz
Maximum voltage:	4 kV _{AC}
Temperature range:	-25 °C, +70 °C

¹⁾ One of the given values

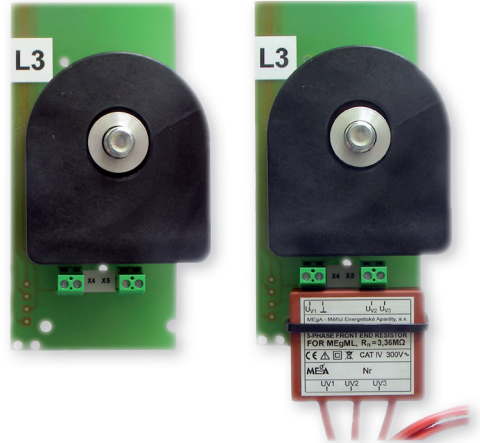
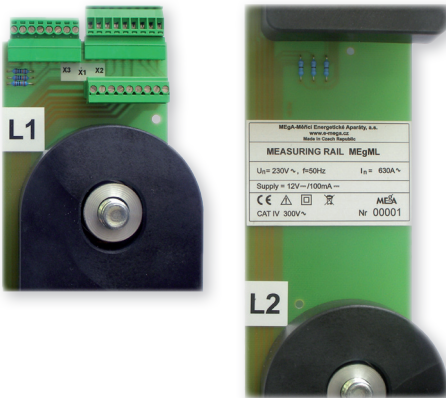
³⁾ M.V. - measured value

²⁾ At the temperature of 23 °C

⁴⁾ For details see Figs 1 to 4



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