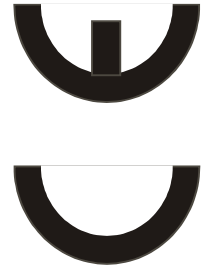


# **FLEX3**

**Instruction manual**





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## 1. PRELIMINARY AND SAFETY



### WARNING

For your own safety as well as that of the apparatus, you are recommended to follow the procedures described in this instruction manual and carefully read all the notes preceded by the symbol . No compliance with the Warnings and/or Instructions may damage the apparatus and/or its components or injure the operator.

### 1.1. Preliminary instruction

- Read this instruction manual and the instrument's one before starting use.
- Any instruction preceded by the caution symbol must be observed in order to avoid accidents or damages.
- This product must be used only by qualified personnel practicing applicable safety precautions, wear protective clothing and gloves as required.
- Do not effect any measurement under conditions beyond the limits specified in this manual.
- Always connect electronics unit to display device before installing the flexible measuring head.
- Do not install the clamp around cables where the current flowing is greater than the maximum measurable current (overrange).



### WARNING

Hazardous potentials may exist in the vicinity of the desired current measurements. Use locally approved safety procedures when working near hazardous potentials. It is recommended not to install the clamp around a live bus that is at a hazardous potential. If installation is not possible when the bus is inactive or power is turned off, always use appropriate gloves and/or equipment approved for working around hazardous potentials when installing the FLEX3 in the vicinity of these hazardous potentials.

The FLEX3 transducer and interconnection cable use double insulation to protect the operator from possible hazardous potentials of the bus. Make sure the electronics package is well away from the bus. The current probe is rated for Installation Category III, Pollution Degree 2. The maximum voltage to earth rating for the transducer and cable is 1000V<sub>AC</sub>.

### 1.2. During use

- Always de-energize circuit under test before installing flexible measuring head. Always inspect the connecting cable and flexible measuring head for damage before using this product.
- Do not use product if damaged.
- Do not use the clamp on non-insulated conductors whose potential to earth exceeds 1000V and for frequencies over 5kHz.
- Do not use the clamp outdoor.
- Do not use the clamp at altitudes exceeding 2000 meters.
- Do not expose the clamp to water splashes.
- Keep the clamp gap perfectly clean.

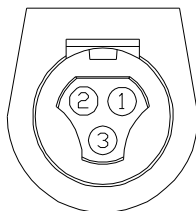
**2. INSTRUMENT DESCRIPTION**

**2.1. Introduction**

Dear Customer, we thank you for your patronage. The instrument you have just purchased will grant you accurate and reliable measurements provided that it is used according to the present manual's instructions.

FLEX3 is an innovative current transducer that combines easy use with measurement accuracy.

The FLEX3 current probe is similar in purpose to current transformer used to measure phase currents. The output is voltage signal proportional to the derivate of AC current in the conductor. The output signal is available via a 3 pin connector (see picture 2 for output signal pin assignment).

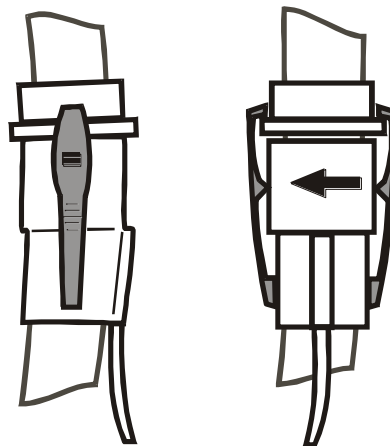


Pin 1	+ Output
Pin 2	- Output
Pin 3	Shield

**Picture 1**

**2.2. Transducer's functions**

The transducer is a versatile current probe that may be wrapped around most conductors. The transducer has a preset bend that allows the transducer to be more easily maneuvered around the conductors (see picture 2 for FLEX3 head transducer). It's application versatility and isolation rating clearly distinguish the FLEX3 transducer from other current measuring methods. The measuring transducer is constructed from non-ferrous materials, minimizing any circuit loading due to magnetic influence.



**Picture 2**

The frequency response of the current probe is rather wide compared to conventional CTs. This allows the user to monitor a much wider range of line harmonic components than conventional CTs allow. The FLEX3 transducer was designed to be very flexible, larger in aperture and smaller in cross section than many conventional CTs. This allows measurements in tight places as never before possible.

### 3. POWER SUPPLY

The FLEX3 is a passive transducer and does not require any power supply.

### 4. HINTS FOR FLEXIBLE CLAMPS USE

All flexible clamps are based on Rogowski's coil principle:

$$V_{coil} = -M \frac{di}{dt}$$

which shows that the voltage output signal is proportional to the rate of change of current. In order to get current value, the voltage output signal is integrated electronically.

Typically the voltage output signal is really low and this suggests using shielded cable for coil connection to instrument's inputs.



**WARNING**

**As the Coil Output connector cannot be perfectly shielded it is recommended to outdistance it by any Potential source.**

### 5. INSTALLATION

The current probe was designed to allow the operator to connect this measurement device around a conductor without disconnecting the conductor, as many CTs presently require. Even though the current probe output is AC, there are instances where the user will want to orient the transducer so that proper polarity will exist at the output terminals. This is done by installing the transducer around the conductor with the molded-in arrow on the latch (see picture 2) pointing in the direction of conventional current flow. Conventional current flow is defined as current flowing from the generator to the load.

The current probe must be installed with the interconnection cable on the outside of the loop when the latch is engaged. The polarity arrow, the double insulation, and the warning symbols will all be on the outside of the loop. It should also be noted that the current probe would produce twice the output voltage if you wrap the transducer around the conductor twice.

There is minimal shock hazard using a FLEX3 current probe. Each transducer has been Hi-Pot tested to several thousand volts with no voltage breakdown. This particular characteristic allows high-current measurement (with a wide frequency bandwidth) of conductors at less than 1000V<sub>AC</sub> potential to earth.



**WARNING**

Hazardous potentials may exist in the vicinity of the desired current measurements. Use locally approved safety procedures when working near hazardous potentials. It is recommended not to install the FLEX3 around a live bus that is at a hazardous potential. If installation is not possible when the bus is inactive or power is turned off, always use appropriate gloves and/or equipment approved for working around hazardous potentials when installing the FLEX3 in the vicinity of these hazardous potentials.

Do not exceed the minimum bending radius of the FLEX3 current transducer when installing the transducers around the conductors. Exceeding the bending radius will degrade the measurement accuracy.

**6. MAINTENANCE**

**WARNING**



Do not use the FLEX3 AC Current Probe if is or seems damaged.

Make sure the current probe and the output cables are clean before installing them around the conductors. If the transducers and cables are not clean, the contaminants on them may provide a conductive path for a high-voltage breakdown. Also, check the transducer and output cables for cuts and abrasions. The transducer should not be used if damaged.

Preventive maintenance primarily consists of cleaning the transducers and cables to prevent surface contamination. Use a mild detergent and water to clean the transducers and cables. Remove the detergent with clean water, then wipe dry with a clean cloth.

**WARNING**



The use of solvents as cleaners are not recommended unless thoroughly tested and found harmless to all surface and parts. Do not submerge the FLEX3 transducers or the electronics package into water or other fluids.



## 7. SPECIFICATIONS

### 7.1. European directives

This instrument has been designed in compliance with the EMC standards in force and its compatibility has been tested for EN50081-1 (class B) and EN50082-2.

This instrument complies with the prescriptions of the European directive on low voltage 73/23/CEE (LVD) and EMC directive 89/336/EEC, amended by 93/68/EEC.

### 7.2. Safety Standards

Standard:	EN61010-1, EN61010-2-032
Insulation:	Double insulation
Pollution:	2
Working category:	CAT III, 1000 V AC <sub>RMS</sub> Phase - Earth

### 7.3. Electrical features

Current Range:	3000A AC <sub>RMS</sub>
Output Sensitivity (on 10k $\Omega$ ):	39.1 $\mu$ V/A
Accuracy (at +25 $^{\circ}$ C):	$\pm$ 1.5% of reading (45 - 65Hz)
Frequency Range:	from 10 Hz to 5kHz (-3dB)
Phase Error:	< $\pm$ 1 $^{\circ}$ (Output on 10k $\Omega$ $\geq$ 2mV, 45 - 65 Hz) < $\pm$ 3 $^{\circ}$ (Output on 10k $\Omega$ < 2mV, 45 - 65 Hz)
Position Sensitivity:	$\pm$ 2 % of range conductor close to coil $\pm$ 4 % of range close to coil fastener

### 7.4. Measuring head mechanical features

Length of transducer:	0.60m
Maximum conductor diameter:	approx. 7" (180 mm)
Bend radius:	38mm
Output Connection:	approx. 2.0m cable with 3 way connector
Weight:	215 g

### 7.5. Environment

Operating Temperature:	from -20 $^{\circ}$ C to +60 $^{\circ}$ C
Storage Temperature:	from -40 $^{\circ}$ C to +80 $^{\circ}$ C
Operating and storage humidity:	from RH 15 % to RH 85 %

## 8. SERVICE

### 8.1. Warranty Conditions

This instrument is guaranteed against any defect in material and manufacturing in compliance with the general sales terms and conditions. Throughout the period of guarantee all defective parts may be replaced and the manufacturer reserves the right to repair or replace the product.

If the instrument is to be returned to the after-sales service or to a dealer, transportation costs are on the customer's behalf. Shipment method however shall be agreed upon.

A report must always be enclosed to a rejected product stating the reasons of its return. To ship the instrument use only the original packaging material; any damage that may be due to no-original packing shall be charged to the customer.

The manufacturer declines any responsibility for damages caused to persons and/or objects.

Warranty is not applied in the following cases:

- Any repair that might be necessary, as a consequence of a misuse of the instrument or of its use with non compatible devices.
- Any repair that might be necessary as a consequence of improper packaging.
- Any repair that might be necessary as a consequence of service actions carried out by unauthorized personnel.
- Any modification of the instrument carried out without the authorization of the manufacturer.
- Use not provided for in the instrument's specifications or in the instruction manual.

The content of this manual cannot be reproduced in any form whatsoever without prior authorization of the manufacturer.

**NOTE All our products are patented and their trade marks registered. The manufacturer reserves the right to modify the product specifications and prices if this is aimed at technological improvements**

### 8.2. Service

If the instrument does not operate properly, before contacting the after-sales service check cables as well as test leads and replace them if necessary.

Should the instrument still operate improperly check that the operation procedure is correct and conforms with the instructions given in this manual.

If the instrument is to be returned to the after-sales service or to a dealer transportation costs are on the customer's behalf. Shipment shall be however agreed upon.

A report must always be enclosed to a rejected product stating the reasons of its return.

To ship the instrument use only the original packaging material; any damage that may be due to no-original packing shall be charged to the customer.





*ADVANCED TEST PRODUCTS*

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