THERMOFLUX NB-IoT

GPRS Thermoflow meter for transmittance measurements

Thermoflux NB-IoT is a heat flux sensor for use in the soil. It offers the best available accuracy and quality assurance of the measurement. The on-line self-test verifies the stable performance and good thermal contact of sensors that are buried and cannot be visually inspected and taken to the laboratory for re-calibration. The self-test also includes self-calibration which compensates for measurement errors caused by the thermal conductivity of the surrounding soil (which varies with soil moisture content), for sensor non-stability and for temperature dependence.

MAIN FEATURES

- low thermal resistance
- large guard area (required by the ISO 9869 standard)
- low electrical resistance (low pickup of electrical noise)
- high sensitivity (good signal to noise ratio in low-flux environments)
- robustness, including a strong cable (essential for permanently installed sensors)
- IP protection class: IP67 (essential for outdoor application)
- incorporated film heater for self-testing

APPLICATIONS

- High-accuracy scientific measurement of soil heat flux, with a high level of data quality assurance.

MEASUREMENT AND CONTROL

Requirements for data acquisition and control:

- for heat flux: one millivolt measurement
- for heater current: one current measurement (or voltage over a current sensing resistor)
- for switching the heater current on and off: one relay with 12 VDC nominal output

CALIBRATION

The calibration is traceable to international standards. The factory calibration method follows the recommended practice of ASTM C1130.

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Testing Solutions

TECHNICAL FEATURES

• Measurand:	heat flux
• On.line functonality testing:	self-test including self-calibration
• Sensing area:	8 x 10^{-4} m^2
• Sensor thermal resistance:	81 x 10^{-4} K / (W/m^2)
• Measurement range:	from -2000 to 2000 W/m^2
• Sensitivity (nominal):	60 x 10^{-6} V / (W/m^2)
• Rated operating temperature range:	from -30 to +70 °C
• IP protection class:	IP67
• Film heater resistance:	100 Ω ± 10%
• Film heater rated power supply:	from 9 to 15 V CC
• Interval between self-tests:	6 hours
• Heating interval duration:	180 s
• Power consumption daily average:	0,02 W
• Standard cable length:	2 x 5 m
• Options:	longer cable length (10, 15, 20, 30, 40 m)
Temperature sensor	
• Self-adhesive silicone plate:	40 x 13 mm
• Sensor:	DIN IEC 751 class A ceramic Pt100 sensor, single element with 3 wires
• Silicone insulated connection cable:	3 x 0,22 mm^2
• Length:	5 m
• Operating temperature	-50 / 180 °C
NB-IoT Module	
• Analog input:	from 1 to 4 (20 mA, 5 V)
• Resolution:	16 bit
• Accuracy:	< 0.25% F.S.
• Power supply:	long duration lithium battery
• Power consumption:	30 mA (stand-by mode); 50 mA (transmission mode)
• Dimensions:	130 x 150 [mm]
• Environmental conditions:	
- Temperature: - Relative humidity:	-20 ~ +70 °C; 30 ~ 95 %
• Modem:	integrated with internal antenna; NB-IoT 5G technology;
• Protection:	Plastic IP67
• Fixing:	on wall or pole (through a mounting bracket to be ordered separately).

ACCESSORIES

- N.2 NB-IoT 5G modules with integrated SIM
- Subscription to the web platform
- N.4 Contact temperature sensors
- N.1 Flowmeter Plate