



# Sensor Supply Units Type M27 and M31 for ICP<sup>®</sup>-Transducers

## Operator's Manual

### Application

The Sensor Supply Units Type M27 and M31 are designed to connect piezoelectric transducers with ICP<sup>®</sup> compatible voltage output to instruments which do not have ICP<sup>®</sup> compatible inputs. The units provide the power supply for the sensor electronics and de-couple DC components.

### What is ICP<sup>®</sup>?

The abbreviation ICP<sup>®</sup> means "Integrated Circuit Piezoelectric". It has been established between many other names as industrial standard for piezoelectric transducers. The integrated circuit of the sensor transforms the charge signal of the piezo-ceramic sensing element, with its very high impedance and high EMI sensitivity, into a voltage signal with low impedance.

It is the distinguishing feature of the ICP<sup>®</sup> electronics, that power supply and measuring signal are transmitted via the same line. So, an ICP<sup>®</sup> Transducer requires, like a transducer with charge output, only one single-ended shielded cable.

Figure 1 shows the principle circuit diagram. The integrated sensor electronics is supplied with constant current. This should not be confused with a 4-20 mA current loop. The constant current  $I_{const}$  is fed into the signal cable of the sensor. A de-coupling capacitor  $C_c$  keeps DC components away from the input of the connected instrument.

Providing the constant current supply and de-coupling the output is the purpose of the Sensor Supply Units Type M27 and M31.

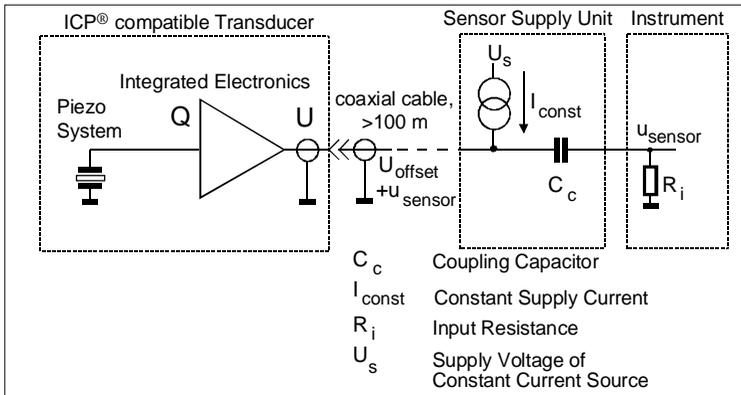


Figure 1: Principle of ICP<sup>®</sup>

By supplying the sensor with constant current a positive DC offset voltage arises at the sensor output. This DC voltage depends on the manufacturer and the specimen and reaches 5 V to 14 V. Round this bias voltage the measuring signal of the transducer may oscillate. The output voltage of the transducer never changes to negative values. Its minimum value is the saturation voltage of the integrated electronics (1V to 2 V). The maximum value of the output voltage is limited by the supply voltage of the constant current source. Figure 2 shows the dynamic range of the transducer. The output of the M27 and M31 Sensor Supply Units is free of DC components. It provides the unaltered AC sensor output signal.

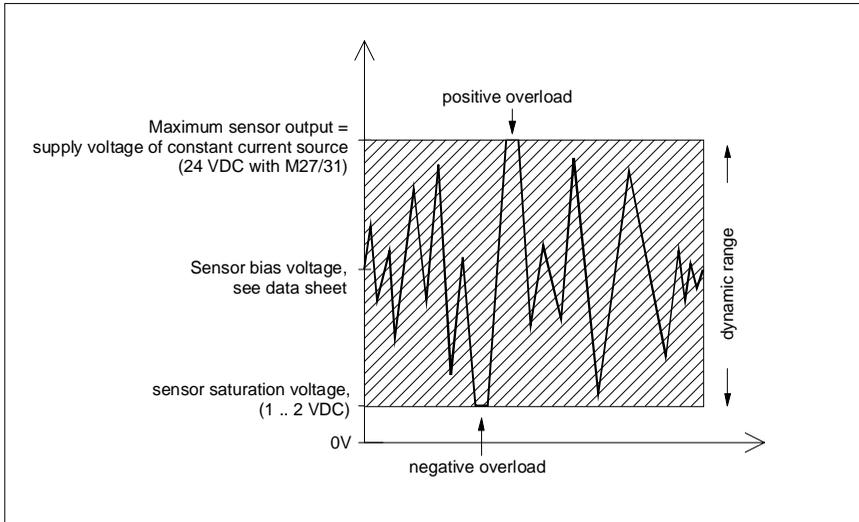


Figure 2: Dynamic range of ICP<sup>®</sup> compatible sensors

## Instrument Description

The Sensor Supply Unit Type M27 is designed for connection of one, Type M31 for connection of maximum four sensors. In addition Type M31 has a change-over switch for the four measuring points. By means of this switch the measuring signal from one of the four inputs will be connected to the shared output of the instrument.

The instruments need a DC power supply between 5 VDC and 24 VDC. Within this range the 24 VDC supply voltage of the constant current source is guaranteed. For power supply you can use the delivered mains plug adapter, the voltage of a battery, or the 5V voltage of a PC, for example. The operating voltage is connected to the instrument through a circular power connector to DIN 45323, where the tip (inner conductor) is the positive terminal. Protection against wrong polarization is provided.

The instruments generate a supply voltage of 24 V for the constant current sources. This voltage is sufficient for getting an optimal dynamic range with all standard ICP<sup>®</sup> compatible transducers in the market. The delivered constant current amounts to 4.5 mA.

Figures 3 and 4 show the connectors and the control LEDs of both instruments.

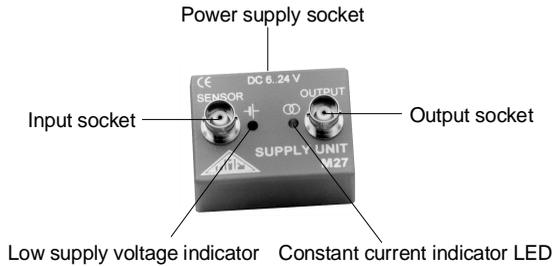


Figure 3: M27

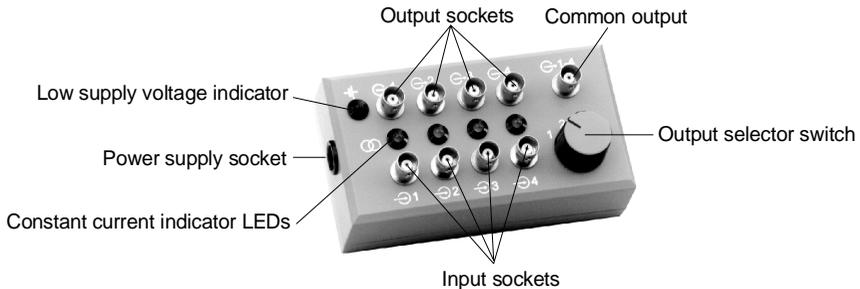


Figure 4: M31

The low voltage LED becomes red, if the supply voltage drops below the limit of 4.7 V. In this case the operation cannot be guaranteed. A yellow LED is assigned to each of the constant current sources and indicates if constant current is flowing. In case it remains dark, although a transducer is connected, the reason may be a defective cable or transducer. For control of the Sensor Supply Unit you may short-circuit the corresponding input. If the unit works properly, the yellow LED will shine.

The input impedance of instruments ( $R_i$  in Figure 1), connected to the outputs of the Sensor Supply Units, shall be more than  $1 \text{ M}\Omega$ , if a lower limiting frequency of the measuring chain of 0.3 Hz is demanded. At an input impedance of  $100 \text{ k}\Omega$  the lower limiting frequency increases to 3 Hz.

## Technical Data

Inputs:	BNC sockets
Outputs:	1 output with BNC socket for each channel, 1 mutual output with BNC socket, switchable, $f_{\min} = 0.3 \text{ Hz}$ at a load impedance $R_{\text{load}} > 1 \text{ M}\Omega$
Constant current source:	3.8 .. 5.6 mA, compliance voltage $> 24 \text{ V}$
Power supply:	$U_S = 5 \dots 24 \text{ V-}$ , $< 50 \text{ mA}$ (M27) / $< 150 \text{ mA}$ (M31) low voltage circular connector to DIN 45323
Case:	cast aluminum, connected to ground
Accessories:	230 V AC mains plug adapter (included) adapters BNC to UNF 10-32 socket model 017 (option)

## Limited Warranty

Metra warrants during a period of  
**24 months**  
that its products will be free from defects in material or workmanship and shall conform to the specifications current at the time of shipment.

The warranty period starts with the date of invoice.

Customer has to provide the dated bill of sale as evidence.

The warranty period ends after 24 months. Repairs do not extend the warranty period.

This limited warranty covers only defects which arise as a result from normal use according to the instruction manual. Metra's responsibility under this warranty does not apply to any improper or inadequate maintenance or modification and operation outside the product's specifications.

Shipment to Metra has to be paid by the customer.

The repaired or replaced product will be sent back at Metra's expense.



## Declaration of Conformity

Product: Sensor Supply Unit

Models: M27 and M31

Hereby is certified that the above mentioned products  
comply with the demands of the following standards:

- EN 50081-1
- EN 50082-1

Responsible for this declaration is the producer

Metra Mess- und Frequenztechnik

MeiBner Str. 58

D-01445 Radebeul

Declared by

Manfred Weber

Radebeul, 2<sup>nd</sup> of July, 1999