PT100 4-fold temperature measurement

Technical description

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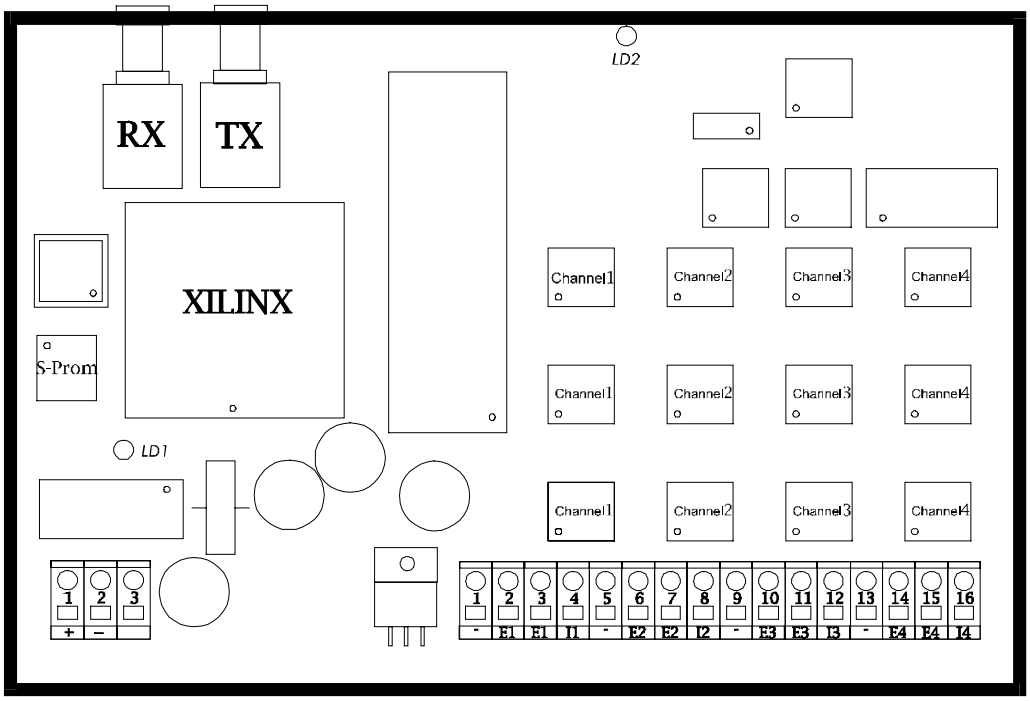


PT100

General information

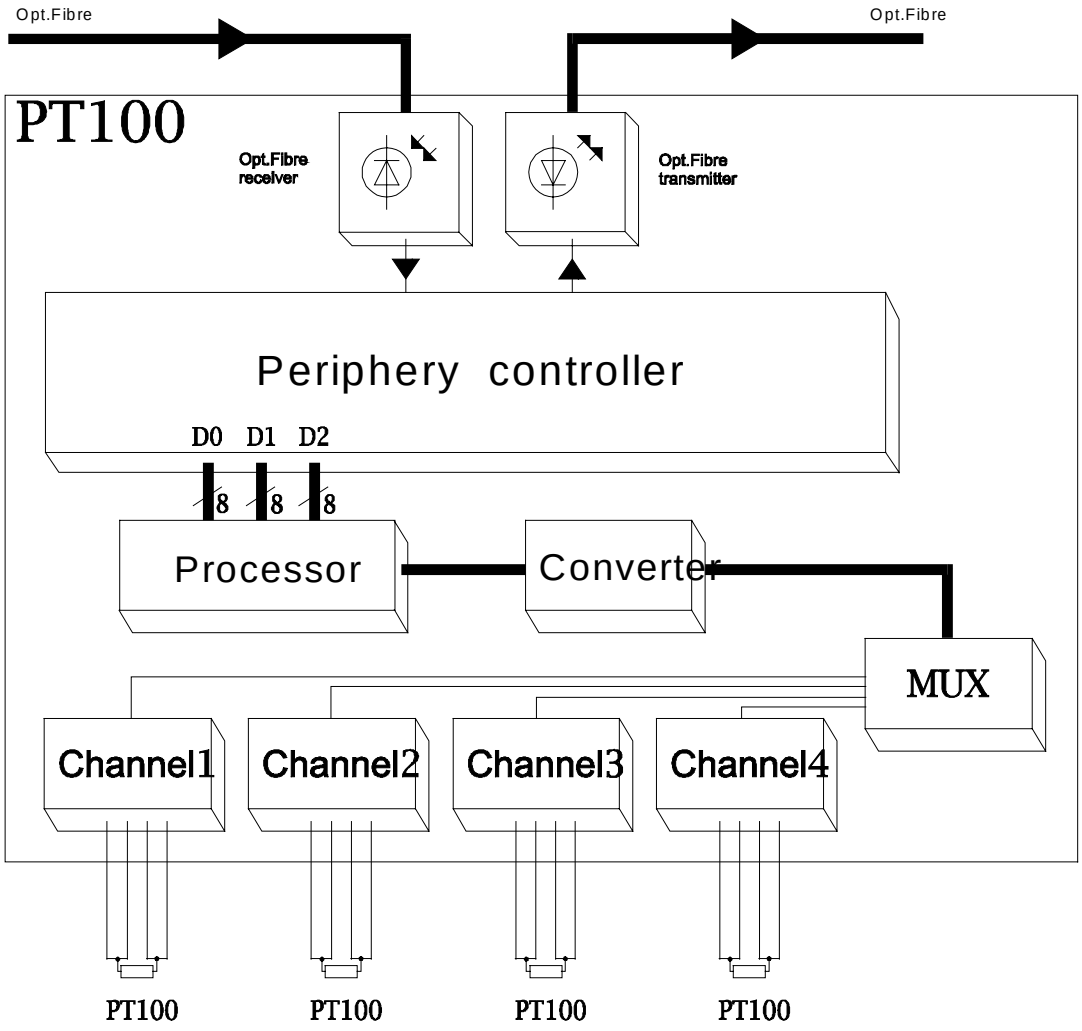
The PT100 module is a temperature measurement module for use in an II/O system. Up to four sensors (PT100) may be connected to each module.

A diagnostic LED is furnished for the II/O optical fibre guide ring:

LD1 The red 'ERROR' LED is switched on after detection of an error message (check sum, frame) and switched off after running three successive correct messages (check sum, frame) have been run.

A match LED is furnished for initial matching:

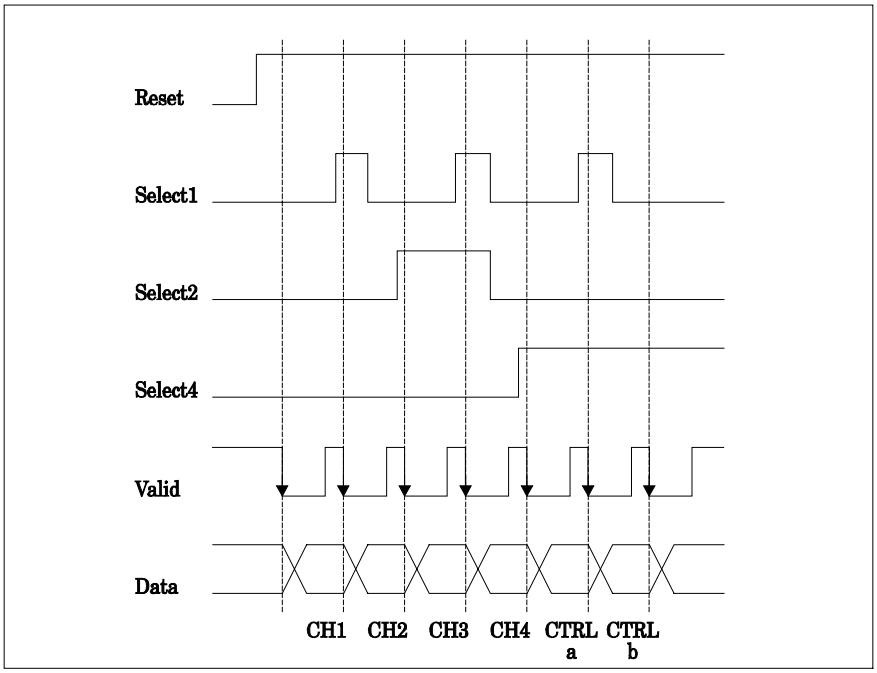
LD2 The second (green) LED is used for control purposes when matching newly connected sensors.



Block diagram

2. Software functional description

Timing diagram:



Explanation of the timing diagram:

Signal assignment to II/O message data bytes:

Reset: D2.7

Select1 (priority 1): D2.0
Select2 (priority 2): D2.1
Select4 (priority 3): D2.2

Valid: D2.3

Data: D0.0 to D0.7
D1.0 to D1.7

The restart signal is used to reset the processor to the PT100 module. The signal remains at "1" for continuous operation.

Channels are pre-selected in accordance with Select 1-4 priorities.

Select1	Select2	Select4	Significance D0, D1
0	0	0	Measurement channel 1 is selected.
1	0	0	Measurement channel 2 is selected.
0	1	0	Measurement channel 3 is selected.
1	1	0	Measurement channel 4 is selected.
0	0	1	Control channel a is selected.
1	0	1	Control channel b is selected.

Pre-selection is valid with the falling edge (1=>0) of signal "Valid" D2.3.

Control channels a and b provide a specific bit pattern at selection. This allows for monitoring of whether or not the microprocessor is active and properly operating.

Set value for control channel a: AA55 hex
Set value for control channel b: 55AA hex

The processor may be restarted by means of the D2.7 reset key if this alternating bit pattern is not provided.

3. Technical specifications

Number of channels	Four, (multiplex)
Resolution	12 bit
Measurement value display	2 byte, (ϑ x 10)
Converter range temperature	-50 to +150 degrees C 0 to +512 degrees C in progress
Monitoring	Display of two control channels for monitoring the module, reset via fibre-optic bus
Connections	Plug-in for PT100 sensor (2-wire, 4-wire)
Data port	II/O system fibre-optic light guide
Transmission rate	2.5 Mbaud, 25 µs for 32 bit
Supply voltage	24 VDC (± 10%)
Power consumption	0.1 A
Casing type	Open card carrier, snap-on device mounting rail as specified in DIN EN 50022, 50035
Dimensions (W * H * D)	168 * 111 * 65 mm
Weight	Approximately 550 g
Operating temperature	±0..+55 ºC
Storage temperature	-20..+70 ºC

4. Installation instructions

Assembly

The PT100 module is connected to the II/O fibre-optical guide ring by means of fibre-optics cable plug-in connectors (Toshiba). The maximum fibre-optical cable length to the adjacent boxes should not exceed 45 m if plastic fibre-optical light guides are used and 600 m in the case of glass-fibre. These values are only valid if bending radii of at least 30 mm are complied with when running the fibre-optical cable. No special tools are required for attaching the connectors if plastic fibre-optical light guides are used.

The Pt100 sensors are directly connected to the inputs (connector X 20) using two- or four-conductor cable (cf. wiring diagram).

Assembly of the PT100 module is performed by means of distributed configuration on the unit or in the switchgear cabinet by simply snapping it onto a device mounting rail as specified in DIN EN 50022 or DIN EN 50035.

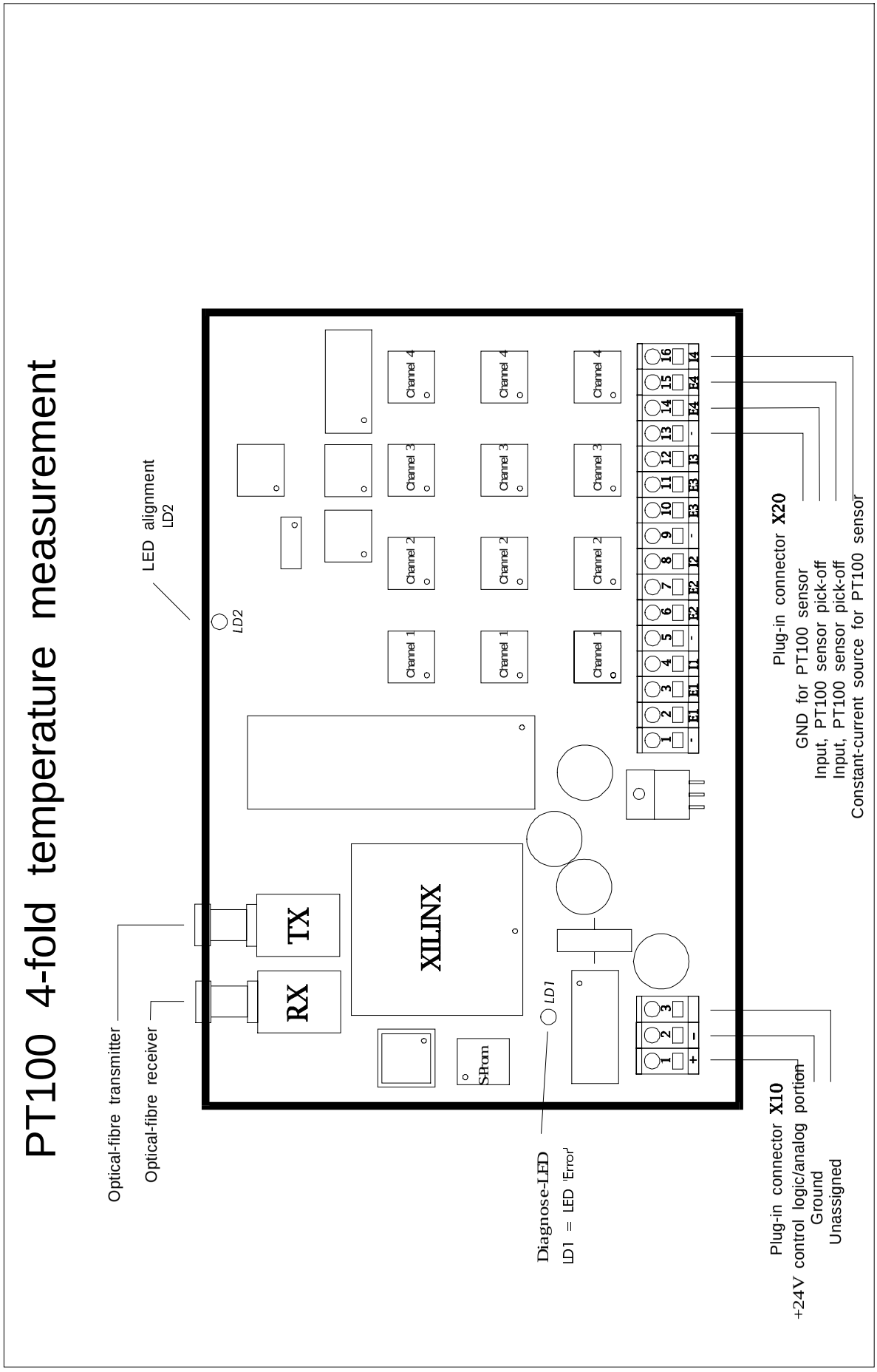
Configuration

The D0 and D1 data bytes are entered into the configuration list as inputs and the D2 and D3 are entered as outputs.

The D0 and D1 data bytes of the II/O message contain the data of the four measurement values (multiplexed).
Data byte D2 is used for selection and acceptance of the data of a measurement channel. In addition, the D2.7 key may be used to reset the microprocessor.
Data byte D3 is presently unassigned (spare slot).

Supply voltage

A tripolar connection terminal with ports for the control logic / analog portion is provided for connecting 24V supply voltage (+) and ground (-) (connector X10). Connector X10 pin 3 is unassigned.


PT100 4-fold temperature measurement
LED alignment
LD2
LD2
Optical-fibre transmitter
Optical-fibre receiver
TX
RX
XILINX
SPROM
LD1
Diagnose-LED
LD1 = LED 'Error'
Channel 1
Channel 2
Channel 3
Channel 4
Plug-in connector X20
GND for PT100 sensor
Input, PT100 sensor pick-off
Input, PT100 sensor pick-off
Constant-current source for PT100 sensor
Plug-in connector X10
+24V control logic/analog portion
Ground
Unassigned

5. Terminal diagram

Plug connection assignment and signal description

CONNECTOR X10

Plug	Pin	Signal	Description
X10	1	+	+24V supply voltage, control logic/analog portion
X10	2	-	Ground
X10	3		Unassigned

CONNECTOR X10

Plug	Pin	Signal	Description
X20	1	-	GND for PT100 sensor
X20	2	E1	Input, PT100 sensor pick-off
X20	3	E1	Input, PT100 sensor pick-off
X20	4	I1	Constant-current source for PT100 sensor (1mA)
X20	5	-	GND for PT100 sensor
X20	6	E2	Input, PT100 sensor pick-off
X20	7	E2	Input, PT100 sensor pick-off
X20	8	I2	Constant-current source for PT100 sensor (1mA)
X20	9	-	GND for PT100 sensor
X20	10	E3	Input, PT100 sensor pick-off
X20	11	E3	Input, PT100 sensor pick-off
X20	12	I3	Constant-current source for PT100 sensor (1mA)
X20	13	-	GND for PT100 sensor
X20	14	E4	Input, PT100 sensor pick-off
X20	15	E4	Input, PT100 sensor pick-off
X20	16	I4	Constant-current source for PT100 sensor (1mA)

Important: A bridge has to be inserted at the input for all of the unused channels. Open inputs are capable of affecting the values of the other channels.

Example: If a PT100 sensor is not connected to channels 2 and 4, then pin 6 has to be bridged with pin 7 and pin 14 with pin 15.