temperature input 3222

- **18 Bit, 4-wire temperature sensing (RTD)**
- **Galvanically isolated**
- **2 Channels, multiplexed sampling**
- **Differential input**

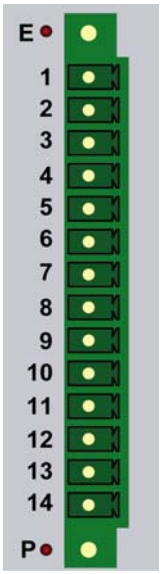
I/O

analog

input

Pinout

LED:	
0; (8)	channel 1: active
1; (9)	channel 2: active
4; (12)	channel 1: error
5; (13)	channel 2: error
E:	failure, red
P:	power supply, red



Pin	Signal
1	RL0+
2	RL0-
3	AGND
4	R0+
5	R0-
6	AGND
7	RL1+
8	RL1-
9	AGND
10	R1+
11	R1-
12	AGND
13	+24V=
14	0V

Attributes

Dataformat:
Standard integer (18-Bit) format:
262143 = T_{max}
0 = T_{min}

Applications:
18 bit temperature sensing, 2channels, 4-wire RTDs:
- @P3222L: temperature input, left slot
- @P3222R: temperature input, right slot

Related application:
16 bit temperature sensing, 2-wire RTDs:
- @P3220L: 2 channel, left slot
- @P3220R: 2 channel, right slot
- @P3420L: 4 channel, left slot
- @P3420R: 4 channel, right slot

18 bit temperature sensing, 3-wire RTDs:
- @P3221L: 2 channel, left slot
- @P3221R: 2 channel, right slot
- @P3421L: 4 channel, left slot
- @P3421R: 4 channel, right slot

16 bit temperature sensing, thermocouples:
- @P3223L: 2 channel, left slot
- @P3223R: 2 channel, right slot
- @P3423L: 4 channel, left slot
- @P3423R: 4 channel, right slot

Electrical Data

Power supply external ..... 24V= ±20%
Operating current ..... 60mA at 24V=, typical
Operating current @ctiveBus ..... 40mA at 3,3V / 0mA at 5V
Power supply protection ..... 30V overvoltage, surge

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System Information

System ID 0x18D
System adress space .....32 bit in, 32 bit out

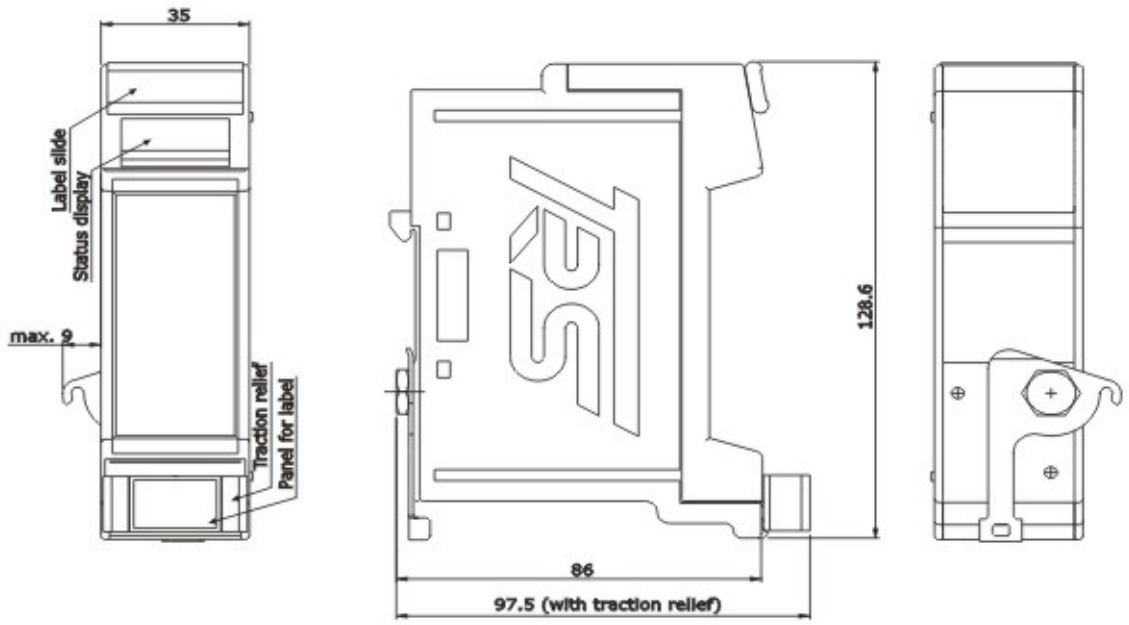
Environmental Conditions

Electromagnetic compatibility (EMC) .....EN 61000-4-2 (IEC-801-2) / EN 61000-4-4 (IEC-801-4)
Operating temperature [°C] .....0..+55
Storage temperature [°C] .....-20 .. +70
Humidity (rel) .....98 % (non condensing)
Protection class*.....IP 20 (DIN 40 050)
*The protection class is valid only with housing and connector installed

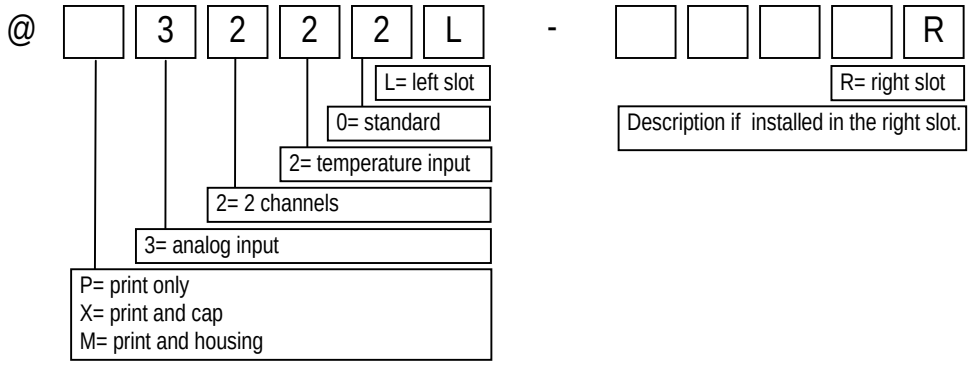
Mechanical Data **(effective if mounted in @M housing)**

Weight .....approx. 0,05 kg including connector (PCB only)
Dimension .....105mm x 80mm x 12mm (PCB only)

Drawing **(effective if mounted in @M housing)**



Ordering Key



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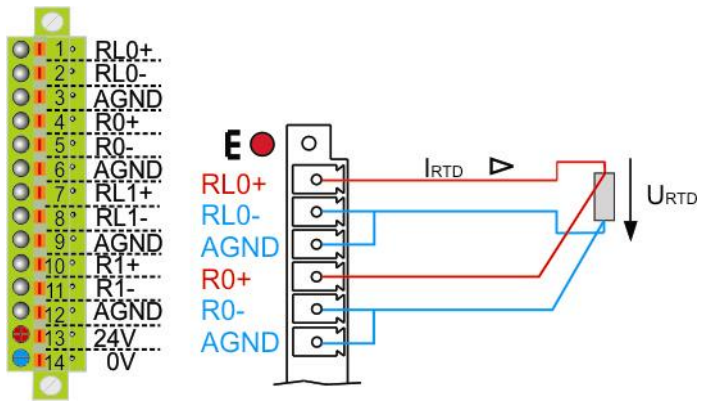
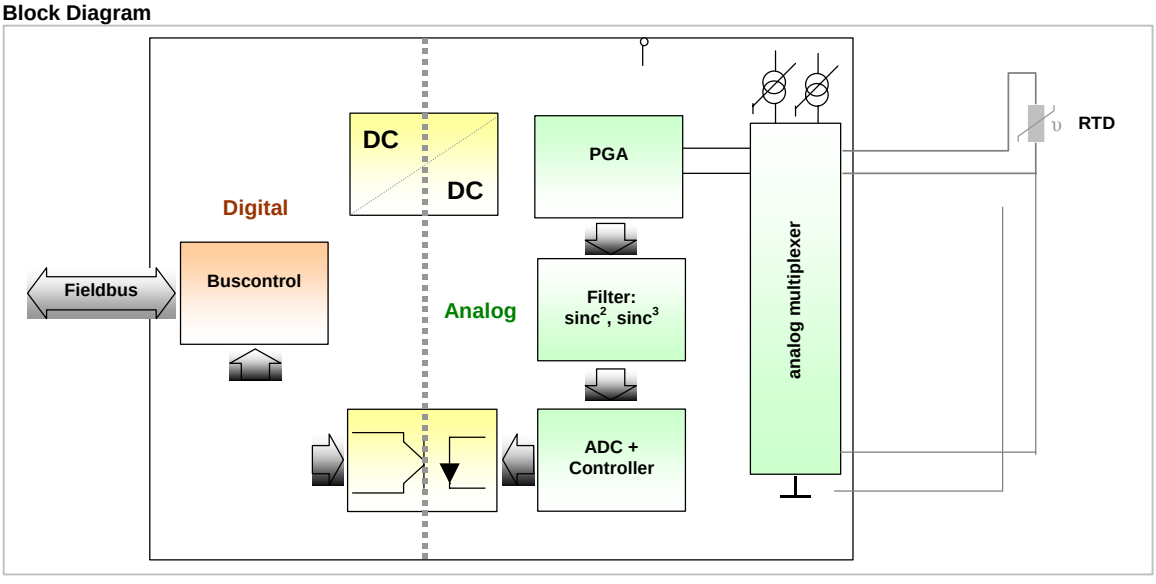
Connection



Functional description

The @P3222 temperature input module allows resistance sensors (PT, NTC, PTC) to be connected directly. All standard types of resistance temperature detectors are supported, in the range of 100Ohm up to 1KOhm nominal resistance. The internal circuitry can handle two sensors using 3-wire connection technique. Linearization over the full temperature range is realised with the aid of a microprocessor and free configurable data tables. This makes the @P3222 module a quite versatile and customizable measurement unit, not only for temperature detection, but also for simple resistance measurement. Parameterisation may be carried via the fieldbus. The default linearization-tables indeed are selected in such a way, that in most cases no configuration or alteration is needed.

Block Diagram



The measuring current (adjustable from 200µA up to 1,1mA) is switched between the input channels. RTD excitation is provided from the module by two matched current sources. When using a three-wire RTD, this method allows an equal current to flow in each RTD lead, which cancels the effects of lead resistances. Sensor malfunctions, such as broken or shorted wires, can be observed and indicated by the module.

The inputs can, if required, be scaled differently. The input range is resolved by the converter with an effective resolution of 18-Bit. In most cases this is quite enough to achieve a temperature resolution of 0.01°C. The accuracy of each channel is between +/- 1.0 °C over the sensors temperature range.

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Data Exchange (a quick overview)

System bus data during initialization

Bit	Name	Description
3 - 0	**STATUS / VERSION**	**Write**: must be set to '0001' during initialization
		Read: returns the software version
7 - 4	**not used**	No function
11 - 8	**not used**	No function
15 - 12	**TABLE 2**	**Write**: identifies the sensor connected to channel 2
		Read: returns the last valid setting
19 – 16	**TABLE 1**	**Write**: identifies the sensor connected to channel 1
		Read: returns the last valid setting
20	**not used**	No function
21	**not used**	No function
22	**ACTIVE 2**	**Write**: a logic '1' activates channel number 2
		Read: returns the last valid setting
23	**ACTIVE 1**	**Write**: a logic '1' activates channel number 1
		Read: returns the last valid setting
27 - 24	**not used**	No function
31 - 28	**HEADER**	**Write**: always write a 0xA (10dec) to enable initialisation
		Read: returns the last valid setting + DONE bit

System bus data after initialization

Bit	Name	Description
23 - 0	**TEMPERATURE**	**Write**: has no effect
		Read: the actual standardised temperature (1/100 Kelvin) of the current sampled channel
25 - 24	**CHANNEL**	**Write**: has no effect
		Read: the active channel number ('00' for channel 1 or '01' for channel 2)
27 – 26	**not used**	No function
30 - 28	**HEADER**	**Write**: changes operation mode of the module
		Read: returns the last valid setting + DONE

Temperature data

The temperature data is standardized to 1/100 Kelvin. To get the temperature in °C a conversion is necessary. Here is conversion example in C:

Temperature Data **=** ***0x85007477*** ..... // the temperature value sent by the module

Temperature Data & **=** ***0x00FFFFFF*** ..... // mask the header

Temperature Data **=** ***(Temperature Data – 27315)/100***

The result in this example would be 25.00°C.

For a detailed description of the temperature module please refer to the temperature modul user guide.

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Revision change

version	description	date
00	serie 0	07/02
01	added: Data Exchange	17/05

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