



Indu-Sol GmbH  
Blumenstrasse 3  
04626 Schmoelln

Telephone:  
+49 (0) 34491 5818-0  
Telefax:  
+49 (0) 34491 5818-99

Email:  
info@indu-sol.com  
Homepage:  
www.indu-sol.com

## “Let the quality of your potential equalization have a value.”

### Determination of loop resistances

The function of a potential equalization, from the perspective of the automation technology, wouldn't be put into any question, because the function is presumed and the boundary points mostly will be seen in the low voltage system. In the meantime it was exposed that a secure and solid working communication network, including the bus system, is connected to the function of the potential equalization. Straying currents and currents of higher frequency, rarely caused by frequency converters, mostly use the shield of our data cable as return current flow instead of the intended potential equalization system. The explanation is simple: „**Discharge currents of higher frequency do not use the way of the lower ohmic resistance but always the way of the lower impedance...!**”

When you do not want to rely yourself on intuitional statements and feelings according the quality of the installed shield and grounding procedures, it is necessary that a certificate of the measurement techniques for a good potential equalization according **DIN EN 50310** has to be recorded. The **mesh resistance measuring clamp EmCheck® MWMZ II** from Indu-Sol GmbH is the suitable tool for this purpose.

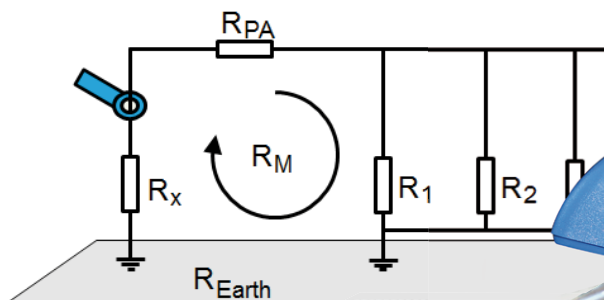
#### Reference values:

The shield loop resistance of data cables (for example: bus cables) should have a maximum impedance value of 0,6 Ohm.

PE/PA loop resistances should be in the range of an approximated impedance value of 0,3 Ohm.

### Mode of functioning and operation

The clamp consists of two coils. The first coil induces a voltage of a defined level and with a defined frequency of 50, 60, 128 or 2,083 Hz. The second coil measures the current induced by coil one in the set frequency range. The ratio of these two values is used to determine and display the alternating current resistance (impedance). The measurement is made without any interruption and can also be carried on conductors which already carry currents during their normal operation.



The total resistance of each mesh will be minimized, by a higher amount of meshes generated in the potential equalization.

### Highlights

- Measuring of earth loop resistance and earth loop inductivity
- First-time: Display of contact voltage
- Alert when detecting a dangerous voltage
- Recording of up to 300 measurements incl. time stamp
- Easy handling to keep the clamp open
- Good visibility of all displayed data via OLED display





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## “Tracing of currents and taking the accordant actions.”

### Measuring and avoiding shield currents

Sporadic interferences in the industrial data communication are mostly caused by compensating currents produced by high-frequently shield currents. Faults in the fieldbus often will be searched directly in the bus system and the installation will be mistrusted. In consideration of the compensating currents of the shield of the data cable by the way of measurement techniques, it becomes clear that the fieldbus is not the reason, but represents the “aggrieved party”. It is now essential to detect the initiator and to take the accordant countermeasures.

The **leakage current clamp EmCheck® LSMZ I** is especially designed for the measuring of leakage and shield currents in the frequency band of 50/60 Hz as well as 5 Hz – 1 kHz. The adjustable measuring range is arranged in levels from 30  $\mu$ A - 100 A, whereupon the lower range is of special interest for the shield current measurement of the data cable.

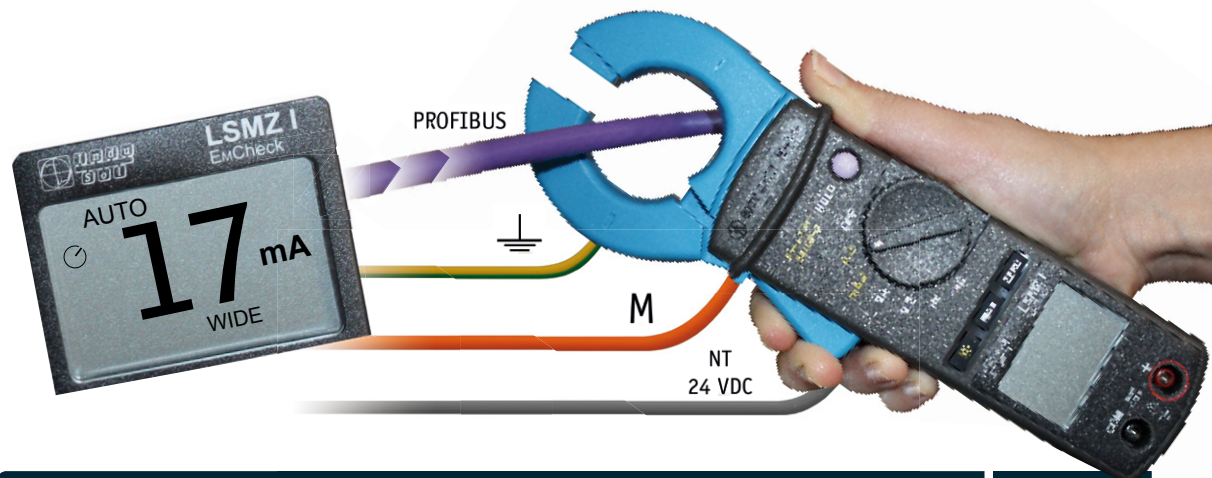
Furthermore the leakage current clamp EmCheck® LSMZ I is the ideal measuring tool to detect insulation faults and unintentional interruptions of FI-safety switches caused by leakage. The leakage current clamp offers all functions of a multiple measuring clamp.

### Configuration and function

The LSMZ I is characterized by a large opening (2,8 cm) for the cable to led through, so that a comfortable measurement is also possible in unfavorable installation situations. Through the holding function it is possible to perform permanent measurements such as maximum currents.

#### Guideline:

By the experiences of Indu-Sol GmbH, a shield current of <40 mA was proven justifiable, independently from the machine specifications. A statement according the level should be made in connection with the adjusted frequency range, to carry out the correct actions in terms of a reduction of shield currents.



Ordering details	Art. No.
Mesh resistance measuring clamp EmCheck® MWMZ II	122010010
Leakage current clamp EmCheck® LSMZ I	122010005
Set of measuring clamps (MWMZ II and LSMZ I)	122010006