

User manual
Firmware version V1.0
10.4.2007

FTR860

2 channel wireless transmitter with temperature sensor, mV, mA and digital inputs



Nokeval

INTRODUCTION

FTR860 is a two channel transmitter for temperature sensor, mV and mA inputs housed in a field enclosure. Measured values are transmitted using license free 433.92 MHz frequency band (ISM) so it can be freely used, for example, almost in whole Europe. The transmitter has a whip antenna for radio coverage up to 200 meters in free space. The transmission interval is programmable and can be set from four seconds to over four minutes.

FTR860 has also two digital inputs (0-5 VDC or 0-230 VAC). The device supports both 24 VDC and 230 VAC supply voltages.

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Manufacturer

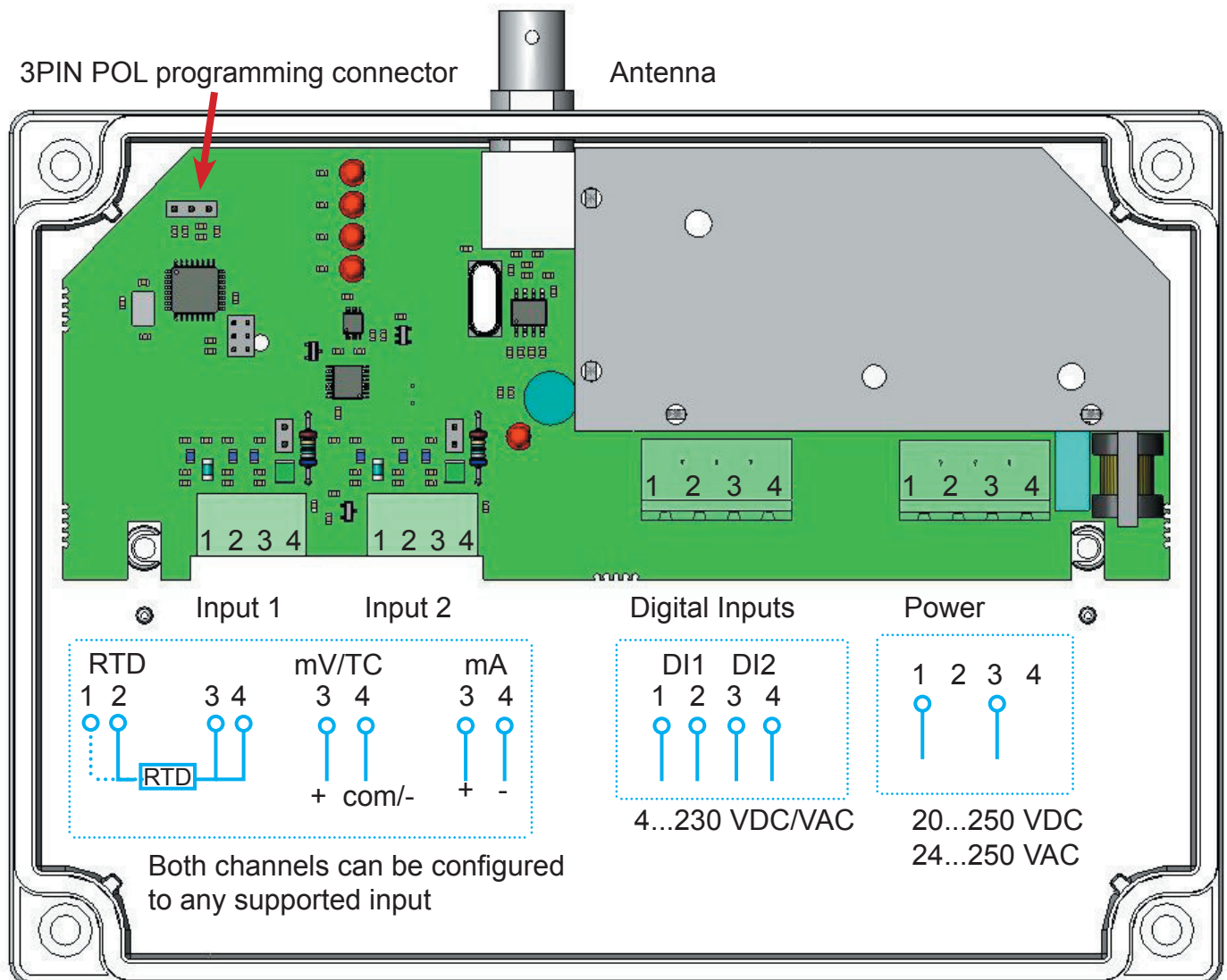
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INSTALLING

Connections

For more detailed information about connections see chapters Supply Voltage and Inputs.



Connecting the antenna

The antenna is connected to the BNC connector at the top side of the case. The antenna can be either directly connected to the BNC connector of the device or alternatively a 50 ohm coaxial cable (RG-58) with BNC connectors can be used to connect the antenna to the device.

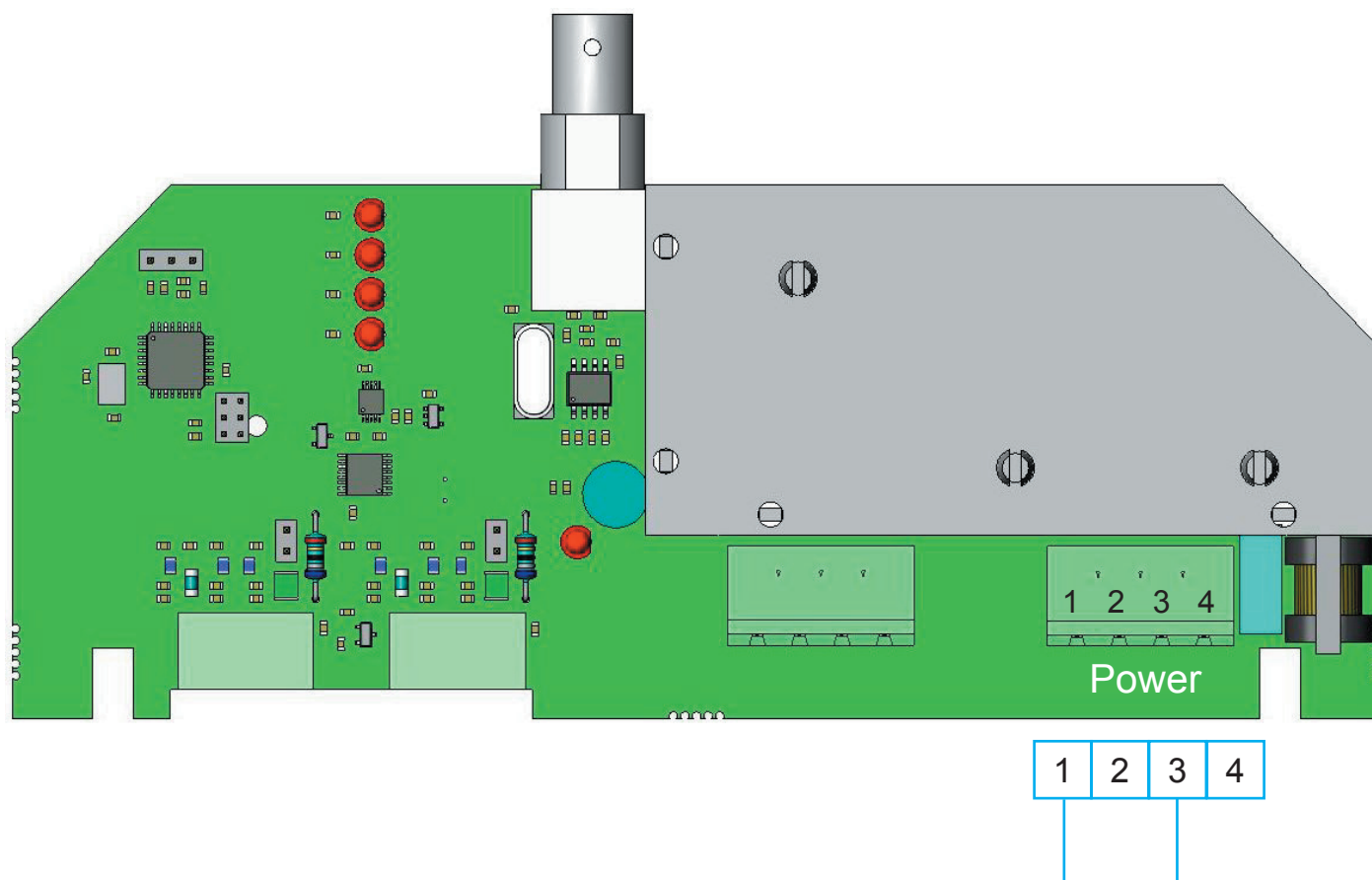
First align the female connector's two guideposts to the male connector's channels. Then press the BNC connector in and lock the connector by rotating the male connector's outer ring clockwise. If needed, the antenna can be removed by rotating the ring counter clockwise and then pulling out the antenna.

SUPPLY VOLTAGE

The device has an universal power supply that supports following voltage ranges:

- 20...250 VDC
- 24...250 VAC

Device's current consumption is less than 40 mA.



Connect the supply voltage to terminals 1 and 3. Either polarity will do. The connector housing provided with the device must be used when connecting the supply voltage.

Attention! The device contains high voltages also when 24 V supply voltage is used. These parts are protected using separate plastic casing that contains no user serviceable parts. Do not open this protective casing.

SETTINGS

Connection settings

Use Mekuwin program or Nokeval 6790 hand held programmer to configure the device. You can download Mekuwin from Nokeval's web site for free.

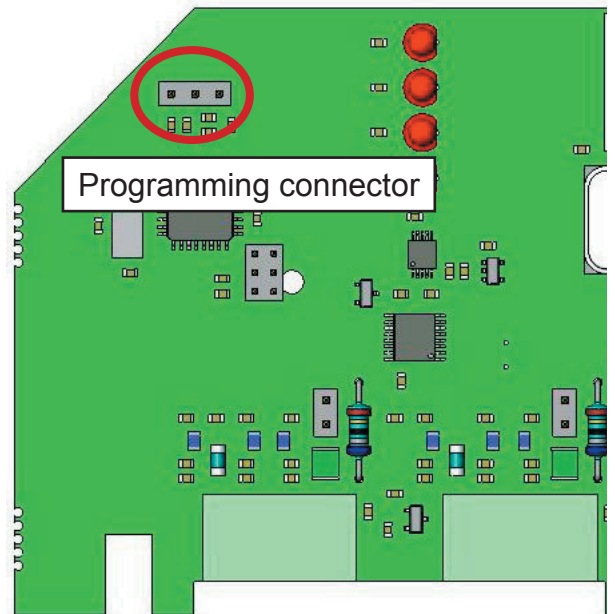
Communication settings for configuration:

Baud rate	9600
protocol	SCL
address	0

Programming connector

The device can be programmed using a PC or Nokeval 6790 hand held programmer.

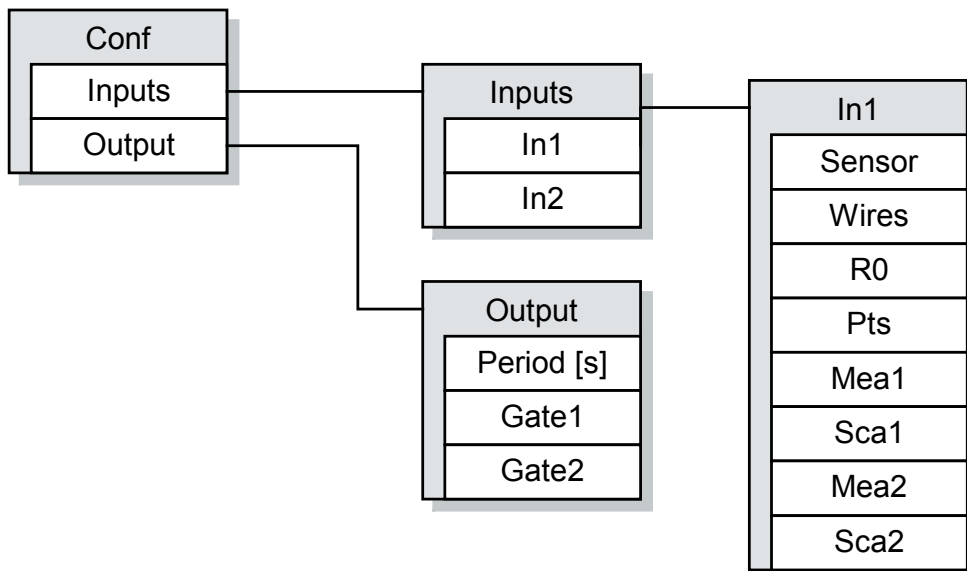
The device has a 3PIN POL programming connector. Use POL-3PIN adaptor to connect a POL-RS232 cable, DCS772 (USB-POL converter) or 6790 to the device.



When the programming connector is connected the device sends measurement data about every 1.3 second. This feature is ment only for testing purposes. When the configuration connection is open no measurement data is sent.

Menu tree

FTR860 menu structure. Both input channels have similar submenus.



INPUTS

Settings

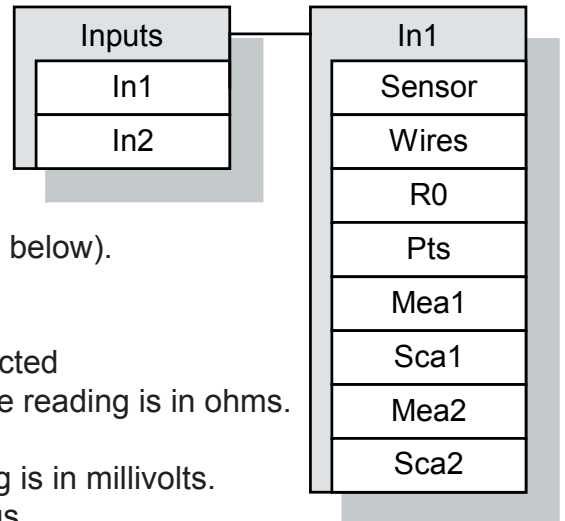
The configuration menu is divided in several submenus. The input settings are in a submenu called Inputs, which is further divided in In1 and In2 submenus. In1 and In2 submenus are identical.

Input submenu

Sensor (In1, In2)

Input range and sensor selection.

- Off: Channel is not in use.
- Pt, Ni, Cu: Resistance thermometers (RTD's).
The nominal resistance is set in R0 (see below).
The reading is in Celsius.
See also sections Wires and R0.
- Ohm: Resistance inputs. The resistor is connected in three-wire or four-wire connection. The reading is in ohms.
See also section Wires.
- mV: Voltage input -30...2000 mV. The reading is in millivolts.
- TcB...TcT: Thermocouples. The reading is in Celsius.
- mA: Current input 0..25 mA. The reading is in milliamperes
The appropriate jumper inside the case has to be closed.



Wires (In1, In2)

RTD connection method. Only visible when RTD or Ohm input is selected.

- 2: two-wire connection
- 3: three-wire connection
- 4: four-wire connection

R0 (In1, In2)

The nominal resistance of a RTD. With Pt and Ni sensors, this is the resistance at 0 °C. With Pt100 set R0=100. With Cu the nominal resistance is given at 25°C. This setting is not visible on other than RTD inputs.

If the real resistance of the sensor at the nominal temperature is known, it can be fed here, in order to cancel the sensor error.

Pts (In1, In2)

Number of scaling points. The scaling means converting the reading to represent some other (engineering) reading.

- 0: No scaling. The reading equals measured reading.
- 1: One point offset correction. The reading corresponding to Mea1 is scaled to be Sca1 when displayed, using appropriate offset value.
- 2: Two point scaling. Readings from Mea1 to Mea2 are scaled to be Sca1 to Sca2. Any values can be used, these have not to be the end points.

Mea1, Sca1, Mea2 and Sca2 (In1, In2)

Scaling points. Visibility of these settings depends on the Pts setting. Unscaled reading Mea1 is converted to Sca1, and Mea2 to Sca2.

Example: Pressure transmitter sends 4-20 mA for pressures 0-6 bar.

Pts = 2

Mea1 = 4 (mA)

Sca1 = 0 (bar)

Mea2 = 20 (mA)

Sca2 = 6 (bar)

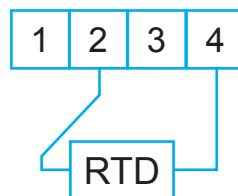
These scaling points can be conveniently used to calibrate a sensor-transmitter pair in a thermal bath. First set the scaling off by setting Pts=0. Apply one or two known temperatures to the sensor and write down the displayed and the real temperatures. Then set Pts to 1 or 2 depending on the number of calibration points, and write the first reading in Mea1 and the real temperature in Sca1. And the same with Mea2 and Sca2 if two points are to be calibrated.

Connections

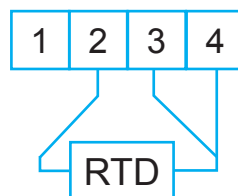
Analog input signals are connected to connectors Input 1 and Input 2.

RTD and resistance inputs (ohm, Pt100, etc)**two-wire connection**

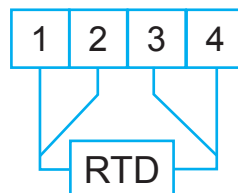
If the sensor has two wires, connect them to terminals 2 and 4.

**three-wire connection**

If the sensor has two wires the same color, connect these wires in terminals 3 and 4, and the third wire in terminal 2.

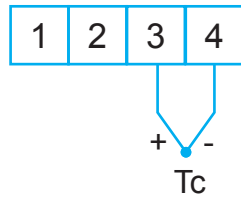
**four-wire connection**

Four-wire connection: Connect the other end of the sensor in terminals 1 and 2, and the other in terminals 3 and 4.



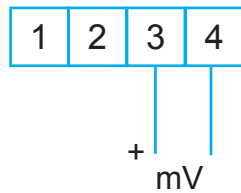
Thermocouple inputs

Connect the positive wire (K type: green or brown) of the thermocouple to terminal 3 and the negative (white or blue) to terminal 4.



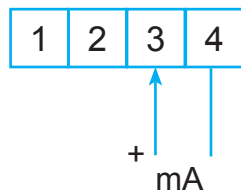
Voltage inputs

Connect the positive wire to terminal 3 and the negative wire to terminal 4.

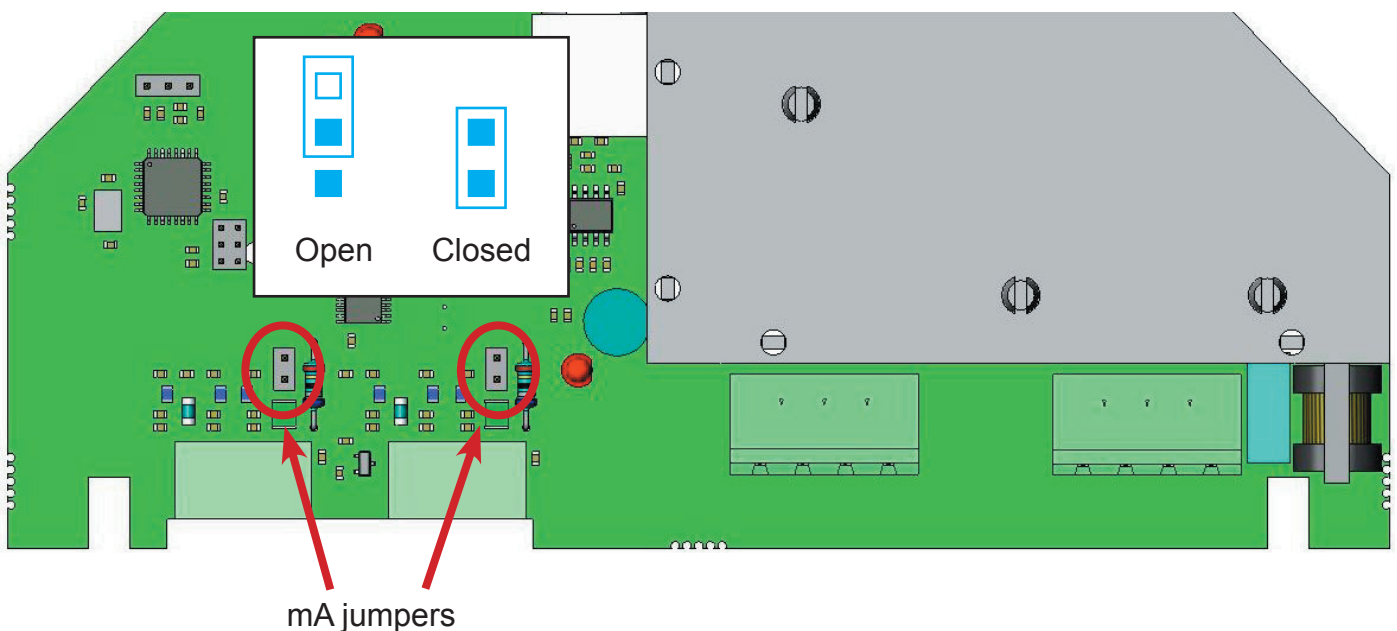


Current inputs

Connect the positive wire to terminal 3 and the negative wire to terminal 4.



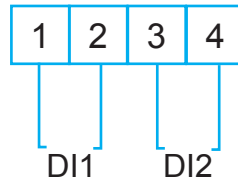
Close the channel's mA jumper.



Digital inputs

The digital inputs of this device are designed for slow signals and wide voltage range. The measurement cycle is approximately 1.3 seconds.

Connect the digital input 1 to terminals 1 and 2. Respectively digital input 2 is connected to terminals 3 and 4. Either polarity will do. The connector housing provided with the device must be used when connecting the digital inputs.



Both direct and alternating voltages can be connected to digital inputs. For example:

0 / +5 VDC

0 / +24 VDC

0 / 230 VAC

Input state is interpreted as "off" if the voltage between the terminals is less than 2 volts and "on" if the voltage is over 4 volts.

Maximum allowed voltage difference between the terminals is 330 VDC or 230 VAC. The insulation between the digital inputs does not fulfill the requirements set for double insulation or reinforced insulation. Therefore, no dangerous voltages can be applied to the other digital input if the other is in contact with a user accessible part.

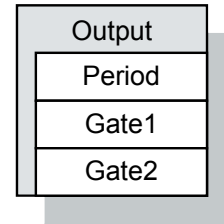
Digital inputs can also be used as a threshold condition to sending measurement data using radio. For more information about this in the chapter Radio transmitter.

RADIO TRANSMITTER

The device sends both the measurement data from both input channels using license free 433.92 MHz frequency range. If needed, radio transmission of a channel can be disabled by setting channel's sensor type to "Off".

Settings

Output submenu



Period

Interval between consecutive radio transmissions. The valid range for the parameter is 4...254 seconds.

There is a small random variation in the transmission interval (max 5.3 % from the defined value). The purpose of this variation is to prevent continuous collisions of data packets send by different devices.

The maximum number of radio transmitters in a coverage area is limited by radio standards. The use of repeaters reduces the maximum number of transmitters because repeaters use the same frequency channel as transmitters. The following example table shows the allowed maximum number of FTR860 transmitters in a coverage area.

2 channels

Transmission Interval (s)	Receiver	Receiver and 1 repeater	Receiver and 2 repeaters
	Maximum number of transmitters		
5	10	5	3
10	20	10	7
20	39	20*	13
30	59	29	20
40	78	39	26
50	98	49	33
60	118	59	39
90	176	88	59
120	235	118	78
240	471	235	157

1 channel

Transmission Interval (s)	Receiver	Receiver and 1 repeater	Receiver and 2 repeaters
	Maximum number of transmitters		
5	26	13	9
10	53	26	18
20	105	53**	35
30	158	79	53
40	211	105	70
50	263	132	88
60	316	158	105
90	474	237	158
120	632	316	211
240	1263	632	421

For example, if you have transmission interval of 20 seconds and one repeater, the maximum number of transmitters is 20*. When only one channel is in use, the maximum number of transmitters is 53**.

Gate1

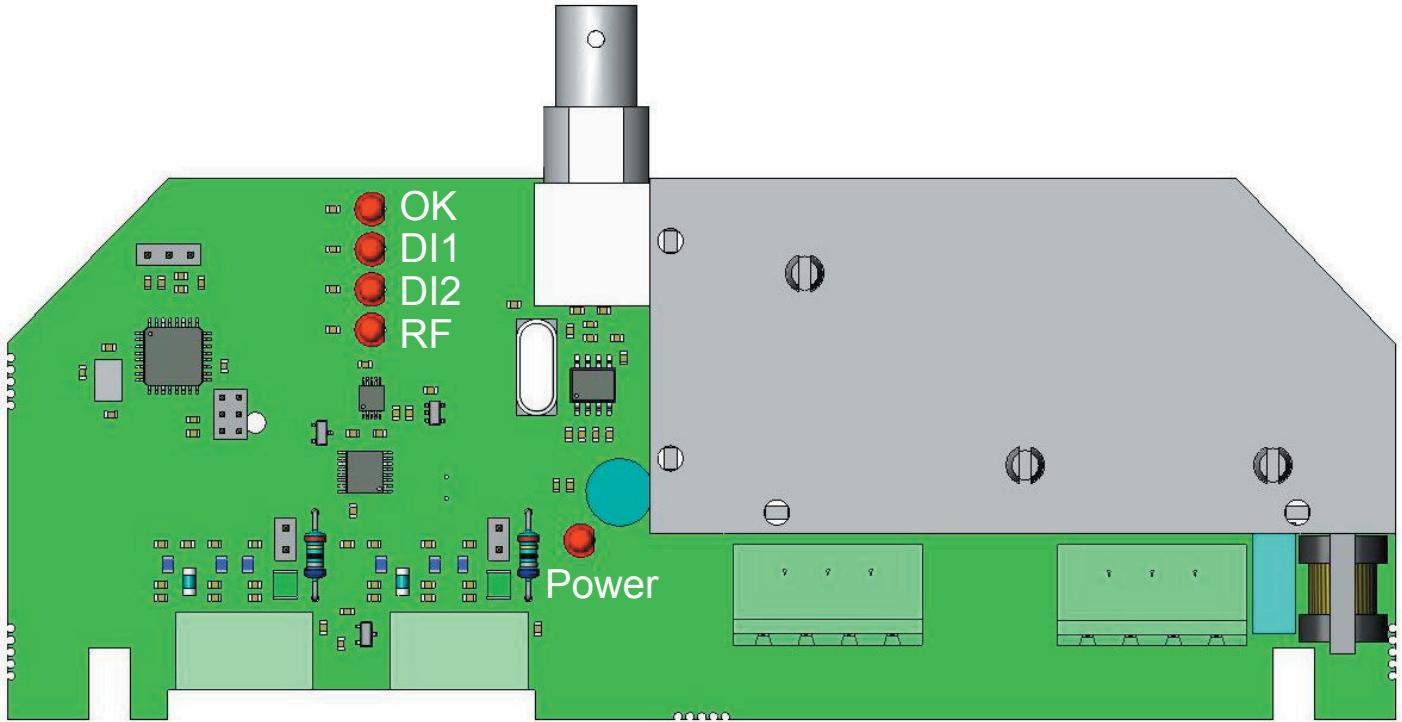
If enabled, the measurement data of input channel 1 is not transmitted unless the state of the digital input 1 is "On". When the state of the digital input 1 changes from "Off" to "On" the next finished measurement result is immediately sent. The next measurement result is sent after the defined transmission interval if the state of the digital input 1 is still "On".

Gate2

If enabled, the measurement data of input channel 2 is not transmitted unless the state of the digital input 2 is "On". When the state of the digital input 2 changes from "Off" to "On" the next finished measurement result is immediately sent. The next measurement result is sent after the defined transmission interval if the state of the digital input 2 is still "On".

INDICATOR LIGHTS

The device has five indicator lights that show the current state of the system, digital inputs, radio transmission and power. In normal operation these lights are not normally needed but they are very useful when troubleshooting error conditions.



OK

When the system is operating normally this indicator light blinks constantly. If the indicator light doesn't blink reset the device by disconnecting power from the device for a moment. If this doesn't help the device must be sent for service.

DI1

This indicator lights when the state of the digital input 1 is "On".

DI2

This indicator lights when the state of the digital input 2 is "On".

RF

This indicator light flashes every time a measurement data is sent.

Power

This indicator is always lit when power is applied to the device.

SPECIFICATIONS

Input

Pt100

Range	-200...700 °C
Accuracy	0.05% rdg + 0.25 °C
Thermal drift	0.02 °C/°C

Ni100

Range	-60...180 °C
Accuracy	0.05% rdg + 0.25 °C
Thermal drift	0.02 °C/°C

Cu10

Range	-200...260 °C
Accuracy	0.05% rdg + 0.25 °C
Thermal drift	0.02 °C/°C

Thermocouples

TC	range	lin.error
B	400...1700°C	±0.3°C
C	0...2300°C	±0.5
D	0...2300°C	±1
E	-100...900°C	±0.2
G	1000...2300°C	±2
J	-160...950°C	±1
K	-150...1370°C	±0.5
L	-150...900°C	±0.5
N	0...1300°C	±0.1
R	0...1700°C	±0.5
S	0...1700°C	±0.5
T	-200...400°C	±1
Thermal drift	0.02°C / °C (ref 25°C)	
Accuracy	0.05% rdg + 0.5°C + lin.error + thermal drift	

mV

Range	-30...2000 mV
Accuracy	0.05% rdg + 0.01 mV
Thermal drift	50 ppm/°C

mA

Range	0...25 mA
Accuracy	0.008 mA
Thermal drift	50 ppm/°C

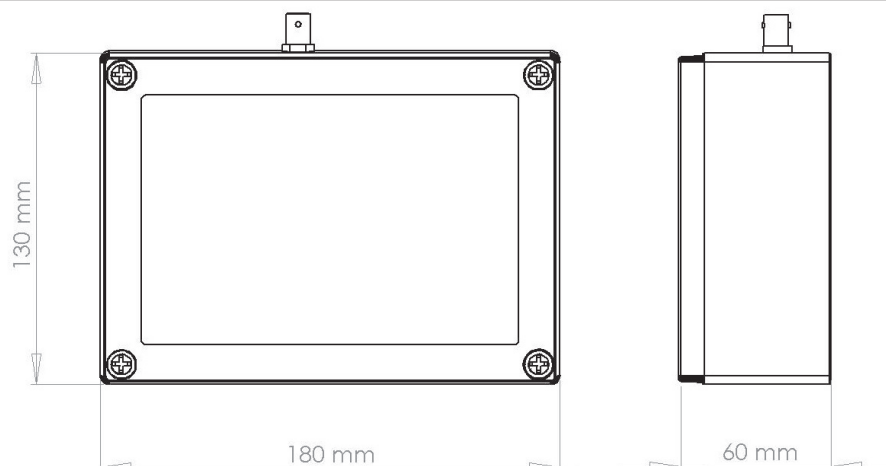
Measures

Case

180 mm x 130 mm x 60 mm
(WxHxD)

Antenna

178 mm, Ø 8...16 mm



Radio transmitter

Antenna

Connector: 50 ohm female BNC connector
Standard antenna: Quarter-wave whip antenna (BNC connector)

Frequency range: License free 433.92 MHz subband f according to ERC/REC/70-03

Power supply

Voltage: 24 VDC/230 VAC ±15%
Current consumption: max 40 mA

Environment

Operating temperature: -30...+60 °C
Protection class: IP65

Configuration

Connector: 3PIN POL programming connector
Protocol: Nokeval SCL protocol
Configuration: PC with Mekuwin for Windows 98...XP or 6970 hand held programmer

Regulations

EMC directive

- EMC immunity EN 61326
- EMC emissions EN 61326, class B

R&TTE directive

- EN 300 220 class 3, Transmitter power class 8 (10 mW)
- EN 301 489
- EN 300 339

