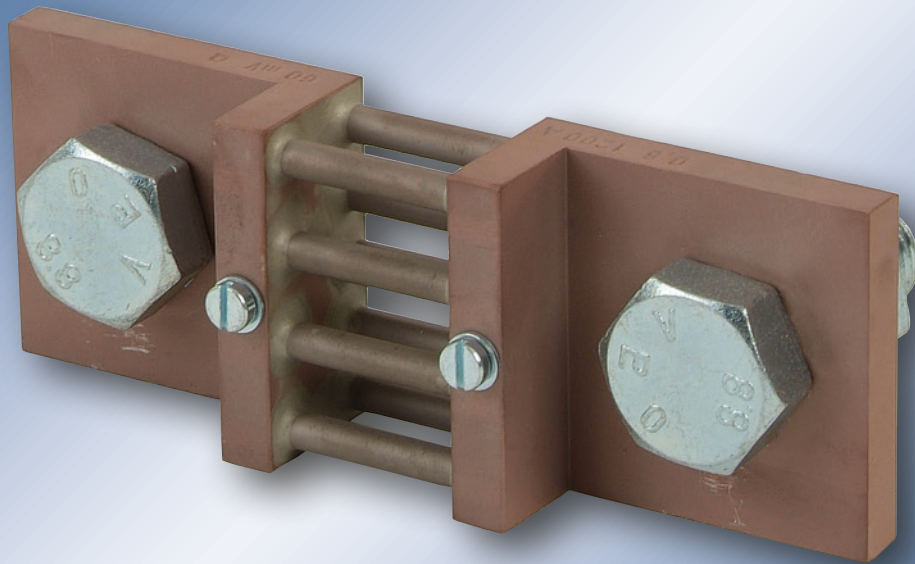


The Art of Measuring.

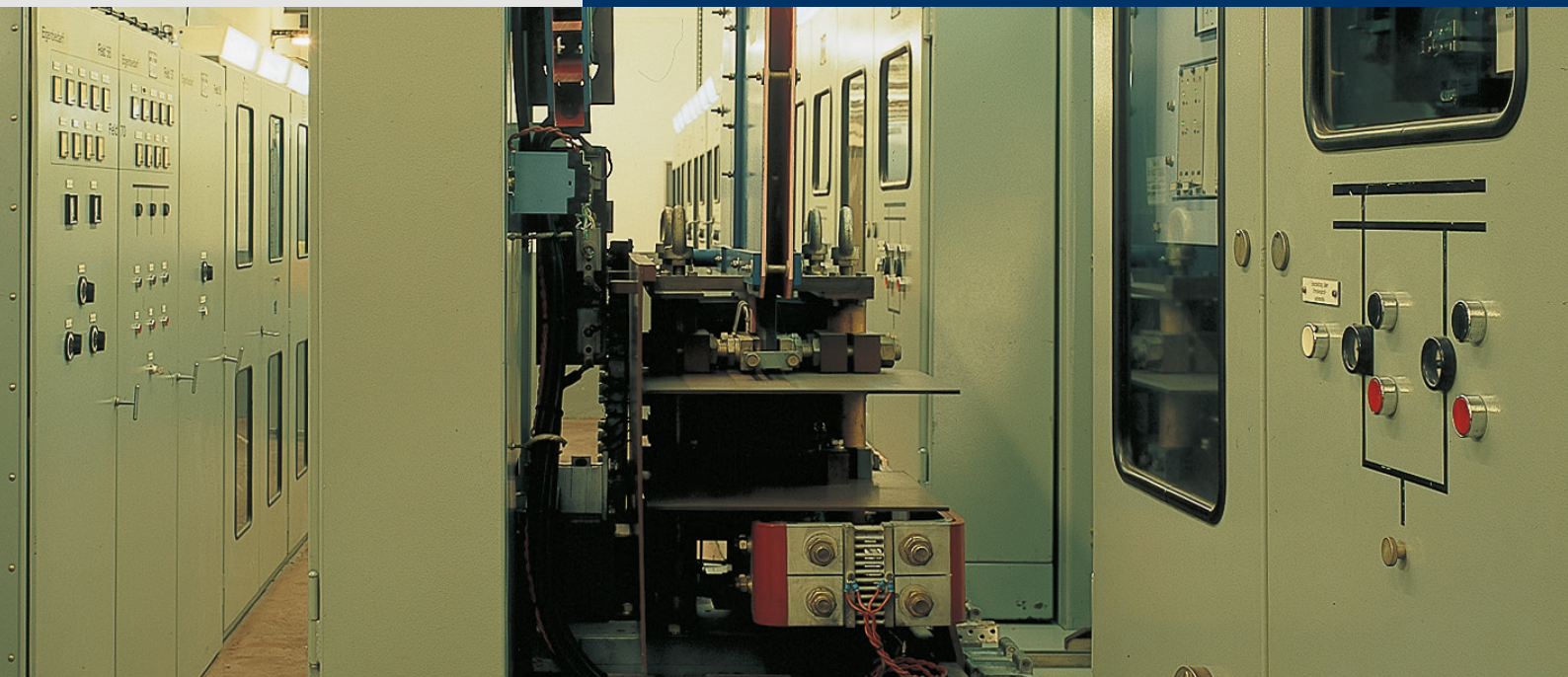
Knick 

Reliable measurement of
DC currents up to the kA range
with a high level of accuracy

Maconic Shunt M500HS-0069



Maconic Shunt Resistors



Usage

In many areas of applications the use of shunt resistors has established itself as a reliable, precise and long-term stable solution for continuous measurement of DC current. The low voltage drop across the shunt resistor is directly proportional to the flowing current. It is sensed by a specially designed shunt isolator, where it is converted to a standard signal and output as a measure of the current for further processing in controllers or displays.

DC currents are measured in a diverse range of applications, including photovoltaics, power supply of public transport systems, control of motors and generators, DC busses of inverters, welding equipment, and generally in systems with high DC currents.

Task

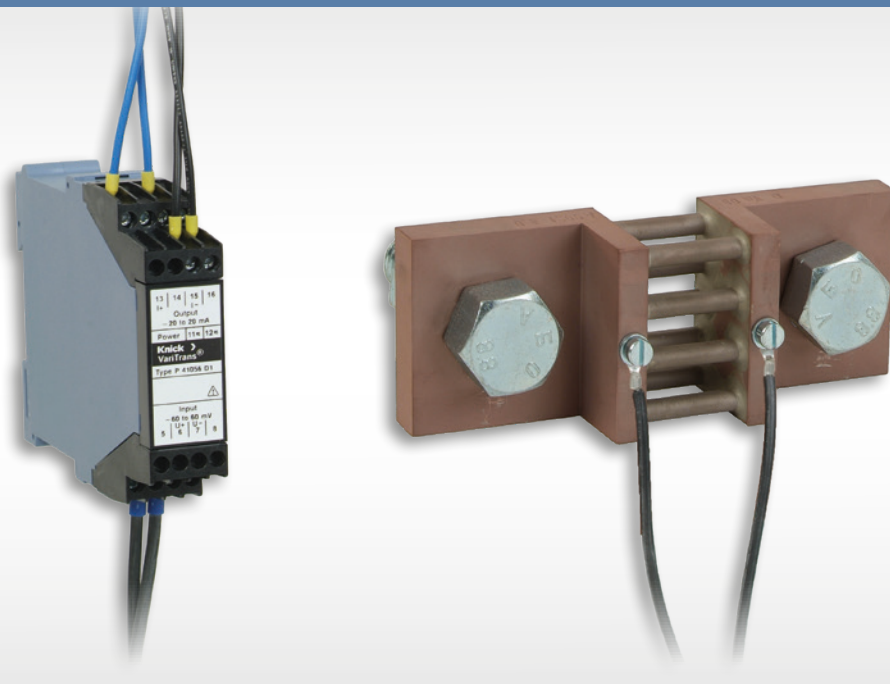
The currents to be measured are associated with system voltages (potentials) which must be safely separated, i.e. galvanically isolated by the shunt isolator. Here, it is important that the voltage measurement is not affected by common mode influences. This can be achieved even for shunt voltages as low as 60 mV by suitably designed shunt isolators. Higher shunt voltages are not necessary with high-quality shunt isolators and because of the physically larger shunt resistors they are generally not desired.

Particularly for high currents, the loss in the shunt resistor must be very low to prevent excessive heating. In any case, the resistance of the shunt should be as constant as possible with changing temperatures. The shunt resistor must be insensitive to corrosion or other environmental effects. Here, special attention must be paid to material and workmanship.

Solution

Maconic shunt resistors are the result of many years of experience in the design and production of such resistors. They are carefully manufactured using high-quality materials. The resistor bars are made of manganin, a special manganese-copper-nickel alloy, so that a very low temperature coefficient is achieved. Dimensioning and mechanical construction are such that the resistors only moderately heat up until the rated current is reached.

The shunt resistors and associated shunt isolators achieve a very good long-term stability, which guarantees the specified accuracy over the normal periods of application of many years. Current peaks do not cause any offset or drift. Protection equipment based on current measurement benefits from the reliability and long-term stability of the measurement and achieves a particularly high level of safety performance.



Due to the low shunt voltage of 60 mV, the dimensions of the shunt resistor can be comparatively small – and this is not at the expense of measurement accuracy because the shunt isolators from Knick are optimized for their special task. Safe measurement of currents associated with high system voltages up to the kV range is also possible. The 3-port-isolated transmitters provide a correspondingly high galvanic isolation and are rated at 3.6 kV working voltage / 15 kV test voltage.

Facts

- Precise and long-term stable measurement of DC currents using shunt resistors
- For currents up to 20 kA, up to 8 kA with standard devices
- Low shunt voltage 30 mV / small dimensions thanks to special shunt isolators
- Shunt accuracy: Class 0.5 optionally Class 0.2
- Shunt isolator/transmitter with 0.1% gain error
- High overload capacity without remaining measurement error
- Measurement principle prevents influences from adjacent lines
- Galvanic isolation between power unit and control unit up to 4.8 kV working voltage / 18 kV test voltage
- Conversion to standard signals ± 20 mA, ± 10 V, 4 ... 20 mA
- MTBF of 96 years for the complete current measurement system
- 5-year warranty

Areas of Applications

- Photovoltaics
- DC-supplied public transport systems
- Control of motors and generators
- Control of DC bus voltage / frequency inverters
- Welding equipment
- Energy metering according to EN 50463 (CMF)

Maconic Shunt Resistors

Specifications

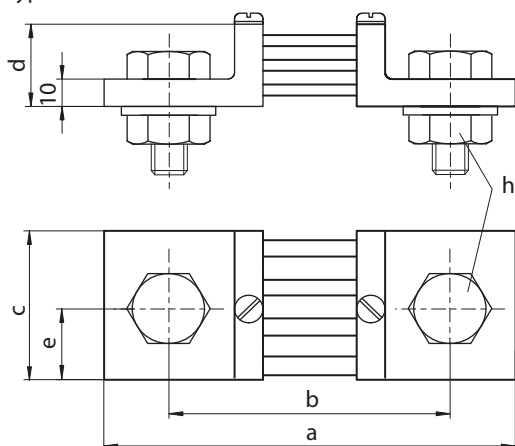
Accuracy under rated conditions	Class 0.5 or Class 0.2 (optional: 0.1 % trimming)		
Overload capacity	Permanent	120% full scale	
	Max 5 s	Rated < 2000 A	500% full scale
		Rated > 2000 A	200% full scale
Rated conditions	23 °C ± 1 K		
Ambient conditions	Climate suitability	Climatic class 3 according to VDE/VDI 3540	
	Ambient temperature	Operation	-10 ... +55 °C
		Transport and storage	-25 ... +65 °C
	Relative humidity	Annual average < 75%, no condensation	
Mounting	Type B	Up to 3000 A	L profiles
Material	Resistor bars	Manganin	
	Connecting pieces	Brass/copper	
Connections	Current	For threaded screws, see table	
	Voltage	M5 x 8	
Ingress protection	IP 00		
Dimensions	See dimension drawings and product data		
Weight	See dimension drawings and product data		

Product Data – Maconic M500HS-0069

Rated current	Rated voltage drop	Type	Weight (kg)	Dimensions (mm)							Terminal screw on each side	Accuracy class	Order no.	
				a	b	c	d	e	f	g				h
500 A	100 mV	B	1.45	190	150	40	30	20			1	M16x45	0,2	Maconic M500HS-0069

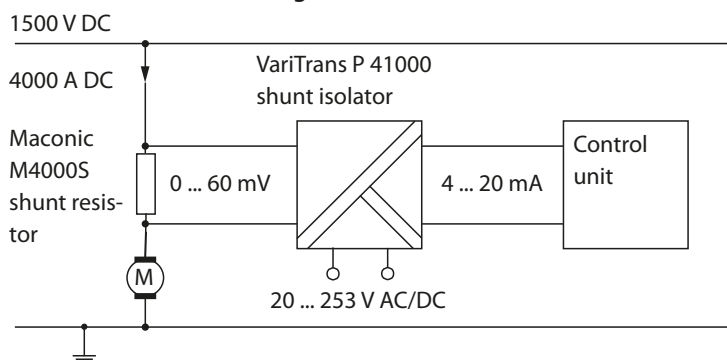
Dimension Drawings

Type B

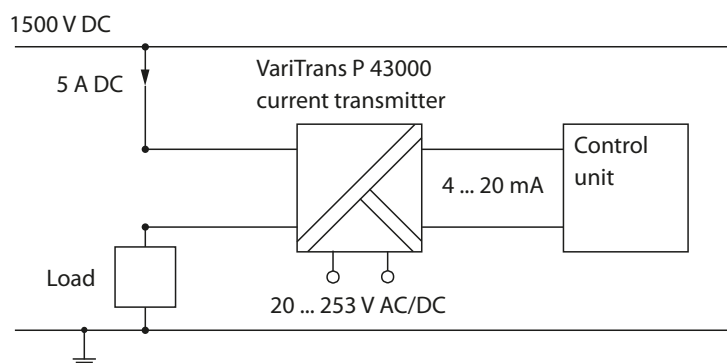


Typical Applications

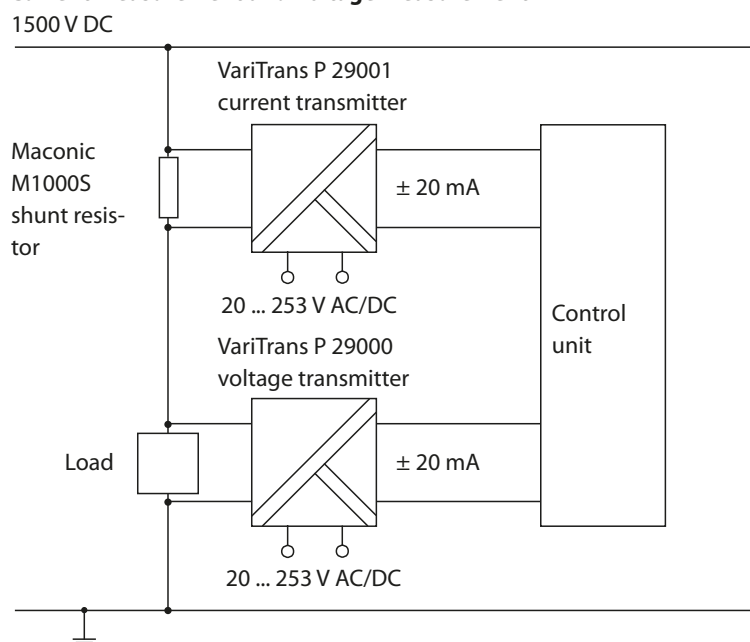
Current Measurement using Shunt Resistor



Direct Current Measurement



Current Measurement and Voltage Measurement





Interface Technology

Indicators

Process Analytics

Portables

Laboratory Meters

Sensors

Fittings

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