

# Integrameter

### General Characteristics

INTEGRAMETER is the last born in our line of on-board metering products and integrates in a single product many functions that were previously divided into multiple components from different suppliers. Thanks to this patent, Microelettrica has become the one supplier in the world to create and deliver a compact and fully integrated device whose characteristics, both in the high voltage section and in the low voltage metering section, offer maximum reliability and safety.

### Functions

INTEGRAMETER's functions are highly customized according to our customers' needs or suggestions coming from our experience:

- Detection and measurement of the instantaneous catenary AC and DC voltages
- Detection and measurement of the instantaneous catenary AC and DC currents
- Measurement of energy consumption
- Analog and/or digital output signals
- RS422 or RS485 serial outputs
- On-line diagnostic through optical fibre

Possible options may include:

- Measurement of harmonics
- GSM communication
- GPRS on board

### Environmental Performance

The device is compliant with all the regulations of the rail market. All the components are homologated for the industrial temperature range (from -40°C to +85°C - Class TX - EN 50125-1) and ensure a proper working in the worst environmental conditions.

<b>Maximum Speed of the rolling stock on which the device is installed</b>	350 km/h
<b>Storage temperature</b>	from -40°C to +85°C
<b>Class of air temperature (EN50125-1)</b>	TX (from -40°C to +85°C)
<b>Class of altitude range (EN50125-1)</b>	A1 (up to 1400m)
<b>Relative humidity at 40°C</b>	95%
<b>Maximum solar radiation (EN50125-1)</b>	1120W/m2
<b>Protection level for terminal box (EN60529)</b>	IP 66
<b>Transverse acceleration (EN50125-1)</b>	GT1 (2 m/s <sup>2</sup> for less than 50ms, 1m/s <sup>2</sup> for more than 50ms)
<b>Longitudinal acceleration</b>	GL1 (max 2 m/s <sup>2</sup> )
<b>Shock and vibrations</b>	EN 61373
<b>Contaminating fluids (60721-3-5)</b>	5F3
<b>Lateral wind withstand</b>	up to 25m/s, gusts up to 40 m/s 1s
<b>Weight</b>	58kg
<b>Rolling Stock Category (NF F 16-101 and NF F 16-102)</b>	A1

### Electrical Performances

The INTEGRAMETER operates under the following power supply systems (EN 50163 – Railway Systems Supply Voltages).

<b>Electrification System/Nominal Voltage</b>	<b>Working Range</b>	
DC 1.5 kV	900 ÷ 2.200	V <sub>DC</sub>
DC 3kV	2.000 ÷ 4.000	V <sub>DC</sub>
AC 15kV 16 2/3 Hz	10.000 ÷ 19.000	V <sub>AC</sub>
AC 25kV 50 Hz	17.000 ÷ 30.000	V <sub>AC</sub>



# Electronic

## Transducers: Integrameter

### The basic configuration includes up to:

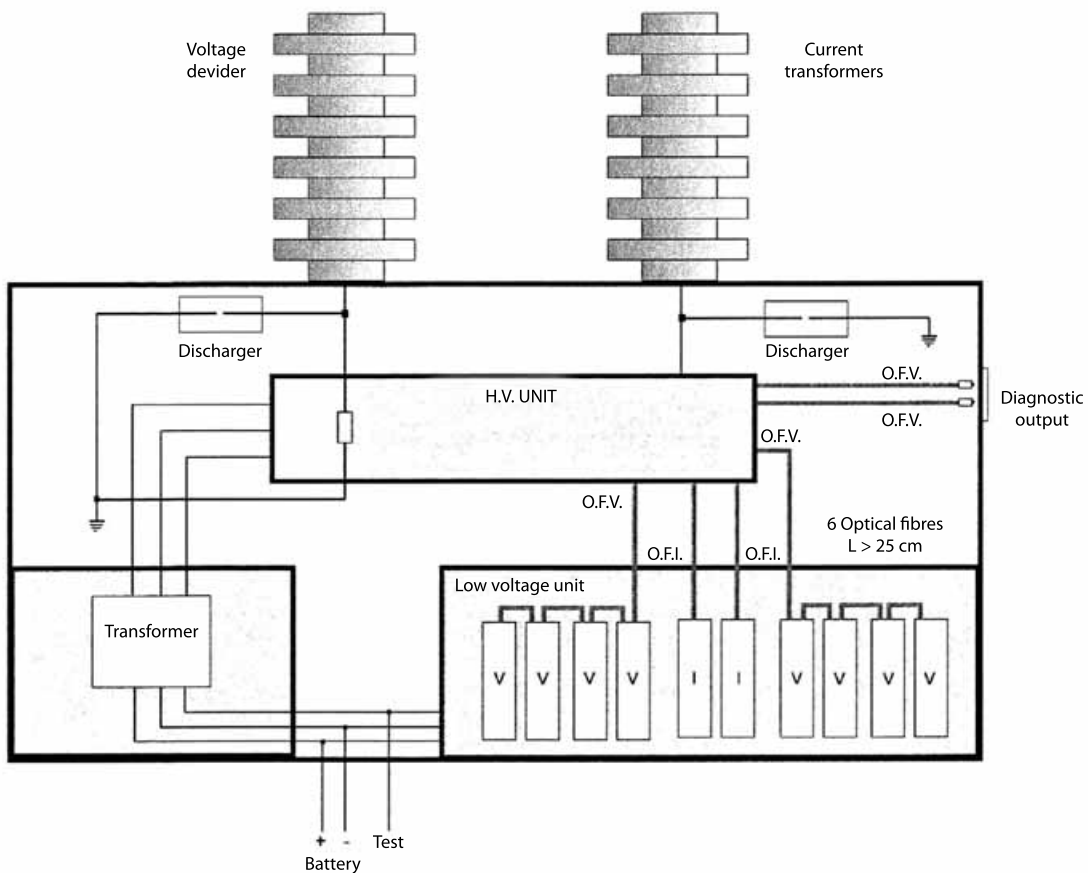
- 8 redundant analog outputs are available for the measurement of the catenary voltages
- 2 analog outputs for catenary AC currents
- 10 redundant digital outputs (relays) for detection of the catenary line system or for diagnosis (see appendix 2)
- Serial ports allow both a redundant serial transmission of voltage and current (RS422 in the basic configuration) and energy measurement (RS485)
- Testing port it is possible to activate a TEST function to check the INTEGRAMETER's proper voltage and current output generation
- Precision: 1% on the whole TX range, 0,5% at 23°C

### Connections

The INTEGRAMETER is supposed to be mounted on the vehicle's roof, by the pantograph.

A terminal is connected to the pantograph while the other is directly connected to the AC High Speed Vacuum Circuit Breaker.

A third terminal is directly connected to the DC High Speed Circuit Braker with an external device that provides the measurement of the current under 3kV<sub>DC</sub> lines.



**KNORR-BREMSE**



*Microelettrica Scientifica*

Microelettrica Scientifica S.p.A. Via Alberelle, 56/58 20089 Rozzano - Italy  
Tel.: +39 02 575731 Fax: +39 02 57510940 - sales.relays@microelettrica.com  
www.microelettrica.com