Instruction and Operating Manual

Temperature Measurement Instrument

Digitemp

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Improvements or instrument changes which have been added after this document was printed are found on one or more pages which are enclosed at the end of this manual.

We ask you to take note of these extra sheets.

Hagen, 09.08.99



On all instrument boards are electronic components that can be damaged through static discharge.

These boards should only be changed or set by qualified personnel who are familiar with these electrostatic components. The necessary saftey guideline and security concepts have to be kept through all work on this equipment.

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1. Introduction

The instrument generation unites the known industrial-minded version and reliability with perfect measurement data processing. The use of most modern components combined with a system-orientated software guarantees optimum precision and operation reliability.

The instrument electronics consisting of plug-in function components even allows an optionextension by plug-in modules and thus a later re-equipment.

Heraeus Electro-Nite measurement instruments of the series **Digitemp** are fitted with the possibility of different information-, data- and signal control outputs. They allow operation of analog and digital peripheral instruments belonging to our product line or of any other instrument of your choice.

Already the standard version offers a serial data output rated for **Heraeus Electro-Nite** digital displays and digital recording instruments.

For the superior central measurement data recording by central computers, proven standard interfaces or interfaces according to customers specifications can be supplied.

Heraeus Electro-Nite temperature measurement instruments are system-orientated.

Extension component groups and a large number of peripheral additional instruments enable complex measurement systems of up to 15 measurement stations whereby even individual customer wishes may be considered.

The universal instrument design allows, beyond this, even other applications such as permanent temperature measurement by using usual thermocouples of different calibration types.

Temperature sensors of our production- and supply line are suitable accessories for our instrument technology. The **Heraeus Electro-Nite** product line thus offers the whole range of temperature measurement applications from one hand.

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2. Field of Application

The immersion temperature measurement instrument **Digitemp** is used for temperature measurement in steel-, cast iron, aluminium and non-metal melts. Temperature recording is made by using suitable immersion lances with pertinent immersion probes or thermocouples. By the possibility of continuous measurements and the EMF-ranges, linearised over the whole temperature range, always new application fields, not only restricted to metal melts, are found.

3. Short Description

Heraeus Electro-Nite immersion temperature measurement instrument **Digitemp**, available in several versions, are independent temperature evaluation instruments. They are mainly used for immersion temperature measurements.

According to this main application the function process of these instruments is automatic and the operation is suitable and reliable. The operator of immersion temperature measurement instruments has only to take care of the immersion lance connected to the instrument and of the immersion of sensors. If power supply is available, the measurement instrument is ready to operate, without the need to introduce the measurement by manual selection.

Signal lamps mounted to the front panel of instrument show the working- and measurement sequences. Signal lamp "ready" (green) signals measurement's readiness of instrument by the sensor being put-on the lance. Signal lamp "measurement" (yellow) signals the measurement process during its hot sequence as well as the calculation process of the instrument. Signal lamp "complete" (red) displays measurement completion. For the operator this will be the signal to remove the sensor out of the melt.

The microprocessor-controlled central unit of the instrument guarantees an optimal evaluation of the E.M.F. The temperature curve detection is made by mathematical tolerance comparison with formation of mean value. The calculated temperature value is displayed by a well-readable sharp-outlined digital display and stored until the next measurement takes place. A possible failure during the measurement sequences, e.g. failure measurement, is signalled by the red signal lamp and additionally digitally displayed. In parallel to signal information "complete" and "failure measurement" the instrument offers a signal contact output by a solid-state relay 10-230V AC/ 10 mA - 1 A for the control of an acoustic signal as standard.

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4. Technical Data

Measurement principle: Measurement value processing is microprocessor-controlled

Evaluation process with digital differentiation and mean value

formation

Measurement ranges: four internal switchable measuring ranges, arithmetically

linearised, according to IEC 584 DIN 43710/IPTS 68 BS 4937

Type S (Pt-10% Rh / Pt) 400 - 1800°C

Type R (Pt-13% Rh / Pt) 400 - 1800°C

Type B (Pt-30% Rh / Pt-6% Rh) 600 - 1900°C

Type K (Ni-Cr / Ni) 200 - 1400°C

50 - 1400°C for continuous measurement

Operation function: Temperature/continuous measurement, internal switchable

Application immersion

temperature measurement: Temperature initial value internally adjustable at 100°C-steps

within the range 400 - 1100°C

Application continuous

temperature measurement: Function continuous temperature measurement

Input resistance: approx. 30 KOhm/mV

Temperature display: Display in °C, internal switchabel on °F LED 4-digit,

Display height 20 mm

Type **DTK01-A-II** (LED 4-digit, display height 50 mm)

Reference temperature: 0 °C with reference junction correction

Resolution: $1 \, ^{\circ}\text{C} / 1 \, ^{\circ}\text{F}$

Calculation accuracy: 0,5 °C

Measurement accuracy: ± 1 °C

Measurement sequence

display: Signal lamps in the front panel "ready", "measurement" and

"complete"

Signal output: potential-free solid-state contact "complete" 10-230V AC/ 10

mA-1A

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Temperature Measurement Instrument **Digitemp**

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Data output: Temperature and measuring place outputs as TTY, 20 mA

current loop with busy/ready-control, transmission rate:

300 baud,

character frame: 1 start bit, 7 data bits, 1 parity bit (even),

1 stop bit

for DELTAPRINT-printer and as option for computer.

Instrument connections: Plug-in input and output at rear of instrument

Type DTK01-A-II instrument inputs and outputs on plug-in

terminals

Operating data: Current supply 230/115 V, + 10%/- 15%, 50/60 Hz

Power consumation approx. 16 VA, Ambient temperature 0 - 50°C

Housing: specific technical data are indicated under chapter 21

Safety reference: This instrument comply with DIN VDE 0701, repair, modifica-

tion and test of electrical instruments

EMC-reference: This instrument come up suitable to EC-instruction 89/336/EEC

to the standard of EMC compability "disturbance sending EN

50081-2" and "disturbance immunity EN 50082-2"

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5. Installation Instructions

Immersion temperature measurement instruments **Digitemp** are of mobile type and most-resistant to shocks.

Permitted ambient temperature is 0 bis +50 °C.

It is to be avoided that ambient temperatures, especially caused by radiant heat, are exceeded. All cables leading to instrument have to be stress-relieved.

5.1. Digitemp, bench-model housing type DTK 01-T-II

Immersion temperature measurement instrument is to be installed within sight range of operation staff in order to ensure good readability. The instrument should be installed at place where appropriate protection against dust and dammages, caused by external influences, is guaranteed. The housing is of protection type IP 41.

Dimensional drawing see chapter 21

5.2. Digitemp, stationary wall-mounting version type DTK 01-A-II

This type of instrument in steelwork's proven, rugged version is protected against dust and splash water. The housing is of protection type IP 65. Instrument is fixed by screws M8 to M10 at the respective mounting brackets.

Dimensional drawing see chapter 21

5.3. **Digitemp**, stationary version for panel-mounting type **DTK 01-S-II**

The instrument - 1/2 19" or 1/1 19" - is to be front-mounted into switch-panel cut-out. By 2 catches, entering into lateral holes, the instrument is screwed to the switching panel from rear. Dimensional drawing see chapter 21

5.4. **Digitemp**, stationary version open 19"-rack-mounting type **DTK 01-E-II**

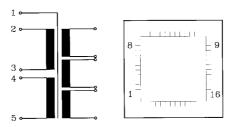
This type is provided for standardised 19"-rack systems. The instrument is mounted by 4 screws M6 x 20 mm - or similar - from front side. For this purpose 4 cage nutes M6 are to be fixed at the respective places in the 19"-board.

Dimensional drawing see chapter 21



Conversion 230V/115V

The conversion of the measuring instrument from 230V to 115V 50/60Hz supply voltage (or vice versa) is possible by re-soldering a jumper on the transformer.



230 V: Connection to 2 and 5, jumper from 3 to 4

115 V: Connection to 2 and 3, jumper from 2 to 4 and 3 to 5

Delivery Condition: see Instrument Label

6. Protection Regulations

Connections of plugs or terminals have to be made according to regulations VDE 0100 "Regulations for erection of power plants of rated voltages less than 1000 V".

6.1. Instrument version Digitemp Typ DTK 01/02-T/S/E-II

With this instrument type an additional connection to protection earth is not necessary. In this case, the main supply line is provided with protective earthing.

6.2. Instrument version Digitemp Typ DTK 01-A-II

With the wall-mounting version protection earth "PE" is to be connected to terminal X0/3.



Attention!

Before you open the instrument it is absolutely necessary to totally switch-off the instrument or to pull-out main plug. It has to be considered that possibly connected power consumers (horn, ext. signalling) have their own power supply which must also be switched-off. Works with power switched-on must only be executed by skilled staff and with greatest care.

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7. Maintenance Instruction

As a result of its fully electronical construction, the temperature measuring instrument is free of maintenance and wear and tear. Since the measurement lances suffer under high thermal and mechanical charge, it is however advisable, to weekly check the measuring system with all peripheral equipments to ensure an accurate measuring value calculation.

For a calibration and function test for both the measuring equipment and the lance, we recommend the use of our lance and calibration control instrument type **CHECKMATE**. In addition to the calibration control it is also possible to control the isolation of the lance and the compensating cable. If it is necessary to change the calibration or the settings for the calibration instruction, see chapter 17.



Attention!

Before opening the instrument switch off the current supply, the supply for the horn and for the signalisation, if connected.

Nearly all important parts of the measuring instruments can be replaced by plug-in or screw systems. As a result of this, the user is able to repair the instrument or add parts to it himself. The electronical boards and the modules should be handled with extreme care; damage or deformation of components should be avoided.

In case of a repeat order for components, please always specify:

The instrument type, instrument serial number and the programm number on the E-PROM label.

8. Putting into Operation

Digitemp is ready to operate until the main cable and immersion lance are connected, but the instrument must run one hour to reach the guaranted accuracy. Readiness of instrument is indicated by four minus signs on the digital display.

8.1. **Digitemp** type **DTK 01/02-T/S/E-II**

With this instrument type, the main cable is connected to the rear line input-socket. The 2-pole main switch is contained in the front-mounted green "ready"-light.

8.2. Digitemp type DTK 01-A-II

With this type the main cable is put through the PG 13.5 screw, located at the bottom part and then connected to the left, plug-in terminal block X0, 1=L1, 2=N, 3=PE.

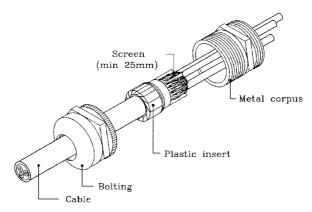
The instrument is switched-on by the illuminated 2-pole main switch which is to be found at the bottom part of housing.





8.3. EMC-measurements that should be noticed by customer

- By the wall mounting housing DTK 01-A the mains lead has to be introduced through the right mounted PG-screwing up. The Protection Earth PE (green/yellow cable) is to be connected directly to PE-earthing bloc.
- All signal leads have to be screened. The screen has to be fixed so that it can be packed together between plastic insert and metal corpus (see picture). To get a safe substance contact the screen should have a length of 25 mm.
- \square The connecting cable should be as short as possible.
- ☐ Inexpert fixing of building unit to the housing may lead to a worsening of EMC-protection.



Make sure that all cable shieldings are to be connected at the stress relief of the plug of Digitemp (Type DTK 01/02-T/S/E).

9. Description of Function Check

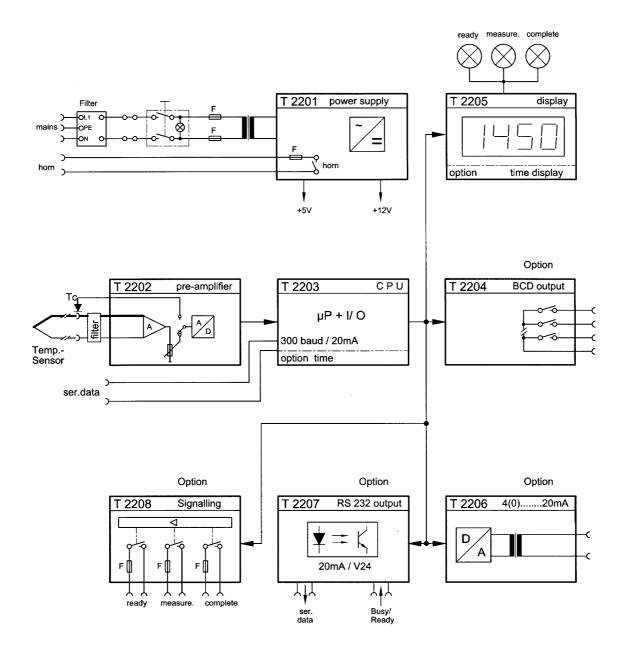
A quick and reliable checking and function control of the whole immersion lance can be made by the Heraeus Electro-Nite lance checking and calibration control instrument type Checkmate.

By this instrument it is possible to simulate temperatures and the measurement control "Ready", "Measurement", "Complete".

Display is stored until a new measurement takes place. Checking of additionally connected instruments is also guaranteed by this function test. If checkings of measurement systems and lance are positive, perfect measurements by using immersion probes can be expected.

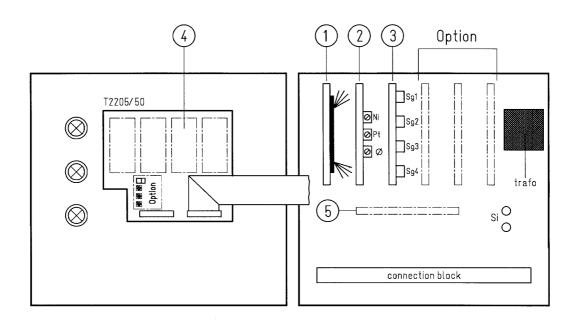
The factory-set basic setting of instruments are based on pragmatical values. It is possible, however, to adapt these settings to specific requirements the customer may have.

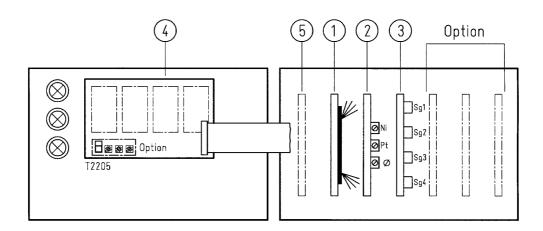
10. Block Circuit Diagram





11. Boards Layout Diagram





Standard Boards

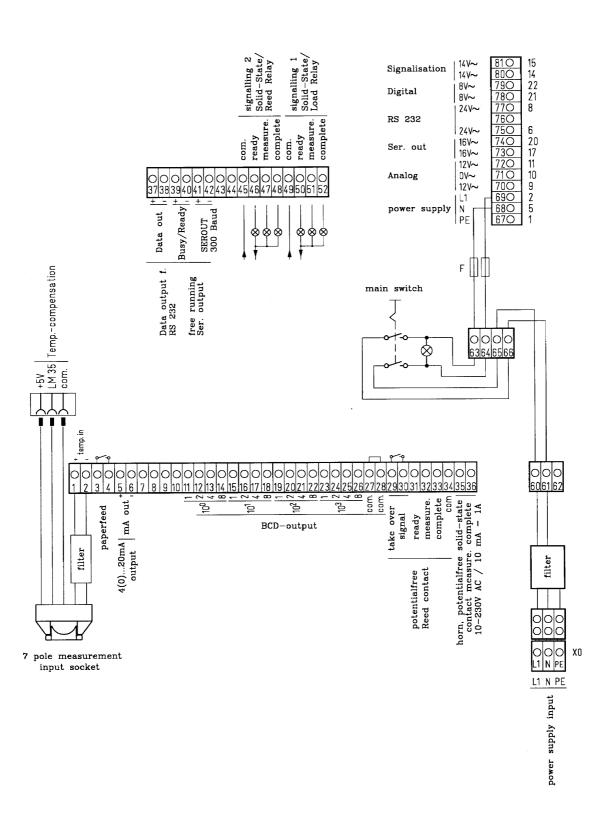
1 = T 2201 power supply 2 = T 2202 pre-amplifier 3 = T 2203 CPU board 4 = T 2205 display

Optional Boards

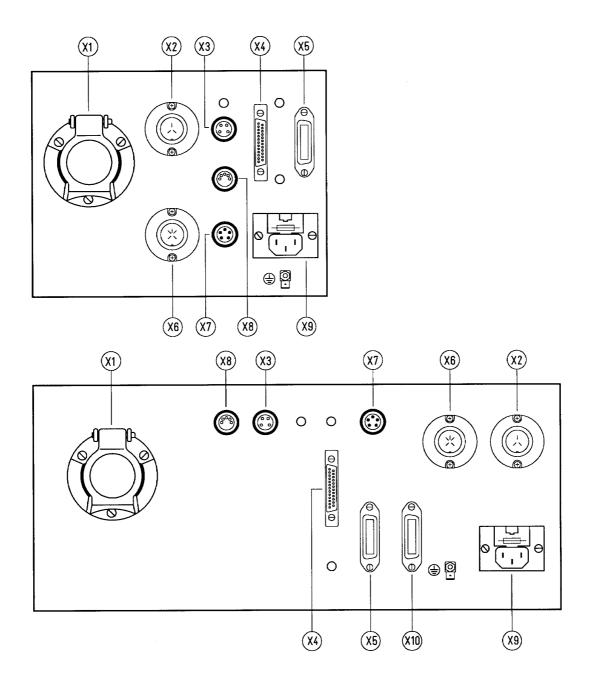
5 =

T 2204 BCD-output T 2206 mA analog output T 2207 serial RS 232 / V24 output T 2208 signal-output

12. Connection Block DTK-A



13. Rear Panel of Housing



X1 = 7-pole measurement input

X2 = measurement complete-contact by solid-state relay 10-230 V AC 10 mA - 1 A.

X3 = serial standard output 300 baud

X4 = RS 232 / V24 output

X5 = BCD-output (1)

X6 = signal output 250V, 2A max.

X7 = signal output Reed-Relay

X8 = 4(0) - 20 mA-analog output

X9 = main input with 2 fuses

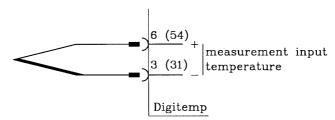
X10 = BCD-output (2)

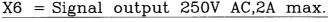
14. Pin Assignment

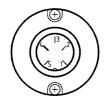
external view

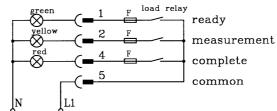


X1 = 7-pole measurement input

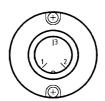


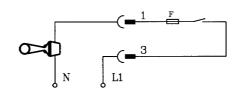






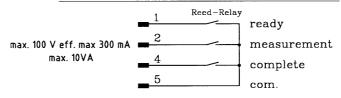
X2 = measurement complete contact 10-230V AC, 10 mA-1A





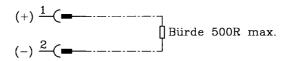
X7 = Signal output Reed-Relay





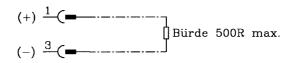
X3 = serial standard output 300 baud, 20mA

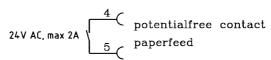




X8 = 4 (0)....20mA-Analogoutput

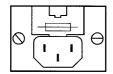






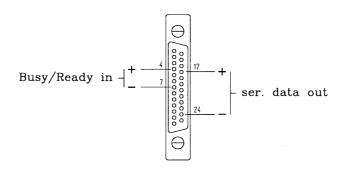
Heraeus
Electro-Nite

X9 = power supply input with 2 fuses

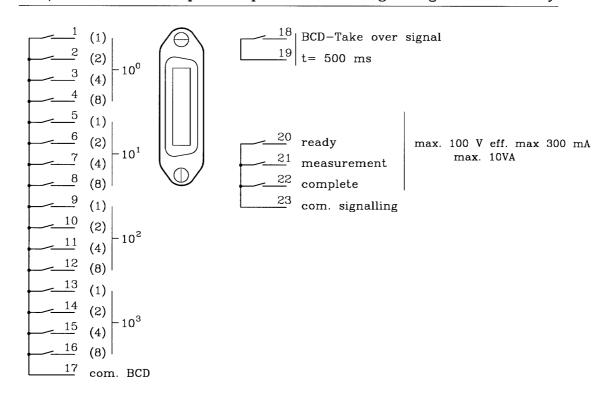


Fuse = 0,8A 230V AC Fuse = 1,6A 115V AC

X4 = RS232 output 20mA/24V with Busy/Ready control



X5 / X10 = BCD-output temperature with signalling via reed relay

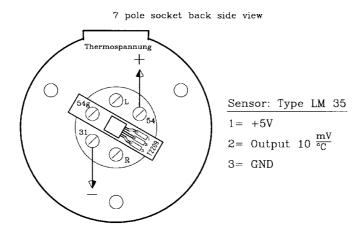


15. Description of Standard In- and Outputs

15.1 Thermocouple-input

The compensating- or thermocouple cable is connected to 7-pole measuremnt input plug at terminals 54 for plus (+), as well as 31 or minus (-).

The respective flanged measurement input socket contains an installed electronic cold junction compensation (0 $^{\circ}$ C). A compensating cable , suitable for thermocouple to measurement input. A cable adjustment is not necessary because of the high input resistance of instrument.



15.2 Signal output

At the end of a measurement sequence the potentialfree closing contact "measurement complete" is available - even with failure measurement - for optical or acoustic signal instruments. Load capacity of solid-state contact is 10-230~V~AC~/~10~mA - 1~A.

The solid-state relay with 2 A in-line micro-fuse is located on power supply board T2201.

15.3 Data output

The **Digitemp** is equipped with a free-running serial data output as standard. This output is mainly intended for driving **Heraeus Electro-Nite**-peripheral instruments like printer, display or so. It is possible, however, to control computers with respective specifications via this output. Data output is made **after** "measurement completed" with the following specifications: TTY CL-20 mA, imprinted direct current, burden max. 500 Ω , 300 baud, 1 start bit, 7 data bits, 1 parity bit (even), 1 stop bit.

All characters set on the CPU-board by DIP-switches are put out:

Temp., measurement station, charge-no., date and time as well as all control signs for connection of a **Heraeus Electro-Nite** printer type **Deltaprint.**

Data telegrams see technical appendix.



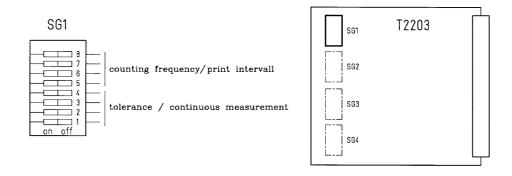
16. Setting Instruction of internal switches

Description and Setting Instructions of Operation-data Selection Switches

On the **CPU-board T2203** there are **four 8-pole** Dual-In-Line-Switches - called switch-groups SG1 - SG4 - , serving for optimization of a single instrument as well as for the formation of a single instrument as well as for the formation of multi-station measurement systems.

For security reasons, switches should be set to their respective position before the instrument is switched-on.

Setting Instructions DIP-Switches SG1



6.1. Counting frequency / Tolerance

Steadiness of stable phase at the end of an immersion temperature measurement (temp.-plateau) is determined by different criteria (bath movements, unstable lance guidance, etc.). Limitation of these influences can be achieved by setting a nominal value (differentiation) consisting of a time- and temperature difference.

The set tolerance value determines the permitted temperature deviation in °C for the period of set measurement cycles (counting frequency).

	Counting frequency (plateautime in sec.)										
SG 1	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5	
8	off	off	off	off	off	off	off	on	on	on	
7	off	off	off	on	on	on	on	off	off	off	
6	off	on	on	off	off	on	on	off	off	on	
5	on	off	on	off	on	off	on	off	on	off	



	Tolerance in °C											
SG 1	1	2	3	4	5	6	7	8	9	10	11	
4	off	off	off	off	off	off	off	on	on	on	on	
3	off	off	off	on	on	on	on	off	off	off	off	
2	off	on	on	off	off	on	on	off	off	on	on	
1	on	off	on	off	on	off	on	off	on	off	on	

Example:

SG 1	Counting frequency 1,5 sec. plateautime	Tolerance 3 °C
8	off	
7	off	
6	on	
5	on	
4		off
3		off
2		on
1		on

With the shown table the **Digitemp** is selecting a series of 3 values (counting frequency) within the range of stable temperature plateau, total deviation of these values must not be higher than 3 °C (tolerance).

If 3 temperature values are found within the requiered tolerance, a mean value is being calculated. This value is stored and displayed as result until next measurement takes place.

If temperature plateau remains within tolerance during 3 measurement cycles (one cycle = approx. 500 ms), a max. deviation of ≤ 1.5 °C /sec. is given with the shown example.

If **Digitemp** cannot find any values within determined tolerance range measurement will be terminated as being false after a superimposed time. (display ---> [----])

If other values than those indicated in the table "counting frequency" are selected, counting frequency will automatically be set to "5".

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16.2. Continuous measurement

If other values than those indicated in the table "tolerance" are set, e.g. all switches to "on", a continuous temperature measurement can be made.

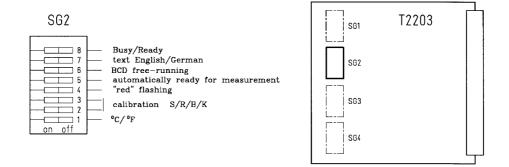
Curve evaluation and time control but not linearization will be out of function then.

It is possible to select the print intervall with switch SG1.5 - SG1.8 in this mode. The print intervall is the time between two printouts via the serial data outputs.

	Print intervall in seconds															
SG1	10	15	20	25	30	35	40	45	50	55	60	90	120	180	300	600
8	on	on	on	on	on	on	on	on	off							
7	on	on	on	on	off	off	off	off	on	on	on	on	off	off	off	off
6	on	on	off	off	on	on	off	off	on	on	off	off	on	on	off	off
5	on	off	on	off	on	off	on	off	on	off	on	off	on	off	on	off

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Setting Instructions DIP-Switch SG2



16.3. **Busy / Ready**

If a peripheral instrument (e.g. printer or computer) is connected to controlled signal output, the busy/ready signal will control the data telegram to be put-out.

If the peripheral instrument is not ready to takeover data, it will lock data output of **Digitemp** by "busy"-signal. If it is "ready" the measured data will be put-out to peripheral instruments.

This Busy/Ready-control can be switched-on or switched-off.

If control is switched-off, data will be put out serially without interrogating busy/ready-signal.

Switch SG2	B/R ''off''	B/R "on"
8	on	off

16.4. Text English/German

Serial data output can be in english/french (place) or german (Ort).

Switch SG 2	english/french	german
7	on	off



16.5. BCD free-running / pulsed

BCD-output, available as option, can be be set to "free-running" or to "shortly pulsed" at the end of a temperature measurement (during computer takeover-command).

Switch SG 2	BCD free-running	BCD pulsed
6	on	off

16.6. Measurement Readiness

If a measured value is below set temperature initial value, measurement readiness will automatically be restored without opening measurement circuit.

This kind of setting is preferably recommended for measurements made by multi-use temperature sensors (e.g. NiCr-Ni mineral-insulated thermocouples).

In case of other switch-positions measurement circuit has to be opened first, after a failure measurement, in order to be able to signal measurement readiness again.

Switch SG 2	automatic	after opening measurement
5	on	off

16.7. Red-flashing in case of failure measurement

A failure measurement is indicated by 4 minus signs [----] on the display and by red signal (= measurement complete).

A 6 sec. lasting flashing of red signal with a horn being switched-on and off at same intervals can especially emphasize a failure measurement signal.

Switch SG 2	static	red-flashing
4	on	off

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16.8. Type of Thermocouple

4 different EMF-ranges can be selected: (switch Ni/Pt on board T2202 has to be considered, too)

Type S (Pt-10%Rh / Pt), Type R (Pt-13%Rh / Pt), Type B (Pt-30%Rh / Pt-6%Rh), Type K (Ni-Cr / Ni)

Switch SG 2	Type S	Type R	Type B	Type K	
3	on	on	off	off	
2	on	off	on	off	

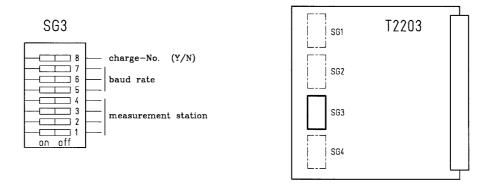
16.9. Temp.-Display

The temperature can be changeover from °C to °F.

Switch SG 2	$^{\circ}\mathrm{C}$	°F
1	on	off



Setting Instructions DIP-Switch SG3



16.10. Charge-No. (Y/N)

Serial output of charge-no. input, available as option, can be switched-on or -off.

Switch SG 3	without output	with output
8	on	off

16.11. **Baud rate**

Baud rate of controlled serial output (Option board T2207) can be adjusted.

SG 3	110	300	600	1200	2400	4800	9600
7	on	on	on	on	off	off	off
6	on	on	off	off	on	on	off
5	on	off	on	off	on	off	on



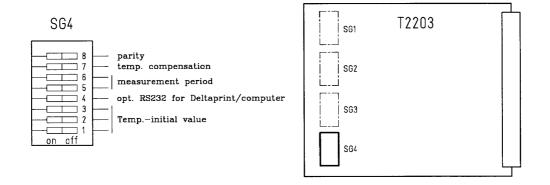
16.12. Measurement Station

If an instrument is placed at a certain measurement station, data output with the respective information "measurement station (01 - 15)" is possible.

SG3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	on	off													
3	on	on	on	off	off	off	off	on	on	on	on	off	off	off	off
2	on	off	off	on	on	off	off	on	on	off	off	on	on	off	off
1	off	on	off												

If all switches are in position "on", "measurement station"-display is not put-out. (standard setting)

Setting Instructions DIP-Switch SG4



16.13. Parity even / odd

In order to adapt the data output via serial output to reciever, it is possible to switch parity-bit either to "even" or "odd".

Switch SG4	Parity "odd"	Parity 'even'
8	on	off



16.14. Temp. Compensation

Temperature of thermosensor, built into 7-pole socket, can be displayed as terminal temperature.

This kind of setting is only possible in case of continuous measurement.

Switch SG4	"on"	''off''
7	on	off

16.15. Measurement Period

For immersion temperature measurements 4 different superimposed periods can be set.

Measurement Period for Pt

Switch SG 4	6 s	8 s	10 s	30 s
6	off	off	on	on
5	off	on	off	on

Measurement Period for Ni

Switch SG 4	20 s	40 s	60 s	80 s
6	off	off	on	on
5	off	on	off	on

16.16. Opt. RS232 for DELTAPRINT / computer

With this switch it is possible to switch over to a second data telegramm. Data telegram see technical appendix.

Switch SG 4	DELTAPRINT-printer	Computer (STX - ETX)
4	on	off



16.17. Initial Value

The temperature initial value of an immersion temperature measurement is adjustable. This is the temperature, where plateau-evaluation starts. ("yellow"-phase).

SG4	400	500	600	700	800	900	1000	1100
3	on	on	on	on	off	off	off	off
2	on	on	off	off	on	on	off	off
1	on	off	on	off	on	off	on	off

How to display and print the internal operating-data

Function of internal operation-data selection switches can be either displayed only or printed by a **Deltaprint**-printer. To achieve this following has to be considered:

Turn mode-switch on board T2205 to position "6". If setting key is actuated now "18 1" or "18 0" is displayed depending on position of 8th switch of switch group SG 1 on board T2203. First figure shows switch group, second figure shows the pertinent switch and last figure shows position of switch:

$$0 = off$$
 $1 = on$

If key is actuated again, position of next switch of switch group is displayed by second segment of display. Sequence of switches is 8 - 1.

By last segment of display

"0" or "1" for "off" or "on" is shown again.

As soon as last switch of fourth switch group has been displayed, first switch position of first switch group is indicated, etc.

In order to determinate the test mode, one has to turn the mode-switch on board T2205 to position "0" again. The last measured temperature value is diplayed.

If a **Deltaprint**-printer is connected to free-running serial output, the switch position of individual switch groups can also be recorded.

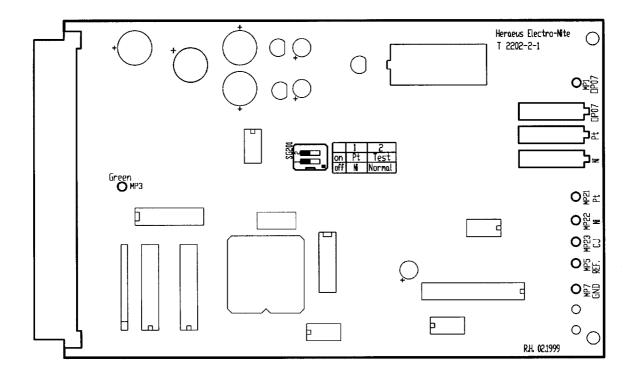
In order to activate print-out, the mode switch on board T2205 has to be turned to position "7". If setting key is actuated once, all switch groups are printed-out.

For normal temperature measurement the mode switch on board T2205 has to be re-turned to position "0".



17. Setting Instructions Preamplifier Board T 2202

Hint: The Digitemp II must be warmed up for the following checks, this means that the instrument is switched on 20 minutes before checking.



Control elements and measurement points

17.1 Check condition

It is necessary to connect the analyser with compensating cable to the measurement input plug of Digitemp II:

at type S, R and B: 400°C and 1700°C at type K: 400°C and 1300°C

Hint: If the analyser cannot give out the temperature as shown above, it is also possible to use other values if the difference between upper and lower value is 600°K.

Attention: During the check of Digitemp II take notice that the temperature of the connector from the analyser is similar to the operating temperature.

17.2 Basic setting of Preamplifier

Set Potentiometer P101 (signed with OP07) for Offset to medium position. In this position, a voltage can be measured by 0 Volt at short-circuited measurement input between the points MP7 = GND and MP1 = OP07-output.

17.3 Setting of platinum-Sensors

On CPU-board T2203 element type S (Pt-10%Rh/ Pt) and continuous measurement are to be set. The print interval for continuous measurement should be set to 120 Sec. (see also setting of DIP-Schalter SG1).

The DIP-switch SG201.1 of pre.-amplifier board T2202-2 is set to platinum (Pt) (SG201/1 ON).

17.4 Adjustment of lower value

Enter measurement input voltage for 400°C (= 3.26 mV at 0°C reference point temperature) via 7-pole measurement input socket.

Set indicated value to 400 °C at Potentiometer P101 (signed with OP07).

17.5 Adjustment of upper value

Enter measurement input voltage for 1700°C (= 17.94 mV at 0°C reference point temperature) via 7-pole measurement input socket.

Set indicated value to 1700°C at Potentiometer P 102 (signed with Pt).

Settings described under 17.4 and 17.5 have to be repeated alternately until both value are correctly displayed.

17.6 Setting of NiCr-Ni-Sensors

On CPU-board T2203 element type K (NiCr-Ni) and continuous measurement are to be set. The print interval for continuous measurement should be set to 120 Sec. (see also setting of DIP-Schalter SG1).

The DIP-switch SG201.1 of pre.-amplifier board T2202-2 is set to nickel (Ni) (SG201/1 OFF).

17.7 Adjustment of upper value

Enter measurement input voltage for 1300°C (= 52.40 mV at 0°C reference point temperature) via 7-pole measurement input socket.

Set indicated value to 1300°C at Potentiometer P 103 (signed with Ni).

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18. Trouble Shooting and Repair Instructions

The following list of indications to systematic failure searching and their removal should be considered by the user. If failures cannot be removed by exchanging the boards the user should contact the responsible service station or send the instrument to manufacturer. When instrument is sent to manufacturer for repair it would be useful to indicate possible failure causes or other remarks facilitating to find failure causes.

Dark Display

Precondition: instrument is switched-on

Cause: a) no external mains voltage

b) mains supply interrupted

c) fuses defective

d) power supply board T2201 defective

Green signal light "Measurement ready" does not light

Precondition: immersion probe is put onto lance

Cause: a) immersion probe defective

b) contact piece of lance defective

c) measurement lance or cable defective

d) signal lamp "measurement ready" defective

e) defect on display board T2205

f) defect on preamplifier board T2202

g) defect on CPU-board T2203

yellow signal lamp "Measurement" does not light

Precondition: "Measurement ready"-signal was o.k., measurement probe immersed

into melt

Cause: a)compensating cable of measurement lance incorrectly connected, if "measu-

rement ready"-signal erases after immersing b) wrong temperature initial value being set

b) wrong temperature initial value being se

c) wrong element type being set

d) signal lamp "measurement" defective

e) defect on display board T2205

f) defect on CPU-board T2203

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Red signal lamp "measurement complete" does not light

Precondition: measurement value has already been displayed

Cause: a) signal lamp "measurement complete" defective

b) defect on display board T2205c) defect on CPU-board T2203

Digital display shows four minus signs "----"

Precondition: measurement value has already been displayed

Cause: a) thermocouple burn-out

b) measurement range has been exceeded

c) failure measurement due to unstable lance holding e.g. during a blowing procedure

- d) failure measurement due to instable lance holding
- e) failure measurement because of loose contact in lance cable
- f) failure measurement because of wrong tolerance/counting frequency setting,
- g) failure measurement because wrong immersion probes have been used
- h) failure measurement because max. measurement period has been exceeded,
- i) failure measurement because of wrong element type/initial value setting,
- j) defect on CPU-board T2203
- k) opening the measurement circuit during continuous measurement

Connected horn erases the display

Precondition: measurement value has already been displayed

Cause: horn is affected by strong inductive disturbances which have to be eliminated

via R-C-series connection as spark quenching directly at horn.



19. Exchange of Single Parts

Nearly all important parts of measurement instrument like electronic boards, main transformer, display frame, terminal strips etc. can be exchanged by plugging or screwing. This enables the user to repair his instrument without problems. When exchanging the plug-in boards, please pay attention to following:



Switch off instrument completely!

The arrangement of following boards (to be seen in boards' layout diagrams, see technical annex) has to be observed:

- a) T 2200 wiring board
- b) T 2201 power supply board
- c) T 2205 display board
- d) T 2208 signal board (option)

All other boards can be plugged-into any free place.

Handling of plug-in boards and component groups has to be made with suitable care, damage and deformations to components located on these boards are to be avoided.

When re-ordering individual component groups the instrument type, instrument no., board handle designation and possibly program no. on CPU-board T 2203 have to be indicated.

20. Packing Instructions

Since our **Digitemp** is a high-grade, electronic measurement instrument, it should only be shipped in its original packing. If the original packing is not available, the temperature measurement instrument should be approprietly packed into a carton filled with a shock-absorbing material (wood-wool, styropor chips or similar). The absorbing layer on each side should be to be wrapped into paper or plastic foil.

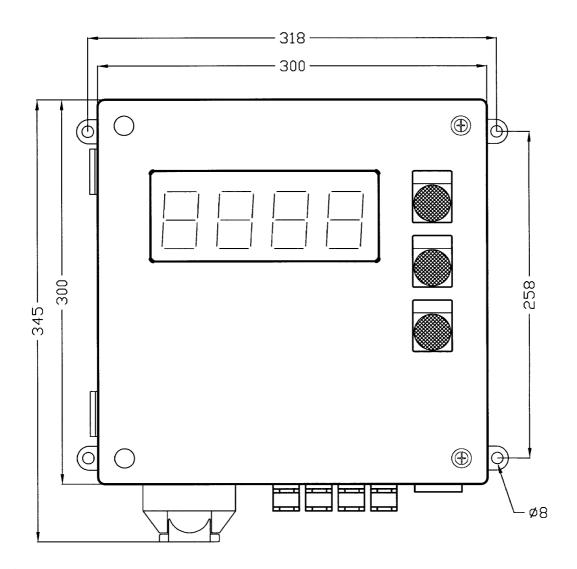
With overseas shipments the instrument has to be airtightly welded into plastic foil by adding a drying agent. The transport container used for this shipment has to be lined with oilpaper.

These packing instructions do apply to returning deliveries of instrument to manufacturer.



21. Dimensional Drawing

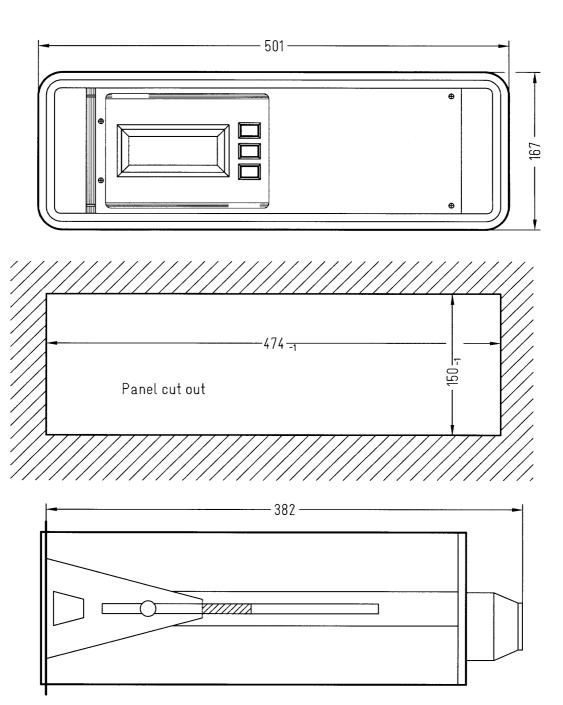
Housing Dimensions DTK 01-A-II



all dimension in mm! Housing depth 255

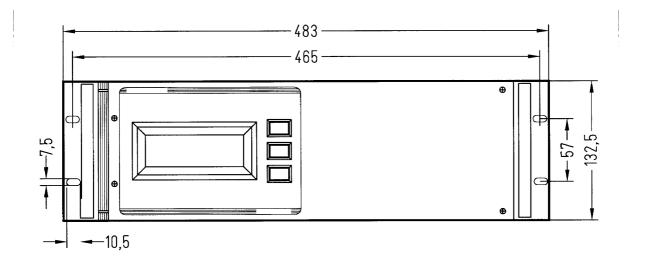


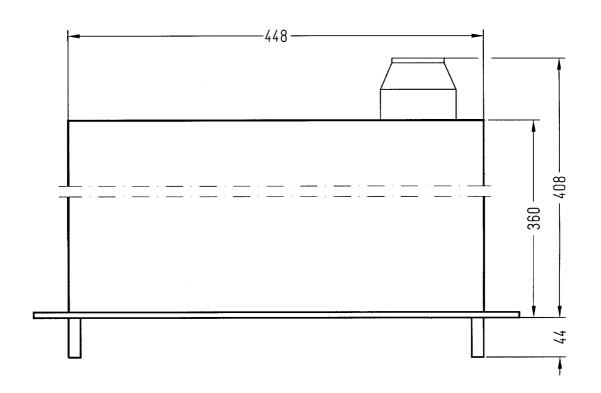
Housing Dimensions DTK 01-S-19"-II





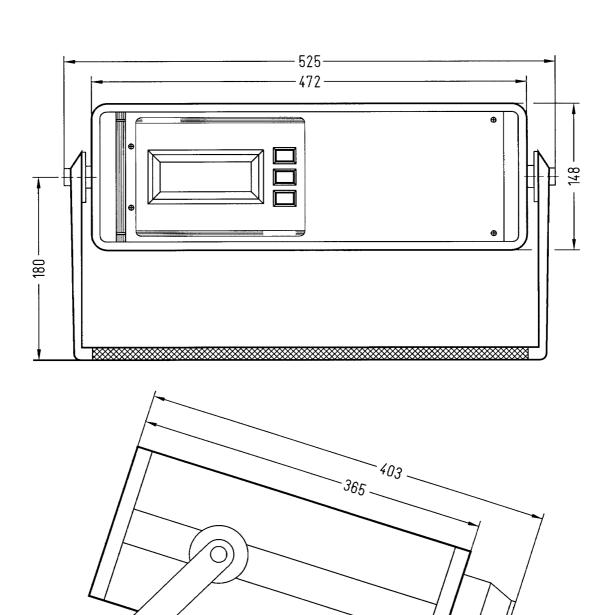
Housing Dimensions DTK 01-E-19"-II





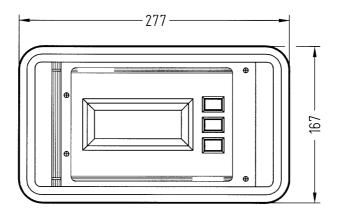


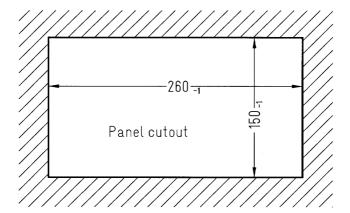
Housing Dimensions DTK 01-T-19"-II

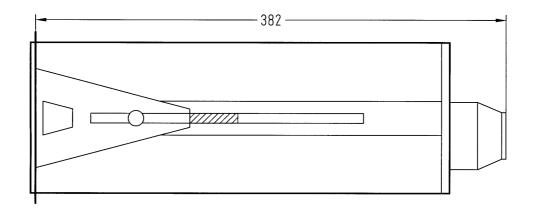




Housing Dimensions DTK 01-S-II

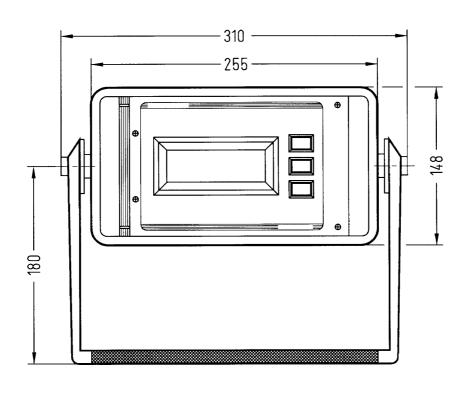


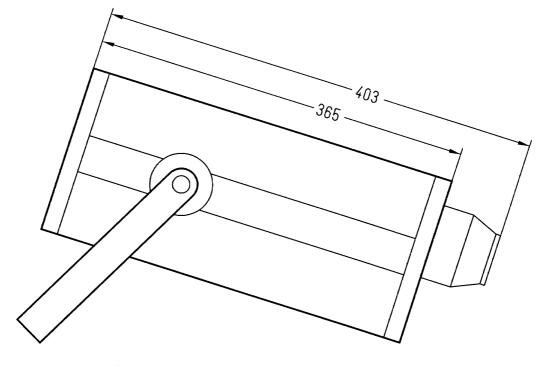






Housing Dimensions DTK 01-T-II





Technical Appendix Optional Boards for Digitemp

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22. Option 02 BCD Output

Description

Via option BCD-output computer, printer, display units or similar instruments that are equipped with a suitable input, can be controlled. The measurement value is put out by 16 bit (4 x 4 bit) via potentialfree reed-relay contacts. In addition to measurement value the signals "measurement ready", "measurement" and "measurement complete" as well as a 500 ms lasting BCD-takeover command, actuated at the same time, are available as potentialfree reed-relay closing contacts.

Data transmission is made parallel to display, i.e. the BCD-value changes together with display, where as final value remains available until a new measurement is made (standard setting). Via switch SG2.6 on CPU-board T2203 an operation can be selected where relays of BCD-output are only activated during the 500 ms lasting takeover command.

Logic of BCD-output can be changed from positive to negative by exchanging the two drivers IC 81LS95 and IC81LS96. Therefore ICs on BCD-board T2204 are of plug-in version. Positive logic means that for a BCD-"0" all 4 reed-relay contacts are **closed**, with negative logic all 4 reed-relay contacts are opened for a BCD-"0".

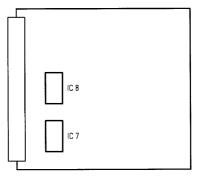
With a failure measurement the BCD-value 1101b in =Dhex =13des is put out. If this value is put out, displays of **Heraeus Electro-Nite** peripheral instruments are darkened or indicate a failure measurement by 4 minus signs [----].

Max. contact load capacity of reed-relays is 100 V D.C. or A.C., 500 mA, 10 VA according to manufacturer.

For data transmission a screened cable with at least 24 x 0.14 mm² has to be used. For cable lenghts over 100 m, a diameter of at least 0.34 mm² should be taken.

Data output is made via terminals 11 to 34 pin X5 and X7 (only signalling). Via pin X10 a second BCD-output can be connected, if desired.

Layout of Logic driver ICs BCD Board T 2204



IC 7 + 8 81LS95 = positive logic IC 7 + 8 81LS96 = negative logic

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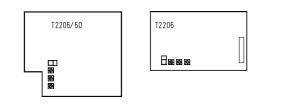
23. Option 03 - accu-buffered real time clock

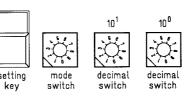
This options allow to put out day, month, year, hours and minutes via serial interface RS 232 as well as via serial standard output. So it is possible to transmit date/time to computer, printer, serially-controlled displays, e.g. type KA502-20 or type DTK 105-A-SE, and other serial peripheral instruments.

When power supply is switched-off, a 100 mAh accu-battery will keep the clock accurately running for, about 500 hours.

The option is located on CPU-board T2203 and control elements on display board T2205 (behind the front door). At any time, but not during a measurement, date and time can be newly set and interrogated.

On the display-board T2205 there are 3 rotary-switches and key by which the clock located on CPU-board T2203 can be set or read.



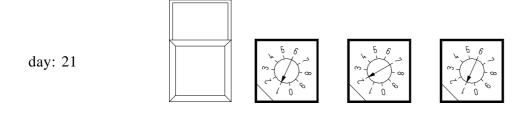


mode switch
0 - normal operation
1 - day
2 - month
3 - year
4 - hours

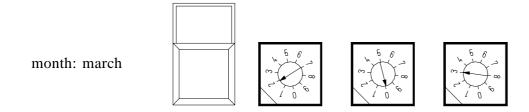
5 - minutes

1) Setting of date and time

Set mode-switch to "1", set day by decimal switch, push setting key.

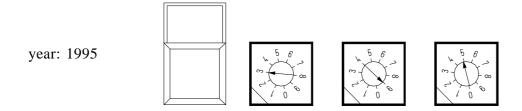


Set mode-switch to "2", set month by decimal switch, push setting key

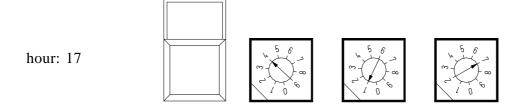




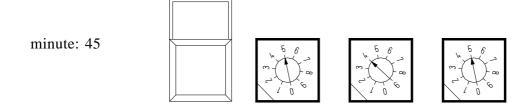
Set mode-switch to "3", set year (e.g. 95 for 1995) by decimal switch, push setting key.



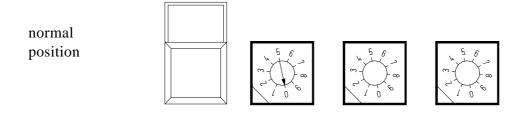
Mode-switch is to be set to "4", set hour by decimal switch, push setting key.



Set mode-switch to "5", set minute by decimal switch, push setting key.



As soon as date/time are put-in, the mode-switch has to set again to "0". If setting-key is actuated then, time, date and year are sequentially displayed as long as key is being pushed.



example: 21.03.95 17:45



24. Option 05 - 4 (0) - 20 mA

24.1. Description

Via analog output 4 or 0 - 20 mA the measurement value is transmitted thermally linear to a line recorder, computer or another peripheral instrument being equipped with a suitable standardized input. Output is made via analog/digital transducer and via voltage controlled current source with isolating module being switched behind, this ensures a real galvanic isolation between measurement instrument and peripheral instrument. Initial and final value of temperature measurement range can be set to 16 different steps via DIP-switch on board. Measurement range should be at least 100 °C. When changing calibration type from NiCr-Ni to Pt-range, initial and final value are automatically shifted.

The option analog output is available in 2 operation types:

- a) **as free-running output**, i.e., the mA-value corresponds to the respective temperature at measurement input and is only kept constant for about 5 s during measurement complete phase. Thus, increase and decrease of temperature can be recorded by a connected connector.
- b) optionally a **stored output** is available, i.e. the mA-value corresponds to the respective temperature displayed and is kept stored like the display until a new masurement takes place. This type should be preferred in case of necessary connection to a computer or to a display without store.

Standard type is version described under a). Changing to type b) can be made by customer by exchanging EPROMs on CPU-board T2203.

If measurement value takeover command is required, the standard measurement complete contact (2 s) or the takeover contact (0,5 s) of BCD-board (option 02) can be used.

In case of failure measurement a value of 20 mA is put-out.

On preamplifier board T2202, a potentionalfree relay contact is closed as long as measurement takes place. This contact can be used for paper driving of a recorder and is avaliable at terminals 3 and 4 or at socket X8 pin 4 and 5.

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24.2. Technical data

Measurement range: 4 (0) - 20 mA, changeable via soldering bridges on board T2206,

standard setting: 4 - 20 mA

600 - 1800 °C with Pt, digitally adjustable

400 - 1350 °C with NiCr-Ni, digitally adjustable

Burden: 0 - 500 R max.

Resolution: 1 °C

Error: < 0,1% of temperature value being set

24.3. Setting Instructions

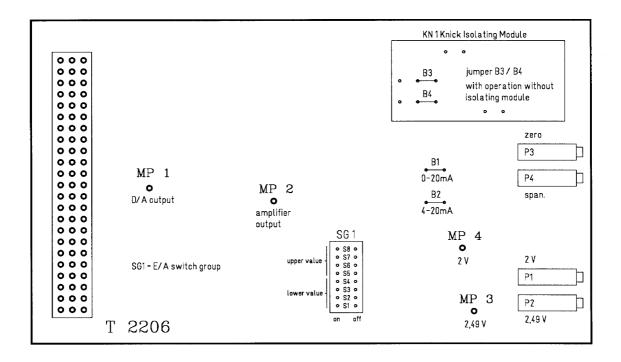
- a) Operation voltage of reference element (2.490 V) has to be set by potentiometer P2 at measureemnt point MP3 (reference point is ground at pin block a/b/c 1).
- b) Reference voltage (2.00 V) has to be by potentiometer P1 at measurement point MP4 (reference point in ground at pin block a/b/c 1).
- c) Depending on measurement range selection, equipment of bridges B1 or B2 has to be made:

bridge B1 for range 0 - 20 mA bridge B2 for range 4 - 20 mA (standard)

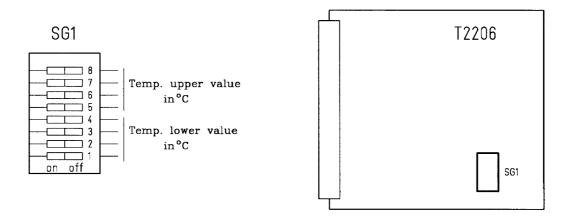
d) As soon as initial- and final value are set the "0"-point of output current can be set by potentiometer B3, the final value (20 mA) can be set by potentiometer P4. These settings have to be made alternaly.



Display of control elements and test points







Temp. upper value in °C

switch	Pt	800	1000	1100	1200	1250	1300	1350	1400
	Ni	600	650	700	750	800	850	900	950
8		on	on	on	on	on	on	on	on
7		on	on	on	on	off	off	off	off
6		on	on	off	off	on	on	off	off
5		on	off	on	off	on	off	on	off

switch	Pt	1450	1500	1550	1600	1650	1700	1750	1800
	Ni	1000	1050	1100	1150	1200	1250	1300	1350
8		off							
7		on	on	on	on	off	off	off	off
6		on	on	off	off	on	on	off	off
5		on	off	on	off	on	off	on	off

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Temp. lower value in $^{\circ}C$

switch	Pt	600	800	900	1000	1050	1100	1150	1200
	Ni	400	450	500	550	600	650	700	750
4		on	on	on	on	on	on	on	on
3		on	on	on	on	off	off	off	off
2		on	on	off	off	on	on	off	off
1		on	off	on	off	on	off	on	off

switch	Pt	1250	1300	1350	1400	1450	1500	1550	1600
	Ni	800	850	900	950	1000	1050	1100	1150
4		off							
3		on	on	on	on	off	off	off	off
2		on	on	off	off	on	on	off	off
1		on	off	on	off	on	off	on	off



25. Option 06-serial Data Output

25.1. **Description**

Via option serial data output RS232 computer, printer, displays or similar instruments provided with a suitable interface, can be controlled. For data transmission a screened cable of $4 \times 0.5 \text{ mm}^2$ has to be used. With 20 mA-current loop operation and transmission rate of 300 baud, max. cable length can be 2000 m. With operation type V24 cable must not be longer than 20 m. With free-running operation without busy/ready control e.g. for digital remote displays, a cable of $2 \times 0.5 \text{ mm}^2$ will be sufficient for data transmission.

Apart from temperature measurement value other data are transmitted as e.g. measurement station, date/time, charge no. and different control signs. This, however, depends on built-in and switched-on options. Data are put out about 2 s after "measurement complete"-signal.

Character frame of signs is as follows: 1 start bit, 7 data bits, 1 parity bit, 1 stop bit. Transmission rate (baud rate) and parity can be set by switches SG 3.7 - SG 4.8 located on CPU-board T2203.

By switch SG 2.1 on CPU-board T2203 a busy/ ready signal can be actuated for control of serial data transmission. If connected peripheral instrument is not ready to receive data, it will lock data output of **Digitemp** by "busy"-signal. In case of "ready"-state, measurement data can be transmitted to peripheral instrument. If control system is switched off, or if "busy"-signal is available for 30 s, data will be put out without further interrogating of control input. **Digitemp** will be ready for measurement again as soon as all data have put-out.

After a failure measurement an "FFFF"-signal will be transmitted as measurement value.

Data output is made via terminal 37 - 40 or pin X4. With 20 mA-current loop operation the correct pin connection of data loop (red) and busy/ready loop (green) can be checked via luminous diodes built-into rear panel (but not with wall-mounting version).

25.2. Setting instructions

By potentiometer P1 current of receiving data loop (busy/ready) - measured between pin C27 and C28 of pin block - can be set to 20 mA.

By potentiometer P2 current of transmitting data loop - measured between pin C25 and C26 of terminal block - can be set to 20 mA.

When operating the busy/ready-controlled RS232-interface, different types of operation can be set via soldering bridges on board T2207

25.3. Standard Settings

Unless special requirements are made when ordering, the system will be supplied with following standard settings:



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a)	baud rate	300
b)	parity	even

- c) data loop 20 mA CL active d) busy/ready-loop 20 mA CL active
- e) with busy/ready-control
- f) data telegram no. 1 for **Deltaprint**

25.4. Operation Types

a) sending data loop active / receiving data loop (busy/ready) active

B/R-V24	[] [] B21	BUSY/READY - V24
B/R-CL	[][] B22	BUSY/READY - CURRENT LOOP
B/R +/-	[][] B1 []	BUSY/READY
B/R ACTIVE	[][] B5 [][] B4	BUSY/READY ACTIVE
B/R PASSIVE	[] []B3	BUSY/READY PASSIVE
V24 DATIN	[] []B16 [] []B15	V24 DATA IN / V24 DATA IN
CL-DATIN	[]	C-LOOP DATA IN / C-LOOP DATA IN
CL-DATOUT	[][] B19 [][] B17	CURRENT LOOP DATA OUT
V24-DATOUT	[] [] B18 [] [] B23 [] [] B20	V24 DATA OUT
CL ACTIVE	[][] B14 [][] B13 [][] B11 [][] B9	CURRENT LOOP ACTIVE
CL PASSIVE	[] []B12 [] []B8	CURRENT LOOP PASSIVE

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b) sending data loop passive / receiving data loop (busy/ready) passive

B/R-V24	[] [] B21	BUSY/READY - V24
B/R - CL	[][] B22	BUSY/READY - CURRENT LOOP
B/R +/-	[][]B1 [] []B2	BUSY/READY - BUSY/READY
B/R ACTIVE	[] []B5 [] []B4	BUSY/READY ACTIVE
B/R PASSIVE	[][] B3	BUSY/READY PASSIVE
V24 DATIN	[] []B16 [] []B15	V24 DATA IN / V24 DATA IN
CL-DATIN	[] [] B7 C-L0	OOP DATA IN / C-LOOP DATA IN
CL-DATOUT	[][] B19 [][] B17	CURRENT LOOP DATA OUT
V24-DATOUT	[] [] B18 [] [] B23 [] [] B20	V24 DATA OUT
CL ACTIVE	[] [] B14 [] [] B13 [] [] B11 [] [] B9	CURRENT LOOP ACTIVE
CL PASSIVE	[][] B12 [][] B8	CURRENT LOOP PASSIVE

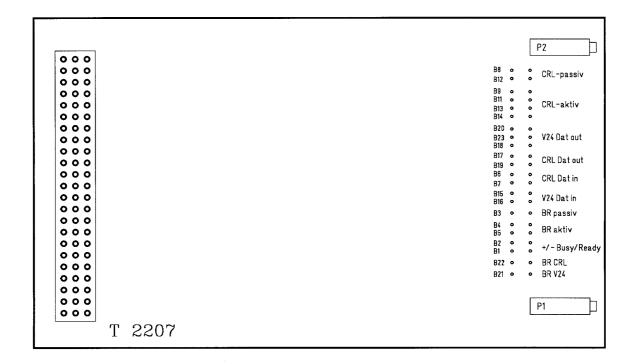
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c) V24 operation with busy/ready control

B/R-V24	[][] B21	BUSY/READY - V24
B/R-CL	[] [] B22	BUSY/READY - CURRENT LOOP
B/R +/-	[][] B1 []	BUSY/READY - BUSY/READY
B/R ACTIVE	[] [] B5 [] [] B4	BUSY/READY ACTIVE
B/R PASSIVE	[] []B3	BUSY/READY PASSIVE
V24 DATIN	[] [] B16 [][] B15	V24 DATA IN / V24 DATA IN
CL-DATIN	[] []B7 [] []B6	C-LOOP DATA IN / C-LOOP DATA IN
CL-DATOUT	[] []B19 [] []B17	CURRENT LOOP DATA OUT
V24-DATOUT	[] [] B18 [][] B23 [][] B20	V24 DATA OUT
CL ACTIVE	[] [] B14 [] [] B13 [] [] B11 [] [] B9	CURRENT LOOP ACTIVE
CL PASSIVE	[] []B12 [] []B8	CURRENT LOOP PASSIVE



Display of control elements and soldering bridges





Annex A

Data telegrammes of free-running serial interface Data telegrammes of controlled serial interface by telegramm-choice "DELTAPRINT-printer"

Beginning of telegramm:

No.	i	ii	iii	iv
1	DEL	DEL	DEL	DEL
2	DEL	DEL	DEL	DEL
3	DEL	DEL	DEL	DEL
4	DEL	DEL	DEL	DEL
5	DEL	DEL	DEL	DEL
6	SI	SI	SI	SI
7	*	*	*	*
8	*	*	*	*
9	*	*	*	*
10	*	*	*	*
11	*	*	*	*
12	*	*	*	*
13	*	*	*	*
14	***	*	*	*
15	*	*	*	*
16	*	*	*	*
17	*	*	*	*
18	*	*	*	*
19	*	*	*	*
20	*	*	*	*
21	*	*	*	*
22	CR	CR	CR	CR
23	T	Т	Т	Т
24	E	Е	E	Е
25	M	М	M	М
26	P	P	P	P
27	SP	SP	SP	SP
28	:	:	:	:
29	SP	SP	SP	SP
30	1	F	2	F

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No.	i	ii	iii	iv
31	2	F	2	F
32	3	F	5	F
33	4	F	4	F
34	SP	SP	SP	SP
35	C	С	F	F
36	CR	CR	CR	CR

i) temperature in °C

ii) temperature in °C by failure measurement

iii) temperature in °F

iv) temperature in °F by failure measurement

End of telegramm:

	1	T	<u> </u>	1		ı	1			1		
No.	v	vi	vii	viii	ix	X	xi	xii	xiii	xiv	xv	xvi
37	SO	О	P	С	С	О	P	SO	О	С	О	P
38	DC1	R	L	Н	Н	R	L	SP	R	Н	R	L
39	SI	Т	A	-	-	Т	A	2	Т	-	Т	A
40	CR	SP	С	N	N	SP	С	2	SP	N	SP	С
41		SP	Е	R	О	SP	Е	•	SP	R	SP	Е
42		:	:	:	:	:	:	0	:	:	:	:
43		SP	SP	SP	SP	SP	SP	1	SP	SP	SP	SP
44		0	0	1	1	0	0		0	1	0	0
45		1	1	2	2	1	1	9	1	2	1	1
46		CR	CR	3	3	CR	CR	2	CR	3	CR	CR
47		so	so	4	4	C	C	SP	so	4	C	C
48		DC1	DC1	5	5	Н	Н	1	SP	5	Н	Н
49		SI	SI	6	6	-	-	0	2	6	-	-
50		CR	CR	7	7	N	N	:	2	7	N	N
51				8	8	R	О	0		8	R	О
52				so	so	:	:	0	0	so	:	:
53				DC1	DC1	SP	SP	SI	1	SP	SP	SP
54				SI	SI	1	1	CR		2	1	1
55				CR	CR	2	2		9	2	2	2
56						3	3		2	•	3	3
57						4	4		SP	0	4	4
58						5	5		1	1	5	5
59						6	6		0		6	6

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No.	v	vi	vii	viii	ix	X	xi	xii	xiii	xiv	XV	xvi
60						7	7		:	9	7	7
61						8	8		0	2	8	8
62						SO	SO		0	SP	SO	SO
63						DC1	DC1		SI	1	SP	SP
64						SI	SI		CR	0	2	2
65						CR	CR			:	2	2
66										0		
67										0	0	0
68										SI	1	1
69										CR		
70											9	9
71											2	2
72											SP	SP
73											1	1
74											0	0
75											:	:
76											0	0
77											0	0
78											SI	SI
79											CR	CR

	v	vi	vii	viii	ix	х	xi	xii	xiii	xiv	xv
text in english			X		X		X				X
spot of measurement		X	X			X	X		X	X	X
charge-no. (option)				X	X	X	X			X	X
date + time (option)								X	X	X	X

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Annex B

Data telegramm of controlled serial interface by telegramm-choice "COMPUTER"

No.	i	ii	iii	iv	v	vi	vii	viii	ix	X
1	STX	STX	STX							
2	SP	SP	SP							
3	SP	SP	SP							
4	SP	SP	SP							
5	SP	SP	SP							
6	SP	SP	SP							
7	SP	SP	SP							
8	SP	SP	SP							
9	SP	SP	SP							
10	Т	О	P	C	С	2	2	2	2	2
11	Е	R	L	Н	Н	2	2	2	2	2
12	M	Т	A	-	-			-		
13	P	SP	С	N	N	0	0	0	0	0
14	SP	SP	Е	R	О	1	1	1	1	1
15	:	:	:	:	:					-
16	SP	SP	SP	1	1	9	9	9	9	9
17	1	0	0	2	2	2	2	2	2	2
18	2	1	1	3	3	SP	SP	SP	SP	SP
19	3	SP	SP	4	4	1	1	1	1	1
20	4	SP	SP	5	5	0	0	0	0	0
21	SP	Т	T	6	6	:	:	:	:	:
22	С	Е	Е	7	7	0	0	0	0	0
23	CR	M	M	8	8	0	0	0	0	0
24	LF	P	P	SP	SP	SP	SP	SP	SP	SP
25	ETX	SP	SP	SP						
26		:	:	Т	T	Т	О	P	С	С
27		SP	SP	Е	Е	E	R	L	Н	Н
28		1	1	M	M	M	Т	A	-	-
29		2	2	P	P	P	SP	С	N	N
30		3	3	SP	SP	SP	SP	Е	R	0
31		4	4	:	:	:	:	:	:	:
32		SP	SP	SP						
33		С	С	1	1	1	0	0	1	1
34		CR	CR	2	2	2	1	1	2	2
35		LF	LF	3	3	3	SP	SP	3	3

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36 ETX ETX 4 4 4 4 SP SP T T 5 5 38 CC C C C E E 6 6 39 CR CR CR CR M M 7 7 40 LF LF LF LF P P 8 8 41 ETX ETX ETX SP SP <th>No.</th> <th>i</th> <th>ii</th> <th>iii</th> <th>iv</th> <th>v</th> <th>vi</th> <th>vii</th> <th>viii</th> <th>ix</th> <th>X</th>	No.	i	ii	iii	iv	v	vi	vii	viii	ix	X
37 SP SP SP T T 5 5 38 C C C E E 6 6 39 CR CR CR M M 7 7 40 LF LF LF LF P P 8 8 41 ETX ETX ETX SP SP<		1									
38 C C C C E E 6 6 39 CR CR CR M M 7 7 40 LF LF LF P P 8 8 41 ETX ETX ETX SP SP <td< td=""><td></td><td></td><td>EIX</td><td>EIX</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>			EIX	EIX							
39 CR CR CR M M 7 7 40 LF LF LF P P 8 8 41 ETX ETX ETX SP CD P A 44 4 SP E 44 4 SP E E 44 4 SP E E E SP S											
LF											
41 ETX ETX ETX SP C A 4 4 4 SP E 4 4 4 SP											
12											
SP SP O P					EIA	EIA	EIA				
1											
1											
3 3 SP C 47											
47 4 4 4 SP E 48 SP											
SP SP SP SP SP SP SP SP											
49 C C SP SP 50 CR CR O O 51 LF LF 1 1 52 ETX SP SP SP 53 SP SP SP SP 54 T											
50 CR CR 0 0 51 LF LF 1 1 52 ETX ETX SP SP 53 SP SP SP 54 T T T T 55 E E E 56 M M M M 57 P P P P P 58 SP											
51 LF LF 1 1 52 ETX SP SP SP 53 SP SP SP SP 54 T											
52 ETX ETX SP SP 53 SP SP SP SP 54 T T T T T T T T T T T T E											
53 SP SP 54 T T T 55 E E E 56 M M M 57 P P P 58 SP SP SP 59 : : : 60 SP SP SP 61 1 1 1 62 2 2 2 63 3 3 3 64 4 4 4 65 SP SP SP 66 C C C 67 CR CR CR 68 LF LF LF 69 ETX ETX ETX	51								LF		
54 T T 55 E E 56 M M 57 P P 58 SP SP 59 : : 60 SP SP 61 1 1 62 2 2 63 3 3 64 4 4 65 SP SP 66 C C 67 CR CR 68 LF LF 69 ETX ETX	52							ETX	ETX	SP	SP
55 E E 56 M M M 57 P P P 58 SP SP SP 59 : : : 60 SP SP SP 61 1 1 1 62 2 2 2 63 3 3 3 64 4 4 4 65 SP SP SP 66 C C C 67 CR CR CR 68 LF LF LF 69 ETX ETX ETX	53									SP	SP
56 M M M 57 P P P 58 SP SP SP 59 : : : 60 SP SP SP 61 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 6 5 SP SP SP SP 6 C C C C C C C C C C C E E E E E E E E E E E E E E E E E E	54									T	T
57 P P 58 SP SP 59 : : 60 SP SP 61 1 1 62 2 2 63 3 3 64 4 4 65 SP SP 66 C C 67 CR CR 68 LF LF 69 ETX ETX	55									E	Е
58 SP SP 59 : : : : 60 SP SP 61 1 1 1 62 2 2 2 63 3 3 3 64 4 4 4 65 SP SP SP 66 C C C 67 CR CR CR 68 LF LF LF 69 ETX ETX ETX	56									M	M
59 : : : : : : : : : : : : : : : : : : :	57									P	P
60 SP SP 61 1 1 62 2 2 63 3 3 64 4 4 65 SP SP 66 CC C 67 CR CR 68 LF LF 69 ETX ETX	58									SP	SP
61 1 1 1 62 2 2 2 63 3 3 3 64 4 4 4 65 SP SP SP 66 C C C 67 CR CR CR 68 LF LF LF 69 ETX ETX ETX	59									:	:
62 2 2 63 3 3 64 4 4 65 SP SP 66 C C 67 CR CR 68 LF LF 69 ETX ETX	60									SP	SP
63 3 3 4 4 4 65 65 SP SP 66 C C C C 67 CR CR 68 ETX ETX	61									1	1
64 4 4 65 SP SP 66 C C 67 CR CR 68 LF LF 69 ETX ETX	62									2	2
65 SP SP 66 C C 67 CR CR 68 LF LF 69 ETX ETX	63									3	3
66 C C 67 CR CR 68 LF LF 69 ETX ETX	64									4	4
67 CR CR 68 LF LF 69 ETX ETX	65									SP	SP
68 LF LF 69 ETX ETX	66									С	С
69 ETX ETX	67									CR	CR
	68									LF	LF
70	69									ETX	ETX
	70										

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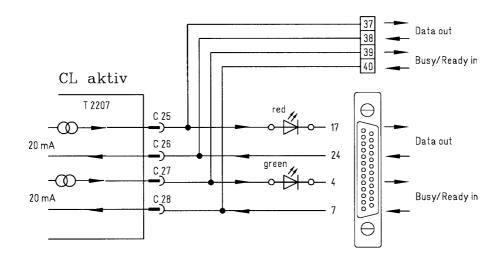
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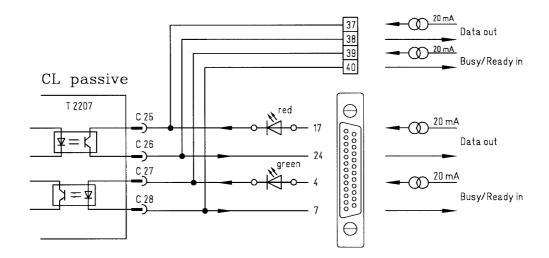


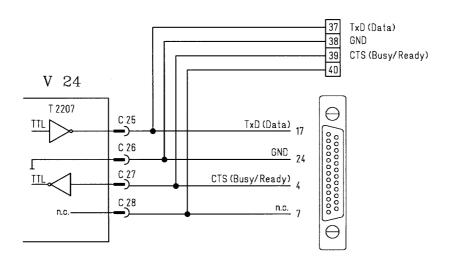
	i	ii	iii	iv	v	vi	vii	viii	ix	X
text in english			X		X			X		X
spot of measurement		X	X				X	X	X	X
charge-no. (option)				X	X				X	X
date + time (option)						X	X	X	X	X

The temperature might be indicated in °C or in °F (see operating instructions). On failure measurement the indicated temperature in telegramm is "FFFF".

Wiring Example









26. Option 07 - 09 - Signal Output

Description

By option signal output type 07, 08 and 09, the measurement sequence of **Digitemp** is out for different control purposes via relays.

Option 07 with reed-relay is provided for control of computers, remote control units (type BMK) or other peripheral instruments, requiring few switching performance. Max. contact load capacity of relays must not exceed 100 V D.C. or A.C., 300 mA, 10 VA. On signal board T2208 every reed-relay contact is provided with a 300 mA protection fuse. Option 08 with solid-state relay (semi-conductor relay) is provided for control of A.C. loads, like signal lamps, horns, conductors, motors or other inductive consumers. Solid state relays provide following: 24 - 250 V, 48 - 62 Hz, min 100 mA, max. 2 A. Every solid state relay is protected by a superquick 2 A-fuse on signal board T2208.

Option 09 with load relay is provided for control of different loads like signal lamps or other ohmic consumers. Max. contact load capacity of relays must not exceed 250 V, 2 A. On signal board T2208 every relay contact is provided with a 2 A protection fuse.

Measurement sequence signalling can be equipped two times on board T2208. Following equipment variants are possible:

```
Board T2208SS - Output 1 = Solid-State, Output 2 = Solid-State
Board T2208SR - Output 1 = Solid-State, Output 2 = Reed-Relay
Board T2208LR - Output 1 = Load-relay, Output 2 = Reed-Relay
Board T 2208LS - Output 1 = Load-Relay, Output 2 = Solid-State
```

Output 1 (solid-state or load-relay) is available at terminals 49 - 52, or at pin X6, output 2 (solid-state or reed-relay) is available at terminals 45 - 48, or at pin X7. If option BCD-output is also installed, the output 2 will be applied to an additional plug.

Inductive consumers like horns or contactors have to be protected against interferences by a R-C-series connection (about 100 R, 0.068 uF).