



SERVING
SAFETY

Mors Smitt Industrial Technology

Industrial sensors

Hall effect sensors

MORS
SMITT™



Mors Smitt Industrial Technology

Industrial sensors



Closed loop current sensors meeting all standards

Mors Smitt Industrial Technology

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

Hall effect sensors

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. Hall effect 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 hall effect 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.

Reliability

Worldwide availability is assured by a network of professional, trained and dedicated subsidiaries, distributors and agents, offering local service and support.

Mors Smitt offers customizable protection solutions, enhancing safety and performance. Not just our products and services but also our production sites are focused on environmental performance improvements by certification of the ISO 9001:2008 and ISO14001 standards.

The company strategy for the future is based upon further responsible development and expansion of its high quality components, responding to tomorrow's needs in the many current sectors it serves. It is based upon putting the skills and talents of its staff to work for company, clients and mankind. Keeping that part of the world's operation for which it plays a role, working successfully, without question and without failure.



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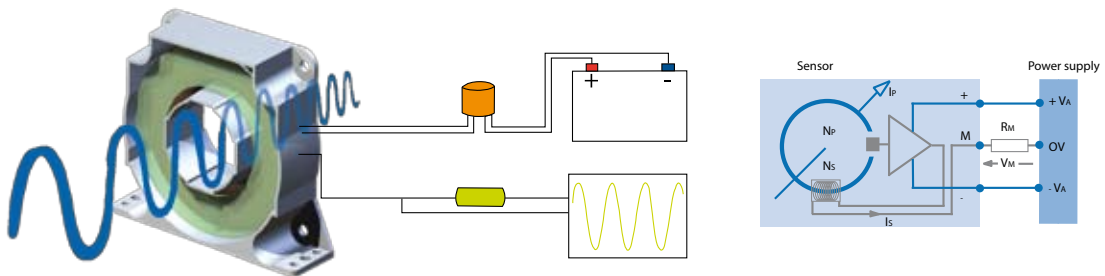
Hall effect sensors

Principle

With over 20 years experience in measurement for railway equipment, a new range of sensors based on closed loop hall effect technology, to supply the industry market. These sensors allow measurement of all current waveforms, with high galvanic insulation between the primary and secondary circuits.

The hall effect 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 I_p or voltage U_p flowing across the sensor and generates a current into the secondary I_s . This secondary current multiplied by the number of turns N_s of secondary winding cancels out the primary magnetic flux that created it. The global flow is equal to zero. The formula $N_p \times I_p = N_s \times I_s$ is true at any time which means the measuring of instantaneous values.

The secondary output current I_s is exactly proportional to the primary current and can be passed through a measuring resistance R_m . The measuring voltage V_m at the terminals of this resistance is therefore proportional to the primary current I_p .



Advantages

- This technology allows all current waveforms: direct, alternating and impulse currents
- Accuracy from 0.5 % over a large frequency range (up to 00 kHz)
- High galvanic isolation 3 kV
- Excellent linearity 0.1 % across a wide operating temperature of -25 °C...+70 °C
- High reliability and overload capacities
- EMC protection on all range of sensors

Applications

Variable speed drives, inverters (UPS), battery chargers, wind turbines, robotics, conveyors, lifts, cranes, welding, rolling mills, telecommunications, marine, military etc.

Product range

MSA305 - up to 300 A

MSA505 - up to 500 A

MSA1005 - up to 1000 A

MSA2005 - up to 2000 A



MSA2005

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 industrial environments

CE

UL pending

High galvanic isolation

Dielectric strength of 3 kV - 50 Hz - 1 min

Measuring of all waveforms

DC, AC, impulse currents

Excellent accuracy, immunity and response time

From $\pm 1.5\%$ to $\pm 0.5\%$ at rated current over $-25\text{ }^{\circ}\text{C}$... $+70\text{ }^{\circ}\text{C}$ with linearity $< 0.1\%$, and over a large frequency from 0 to 100 kHz. Response time $< 1\text{ }\mu\text{s}$

Form fit function

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

EMC protection

MSA sensors include EMC protection on the whole range

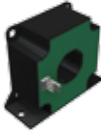
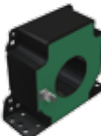


Output connection

Molex output connector



Overview

Technical characteristics

	 MSA 305	 MSA 505	 MSA 1005	 MSA 2005
Primary nominal RMS current (I _{pn})	300 A	500 A	1000 A	2000 A
Primary current measuring range	± 500 A	± 800 A	± 1500 A	± 3000 A
Output measuring resistance (R _m) 70 °C	20 Ω max for 500 A @ 15 V 54 Ω max for 500 A @ 24 V	7 Ω max for 500 A @ 15 V 60 Ω max for 500 A @ 24 V	7 Ω max @ 15 V 25 Ω max @ 24 V	11 Ω max @ 24 V
Secondary nominal RMS current (I _{sn})	150 mA	100 mA	200 mA	400 mA
Conversion ratio	1:2000	1:5000	1:5000	1:5000
Auxiliary supply (V _C)	± 12 V... ± 24 VDC (± 5%)	± 12 V... ± 24 VDC (± 5%)	± 15 V... ± 24 VDC (± 5%)	± 15 V... ± 24 VDC (± 5%)
Current consumption (I _c)	± 33 mA + I _s @ 24 VDC	± 33 mA + I _s @ 24 VDC	± 33 mA + I _s @ 24 VDC	± 33 mA + I _s @ 24 VDC
Dielectric test	3 kV	3 kV	3 kV	4 kV
Overall accuracy	± 0.5 % at 25 °C ± 1.5 % at -25 °C... +70°C	± 0.5 % at 25 °C ± 1.5 % at -25 °C... +70°C	± 0.5 % at 25 °C ± 1.5 % at -25 °C... +70°C	± 0.5 % at 25 °C ± 1.5 % at -25 °C... +70°C
Linearity	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Offset current at I _p =0 - T _A =25°C	± 0.25 mA	± 0.25 mA	± 0.25 mA	± 0.25 mA
Response time @ 90% of I _{pn} and di/dt 100 A / μs	<1 μs	<1 μs	<1 μs	<1 μs
Frequency bandwidth (-1 dB)	DC to 100 kHz	DC to 100 kHz	DC to 100 kHz	DC to 150 kHz
Operating temperature	-25 °C...+70 °C	-25 °C...+70 °C	-25 °C...+70 °C	-25 °C...+70 °C
Storage temperature	-40 °C...+85 °C	-40 °C...+85 °C	-40 °C...+85 °C	-40 °C...+85 °C
Secondary coil resistance @ 70 °C	30 Ω	76 Ω	34 Ω	25 Ω
Weight	110 g (± 5%)	210 g (± 5%)	550 g (± 5%)	1550 g (± 5%)
Molex connector ¹	✓	✓	✓	✓
Horizontal / vertical / chassis / busbar mounting	✓	✓	✓	✓

¹ other outputs on request

General data

- The housing and insulation resin 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 transducer 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

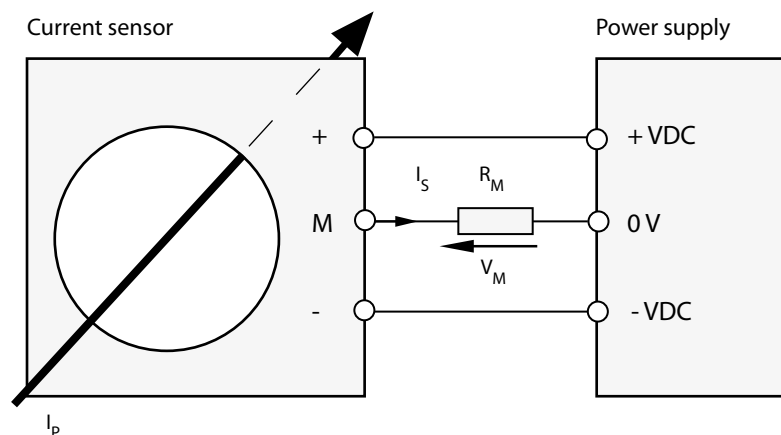
- Molex HE14 type connector
- Other output on request

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 transducer can result in transducer poor performances or malfunction)

Wiring diagram

- Direction of current: a primary current I_p flowing in the direction of the top arrow on the transducer generates a positive secondary output current on terminal M
- Auxilliary supply voltage : bipolar voltage $-VDC \dots 0V \dots +VDC$



Mechanical mounting

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

Precautions in electromagnetic environment

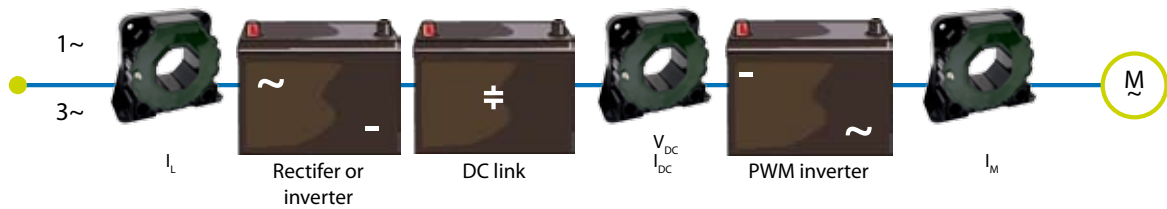
Due to their principle of operation (measure of magnetic field by the Hall effect probe), closed loop hall effect current sensors can be sensitive to strong magnetic fields. It is recommended to avoid positioning them too close to high current power cables.

Processing of the sensor's 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.

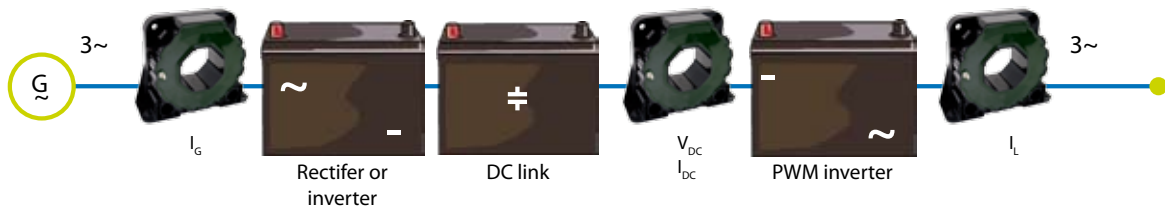
In the event of sensor failure, the processing of the output signal should take into account deterioration in performance (i.e. absence of signal or saturated signal) and rapidly and safely shut the system down.

AC variable speed and servomotor drives



Typical applications:

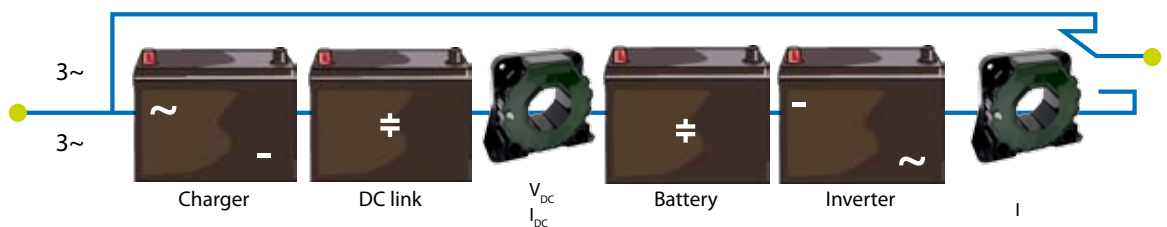
- Machine tools, printing, paper, textile, plastic
- Steel mills
- Lifts
- Cranes
- Robotics
- Pumps



Energy inverters for all kind of renewable energies (wind, sun, hydrogen, ocean currents, energy storage, etc.)



Uninterruptible power supplies



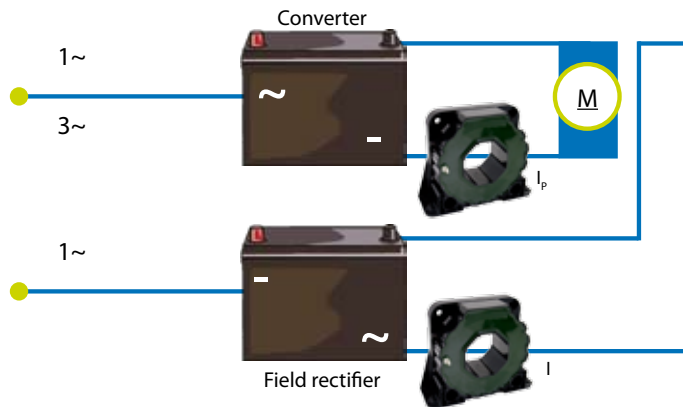
Typical applications:

- EDP systems
- Telecom
- Security systems



Applications

Static converters for DC motor drives

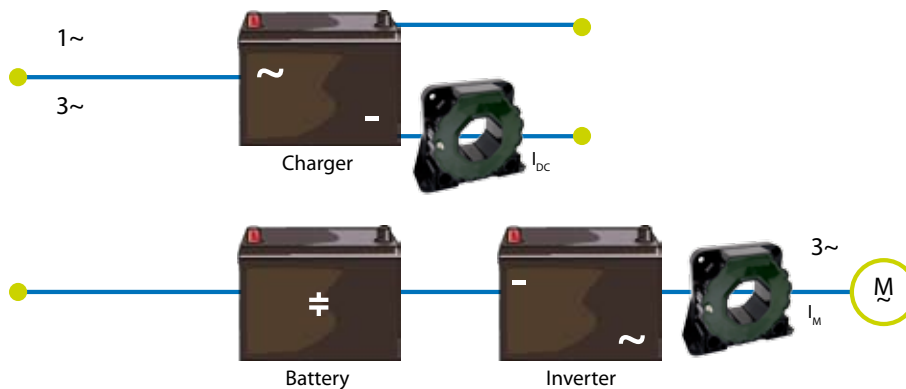


Typical applications:

- Machine tools, printing, paper, textile, plastic
- Cranes
- Escalators
- Electrical door opening systems



Battery supplied applications

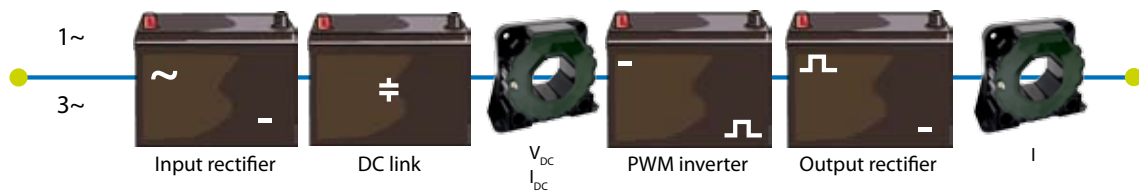


Typical applications:

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



Switched mode power supplies

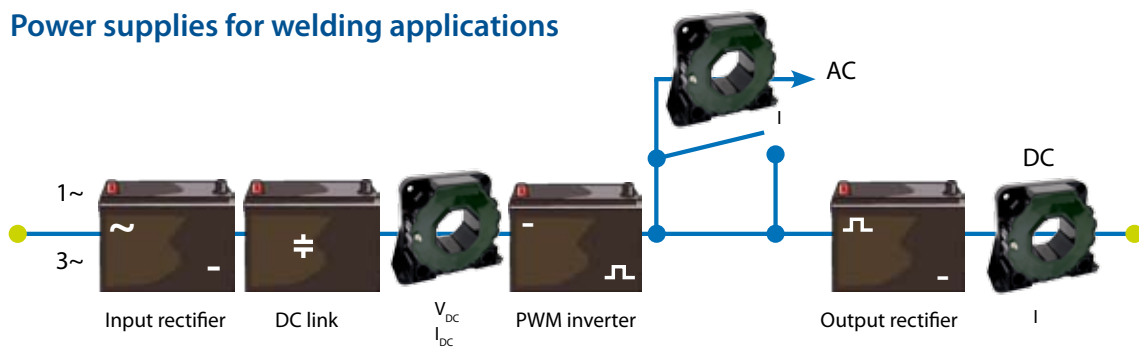


Typical applications:

- Power supply for electronic equipment and control systems
- Battery chargers
- Telecom
- Voltage and current stabilizer for industry and lab applications
- Electronic ballast



Power supplies for welding applications



Typical applications:

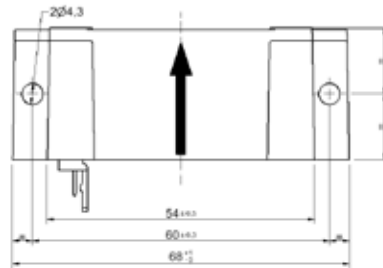
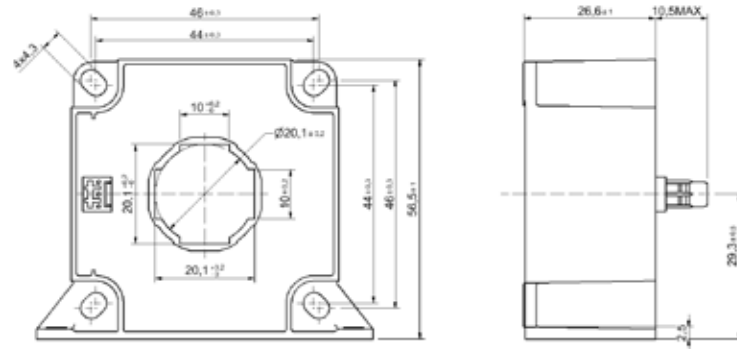
- Test & measurement in laboratories & universities
- Medical X ray and imaging equipment
- Electrolysis, currents monitoring
- Inductive heating
- Energy management systems, monitoring of load currents
- Overcurrent protection
- Control and safety systems
- Electrical traction



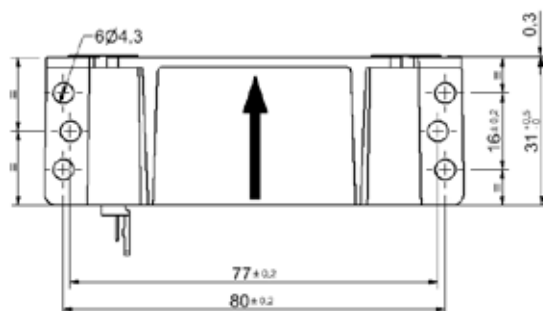
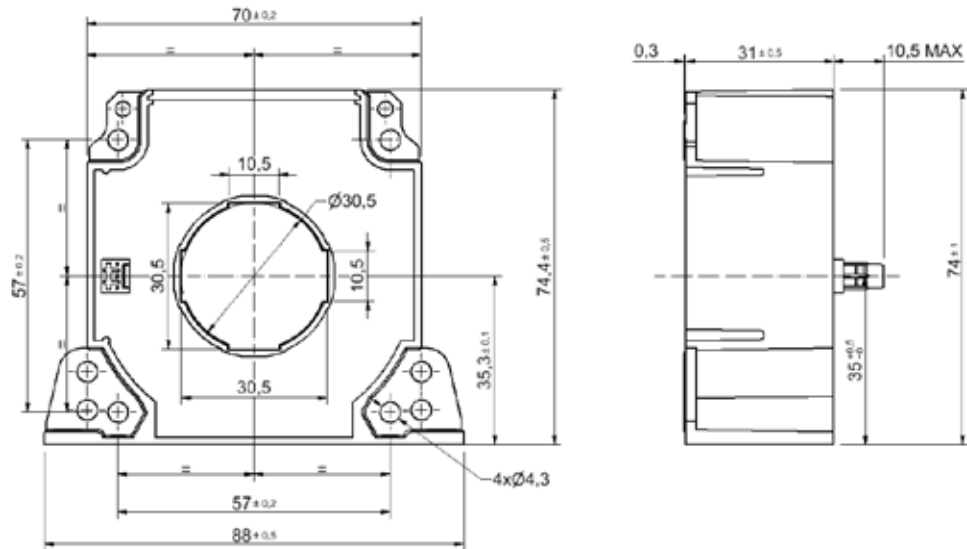
Dimensions

Dimensions

MSA 305



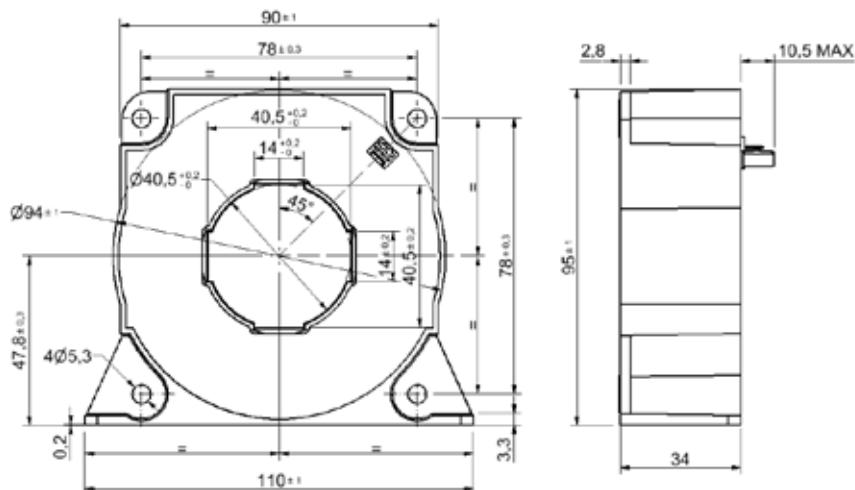
MSA 505



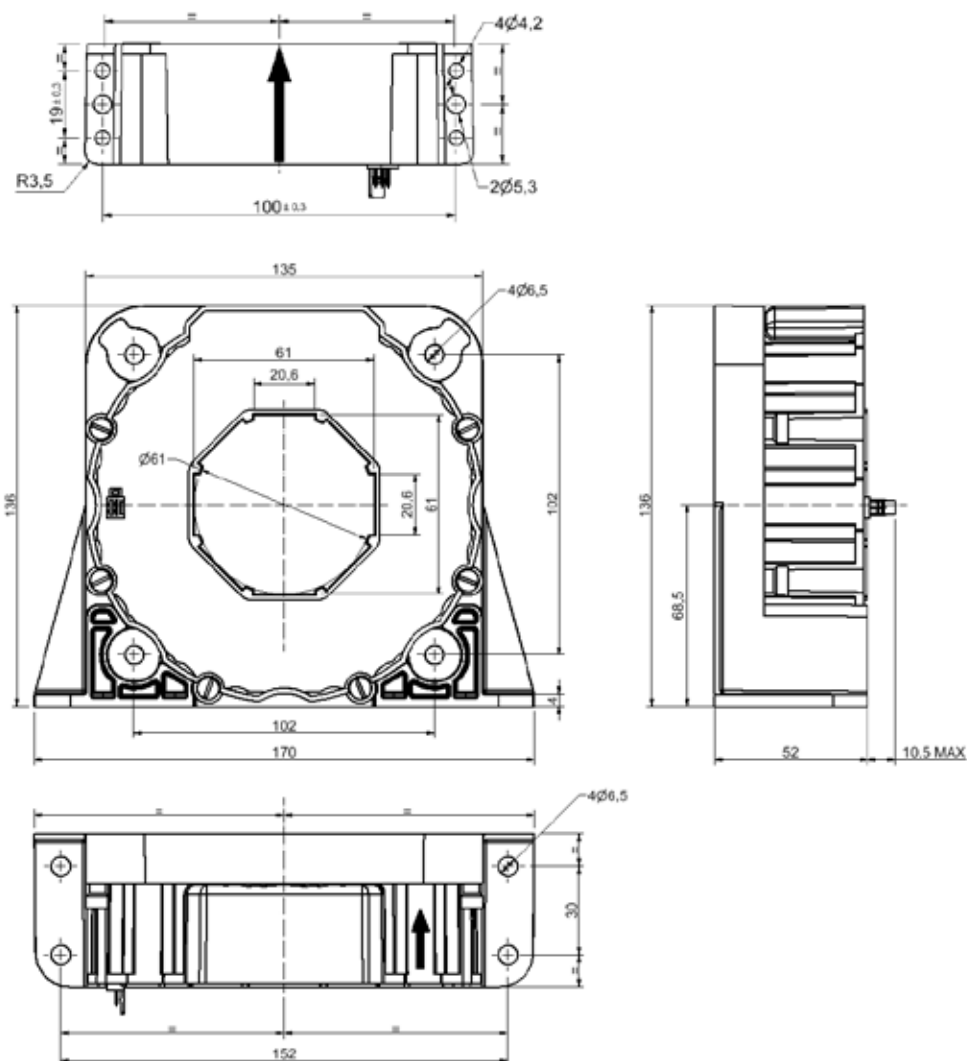


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MSA 1005



MSA 2005



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