

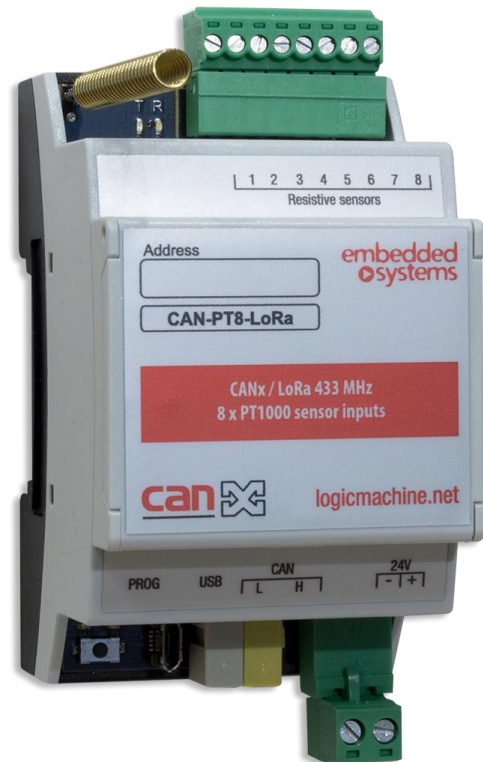
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## CANx/ LoRa 433 MHz 8 x PT1000 sensor inputs

**ENG - Data sheet**  
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### Application

8 channel CAN PT1000 inputs extension is designed to be used in building and industrial automation applications as an extension module to LogicMachine series devices based on CAN FT bus and LoRa 433 wireless. The configuration and monitoring of the device is done through separate LogicMachine CANx application. The device is designed for DIN-rail mounting and requires 3 DIN-units.



<b>Types of product</b>	
CAN-PT8	CANx 8 x PT1000 sensor inputs
CAN-PT8-LoRa	CANx / LoRa 433 8 x PT1000 sensor inputs
<b>Technical data</b>	
Power supply	12-32V DC
Power consumption (at 24V)	4 mA (all sensors connected), 0.2 mA (max current per channel), 19 mA (full load with LoRa)
DC overvoltage protection:	50 V
Wrong wiring polarity protection	Yes
<b>Interfaces and operating elements</b>	
PT1000 temperature sensor inputs	8
USB	1 microUSB for upgrade firmware flashing
CAN FT	1
LED	1 – CPU load, 1 - Error, 2 - RX/TX LoRa
Programming/reset button	1
<b>LoRa specification</b>	
Power on transmitter	1.6-50 mW (software adjustable)
Frequency range	433-434,750 MHz
Channel bandwidth	125 / 250 / 500 kHz
Carrier frequency step	125 kHz
Spreading factor	7-12
<b>Clamps and enclosure</b>	
CAN FT Terminal	0.8mm <sup>2</sup>
Inputs	3.5 mm <sup>2</sup>
Power supply	5 mm <sup>2</sup>
Color	Gray
Dimensions	52(W)x100(H)x68(L) mm
Protection	IP20 according to EN 60529
Usage temperature	-5C ... +55C
Storage temperature	-20C ... +70C
Net weight:	86 g
Gross weight	97 g
<b>Standards and norms compliance</b>	
CE conformity	EMBS-CE-190223/05 Electromagnetic compatibility
EMC	EN61000-6-1, EN61000-6-3



## **Caution**

### **Security advice**

The installation and assembly of electrical equipment may only be performed by skilled electrician. The devices must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with application that can result danger of people, animals or real value

### **Mounting advice**

The devices are supplied in operational status. The cables connections included can be clamped to the housing if required.

### **Electrical connection**

The devices are constructed for the operation of protective low voltage (SELV). Grounding of device not needed. When switching the power supply on or off, power surges must be avoided.

## **Default settings**

Line ID: 0

Node ID: 1

Max. number of group addresses per object : 16

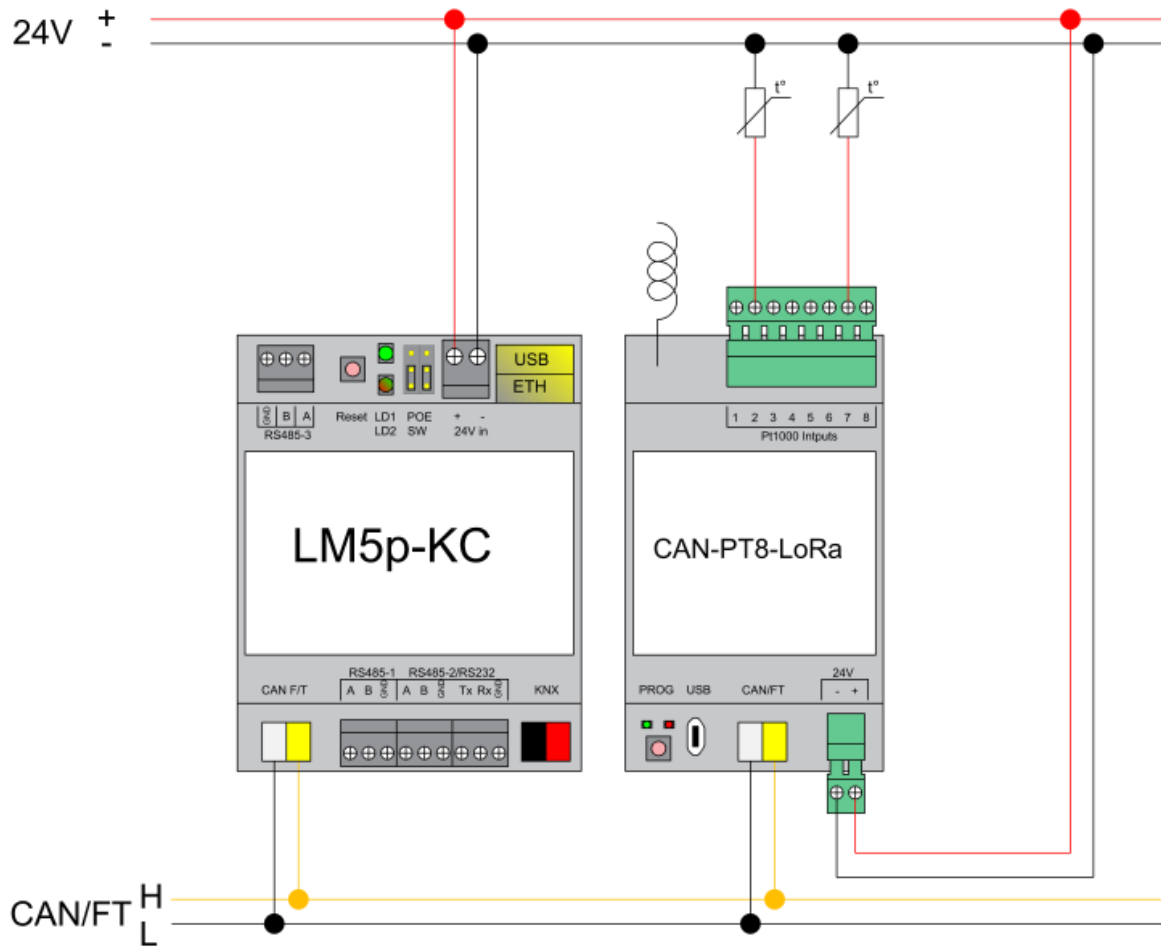
Reset to defaults

Press programming button for 5 seconds, the RED LED blinks 2 times, then release button - GREEN lights up shortly.

## **Programming physical address**

Press *Tools* → *Write device address* from CANx app. Choose address and press *Write*. Then press programming button shortly on the device, GREEN LED lights up shortly. The LED is switched off automatically in 1 second which means address is written.

# Connection diagram



# CANx software settings

## Thermostat General

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1)      Device location + Add - No location - ×

All Enabled Disabled ▲

Thermostat 1 - General

Thermostat 1 - Heat / C...

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Sensor value ⊖    Value correction    Thermostat ⊖

**Sensor value**

PT1000 - read-only ▼

### Sensor value:

*PT1000 – ready-only* – PT1000 value for reading only

*PT1000 – send value every 20 seconds* – send the value into the CAN bus every 20 seconds.

Default flags: read (R), transmit (T)

### Value correction: temperature value compensation

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1)      Device location + Add - No location - ×

All Enabled Disabled ▲

Thermostat 1 - General

Thermostat 1 - Heat / C...

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Thermostat 3 - Heat / C...

Thermostat 4 - General

Thermostat 4 - Heat / C...

Thermostat 5 - General

Thermostat 5 - Heat / C...

Thermostat 6 - General

Sensor value ⊕    Value correction    Thermostat ⊖

**Value correction**

No correction ▼

No correction

+1°C

+2°C

+3°C

+4°C

+5°C

+6°C

+7°C

-1°C

-2°C

-3°C

-4°C

-5°C

-6°C

-7°C

**Thermostat:** define either the thermostat functionality is enabled. Default flags: write (W)

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1) Device location + Add - No location - x

All Enabled Disabled

Thermostat 1 - General  
Thermostat 1 - Heat / C...  
Thermostat 2 - General  
Thermostat 2 - Heat / C...  
Thermostat 3 - General  
Thermostat 3 - Heat / C...  
Thermostat 4 - General  
Thermostat 4 - Heat / C...

Sensor value ☺ Value correction Thermostat ☺ Setpoint Hysteresis Stand-by mode

**Thermostat**  
Enabled v

Flags F T R W

*Thermostat can be enabled/disabled via control object*

**Group addresses** + Add 1 bit (boolean)  
No group addresses selected

**Tags**  
No tags set

**Setpoint:** base setpoint settings. Default flags: write (W)

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1) Device location + Add - No location - x

All Enabled Disabled

Thermostat 1 - General  
Thermostat 1 - Heat / C...  
Thermostat 2 - General  
Thermostat 2 - Heat / C...  
Thermostat 3 - General  
Thermostat 3 - Heat / C...

Sensor value ☺ Value correction Thermostat ☺ Setpoint Hysteresis Stand-by mode

**Group addresses** + Add 4 byte floating point  
0/0/27 PT8 (8 PT1000 inputs/thermostats + LoRa) - Setpoint

Flags F T R W

**Tags**  
No tags set

**Hysteresis:** interval during which the status will remain as current value. Used to exclude border value instability

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1) Device location + Add - No location - x

All Enabled Disabled

Thermostat 1 - General  
Thermostat 1 - Heat / C...  
Thermostat 2 - General  
Thermostat 2 - Heat / C...  
Thermostat 3 - General  
Thermostat 3 - Heat / C...  
Thermostat 4 - General

Sensor value ☺ Value correction Thermostat ☺ Setpoint Hysteresis Stand-by mode

**Hysteresis**  
±1°C (Comfort)

- ±1°C (Comfort)
- ±2°C
- ±3°C (Night mode/Stand-by)
- ±4°C
- ±5°C (Freeze/overheat protection)
- ±6°C
- ±7°C

**Stand-by mode:** Stand-by mode / night mode. Default flags: write (W)

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1) Device location + Add - No location -

All Enabled Disabled

Sensor value Value correction Thermostat Setpoint Hysteresis Stand-by mode

Thermostat 1 - General

Thermostat 1 - Heat / C...

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Thermostat 3 - Heat / C...

Thermostat 4 - General

Thermostat 4 - Heat / C...

Group addresses + Add 1 bit (boolean)

0/0/28 PT8 (8 PT1000 inputs/thermostats + LoRa) - Stand-by mode

Flags F T R **W**

Tags

No tags set

**Heating control:** define either enable/disable heating thermostat functionality. Default flags: write (W)

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1) Device location + Add - No location -

All Enabled Disabled

Heating control Heating output Cooling control Cooling output

Thermostat 1 - General

Thermostat 1 - Heat / C...

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Thermostat 3 - Heat / C...

Thermostat 4 - General

Thermostat 4 - Heat / C...

Heating control

Enabled

Flags F T R **W**

Heating can be enabled/disabled via control object

Group addresses + Add 1 bit (boolean)

No group addresses selected

Tags

No tags set

**Heating output:** define either disable/enable heating output via group address. Default flags: transmit (T), read (R).

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1) Device location + Add - No location -

All Enabled Disabled

Heating control Heating output Cooling control Cooling output

Thermostat 1 - General

Thermostat 1 - Heat / C...

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Thermostat 3 - Heat / C...

Group addresses + Add 1 bit (boolean)

No group addresses selected

Flags F **T** **R** W

Tags

No tags set



**Cooling control:** define either enable/disable cooling thermostat functionality. Default flags: write (W)

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1)      Device location + Add - No location - ×

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All Enabled Disabled ▲

Thermostat 1 - General

**Thermostat 1 - Heat / C...**

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Thermostat 3 - Heat / C...

Thermostat 4 - General

Thermostat 4 - Heat / C...

Heating control ☑   Heating output   Cooling control ☑   Cooling output

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**Cooling control**      **Flags**

Enabled ▼      F T R W

*Cooling can be enabled/disabled via control object*

**Group addresses** + Add 1 bit (boolean)

🔍 No group addresses selected

**Tags**

🔍 No tags set

**Cooling output:** define either disable/enable cooling output via group address. Default flags: transmit (T), read (R).

PT8 (8 PT1000 inputs/thermostats + LoRa) (0.1)      Device location + Add - No location - ×

---

All Enabled Disabled ▲

Thermostat 1 - General

**Thermostat 1 - Heat / C...**

Thermostat 2 - General

Thermostat 2 - Heat / C...

Thermostat 3 - General

Heating control ☑   Heating output   Cooling control ☑   Cooling output

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**Group addresses** + Add 1 bit (boolean)      **Flags**

🔍 No group addresses selected      F T R W

**Tags**

🔍 No tags set

## LoRa General settings

**Frequency** – define the frequency LoRa will operate in. Frequency should be equal on transmitter and receiver(-s).

Frequency TX power Bandwidth Spreading Factor

**Frequency**

433 MHz
LoRa disabled
433 MHz
433.125 MHz
433.250 MHz
433.375 MHz
433.500 MHz
433.625 MHz
433.750 MHz
433.875 MHz
434 MHz
434.125 MHz
434.250 MHz
434.375 MHz
434.500 MHz
434.625 MHz
434.750 MHz

**TX power** – output power of LoRa transceiver

Frequency TX power Bandwidth Spreading Factor

**TX power**

17 dBm
17 dBm
16 dBm
15 dBm
14 dBm
13 dBm
12 dBm
11 dBm
10 dBm
9 dBm
8 dBm
7 dBm
6 dBm
5 dBm
4 dBm
3 dBm
2 dBm

**Bandwidth** – define the bandwidth of the channel. The lower the bandwidth – the lower the data rate / longer the distance. Bandwidth should be equal on transmitter and receiver(-s).

Frequency TX power Bandwidth Spreading Factor

**Bandwidth**

- 125 kHz (lower data rate, longer range)
- 125 kHz (lower data rate, longer range)
- 250 kHz
- 500 kHz (higher data rate, shorter range)

**Spreading factor** - The basic principle of spread spectrum is that each bit of information is encoded as multiple chirps. Within the given bandwidth the relationship between the bit and chirp rate for LoRa modulation may differ between spreading factor (SF) 7 to 12. Spreading factor should be equal on transmitter and receiver(-s).

Frequency TX power Bandwidth Spreading Factor

**Spreading Factor**

- SF7 (higher data rate, shorter range)
- SF7 (higher data rate, shorter range)
- SF8
- SF9
- SF10
- SF11
- SF12 (lower data rate, longer range)

### Date rates

Best case: SF7 / 500 kHz = 16ms per message (22 kbps)

Default: SF7 / 125 kHz = 62ms per message (5.5kbps)

Worst case: SF12 / 125 kHz = 1300ms per message (0.3 kbps)

2x increase in bandwidth provides 2x less air time

SF+1 takes approximately 2x more air time compared to previous SF

### LoRa Messages

**ACK mode** – message acknowledgement mode

ACK disabled - no ACK will be done (faster and less reliable communication)

ACK enabled - each message will be acknowledged (slower, more reliable)

ACK gateway mode – the node will retransmit ACK to the next node

ACK mode | Filter mode | Statistics 


**ACK mode**

ACK disabled (faster, less reliable) ▼  
**ACK disabled (faster, less reliable)**  
 ACK enabled (slower, more reliable)  
 ACK gateway mode (slower, more reliable)

**Filter mode** – define either to pass messages with F (Filter) flag enabled in object settings

**Flags**

F  T  R  W

ACK mode | Filter mode | Statistics 

**Filter mode**

No filtering ▼  
**No filtering**  
 Pass messages without filter flag  
 Pass messages with filter flag

**Statistics** – receive statistic information to group address – source address / RSSI signal level / TX power. Statistics telegram can be sent on all valid telegrams which are received by LoRa.


ACK mode | Filter mode | Statistics 

**Statistics**

Enabled (Source, RSSI, TX power) ▼

**Flags**

F  T  R  W

**Group addresses**  Add 4 byte LoRa status

✕ 0/0/3 R6 (6 Relay outputs + LoRa) - Statistics  
 Q

**Tags**

Q No tags set

Groups Devices Locations Connection helper Line scan Device scan Reports Monitor Tools

Name or address Datatype Tags All tags Any tag Location Exact Incl. sub Properties

Address	Name	Datatype	Tags	Value	Properties
0/0/1	UIO8 (8 Universal IO ports + LoRa) - Statistics	4.5. 4 byte LoRa status		0.4 / -15 dB / 17 dBm	E R P
0/0/2	UIO8 (8 Universal IO ports + LoRa) - Input 1	0.1. 1 bit (boolean)		0	E R P
0/0/3	R6 (6 Relay outputs + LoRa) - Statistics	4.5. 4 byte LoRa status		0.2 / -15 dB / 17 dBm	E R P

## LoRa Security

Define security key 1 or/and key 2 in HEX form. Up to 8 HEX characters are supported for each of the keys. Encryption keys must be equal for all LoRa devices on the same line



Encryption key 1 Encryption key 2

38 54 3A B8 0D FD 9B CF

*Up to 8 HEX characters, separated by space.  
Encryption keys must be equal for all LoRa devices on the same line*

## Notification LEDs

- During transmission you can see two LEDs on LoRa device

	Sending LoRa telegram
	Receiving LoRa telegram

- In case statistics is enabled on receiver device and CAN FT line is disconnected from it, both LEDs will light up (receiving telegram from sender, sending telegram with statistics).
- In case ACK is enabled, both orange and blue LEDs will light up.