



INSTRUCTION MANUAL

VIBRATING WIRE READOUT UNIT

Model FC-5

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1 INTRODUCTION

The FC-5 readout is a durable, self-powered, portable unit; it is designed to read inductive sensors. The front panel has various options and control devices (knobs, switches, a crystal liquid display). The readout unit is provided with an external charger for charging the battery. A measurement wire makes it possible to be connected on a sensor or a switching unit.



FIGURE 1: FC-5 Readout Unit.

The FC-5 Readout Unit enables:

- To read the frequency of self-oscillating circuits for simple or double metering for all TÉLÉMAC inductive sensors, with a resolution of 0.1 Hz
- To read the temperature measurement at the inductive sensor level, and for those including a thermistor (optional)

The frequency-measuring device includes:

- A micro processor of 8 bits controlled by a quartz of 16 MHz
- A sequencer allowing measurements in metering/countdown for 2-coil inductive sensors
- Temperature reading is done by measuring the terminal voltage of a thermistor placed in the sensor. This tension is converted to indicate the temperature directly

2 SPECIFICATIONS

DIMENSIONS	
Length x width x thickness:	240 x 190x 110 mm
Mass:	±1500 g
ENVIRONMENT	
Degree of protection closed:	IP 68
Degree of protection opened:	IP 65
Storage temperature:	-40°C to +80°C
Operating temperature:	0°C to +70°C
POWER SUPPLY	
Battery:	6, C type 1.2 V, cadmium nickel accumulators of a capacity of 3 Ah
Autonomy:	Approximately 8 hours on continuous mode

3 DESCRIPTION

3.1 FRONT PANEL

The FC-5 front panel is equipped with:

- a four position rotary switch
- an alphanumeric crystal liquid display with 2 lines and 20 characters
- a six point "SENSOR" footing LEMO type
- a two point "CHARGER" footing LEMO type

The rotary switch makes it possible to select various station functions. LCD display indicates measurement results. Connect wire sensor in the "CAPTEUR/SENSOR" connection. To charge battery, connect the wire in the battery charger connection on the front panel.

Other positions on the rotary switch allows to start the readout unit and select desired functions for readings:

- **CS**: frequency measurement, sensor with simple coil.
- **CD**: frequency measurement, sensor with double coil.
- **TC**: temperature measurement (if the sensor is equipped with the option). After each series of readings, make sure to shut the readout unit to the "ARRÊT/OFF" position, in order to preserve the batteries.

3.2 CONNECTING TO SENSOR

If the sensor to be measured is provided with a switch or if it is connected to a switching box, connect the two-pin wire, between the FC-5 front switch and the sensor switch.

If the sensor is not provided with a switch, connect the wire with alligator clips and connect all sensor wires to the various clips as follows:

WIRE	SENSOR
Contact number 1: Blue	Power supply -
Contact number 2: Red	Power supply +
Contact number 3: White	Wire signal
Contact number 4: Yellow	Wire relay
Contact number 5: Green	Temperature
Contact number 6: Not wired	-
Contact number 7: Not wired	-
Contact number 8: Not wired	-

- **CD:** Connect as if the sensor had one coil. If one using alligator clip wires, connect the FC-5 DC yellow wire to the wire control relay of the sensor.

3.2.1 FREQUENCY MEASUREMENT – SINGLE SENSOR (CS)

The CS switch position allows reading a 1-coil inductive sensor. The measurement of these sensors is done by direct reading of a frequency in single metering. Frequency sensor, displayed in hertz, is refreshed every second after each count.

After connecting the sensor as indicated, put the switch to the position CS. The display indicates the sensor coil frequency. Wait a few seconds to let the sensor electronics stabilize before taking any readings.

3.2.2 FREQUENCY MEASUREMENT - DOUBLE SENSOR (CD)

The CD switch position allows reading a 2-coil inductive sensor. The reading of these sensors is done by metering on the first coil, followed by a countdown on the second coil. The measurement is the difference of frequency between sensor's 2 coils, displayed in hertz, it is refreshed after the metering/countdown phase.

After having connected the sensor as indicated, put the switch on the CD position. The display indicates the difference between the frequencies of the 2 coils. Wait a few seconds to let the sensor electronics stabilize before taking any readings.

3.2.3 SENSOR TEMPERATURE MEASUREMENT (TC)

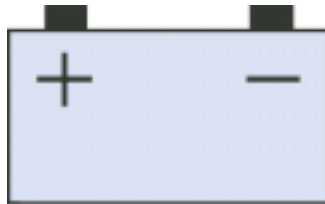
Put the switch on the TC position. The temperature measurement is taken with the thermistor located inside the sensor (if this option is applicable). The terminal voltage of thermistor varies according to the temperature. The microprocessor converts tension and calculates equivalent temperature. Displayed temperature will show in tenth of degree.

Measuring accuracy in absolute depends on the thermistor used and is about 3°. On the other hand, the variation (of temperature between a instant "To" and an instant "Tn" is obtained with a precision of about a tenth of a degree, assuming that wire isolation characteristics are maintained.

4 POWER SUPPLY AND CHARGING BATTERIES

When battery tension becomes too weak, a message will appear on the front panel. Then it is necessary to reload the batteries with the provided charger.

Connect the male part plug located at the end of the charger wire, in the female connector located on the front panel of the FC-5 (showed as a small battery diagram)



then connect battery charger on the sector. The readout unit must be in the "ARRÊT/OFF" position during the loading period.

Loading period is approximately 14 hours. When loading period is complete the liquid display on the front panel will become extinct.

5 SENSOR READING

5.1 1-COIL INDUCTIVE SENSOR

Each sensor is delivered with a calibration sheet, including a conversion chart corresponding to each physical frequency measurement in its unit.

5.2 2-COIL INDUCTIVE SENSOR

These sensors represent a linear response curve in its field of application. Each sensor is delivered with a calibration sheet, indicating the coefficient reading physical/difference in frequency.

Conversion between the reading on the FC-5 unit and the physical size to be measured is done as follows:

Measurement = Conversion coefficient x Difference in frequency

5.3 EXAMPLES OF CALCULATION FOR DISPLACEMENT TRANSDUCER

- **1-coil sensors:**

$$M_{(t_0)} = 42\,848 \text{ Hz let } -58.82 \text{ mm}$$

$$M_{(t_1)} = 42\,640 \text{ Hz let } -57.11 \text{ mm}$$

The displacement δ is given by:

$$\delta = M_{(t_1)} - M_{(t_0)}$$

$$\delta = -57,11 - (-58,82)$$

$$\delta = +1,71 \text{ mm}$$

- **2-coil sensor:**

$$M_{(t_0)} = 928 \text{ Hz}$$

$$M_{(t_1)} = 212 \text{ Hz}$$

Sensor coefficient $\alpha = 3,9 \cdot 10^{-3} \text{ mm / metering/countdown unity}$

The displacement δ is given by:

$$\delta = (M_{(t_1)} - M_{(t_0)}) \times \alpha$$

$$\delta = (212 - 928) \times 3,9 \cdot 10^{-3}$$

$$\delta = -2,79 \text{ mm}$$

NOTE: A DISPLACEMENT δ OF A POSITIVE SIGN INDICATES A LENGTHENING OF THE BASE MEASUREMENT. ON THE OPPOSITE A NEGATIVE SIGN INDICATES A SHORTENING OF THE BASE MEASUREMENT.