Micatrone®

Measurement converter for Pt-100 temperature sensor (Temperature transmitter)

MO-3000

Mi-204gb / 2006-09-22

APPLICATION:

The MO-3000 is designed to convert the Pt-100 sensor's resistance to a load-independent output signal 4 - 20 mA.

The converters are intended for local installation close to the sensor since the mA signal is significantly less susceptible than when transferring the measurement signal to a control room or equipment cabinet.

Examples of suitable applications are outdoor temperature measurement with output signals to equipment such as a MICATRONE; MTR-3000 temperature controller, a MVP-3000 boiler sequence controller or during temperature measurements which are transferred to a computer via a MICATRONE MQD-55 data communication unit, plus several other applications.

DESIGN:

The MO-3000/2T is a converter for a two-wire system. The supply to the converter and the signal go through the same cable. The supply comes from the receiving equipment or a separate voltage measurement device.

The MO-3000/4T has a voltage supply device built into the converter which is connected to 230 V AC.

To allow the converter to be installed locally in environments that are sometimes adverse, it is enclosed in a high-specification ABS enclosure with protection class IP65 as per EN60529.

In the event of a cable break, sensor break or sensor short circuit, the output signal will extend beyond its working range so that an indication or alarm can be emitted in an abnormal situation.

TECHNICAL DATA:

Input:
Pt-100 sensor with 2- or 3-wire connection .

Measurement range:	-50…+50°C
(standard)	0…+200°C
	0…+400°C
	0…+600°C
Sensor current:	0,8 mA

Output:

Output signal:	4...20 mA
Min.output signal:	2,2 mA
Max. output signal:	27 mA

Voltage supply:

MO-3000/2T:	8…32 VDC
	max. 36 VDC

Max. load:

$$R_b = \frac{\text{supply voltage} - 8V}{0{,}02A}\ \Omega$$

Polarity protection: integral to max. 36 VDC

Voltage supply:

MO-3000/4T:	230 VAC +/- 15%
Max. load:	1000 ohm

Measurement error:(all values Fsd,max.signal)

Calibration error:	< 0,1% or < 0,3°C
Linearity error:	< 0,15%
Temperature drift:	(zero point and measure ment range)< 0,005% / K

CONNECTION:

Cable dependence:

Sensor-Converter:	< 0,1% for cables up to 25ohm
	< 0,2% for cables up to 100 ohm
Outgoing load dependence:	< 0,01% for 1…1000 ohm

Supply voltage-dependence:

Separate supply:	< 0,01% for Δ 10 VDC
built-in supply:	no effect for 230 VAC +/-15%
Estimated max. measurement error:	< 0,3%
Estimated long-term drift:	< 0,2% a year

Error indication:

Short circuited sensor:	I_{ut} < 2,6 mA
Break in sensor:	I_{ut} > 25 mA
Break in cable to terminal 3:	I_{ut} > 25 mA
Break in cable to terminal 4 and 5:	I_{ut} < 2,6 mA

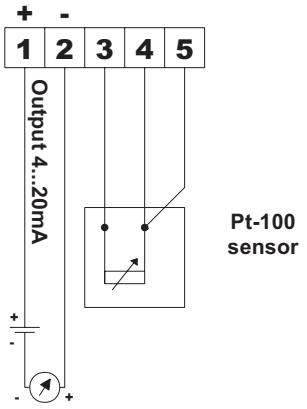
Enviroment:

Temperature:	-30°C…+60°C
Protection class:	IP65
EMC:	EN50081-1 & EN50082-2

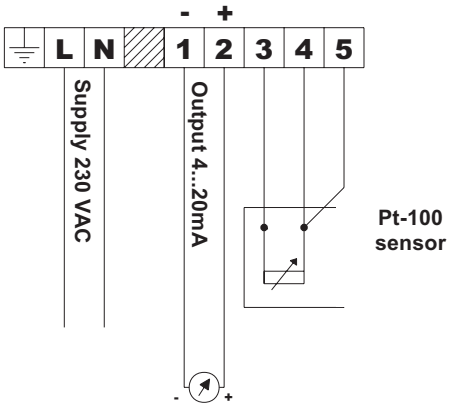
Dimensions:

HxWxD:	120 x 122 x 57 mm
Mounting holes:	110 x 90 mm (H x W)
Cable glands:	3 pcs M16x1,5

MO-3000/2T



MO-3000/4T

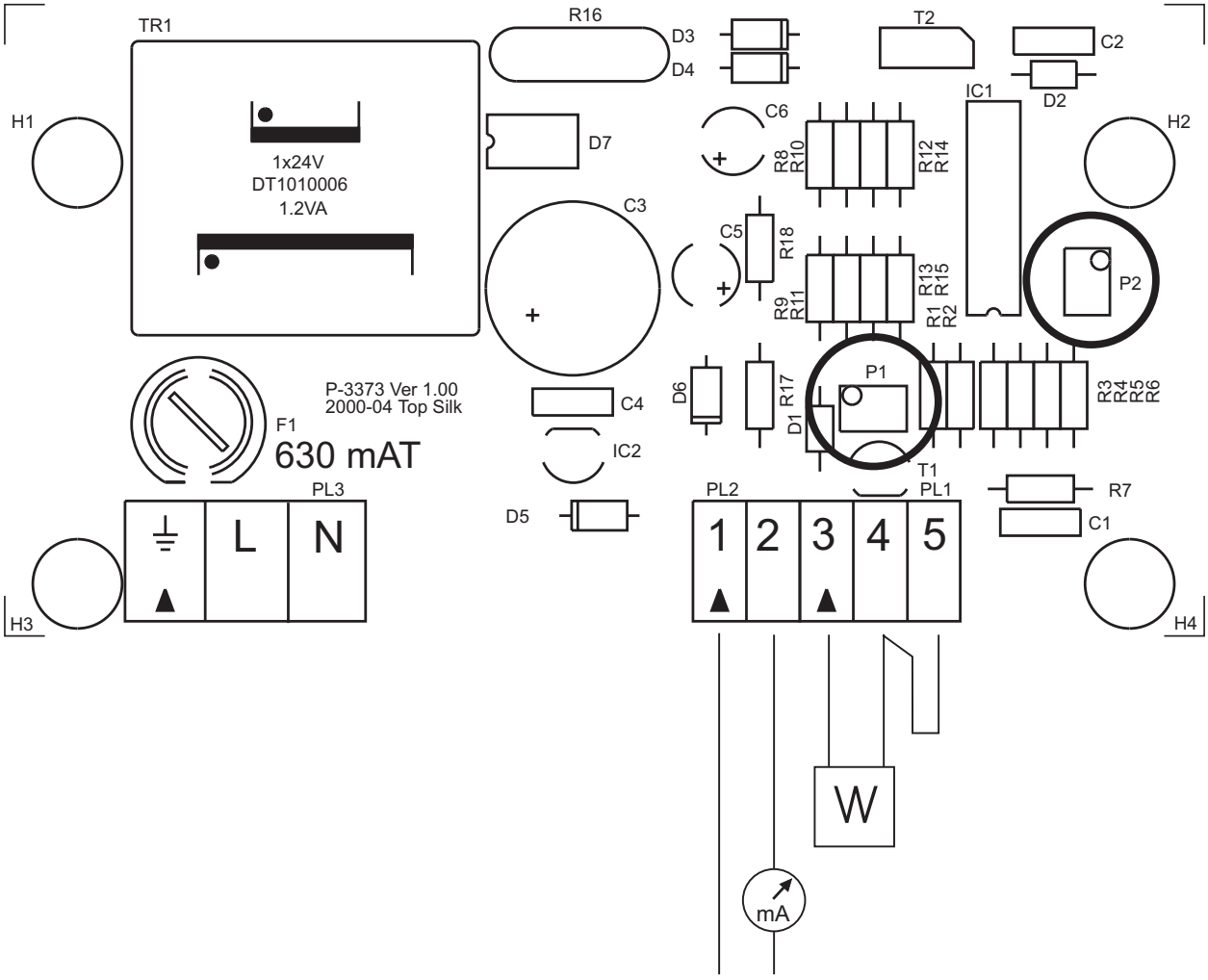


ADJUSTMENT OF ZERO POINT AND MAXIMUM SIGNAL:

Connect a resistance decade to terminals 3 and 4, short circuit between terminals 4 and 5. Connect a digital mA meter to the mA circuit.

Set the resistance decade to the measurement range's minimum value (see the table). Adjust the zero point potentiometer marked P1 to 4 mA on the mA meter.

Set the resistor decade to the measurement range's maximum value (see the table). Adjust the maximum signal point potentiometer marked P2 to 20 mA on the mA meter.



RESISTANCE TABLE FOR PLATINUM RESISTOR Pt-100

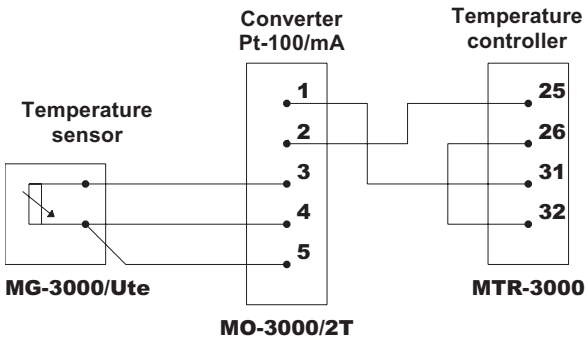
Pt-100 = 100 Ω at 0 °C. All resistance values in Ω.										
°C	-9	-8	-7	-6	-5	-4	-3	-2	-1	0
-40	80,65	81,04	81,44	81,83	82,23	82,63	83,02	83,42	83,81	84,21
-30	84,61	85,00	85,40	85,79	86,19	86,59	86,98	87,38	87,77	88,17
-20	88,57	88,96	89,36	89,75	90,15	90,55	90,94	91,34	91,73	92,13
-10	92,52	92,92	93,31	93,71	94,10	94,49	94,89	95,28	95,68	96,07
0	96,46	96,86	97,25	97,64	98,04	98,43	98,82	99,21	99,61	100,00
°C	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
0	100,00	100,39	100,78	101,17	101,56	101,95	102,34	102,73	103,12	103,51
10	103,90	104,29	104,68	105,07	105,46	105,85	106,24	106,63	107,02	107,40
20	107,79	108,18	108,57	108,96	109,35	109,73	110,12	110,51	110,90	111,28
30	111,67	112,06	112,45	112,83	113,22	113,61	113,99	114,38	114,77	115,15
40	115,54	115,93	116,31	116,70	117,08	117,47	117,85	118,24	118,62	119,01
50	119,40	119,78	120,16	120,55	120,93	121,32	121,70	122,09	122,47	122,86
60	123,24	123,62	124,01	123,39	124,77	125,16	125,54	125,92	126,31	126,69
70	127,07	127,45	127,84	128,22	128,60	128,98	129,37	129,75	130,13	130,51
80	130,89	131,27	131,66	132,04	132,42	132,80	133,18	133,56	133,94	134,32
90	134,70	135,08	135,46	135,84	136,22	136,60	136,98	137,36	137,74	138,12
100	138,50	138,88	139,26	139,64	140,02	140,39	140,77	141,15	141,53	141,91
110	142,29	142,66	143,04	143,42	143,80	144,17	144,55	144,93	145,31	145,68
120	146,06	146,44	146,81	147,19	147,57	147,94	148,32	148,70	149,07	149,45
130	149,82	150,20	150,57	150,95	151,33	151,70	152,08	152,45	152,83	153,20
140	153,58	153,95	154,32	154,70	155,07	155,45	155,82	156,29	156,57	156,94
150	157,31	157,69	158,06	158,43	158,81	159,18	159,55	159,93	160,30	160,67
160	161,04	161,42	161,79	162,16	162,53	162,90	163,27	163,65	164,02	164,39
170	164,76	165,13	165,50	165,87	166,24	166,61	166,98	167,35	167,72	168,09
180	168,46	168,83	169,20	169,57	169,94	170,31	170,68	171,05	171,42	171,79
190	172,16	172,53	172,90	173,26	173,63	174,00	174,37	174,74	175,10	175,47
200	175,84	176,21	176,57	176,94	177,31	177,68	178,04	178,41	178,78	179,14
210	179,51	179,88	180,24	180,61	180,97	181,34	181,71	182,07	182,44	182,80
220	183,17	183,53	183,90	184,26	184,63	184,99	185,36	185,72	186,09	186,45
230	186,82	187,18	187,54	187,91	188,27	188,63	189,00	189,36	189,72	190,09

°C	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
240	190,45	190,81	191,18	191,54	**191,90**	192,26	192,63	192,99	193,85	193,71
250	194,07	194,44	194,80	195,16	195,52	195,88	196,24	196,60	196,96	197,33
260	197,69	198,05	198,41	198,77	199,13	199,49	199,85	200,21	200,57	200,93
270	201,29	201,65	202,01	202,36	202,72	203,08	203,44	203,80	204,16	204,52
280	204,88	205,23	205,59	205,95	206,31	206,67	207,02	207,38	207,74	208,10
290	208,45	208,81	209,17	209,52	209,88	210,24	210,59	210,95	211,31	211,66
300	212,02	212,37	212,73	213,09	213,44	213,80	214,15	214,51	214,86	215,22
310	215,57	215,93	216,28	216,64	216,99	217,35	217,70	218,05	218,41	218,76
320	219,12	219,47	219,82	220,18	220,53	220,88	221,24	221,59	221,94	222,29
330	222,65	223,00	223,35	223,70	224,07	224,41	224,76	225,11	225,46	225,81
340	226,17	226,52	226,87	227,22	227,57	227,92	228,27	228,62	228,97	229,32
350	229,67	230,02	230,37	230,72	231,07	231,42	231,77	232,12	232,47	232,82

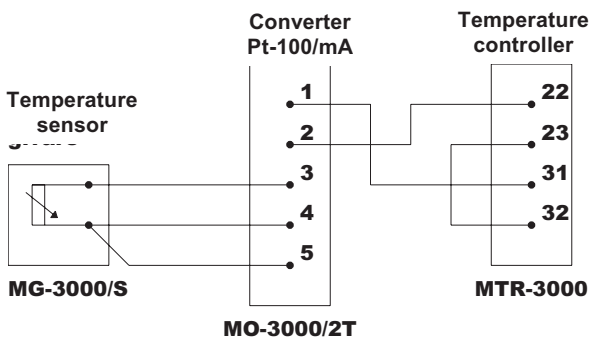
Exampel: **244°C=191,90Ω**

Permitted tolerances: 0 °C = ±0,3 °C och 0,1 Ω
100 °C = ±0,6 °C och 0,25 Ω
150 °C = ±0,9 °C och 0,3 Ω
200 °C = ±1,2 °C och 0,45 Ω

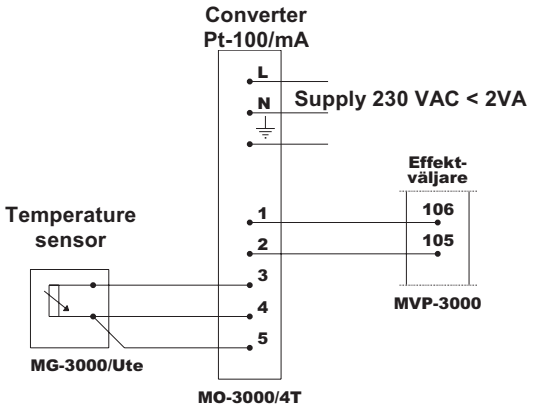
APPLICATION EXAMPLES:



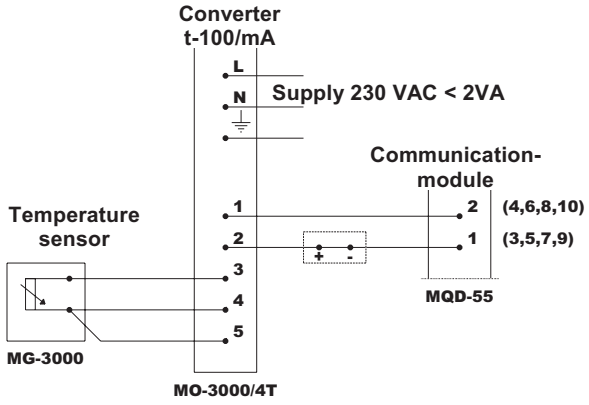
1. Outdoor temperature measurement for MTR-3000 temperature controller



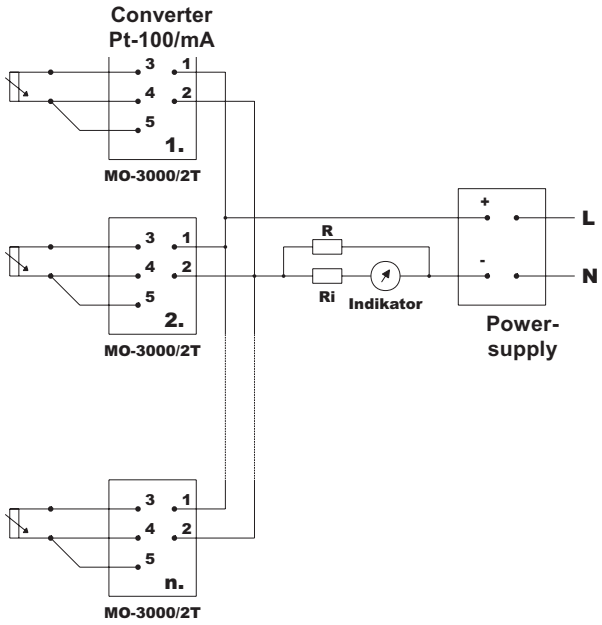
2. High temperature measurement for MTR-3000 temperature controller



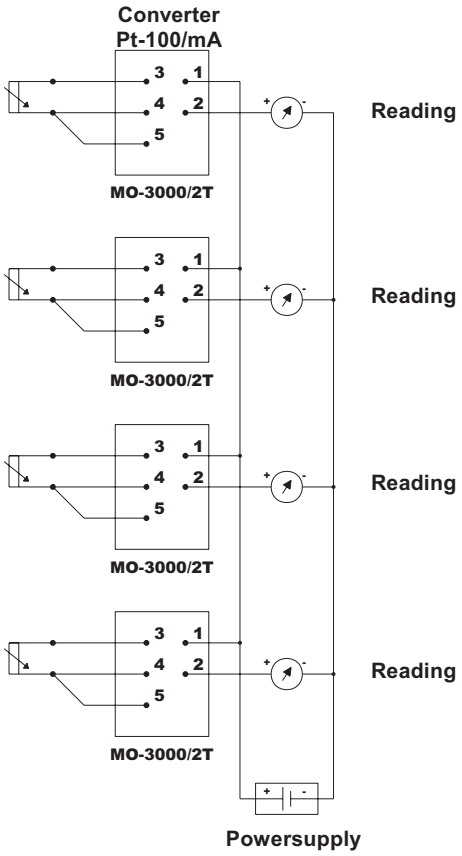
3. Outdoor temperature measurement for MVP-3000 boiler sequence controller



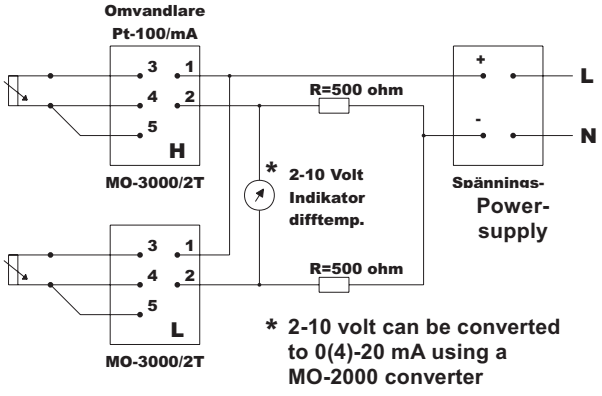
4. Temperature measurement transferred to computer via MQD-55



6. Mean value of several measurements



5. Voltage measurement for several converters from a voltage measurement device



7. Temperature difference

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