



- **Simulate a low-level voltage source from a Rogowski Coil**
- **MLLF provides filtering of the low-level outputs**
- **Can be used with any SMRT or FREJA 500 series unit***
- **Three Rogowski Output Voltage ranges available, 2, 10 & 40V**
- **Millivolt output in low voltage range, with high resolution and accuracy**

DESCRIPTION

In Rogowski mode, the Current channels will convert from a current source to a millivolt source. This will allow the current channel to simulate a low-level voltage source from a Rogowski coil. The MLLF will provide filtering of the low-level outputs from the latest version of Voltage/Current generators in the Megger SMRT series and FREJA 500 series test sets. The MLLF provides the interface from the low-level outputs to the device under test using appropriate interface cables.

APPLICATIONS

There are three ranges for the Rogowski outputs, 2, 10 and 40 Volts, with high resolution and accuracy. When in the Low Voltage mode, the voltage channel provides 0 to 2 Volts with high resolution and accuracy.

Use the Low-Level outputs available on the latest versions of SMRT and FREJA Relay Test Sets for testing relays, which use low voltage signals from non-conventional CT's and VT's such as Rogowski coils and CVT's. The current and voltage channels can be configured to simulate low-level outputs using RTMS (Relay Test Management Software) on a SMRT or FREJA Local/Remote on a FREJA 500 Series unit. Low-Level outputs are available from the voltage and current channel output terminals through the individual MLLF low-level filters. For testing relays like the ABB REF61x and Siemens 7SJ8x, the low-level filters provide the interface between the SMRT/FREJA relay test set converted low-level output terminals and the low-level signal interface cables to the relay under test.

SOFTWARE

Relay Test Management Software (RTMS)

Low level Rogowski and Low Voltage Output capability are included in the latest RTMS or FREJA Local/Remote, which is supplied with all SMRT or FREJA 500 series units. RTMS or FREJA Local/Remote is a Microsoft® Windows® XP® Service Pack 3/ Vista™/7/8/10 compatible software program designed to manage all aspects of protective relay testing using the Megger SMRT Family or FREJA 500 series units.

Low Level Outputs

In the RTMS Configuration screen under the System tab is the Low-Level Outputs button. The Low-Level Outputs button is defaulted to (Disabled) in the Software and the user will be able to enable the Low-Level Outputs with VIGEN Hardware revision 3.5.1 or higher. Pressing the Low-Level Outputs button will take the user to the setting screen seen in the following figure.

Rogowski:					Low Voltage:				
SCALE: 1.00 A = 150.0 mV					SCALE: 1.00 V = 150.0 mV				
Gen Num	Enabled	Amplitude Correction (multiple)	Phase Correction (degrees)	Max Current (A)	Gen Num	Enabled	Amplitude Correction (multiple)	Phase Correction (degrees)	Max Voltage (V)
1	Normal (50A)	1.0000	0.00	60.000	1	High (200V)	1.0000	0.00	300.000
2	Normal (50A)	1.0000	0.00	60.000	2	High (200V)	1.0000	0.00	300.000
3	Normal (50A)	1.0000	0.00	60.000	3	High (200V)	1.0000	0.00	300.000
					4	High (200V)	1.0000	0.00	300.000

Figure 3: Rogowski and Low Voltage Setting Screen

*Requires VIGENS with hardware version 3.5.1 or higher

MLLF Megger Low Level Filter



Low Output Current Generator 0-50 mA / Rogowski

The current generators have the ability to provide very low current outputs ranging from 0 to 50mA full scale or be enabled to provide a voltage output simulating a Rogowski output.

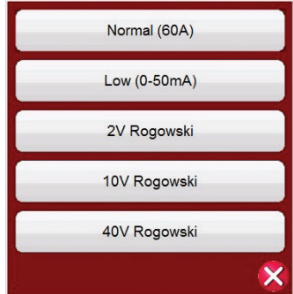


Figure 4: Current Generator Low Output Selection List

Rogowski Mode

Rogowski mode will change the current channel from a current source to a voltage source. This will allow the current channel to simulate a low-level voltage source from a Rogowski coil. There are three ranges for the Rogowski outputs, 2, 10 and 40 Volts. Different Rogowski coils have different output levels. In the Rogowski Info screen the user sets the scale (or ratio) of the secondary current to millivolt output. This is to adjust the ratio between the Rogowski coil millivolt outputs to an equivalent secondary current output. Test values must be entered in secondary current values, with the appropriate millivolts applied to the relay under test as well as setting the Amplitude and Phase Correction Factors, see the following figure.

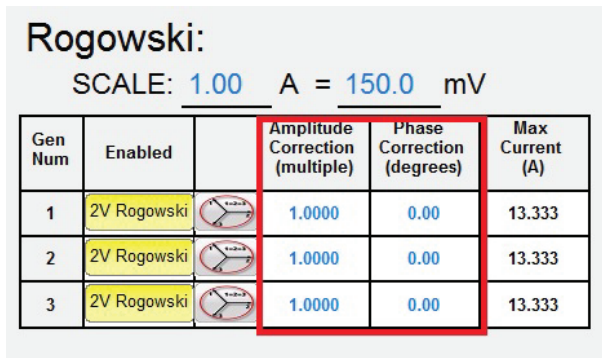


Figure 5: Rogowski Amplitude and Phase Correction Factors

Different relays have different Rogowski amplitude and phase correction settings. Check with the appropriate Relay Manufacturer for the applicable values to apply.

Low Voltage Mode

The Low Voltage mode will change the voltage channel to a millivolt source. This will allow the voltage channel to simulate a low-level voltage source such as a Rogowski or a voltage divider, see the following figure.

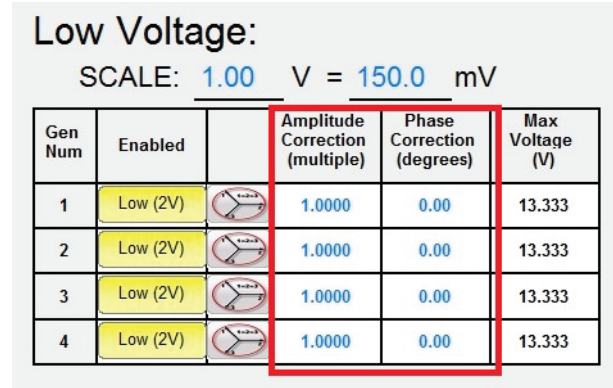


Figure 6: Low Voltage Amplitude and Phase Correction Factors

After setting low-level outputs and returning to the Home Screen in RTMS a Θ symbol will appear in the setting values window indicating that low-level outputs are enabled, see the following figure.

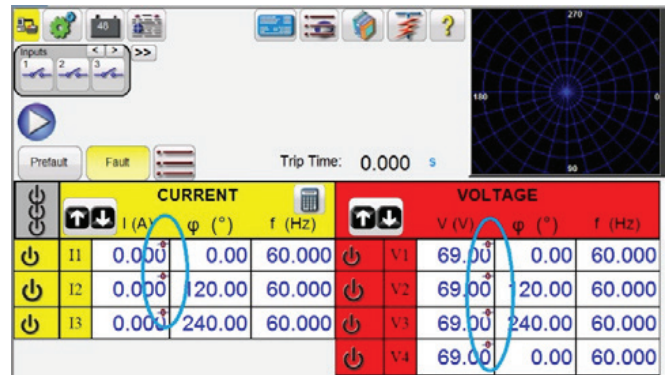
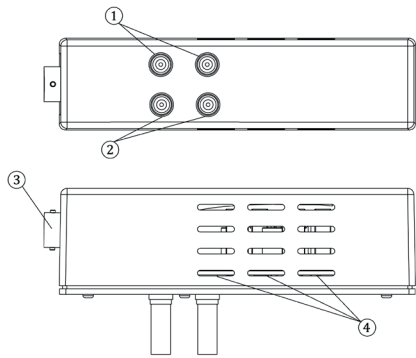


Figure 7: Low Level Outputs Enabled Symbol

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MLLF

Megger Low Level Filter



1. **Voltage Inputs:** For connection to the Voltage Channel
2. **Current Inputs:** For connection to the Current Channel
3. **Low Level Connection Terminal:** For connection of Relay Low Level Cables
4. **Ventilation slots:** For cooling purposes

SPECIFICATIONS

Specifications are subject to change without notice. Accuracies are specified from 10 to 100 % of range, 25°C ± 5°C, 50-60 Hz.

Environment

Application field:	For use in high-voltage substations and industrial environments
Temperature Operating:	0°C to 50°C (32°F to +122°F)
Storage & transport:	-25°C to +70°C (-13°F to +158°F)
Humidity:	5% – 90% RH, non-condensing
Altitude (operational):	3000 m. Full duty cycle: 2000 m.

CE-marking

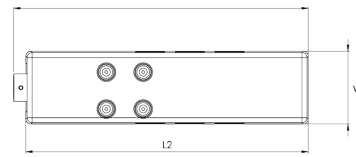
LVD: EN/IEC 61010-1:2001 (2nd Edition)

Conformance Standards

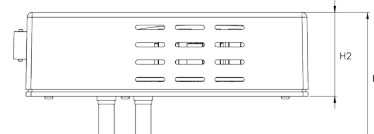
Safety:	EN 61010-1, UL 61010-1, CSA- C22.2 #61010-1
Shock:	EN/IEC 60068-2-27
Vibration:	EN/IEC 68-2-6
Transit Drop:	ISTA 1A
Free Fall:	EN/IEC 60068-2-32
Drop / Topple:	EN/IEC 60068-2-31
EMC Emissions:	EN 61326-2-1, EN 61000-3-2/3 FCC Subpart B of Part15 Class A
Immunity:	EN 61000-4-2/3/4/5/6/8/11

GENERAL

Dimensions



L1 = 5.83in. (14.80 cm)
L2 = 5.57in. (14.14 cm)
W = 1.37in. (3.47cm)
H1 = 2.60in. (6.60cm)
H2 = 1.64in. (4.16cm)



Weight

1lb. (0.45kg) each

Enclosure

The MLLF unit comes housed in a rugged, lightweight UL94 V0 rated plastic enclosure. IEC Enclosure Rating IP20

AC Low Level Rogowski Output (converted current channels)

Range:	2V
Accuracy:	0 - 1V: 0.5mV typical & 1mV guaranteed 1 - 2V: 0.5mV typical & 2mV guaranteed
Resolution:	0.001
Measurements:	AC RMS
Ranges:	10, 40V
Accuracy:	± 0.05% of reading + 0.02% of range typical ±0.15% of reading +0.05% of range guaranteed
Resolution:	0.001
Measurements:	AC RMS

AC Low Level Voltage Output

Range:	2V
Accuracy:	0 - 1V: 0.5mV typical & 1mV guaranteed 1 - 2V: 0.5mV typical & 2mV guaranteed
Resolution:	0.001
Measurements:	AC RMS

*Requires VIGENS with hardware version 3.5.1 or higher

ORDERING INFORMATION









Description	Part Number
 <p>Megger Low Level Filter (Set of three Filters)</p>	MLLF

Table of Accessories

Description	Part Number
 <p>Single Filter</p>	V1013-611
 <p>Set of three (Qty. 1 each, Red, Yellow & Blue) CAT5E Ethernet cables for interconnection between the MLLF and the ABB REF61x Relay under test, each 210cm (7 ft.) long, LEMO Connector to RJ45.</p>	2013-473
 <p>Set of three (Qty. 1 each, Red, Yellow & Blue) CAT5E Ethernet cables for interconnection between the MLLF and the Siemens 7SJ8x Relay under test, each 210cm (7 ft.) long, LEMO Connector to RJ45.</p>	2013-474
 <p>Set of three (Qty. 1 each, Red, Yellow & Blue) generic CAT5E Ethernet cables for interconnection between the MLLF and the Relay under test, each 210cm (7 ft.) long, LEMO Connector to 8mm Banana.</p>	2013-475
 <p>Qty. 1 each, CAT5E Ethernet cable for interconnection between the MLLF and the ABB REF61x Relay under test, each 210cm (7 ft.) long, LEMO Connector to RJ45.</p>	Red: 2013-473A
	Yellow: 2013-473B
	Blue: 2013-473C
 <p>Qty. 1 each, CAT5E Ethernet cables for interconnection between the MLLF and the Siemens 7SJ8x Relay under test, each 210cm (7 ft.) long, LEMO Connector to RJ45.</p>	Red: 2013-474A
	Yellow: 2013-474B
	Blue: 2013-474C
 <p>Qty. 1 each, generic CAT5E Ethernet cables for interconnection between the MLLF and the Relay under test, each 210cm (7 ft.) long, LEMO Connector to 8mm Banana.</p>	Red: 2013-475A
	Yellow: 2013-475B
	Blue: 2013-475C

United States
4545 West Davis Street
Dallas, Texas 75211-3422 USA
T 800.723.2861 (USA only)
T +1 214.333.3201
F +1 214.331.7399
E usales@megger.com

MLLF_DS_US_v2
us.megger.com
ISO 9001:2015
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