Wabtec
CORPORATION

Components

Industrial Sensors

Mors Smitt
A Wabtec Company

Industrial sensors

Mors Smitt has extended its product portfolio focusing on market sectors like power generation, transmission and distribution, factory automation, petro-chemical, water treatment plants and general industrial requirements.

Today, more and more applications that used to be mechanical are changing to fully electronic control offering increased reliability, improved regulation standards and higher energy efficiency.

For motors with inverter control total energy consumed savings of up to 50% are achievable. The inverter control requires reliable, accurate current measurements.

For renewable sources, power electronics also play a key role in energy savings. Modern systems are becoming more complex and require precise coordination between the power semiconductors, the system controller, mechanics and the feedback sensors. The sensors provide all necessary information of the load to fulfill that function.

Other power electronics applications involving sensors are: motor drives, UPS, welding, robotics, cranes, cable cars, ski lifts, elevators, medical systems, power supplies for computer servers and telecom.

Mors Smitt closed loop sensors ensure high accuracy of current measuring in power electronics equipments for a full protection against overload or underload, control and regulation of the power equipment.

Principle

With over 25 years experience in measurement for railway equipment, Mors Smitt introduces a new range of sensors based on closed loop technology, to supply the industry market. These sensors allow measurement of all current waveforms, with high galvanic insulation between the primary and secondary circuits.

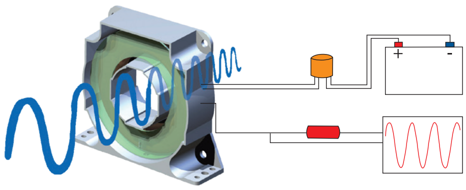
Closed loop sensors

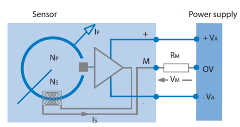
The probe placed in the air gap of the magnetic circuit, provides a voltage proportional to this flux. The electronic circuit amplifies the signal from the primary current Ip or voltage Up flowing across the sensor and generates a current into the secondary Is.

This secondary current multiplied by the number of turns Ns of secondary winding cancels out the primary magnetic flux that created it. The global flow is equal to zero. The formula Np x Ip = Ns x Is is true at any time which means the measuring of instantaneous values.

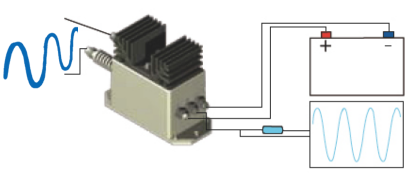
The secondary output current Is is exactly proportional to the primary current and can be passed through a measuring resistance Rm. The measuring voltage Vm at the terminals of this resistance is therefore proportional to the primary current Ip.

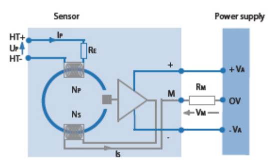
Current sensors





Voltage sensors





Output connection

Molex output connector
for MSA sensors

M5 output connectors
for MSV sensors

High galvanic isolation

Dielectric strength of 3.8 kV...6 kV - 50 Hz -1 min

Measuring of all waveforms

DC, AC, impulse currents

Excellent accuracy, immunity and response time

From ± 1.5 % to ± 0.5 % at rated current over -40 °C...+85 °C with linearity < 0.1 %, and over a large frequency from DC to AC and impulse waveforms. Response time <1 µs

Form fit function

The sensors can be mounted vertically or horizontally and provide form fit functions with other sensors

Compliant to major industrial standards

EN 50178	Electronic equipment for use in power installations
EN 61000-6-2	Electromagnetic compatibility - immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility - emission standard for industial environments

EMC compliant

All sensors include EMC compliancy

Dedicated customer service & production

Mors Smitt ensures customer support throughout the product life cycle, moreover we are able to adapt our capacity of production and reactivity to exceed our customer on time delivery and after sales service.

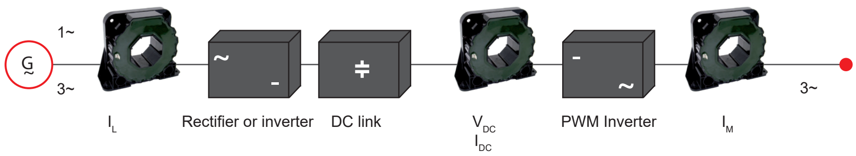
5 year warranty

Mors Smitt return of experience in the railway sector facing the harshest environments and strictest standards allow us to provide our customers a 5 year warranty on all our industrial sensors.

Applications

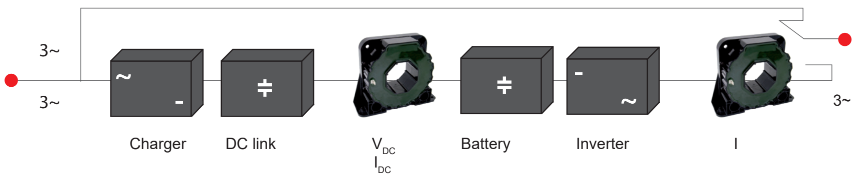
Motor and renewable energy inverters

- Machine tools, printing, paper, textile, plastic
- Steel mills, lifts
- Cranes, robotics, pumps
- Energy inverters for renewable energies (wind, sun, hydrogen, ocean currents, energy storage etc.)



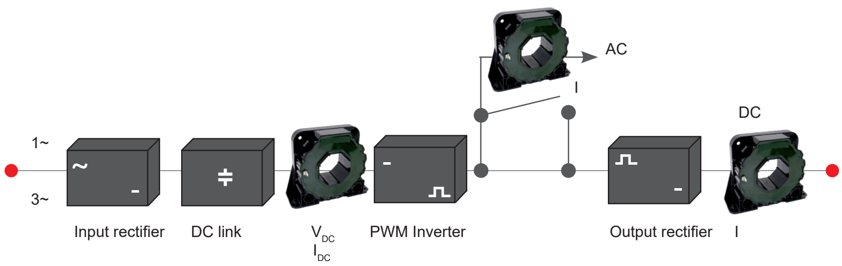
Uninterruptible power supplies

- EDP systems
- Telecom
- Security systems



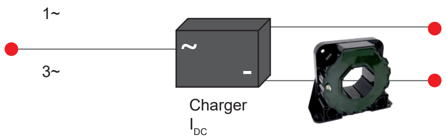
Power supplies for welding applications

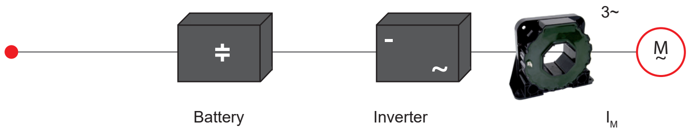
- Test & measurement in laboratories & universities
- Medical X ray and imaging equipment
- Electrolysis, currents monitoring
- Inductive heating
- Energy management systems, monitoring of load currents
- Overcurrent protection
- Control and safety systems
- Electrical traction



Battery supplied applications

- Electric vehicles (zero emission vehicles)
- Forklift trucks
- Wheel chairs
- Solar power supplies





Current Sensors

Selection guide

	 MSA 305	 MSA 505	 MSA 1005	 MSA 2005
Primary nominal RMS current (Ipn)	300 A	500 A	1000 A	2000 A
Primary current measuring range	± 500 A	± 800 A	± 1500 A	± 3000 A
Output measuring resistance (Rm) 70 °C	20 Ω max for 500 A @ 15 V 54 Ω max for 500 A @ 24 V	7 Ω max for 800 A @ 15 V 60 Ω max for 800 A @ 24 V	7 Ω max @ 15 V 25 Ω max @ 24 V	11 Ω max @ 24 V
Secondary nominal RMS current (Isn)	150 mA	100 mA	200 mA	400 mA
Conversion ratio[1]	1:2000	1:5000		
Auxiliary supply (VC)	± 12 V... ± 24 VDC (± 5%)			
Current consumption (Ic)	± 20 mA + Is @ 15 VDC	± 22 mA + Is @ 15 VDC		± 33 mA + Is @ 15 VDC
Dielectric test[1]	3.8 kV	4 kV		6 kV
Overall acuracy	± 0.5 % at 25 °C / ± 1 % at -40 °C... +85°C			
Linearity	< 0.1%			
Offset current at Ip = 0 - TA=25 °C	± 0.25 mA			
Response time @ 90% of Ipn and di/dt 100 A / µs	<1 µs			
Frequency bandwidth (-1 dB)	DC to 100 kHz by technology			
Operating temperature	-40 °C...+85 °C			
Storage temperature	-50 °C...+90 °C			
Secondary coil resistance @ 70 °C	30 Ω	60 Ω	30 Ω	25 Ω
Weight	110 g (± 5%)	210 g (± 5%)	550 g (± 5%)	1550 g (± 5%)
Molex connector[1]	✓			
Horizontal / vertical / chassis	✓			
5 year warranty	✓			

[1] other conversion ratio, dielectric, outputs on request

Current Sensors

Features

General data

- The housing and insulation resin (UL94 V0) are self-extinguishable upon fire
- Mounting holes are provided in the housing mold for two positions on a base or flat mount through a plate
- Direction of current: a primary current flowing in the direction of the top arrow on the sensor generates a positive secondary output current on terminal M

Primary connection

- Hole for primary conductor
- The temperature of the primary conductor in contact with the housing shall not exceed 100 °C

Secondary connection

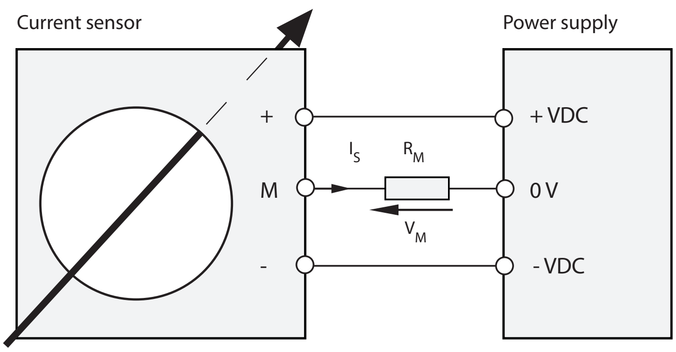
- Molex HE14 type connector
- Other output on request

Wiring and mounting instructions

These general instructions are not exhaustive and provide basis for proper installation of the sensors.
Each configuration being different, please consult us for particular advice. (Note that non proper installation or incorrect use of the sensor can result in sensor poor performances or malfunction)

Wiring diagram

- Direction of current: a primary current Ip flowing in the direction of the top arrow on the sensor generates a positive secondary output current on terminal M
- Auxiliary supply voltage:
  bipolar voltage –VDC…0 V…+VDC



Mechanical mounting

- Any mounting position is possible
- Recommended fixing: by screws and flat washers
- The busbar (or cable) must be centred

Precautions in electromagnetic environment

Due to their principle of operation (measure of magnetic field by the Hall effect probe), closed loop hall effect current sensors can be sensitive to strong magnetic fields. It is recommended to avoid positioning them to close to high current power cables.

Processing of the sensor output signal

Standard codes of practice advise that, before the signal is processed, a low-pass filter adapted to the bandwidth of the sensor is used. Also, in the case of digital processing of the signal, it is also recommended that the sampling frequency is adapted to the bandwidth of both the signal to be measured and the sensor.

In the event of sensor failure, the processing of the output signal should take into account deterioration in performance (i.e. absence of signal or saturated signal) and rapidly and safely shut the system down.

Safety instructions

Our sensors must be used in electrical or electronic equipment with respect to relevant standards and safety requirements in accordance with the manufacturer's operating instructions.

Caution, risk of electrical shock

When operating the sensor, certain parts of the module can carry hazardous voltage (eg. primary terminals, power supply). Ignoring this warning can lead to injury and/or cause serious damage.

- This sensor is a built-in device, whose conducting parts must be inaccessible after installation
- A protective housing or additional shield could be used
- Main supply must be able to be disconnected

Current sensor

MSA 305-S

300 A
Closed loop

Industrial applications, current measuring of all waveforms AC, DC

- Chassis mount
- Closed loop
- High dielectric strength
- Precise linearity
- Precise accuracy
- High dynamic response
- No foucault losses in the magnetic circuit

Electrical specifications

Primary nominal RMS voltage	V_{PN}	300 A
Primary voltage measuring range	V_P	± 300 A
Output measuring resistance	R_M	20 Ω max for 500 A @ 15 V 70 °C 54 Ω max for 500 A @ 24 V 70 °C
Secondary nominal RMS curent	I_{SN}	150 mA
Conversion ratio	K_N	1:2000
Auxiliary supply voltage	V_C	±12 to ±20 VDC ±5 %
Current consumption	I_C	±20 mA + Is @ 15 VDC
Dielectric strength between:		
primary and secondary circuit	V_{D1}	3.8 kV - 50 Hz - 1 min

Electrical specifications

Overall accuracy @ I_{PN} - T_A=25 °C	X_G	± 0.5 %
Overall accuracy @ I_{PN} - T_A=-40 °C...85 °C	X_G	± 1 %
Linearity	E_L	< 0.1%
Offset current @ I_P =0 - T_A=25 °C	I_0	± 0.25 mA max
Thermal drift of I_0 between -40 °C...+85 °C	I_{0T}	± 1 mA max
Resp.time @ 90% of I_{PN} and di/dt 100 A / µs	T_r	< 1 µs
di/dt accuracy followed	di/dt	> 50 A / µs
Frequency bandwidth (-3 dB)	f	DC to 100 kHz by technology

General specifications

Operating temperature	T_A	-40 °C...+85 °C
Storing temperature	T_s	-50 °C...+90 °C
Secondary coil resistance @ 70 °C	R_s	30 Ω
Weight	m	110 g ± 5%

Standards

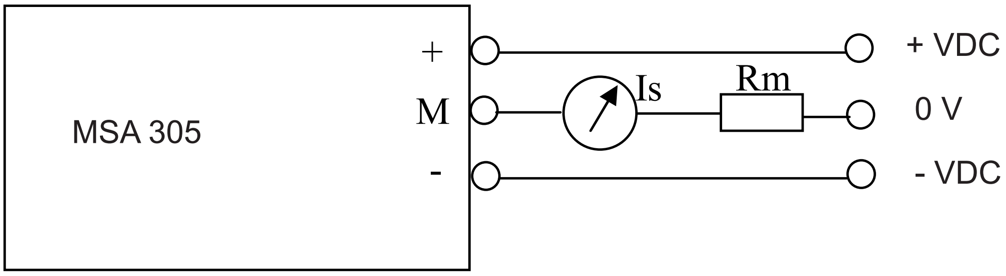
EN 50178, EN 61000-6-2, EN 61000-6-4

CE cULus

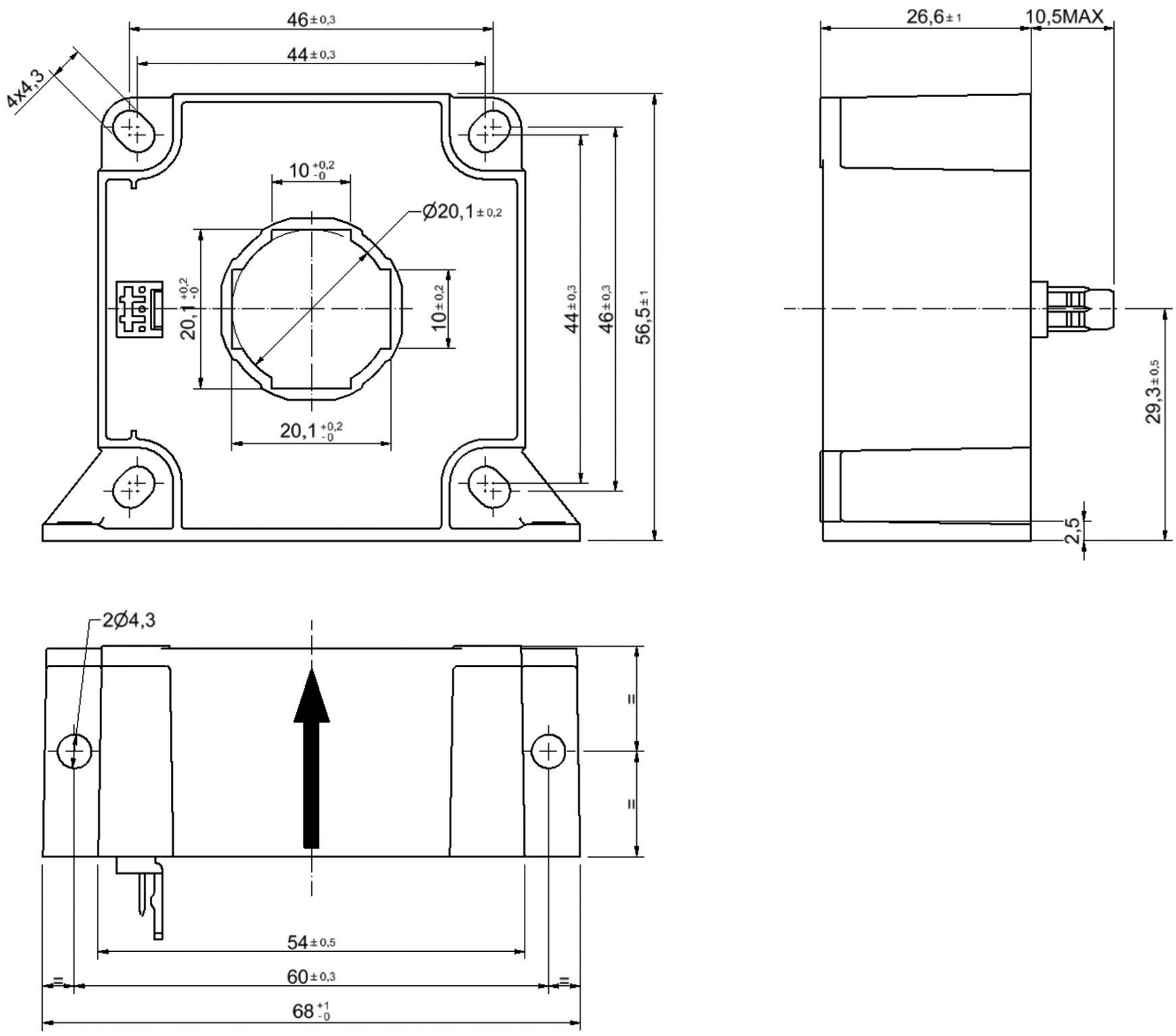
Ordering reference

MSA 305-S1

Connections



Dimensions



Current sensor
MSA 505-S

500 A
Closed loop

Industrial applications, current measuring of all waveforms AC, DC

- Chassis mount
- Closed loop
- High dielectric strength
- Precise linearity
- Precise accuracy
- High dynamic response
- No foucault losses in the magnetic circuit

Electrical specifications

Primary nominal RMS voltage	V_{PN}	500 A
Primary voltage measuring range	V_P	± 800 A
Output measuring resistance	R_M	7 Ω max for 800 A @ 15 V 70 °C 60 Ω max for 800 A @ 24 V 70 °C
Secondary nominal RMS curent	I_{SN}	100 mA
Conversion ratio	K_N	1:5000
Auxiliary supply voltage	V_C	±12 to ±24 VDC ±5 %
Current consumption	I_C	±22 mA + Is @ 15 VDC
Dielectric strength between:		
primary and secondary circuit	V_{D1}	4 kV - 50 Hz - 1 min

Electrical specifications

Overall accuracy @ I_{PN} - T_A=25 °C	X_G	± 0.5 %
Overall accuracy @ I_{PN} - T_A=-40 °C...85 °C	X_G	± 1 %
Linearity	E_L	< 0.1%
Offset current @ I_P =0 - T_A=25 °C	I_0	± 0.25 mA max
Thermal drift of I_0 between -40 °C...+85 °C	I_{0T}	± 1 mA max
Resp.time @ 90% of I_{PN} and di/dt 100 A / µs	T_r	< 1 µs
di/dt accuracy followed	di/dt	> 100 A / µs
Frequency bandwidth (-3 dB)	f	DC to 100 kHz by technology

General specifications

Operating temperature	T_A	-40 °C...+85 °C
Storing temperature	T_s	-50 °C...+90 °C
Secondary coil resistance @ 70 °C	R_s	60 Ω
Weight	m	210 g ± 5%

Standards

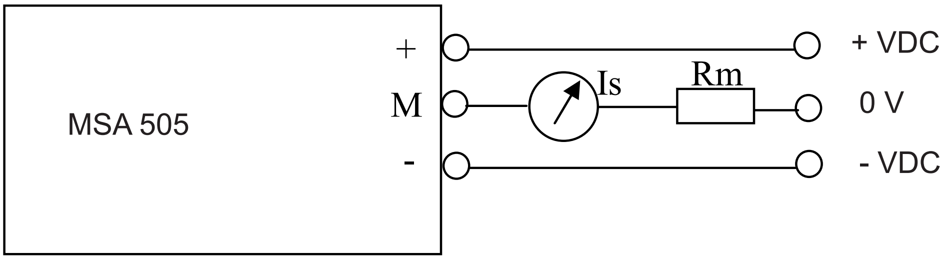
EN 50178, EN 61000-6-2, EN 61000-6-4

CE c RU us

Ordering reference

MSA 505-S1

Connections



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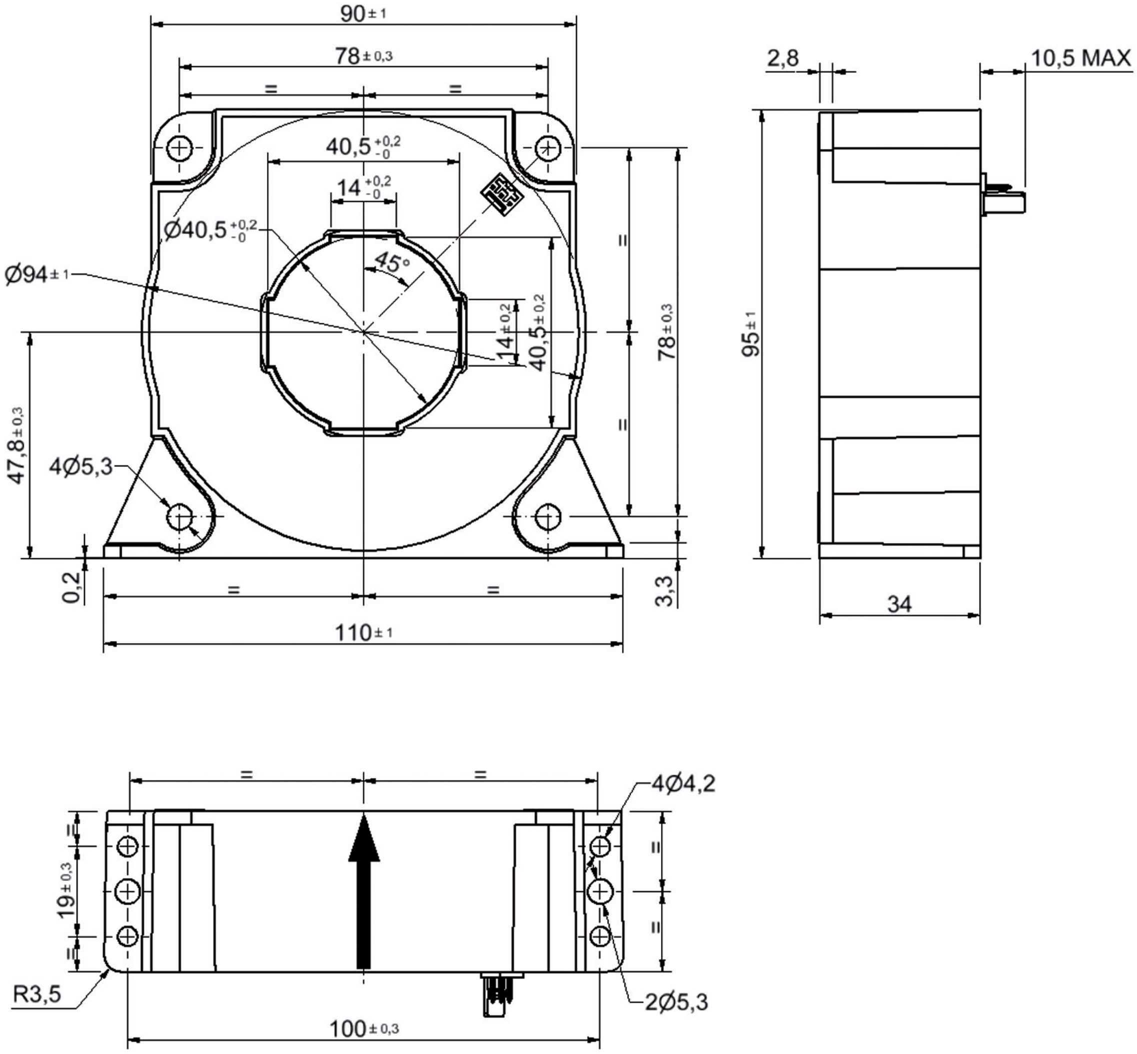
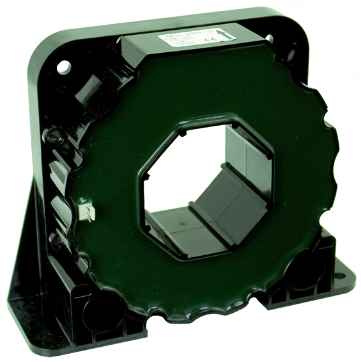


Current sensor
MSA 1005-S

1000 A
Closed loop



Industrial applications, current measuring of all waveforms AC, DC

- Chassis mount
- Closed loop
- High dielectric strength
- Precise linearity
- Precise accuracy
- High dynamic response
- No foucault losses in the magnetic circuit

Electrical specifications

Primary nominal RMS voltage	V_{PN}	1000 A
Primary voltage measuring range	V_P	± 1500 A
Output measuring resistance	R_M	7 Ω max @ 15 V 70 °C 25 Ω max @ 24 V 70 °C
Secondary nominal RMS curent	I_{SN}	200 mA
Conversion ratio	K_N	1:5000
Auxiliary supply voltage	V_C	±15 to ±24 VDC ±5 %
Current consumption	I_C	±22 mA + Is @ 15 VDC
Dielectric strength between:		
primary and secondary circuit	V_{D1}	4 kV - 50 Hz - 1 min

Electrical specifications

Overall accuracy @ I_{PN} - T_A=25 °C	X_G	± 0.5 %
Overall accuracy @ I_{PN} - T_A=-40 °C...85 °C	X_G	± 1 %
Linearity	E_L	< 0.1%
Offset current @ I_P =0 - T_A=25 °C	I_0	± 0.25 mA max
Thermal drift of I_0 between -40 °C...+85 °C	I_{0T}	± 1 mA max
Resp.time @ 90% of I_{PN} and di/dt 100 A / µs	T_r	< 100 µs
di/dt accuracy followed	di/dt	> 100 A / µs
Frequency bandwidth (-3 dB)	f	DC to 100 kHz by technology

General specifications

Operating temperature	T_A	-40 °C...+85 °C
Storing temperature	T_s	-50 °C...+90 °C
Secondary coil resistance @ 70 °C	R_s	30 Ω
Weight	m	550 g ± 5%

Standards

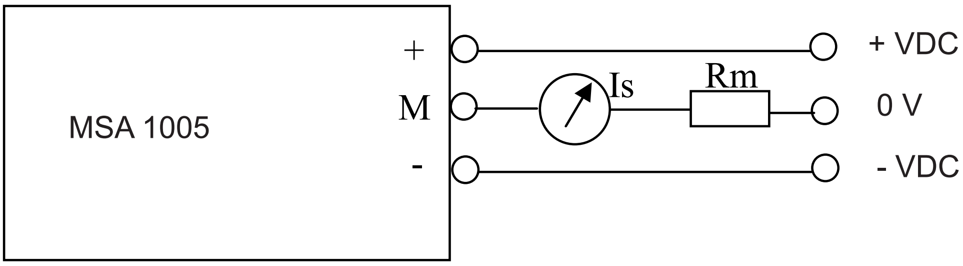
EN 50178, EN 61000-6-2, EB 61000-6-4

CE c UL us

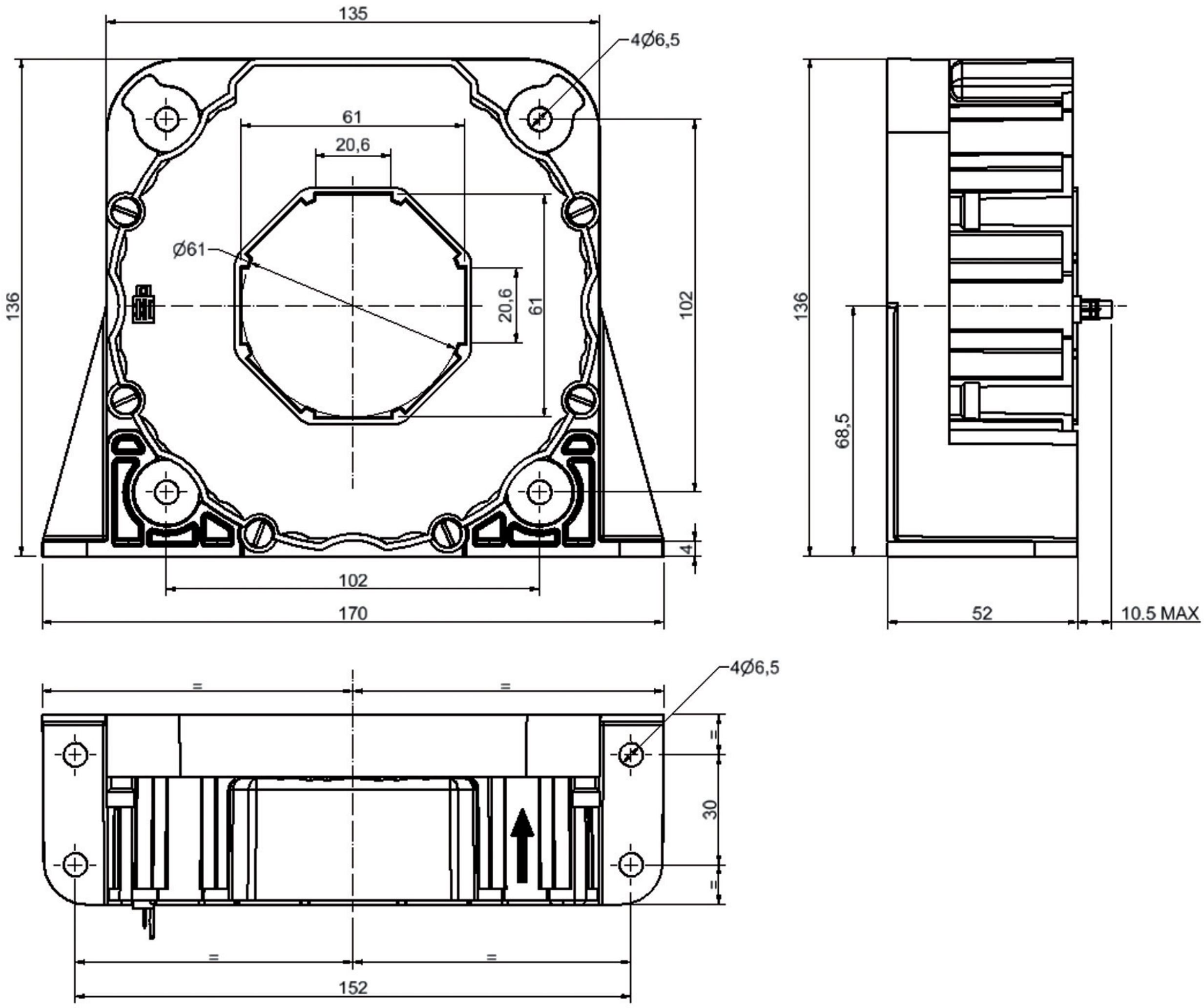
Ordering reference

MSA 1005-S1

Connections

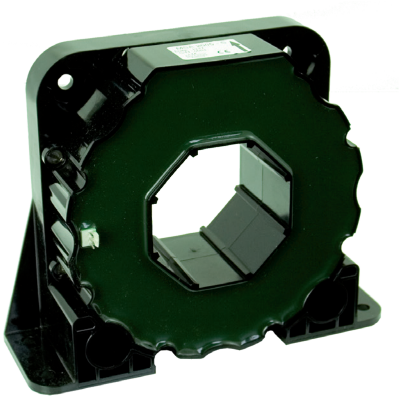


Dimensions



Current sensor
MSA 2005-S

2000 A
Closed loop



Industrial applications, current measuring of all waveforms AC, DC

- Chassis mount
- Closed loop
- High dielectric strength
- Precise linearity
- Precise accuracy
- High dynamic response
- No foucault losses in the magnetic circuit

Electrical specifications

Primary nominal RMS voltage	V_{PN}	2000 A
Primary voltage measuring range	V_P	± 3000 A
Output measuring resistance	R_M	11 Ω max @ 24 V 70 °C
Secondary nominal RMS curent	I_{SN}	400 mA
Conversion ratio	K_N	1:5000
Auxiliary supply voltage	V_C	±15 to ±24 VDC ±5 %
Current consumption	I_C	±22 mA + Is @ 15 VDC
Dielectric strength between:		
primary and secondary circuit	V_{D1}	6 kV - 50 Hz - 1 min

Electrical specifications

Overall accuracy @ I_{PN} - T_A=25 °C	X_G	± 0.7 %
Overall accuracy @ I_{PN} - T_A=-40 °C...85 °C	X_G	± 1 %
Linearity	E_L	< 0.1%
Offset current @ I_P =0 - T_A=25 °C	I_0	± 0.25 mA max
Thermal drift of I_0 between -40 °C...+85 °C	I_{0T}	± 1 mA max
Resp.time @ 90% of I_{PN} and di/dt 100 A / µs	T_r	< 100 µs
di/dt accuracy followed	di/dt	> 100 A / µs
Frequency bandwidth (-3 dB)	f	DC to 100 kHz by technology

General specifications

Operating temperature	T_A	-40 °C...+85 °C
Storing temperature	T_s	-50 °C...+90 °C
Secondary coil resistance @ 70 °C	R_s	25 Ω
Weight	m	1550 g ± 5%

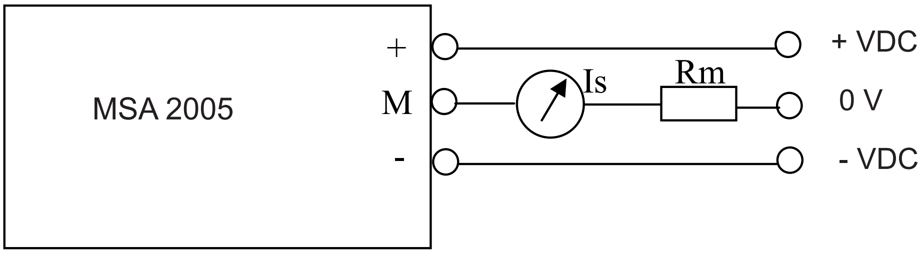
Standards

EN 50178, EN 61000-6-2, EB 61000-6-4

Ordering reference

MSA 2005-S1

Connections



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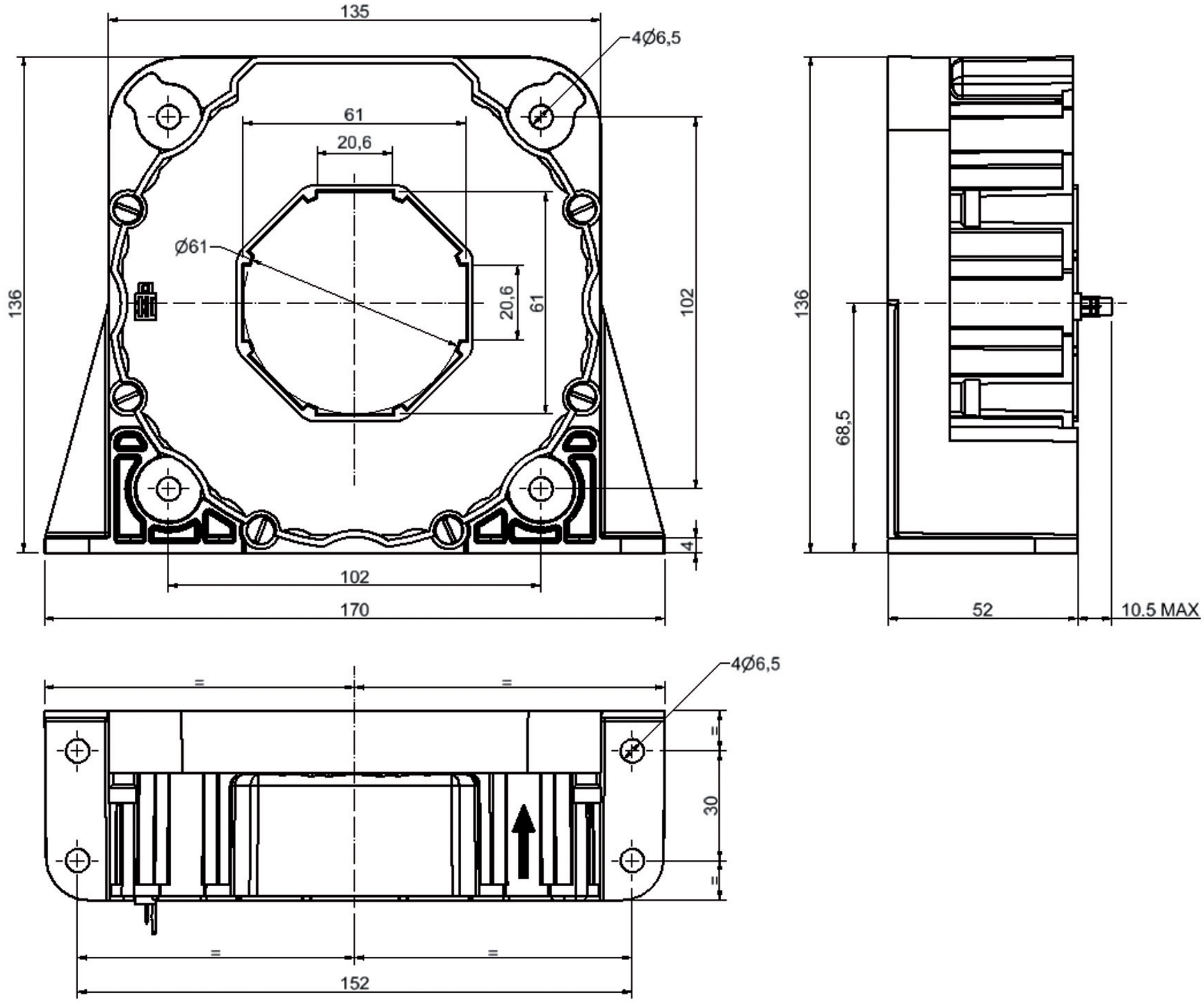


Selection guide

	 MSV 100	 MSV 200				
Primary nominal RMS voltage (Ipn)	950 V	1000 V	2000 V	3000 V	4000 V	5000 V
Primary current measuring range	± 1400 A	± 1500 A	± 3000 A	± 4500 A	± 6000 A	± 6000 A
Output measuring resistance (Rm) 25 °C	220 Ω max for 1400 V	tba				
Secondary nominal RMS current (Isn)	50 mA for 1000 V	50 mA				
Conversion ratio[1]	1000 V / 50 mA	1/5	1/10	1/15	1/20	1/25
Auxiliary supply (VC)	± 12 V... ± 24 VDC (± 5%)	± 12 V... ± 24 VDC (± 5%)				
Current consumption (Ic)	± 20 mA + Is @ 15 VDC	± 33 mA + Is @ 24 VDC				
Dielectric test[1]	3.8 kV	10 kV				
Overall acuracy	± 0.5 % at 25 °C ± 1 % at -40 °C...+85 °C	± 0.7 % at 25 °C				
Linearity	< 0.1%	< 0.1%				
Offset current at Ip = 0 - TA=25 °C	± 0.25 mA	± 0.2 mA				
Response time @ 90% of Ipn and di/dt 100 A / µs	<1 µs	<100 µs				
Frequency bandwidth (-1 dB)	DC to 100 kHz by technology	DC to 100 kHz by technology				
Operating temperature	-50 °C...+85 °C	-50 °C...+85 °C				
Storage temperature	-50 °C...+90 °C	-50 °C...+90 °C				
Secondary coil resistance @ 70 °C	60 Ω ± 7%	60 Ω ± 7%				
Weight	500 g (± 10%)	800 g (± 10%)				
Molex connector[1]	✓	✓				
Horizontal / vertical / chassis	✓	✓				
5 year warranty	✓	✓				

[1] other conversion ratio, dielectric, outputs on request

Voltage Sensors

Features

General data

- The housing and insulation resin (UL94 V0) are self- extinguishable upon fire
- Mounting holes are provided in the housing mold for base mount, 2 fastening slots of Ø 6.5 mm
- Direction of current: a positive primary differential potential (U_{HT+} - U_{HT-} >0) generates a positive secondary output current on terminal M
- Power supply is protected against polarity reversal

Primary connection

- Primary 2 x M5 insert
- Tightening torque value 2.2 Nm

Secondary connection

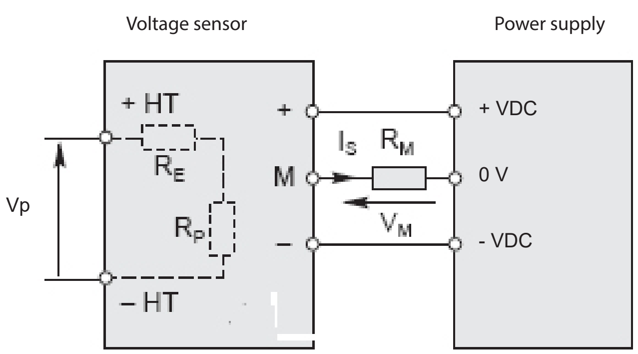
- Secondary 3 x M5 insert
- Tightening torque value 2.2 Nm
- EMC shield optional, other output on request

Wiring and mounting instructions

These general instructions are not exhaustive and provide basis for proper installation of the sensors. Each configuration being different, please consult us for particular advice. (Note that non proper installation or incorrect use of the sensor can result in sensor poor performances or malfunction)

Wiring diagram

- Connect primary voltage Vp to measure to HT+ and HT-
- Auxiliary supply voltage: bipolar voltage –VDC…0 V…+VDC



Mechanical mounting

- Base mounting, heatsink on the top or on the side, with fins in vertical position
- Recommended fixing: by 2 x M6 screws with flat washers
- M5 inserts with tightening torque 2.2 Nm for primary and secondary connections

Precautions in electromagnetic environment

Due to their principle of operation (measure of magnetic field by the Hall effect probe), closed loop hall effect current sensors can be sensitive to strong magnetic fields. It is recommended to avoid positioning them to close to high current power cables.

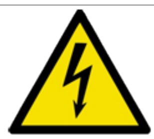
Processing of the sensor output signal

Standard codes of practice advise that, before the signal is processed, a low-pass filter adapted to the bandwidth of the sensor is used. Also, in the case of digital processing of the signal, it is also recommended that the sampling frequency is adapted to the bandwidth of both the signal to be measured and the sensor.

In the event of sensor failure, the processing of the output signal should take into account deterioration in performance (i.e. absence of signal or saturated signal) and rapidly and safely shut the system down.

Safety instructions

Our sensors must be used in electrical or electronic equipment with respect to relevant standards and safety requirements in accordance with the manufacturer's operating instructions.



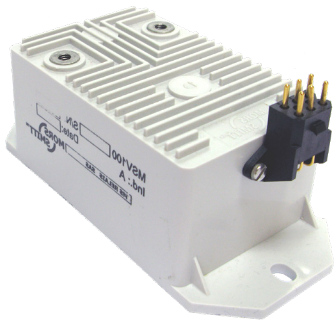
Caution, risk of electrical shock

When operating the sensor, certain parts of the module can carry hazardous voltage (eg. primary terminals, power supply). Ignoring this warning can lead to injury and/or cause serious damage.

- This sensor is a built-in device, whose conducting parts must be inaccessible after installation
- A protective housing or additional shield could be used
- Main supply must be able to be disconnected

Voltage sensor
MSV 100

950 V
Closed loop



Industrial applications, voltage measuring of all waveforms AC, DC

- Chassis mount
- Closed loop (compensated)
- High dielectric strength
- Precise linearity
- Precise accuracy
- High dynamic response
- No foucault losses in the magnetic circuit
- EMC shielding (optional)

Electrical specifications

Primary nominal RMS voltage	V_{PN}	950 V
Primary voltage measuring range	V_P	± 1400 V
Output measuring resistance	R_M	220 Ω max for 1400 V @ 24 V 70 °C
Secondary nominal RMS curent	I_{SN}	50 mA for 1000 V
Conversion ratio	K_N	1000 V / 50 mA
Auxiliary supply voltage	V_C	±15 to ±24 VDC ±5 %
Current consumption	I_C	±33 mA + Is @ 24 VDC
Dielectric strength between:		
primary and secondary circuit	V_{D1}	6 kV - 50 Hz - 1 min
shield and secondary circuit	V_{D2}	1.5 kV - 50 Hz - 1 min

Electrical specifications

Overall accuracy @ I_{PN} - T_A=25 °C	X_G	± 0.7%
Linearity	E_L	< 0.1%
Offset current @ I_P =0 - T_A=25 °C	I_0	± 0.2 mA max
Thermal drift of I_0 between -50 °C...+85 °C	I_{0T}	± 1 mA max
Response time @ 90% of V_{PN}	T_r	< 100 µs
Frequency bandwidth (-3 dB)	f	DC to 100 kHz by technology

General specifications

Operating temperature	T_A	-50 °C...+85 °C
Storing temperature	T_s	-50 °C...+90 °C
Secondary coil resistance @ 70 °C	R_s	60 Ω ± 7%C
Weight	m	500 g ± 5%

Standards

EN 50155, IEC 61373, NF F16-101/102, IEC 60068-2-11

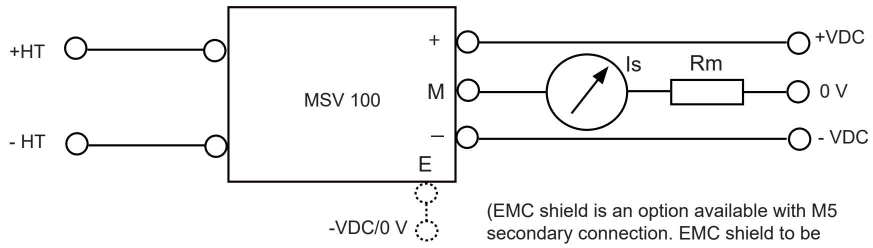
CE

Ordering reference

MSV 100 MSV100-1-D-2-3-2-N

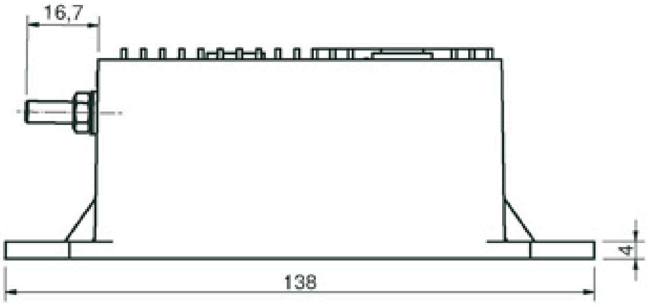
MSV 100 with EMC shield connection
MSV 100 MSV100-1-D-2-3-2-Y

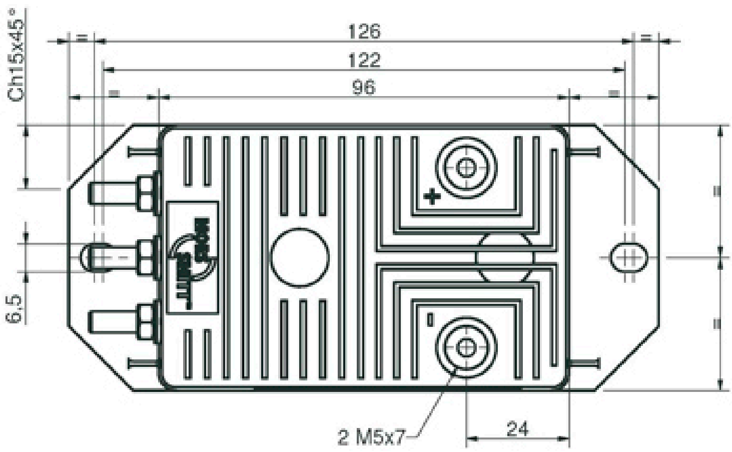
Connections

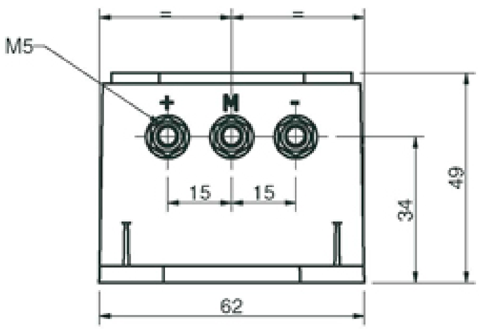


(EMC shield is an option available with M5 secondary connection. EMC shield to be connected to ground or 0 V or -VDC)

Dimensions







Voltage sensor
MSV 200

1000 V, 2000 V, 3000 V, 4000, 5000 V
Closed loop

Industrial applications, voltage measuring of all waveforms AC, DC

- Chassis mount
- Closed loop (compensated)
- High dielectric strength
- Precise linearity
- Precise accuracy
- High dynamic response
- No foucault losses in the magnetic circuit
- EMC shielding (optional)

Electrical specifications

Primary nominal RMS voltage	V_{PN}	1000 V / 2000 V / 3000 V / 4000 V / 5000 V
Primary voltage measuring range	V_P	± 1500 V / ± 3000 V / ± 4000 V / ± 6000 V
Primary resistance @ 25 °C	R_P	100 kΩ
Output measuring resistance	R_M	tba
Secondary nominal RMS curent	I_{SN}	50 mA for 1000 V
Primary windings	N_P	10000 / 20000 / 30000 / 40000 / 50000
Secondary windings	N_S	2000
Conversion ratio	K_N	N_P / N_S
Auxiliary supply voltage	V_C	±15 to ±24 VDC ±5 %
Current consumption	I_C	±33 mA + Is @ 24 VDC
Dielectric strength between:		
primary and secondary circuit	V_{D1}	6 kV - 50 Hz - 1 min
shield and secondary circuit	V_{D2}	1.5 kV - 50 Hz - 1 min

Electrical specifications

Overall accuracy @ I_{PN} - T_A=25 °C	X_G	± 0.7%
Linearity	E_L	< 0.1%
Offset current @ I_P =0 - T_A=25 °C	I_0	± 0.2 mA max
Thermal drift of I_0 between -50 °C...+85 °C	I_{0T}	± 1 mA max
Response time @ 90% of V_{PN}	T_r	< 100 µs
Frequency bandwidth (-3 dB)	f	DC to 100 kHz by technology

General specifications

Operating temperature	T_A	-50 °C...+85 °C
Storing temperature	T_s	-50 °C...+90 °C
Secondary coil resistance @ 70 °C	R_s	60 Ω ± 7%C
Weight	m	800 g ± 5%

Standards

EN 50155, IEC 61373, NF F16-101/102, IEC 60068-2-11

CE

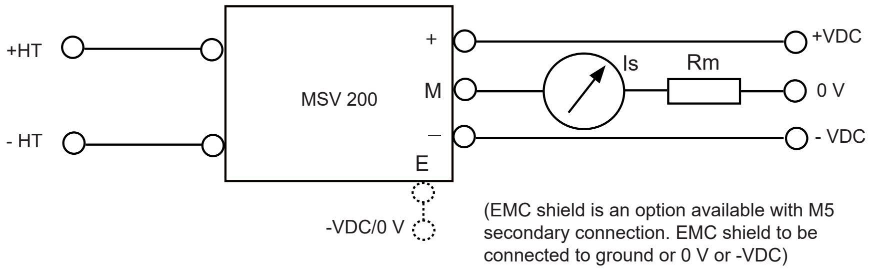
Ordering reference

MSV 200-1000V	MSV200-1-D-2-3-2-N
MSV 200-2000V	MSV200-2-D-2-3-2-N
MSV 200-3000V	MSV200-3-D-2-3-2-N
MSV 200-4000V	MSV200-4-D-2-3-2-N
MSV 200-5000V	MSV200-5-D-2-3-2-N

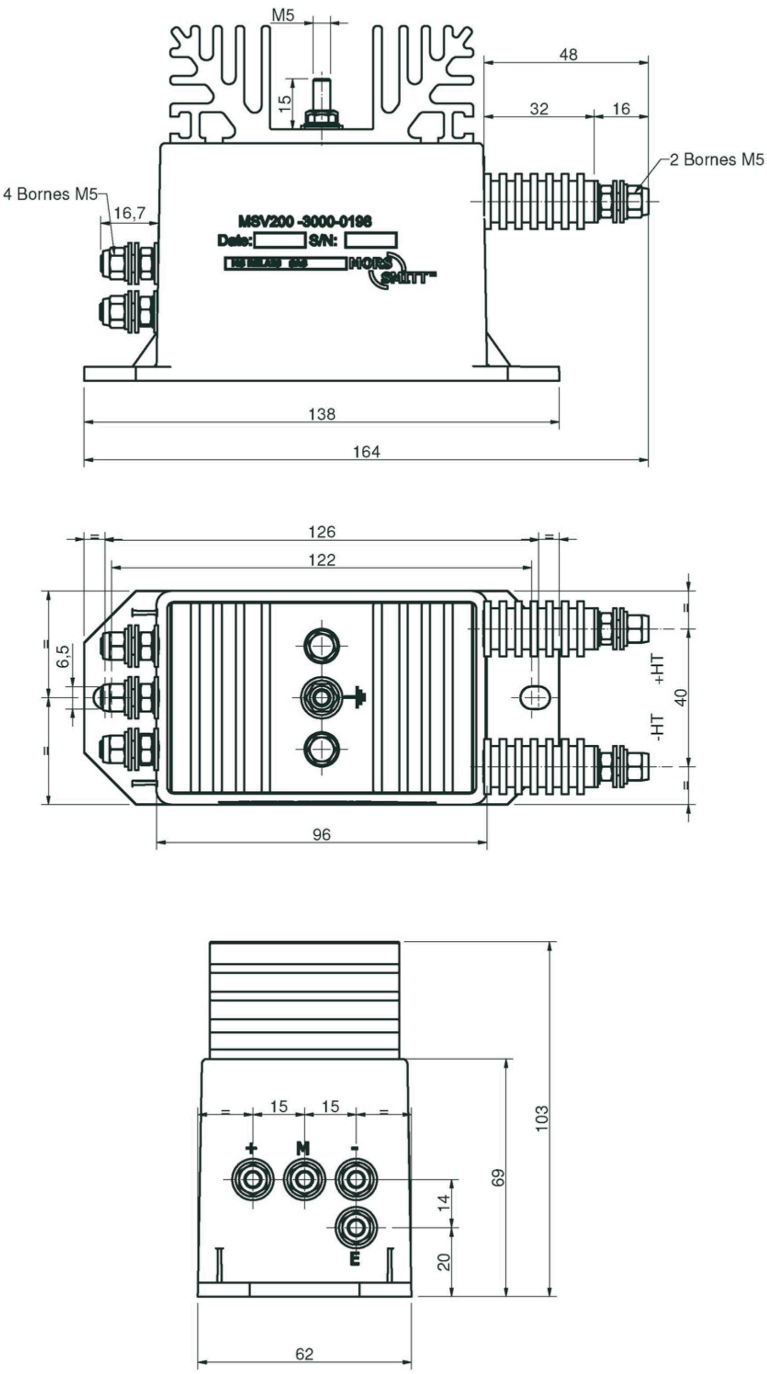
MSV 200 with EMC shield connection

MSV 200-1000V	MSV200-1-D-2-3-2-Y
MSV 200-2000V	MSV200-2-D-2-3-2-Y
MSV 200-3000V	MSV200-3-D-2-3-2-Y
MSV 200-4000V	MSV200-4-D-2-3-2-Y
MSV 200-5000V	MSV200-5-D-2-3-2-Y

Connections



Dimensions



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Wabtec NETHERLANDS

BRO-Industrial Sensors V3.0 February 2021

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