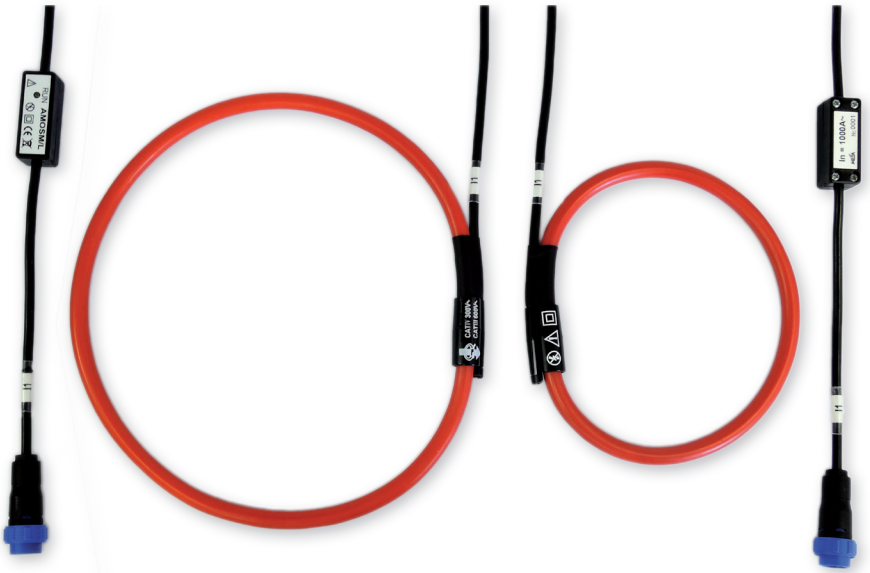
AMOS M – Active flexible sensor for measuring alternating currents



MEgA – Měřící Energetické Aparáty, a.s.
664 31 Česká 390
Czech Republic

AMOS M – Active flexible sensor for measuring alternating currents

1/ DESCRIPTION

The AMOS M is an active flexible sensor for measuring alternating currents in low-voltage distribution networks. It boasts a small diameter sensor coil, good flexibility and improved resistance to running water. It is designed with two sensor lengths, the **AMOS M standard** version has a sensor section of 40 cm and the **AMOS M long** version has a 60 cm sensor section. Even at minimum supply voltage, the AMOS M has an extended measuring range which grows larger with increasing voltage.

The AMOS M sensor converts alternating current to alternating voltage and the signal is actively processed in the amplifier and currents are measured in a wide frequency range while minimizing phase shift between the measured current and the output voltage.

AMOS M sensors are designed for measuring alternating currents with portable devices, however they may be modified to measure currents with fixed devices, from which they are powered. An active power supply is signalized by a glowing **RUN** LED light. The accuracy of current measurements using the AMOS M flexible sensor depends on the location of the lock in regards to the conductors with the measured current. The AMOS M sensor is calibrated when placing the lock as far as possible from the conductor with the measured current. In order to decrease the influence of currents running through neighbouring conductors on the output voltage of the AMOS M sensor, it is suitable to place the lock as far as possible from the surrounding conductors. The cap must be fully inserted into the lock during measuring.

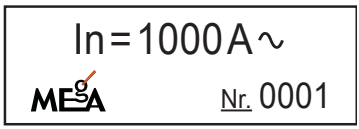
2/ SENSOR DESIGN

The AMOS M standard version has a 40 cm coil, the long version has a 60 cm coil with an 8 mm diameter. The diameter of the cap inserted into the lock is 10 mm. When measuring, both parts of the plastic connector must be fully inserted and secured against disconnection using a flexible element with a latch. When disconnecting the coil, the flexible element is bent away from the direction of the sensor axis, within the given allowance. Thanks to the flexibility of the coil, it is possible to disconnect it with one hand. The coil has two layers of colour-coded insulation, increasing the chance of identifying mechanical damage to the insulation.

The lead of the AMOS M sensor has a length of 180 cm and a diameter of 4.8 mm. The amplifier case is located 150 cm from the coil and is labelled with basic information about the given AMOS M sensor. Besides the sensor type and manufacturer, this information also includes the nominal current value, serial number, **RUN** LED light and prescribed safety information. Basic safety information is also printed on the lock, which also contains a pictogram showing the application direction of the coil on the measured conductors. The arrow showing the positive direction of measured current contains, if requested upon order, the phase of the measured current for which the sensor will be used. The end of the cable of the AMOS M sensor is fitted with a Buccaneer connector socket with six contacts.

Despite the amplifier is designed with increased durability and humidity resistance, it is not suitable to expose the AMOS M sensor to a long-term humid environment, not even condensed humidity.

Information on labels of the flexible sensor amplifier



Information on the lock of the flexible sensor sensing part

3/ SAFETY INFORMATION

- **Maximum attention must be paid to this information.**
- Warnings ⚠ draw attention to the facts presenting safety risks to the operator.
- Notices ⚠ indicate conditions and facts that may cause damage to the flexible AMOS M sensor.

⚠ Warning

- **Warning, the operator installing current sensors on live parts must be equipped with personal protective equipment and additional safety devices and use them during the installation.**
- **Protection provided by the AMOS M sensor may be impaired, when using the AMOS M sensor in a way not intended by the manufacturer.**
- Operators performing installations and removals of the AMOS M sensor in dangerous environments must be qualified for work on or near to dangerous voltages. The operator must also be trained in providing the first aid.
- Installations and removals of the AMOS M sensor in dangerous environments may only be performed by qualified persons equipped with personal protection equipment against risk of electric shock.
- It is not permitted to connect the AMOS M flexible sensors to phase voltage higher than 600 V_{AC} in CAT III installations, otherwise there is a risk of electric shock.
- It is not permitted to connect the AMOS M flexible sensors to phase voltages higher than 300 V_{AC} in low-voltage networks between HV/LV transformers and customer electricity meters characterized by **CAT IV** overvoltage categories, otherwise there is a risk of electric shock.
- In case of a mechanical damage, even to just the top layer of the insulation of the sensor section, which can show by a change in colour of the sensor section surface, the sensor must be immediately dismounted and sent for repair.
- The AMOS M flexible sensors may only be maintained and repaired by the manufacturer or service organizations trained by the manufacturer.

Meanings of symbols used in the user description of the AMOS M flexible sensor:


Danger, risk of electric shock


Comment in the documentation / Warning


Do not install around non-insulated hazardous live conductors which can cause electrical shock, burning or arc discharge

CAT IV Overvoltage category, characterizing the state of the transient overvoltage. General low-voltage distribution network from a transformer station to fuses at the electricity meter.

CAT III Overvoltage category, characterizing the state of the transient overvoltage. General low-voltage installations in buildings behind fuses at the electricity meter.


Safety class II, double or increased insulation

IP code Degree of protection provided by enclosure


The product is intended for recycling and collection points


Declaration of Conformity – European Community

The AMOS M coil and lead fulfil tests compliant to standards:

EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements. (IEC 61010-1:2010)
EN 61010-2-030:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use, special requirements for testing and measuring circuits. (IEC 61010-2-030:2010)
EN 61010-2-032:2012	Safety requirements for electrical equipment for measurement, control, and laboratory use, special requirements for hand-held and hand-hand-manipulated current sensors for electrical test and measurement. (IEC 61010-2-032:2012)
EN 61010-31:2015	Safety requirements for hand-held probe assemblies for electrical measurement and test. (IEC 61010-31:2015)
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements, Part 1: General requirements. (IEC 61326-1:2012)

4/ INSTALLATION INSTRUCTIONS OF THE AMOS M SENSOR

Installing AMOS M sensors on live conductors may only be done on a voltage-free system. The installation and removal of AMOS M sensors in low-voltage switchboards can only be done when wearing dielectric gloves and using prescribed personal protective equipment.

- As pictured on the back of the instruction manual, the free end of the coil is flexed out of the lock.
- Then the free end of the sensor coil is put around a conductor for measuring and inserted back into the lock.
- The coil section opposite the lock is placed near to the conductor with the measured current.
- The AMOS M amplifier case may not come into contact with live parts during installation and must be placed away from them in a distance greater than the allowed surface and air distance valid for voltages of live parts in the given working environment.
- If necessary, the coil is fixated using tightening straps.
- The AMOS M connector is inserted into the measuring device.
- To remove it, the flexible element on the lock is flexed away from the end of the coil and the cap is pulled out.

Is not allowed to use the AMOS M sensor to measure currents in circuits exceeding voltages of 300 V_{ef} in CAT IV circuits and 600 V_{ef} in CAT III circuits.

It is not allowed to use the AMOS M sensor with a visibly damaged outer insulation.

5/ TECHNICAL PARAMETERS

Nominal current I_n:	30 A, 100 A, 300 A, 1000 A, 3000 A [1]
Output voltage:	1.00 V for I_n
Measuring range:	1.5 I_n at $\pm U_{power} = \pm 3$ V, 2.5 I_n at $\pm U_{power} = \pm 5$ V, 7 I_n at $\pm U_{power} = \pm 12$ V
Basic error in calibration position:	1.0 % I_n for f in a range of 45 Hz to 65 Hz 2.0 % I_n for f in a range of 40 Hz to 1000 Hz
Phase error in calibration position:	2.0 ° for f in a range of 45 Hz to 65 Hz 3.0 ° for f in a range of 40 Hz to 1000 Hz
Additional error in connector position:	1.5 % I_n for f in a range of 45 Hz to 65 Hz
Temperature coefficient:	± 0.02 % I_n / °C
External conductor field with I = 300 A, l = 32 mm (standard), l = 47.5 mm (long):	± 1 % I_n ± 2.0 mV max
Sensor output resistance:	max. 100 Ω
Recorder input resistance:	min. 10 kΩ
Coil length:	40 cm (standard), 60 cm (long)
Coil diameter:	8 mm
Diameter of the cap section:	10 mm
Permitted radius of coil bend:	> 20 mm
Length of sensor cable:	1,8 m [2]
Testing voltage acc. to EN 61010-2-032:2012:	5 400 V_{rms}, 50 Hz, 5 s

[1] Only a single value
[2] Can be ordered with a length of up to 5 m

6/ REFERENCE CONDITIONS

Temperature:	20 °C ± 3 °C
Relative humidity:	20 % – 75 % RH
Measured current:	sinusoidal, 50 Hz ± 0.5 Hz
External alternating magnetic field:	smaller than 0.5 mT
R_{input} of connected recorder:	> 10 kΩ

7/ OPERATING CONDITIONS

Temperature:	-20 °C to +55 °C
Relative humidity:	< 95 %
Maximum alternating voltage of the measured conductor without own insulation:	300 V in the CAT IV environment 600 V in the CAT III environment
Degree of protection provided by enclosure:	IP65
Measuring category for sensor coil:	CAT IV / 300 V, CAT III / 600 V
Safety category:	II

8/ SENSOR POWER SUPPLY

Supply voltage:	$+U_{power}$ = +3 V to +12 V, $-U_{power}$ = -3 V to -12 V
Consumption:	max. 2.0 mA / ± 5 V

9/ ORDERING

The order shall contain the following specifications:

- Nominal value of measured current I_n.
- AMOS M standard or AMOS M long.
- Number of individual sensors or triple sensors with the request to mark measured phase.
- Besides standard sensor cable length. Maximum length is 5 m.

10/ CONNECTOR DIAGRAM

Type Buccaneer PX0410/06P:

1. Common conductor
2. Shielding
3. U_{out}
4. $+U_{power}$
5. $-U_{power}$
6. Not connected

11/ MANUFACTURER

MEgA – Měřící Energetické Aparáty, a.s.

664 31 Česká 390, Czech Republic

Tel. +420 545 214 988

e-mail: mega@e-mega.cz

website: www.e-mega.cz

AMOS M – Active flexible sensor for measuring alternating currents

Release the lock

Pull out the cap

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