Test and Calibration equipment

Temporary Manual

Hand-Held Thermometer

CTH 6450

CE

WIKA

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TABLE OF CONTENTS

1 General

1.0 General notices

In the following chapters detailed information on the handheld pressure indicator CPH6200 and its proper use can be found.

Should you require further information, or should there be problems which are not dealt with in detail in the operating instructions, please contact the following address:

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The factory calibration of the instruments are according to respective international guidelines.
The guarantee time for the handheld pressure indicator CPH6200 is 24 months according to the general terms of supply of ZVEI.
All guarantee claims lapse if the appliance is put to improper use or if the operating instructions are not observed or if an attempt is made to open the appliance.
We also point out that the contents of these operating instructions does not form part of an earlier or existing agreement, assurance or legal relationship or is meant to change these. All obligations of WIKA Alexander Wiegand GmbH & Co. KG result from the respective sales contract and the general business terms of WIKA Alexander Wiegand GmbH & Co. KG.

We reserve the right to effect reasonable changes on the basis of technical improvements.

any means is prohibited.

1.1 Safety Requirements

This device has been designed and tested in accordance with the safety regulations for electronic devices.
However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device is not Subjected to any other climatic conditions than those stated under "Specification".
2. Device and sensors have to be handled with care (don't throw, hit, etc.). Protect plugs and sockets from soiling.
3. If the device is transported from a cold to a warm environment condensation may cause in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.
4. If device is to be connected to other devices (e.g. via serial interface) the circuitry has to be designed most carefully. Internal connection in third party devices may result in not-permissible voltages impairing or destroying the device or another device connected.
   Warning: If device is operated with a defective mains power supply (e.g. short circuit from mains voltage to output voltage) this may result in hazardous voltages at the device (e.g. at sensor socket or interface).
5. If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting. Operator safety may be a risk if:
   - there is visible damage to the device
   - the device is not working as specified

- the device has been stored under unsuitable conditions for a longer period of time.

In case of doubt, please return device to manufacturer for repair or maintenance.

6. Repairs should only be carried out by the manufacturer. All other repairs or modifications of the transmitter are unauthorized.
7. Any operation not described in the following instructions must not be carried out.

1.2 Operation And Maintainance Advice

- Operation With Battery Or Accu

If ⚠ and ´bAt´ are shown in the secondary display the battery has been used up and needs to be replaced, or resp. the accu is empty and has to be rechagred. The device will, however, operate correctly for a certain amount of time. If ´bAt´ is shown in the upper display the voltage is too low to operate the device; the battery or accu has been completely used up.
Please note: We recommend to take out battery/accu if device is not used for a longer period of time!

- Mains Operation With Power Supply

Warning: When using a power supply please note that operating voltage has to be 10.5 to 12 V DC.
Do not apply overvoltage!! Cheap 12V-power supplies often have excessive no-load voltage.
We, therefore, recommend using regulated voltage power supplies. Trouble-free operation is guaranteed by our power supply unit.
Prior to connecting the power supply to the mains make sure that the operating voltage stated at the power supply is identical to the mains voltage.

Connecting/Changing Sensors
- Make sure that the correct type of thermoelement is set (p.r.t. "Configuration of The Instrument")! Otherwise a wrong
temperature will be displayed. The measuring device has been optimised for measurements with a type K probe.
- If other thermoelements but type K (NiCr-Ni) are used already the smallest temperature difference between plug and
instrument will result in measuring errors. Therefore wait for the temperatures to adjust after plug-in or touching a
sensor plug (depending on temperature ~15min.)
- Thermoelements are suitable to measure within a large temperature range. But keep in mind the allowed temperature range
of your specific temperature probe!

- Maintainance Advice

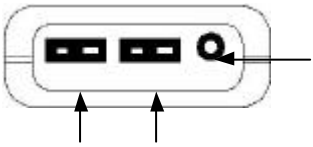
The digital instrument and sensors are completely of solid state principle, not containing any moving parts. Dismantling of enclosures invalidates warranty.

If cleaning is necessary, use a colth damp by a mild soap cleaner, avoid any solvent or caustic abrasive agent.

As for measurement devices usual, the accuracy of the device should be tested in regularly time periods (approx. 1 time per year)(see chapter 7).

1.3 Connections

At the top of the device:
are located the sockets CH1 and CH2 for connecting the temperature sensors of the CTH-series (see chapter 5) and the socket for connecting the interface converter (see chapter 4).



At the left side of the device:
is located the mains adapter socket to connect the available power supply unit (see valid price list of CTH 6450).

1.4 Display

An arrow indicates:
whether channel 1, 2 or DIF (1-2) is shown in the main display / secondary display

An arrow below:
- **Offset**: indicates that zero point offset is activated
- Corr: indicates that correction factor (for surface measure.)is activated.

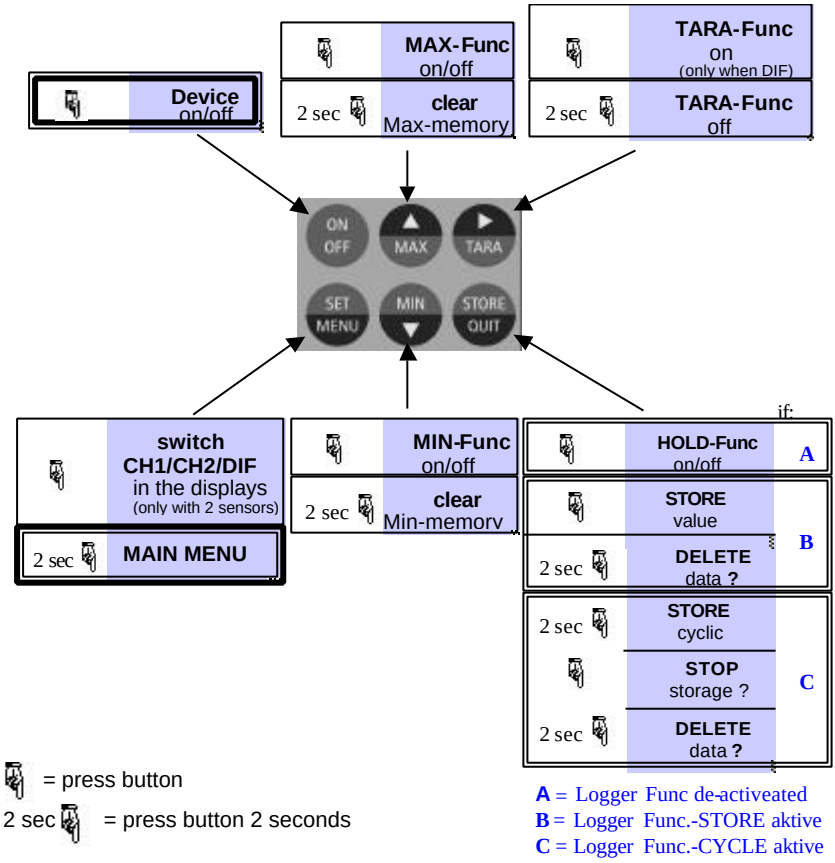
Main display: indicates value of Channel 1, 2 or DIF (1-2).

Indicates low battery and other warnings.

Secondary display: **:** indicates value of Channel 1, 2 or DIF (1-2).

An arrow above:
- **Logg** appears, if logger function is chosen, flashes

1.5 Basic Operation



When switching on the device, the thermocouple type will shortly be displayed (selectable over the main menu), whether an alarm function is activated and finally if the logger function is not off the time of the integrated clock will shortly be displayed. Check the clock and adjust, if necessary (see chapter 2).

Max Function: Pressing ´max´ shows the maximum of the measured values. Pressing it again hides it. To clear the max memory press key ´max´ for >2 seconds.

Min Function: Pressing ´min´ shows the minimum of the measured values. Pressing it again hides it. To clear the min memory press key ´min´ for >2 seconds.

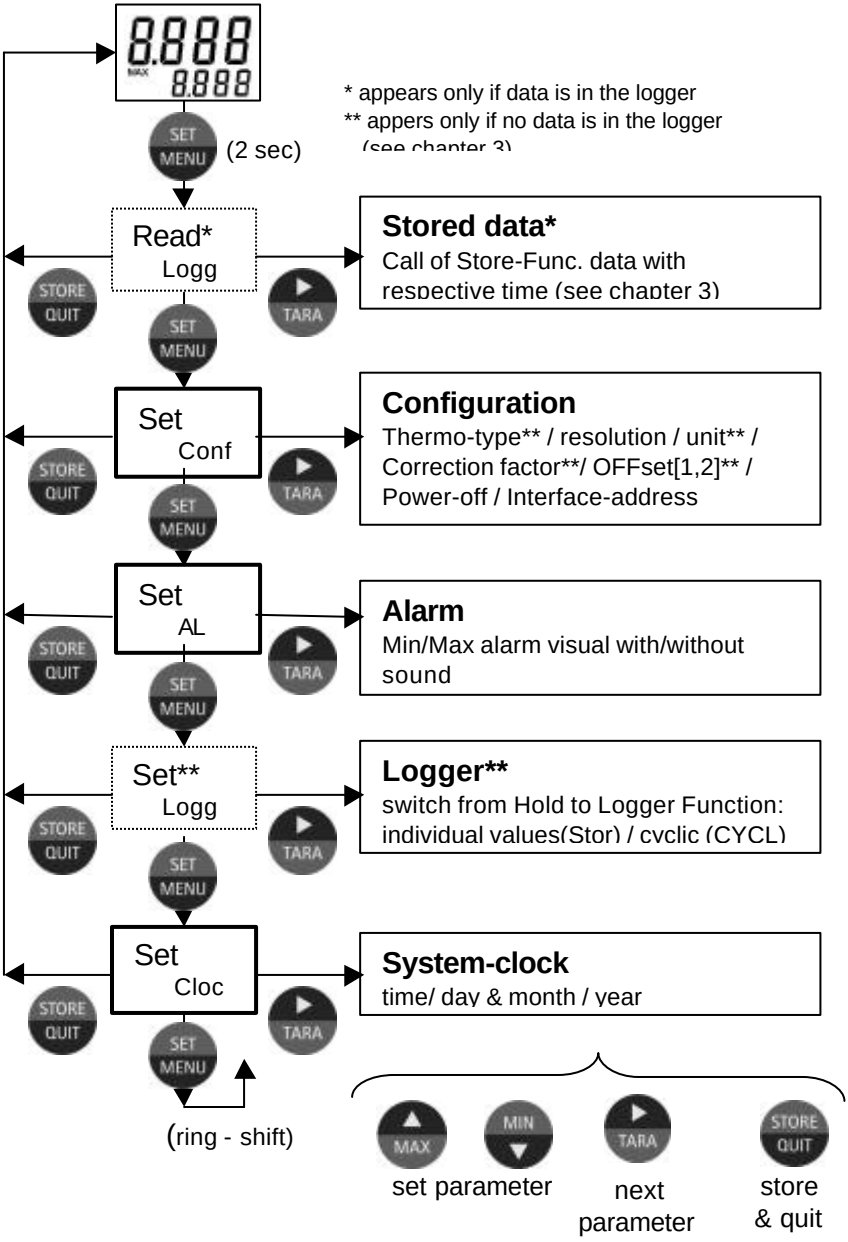
Hold Function*: By pressing ´Store/Quit´ the last measuring value will be held in the secondary display. Pressing it again hides it. (*only when main menu logger = ‚off‘ is chosen).

Logger Function: Activation with key ´Store/Quit´, if in the main menu a logger function was chosen before.

Tare Function: By pressing ´Tara´ the DIF-display (CH1-CH2) will be set to 0. All DIF-measurings from then on will be displayed relatively to the set tare value. Is the Tare-Function activated an arrow above „Tara“ appears . To de-activate the function press ´Tara´ for >2 sec. (**only if 2 sensors connected).

Differential press.** Pressing ´set/Menu´ will cyclic change whether channel 1, channel 2 or the difference (CH1-CH2) is shown in the main and secondary display. (**only if 2 sensors are connected).

Main Menu


* appears only if data is in the logger
** appers only if no data is in the logger
(see chapter 3)
SET MENU
(2 sec)
Read*
Logg
STORE QUIT
TARA
Stored data*
Call of Store-Func. data with respective time (see chapter 3)
Set
Conf
Configuration
Thermo-type** / resolution / unit** / Correction factor**/ OFFset[1,2]** / Power-off / Interface-address
Set
AL
Alarm
Min/Max alarm visual with/without sound
Set**
Logg
Logger**
switch from Hold to Logger Function: individual values(Stor) / cyclic (CYCL)
Set
Cloc
System-clock
time/ day & month / year
(ring - shift)
MAX
MIN
set parameter
next parameter
store & quit

Menu	Param.	Setting	Meaning
SEt ConF	**Set Configuration: Generic Configurations**		
	tyP**	ni.cr/J/t/S/n	Type: selected type of thermocouple
	rES**	Auto/0.1°/1°	Resolution: resolution of display
	Unit	°C/°F	Unit: Temperature unit
	Corr**	oFF	Correction: surface correction factor deactivated
		1.001..1.200	Correction faktor for channel 1 & 2
	OFFS [1,2]	oFF	Offset: Offset factor for channel [1,2] deactivated
		-10.0..10.0°	Zero point displacement for channnel [1,2]
	P.oFF	1..120	**Auto Power Off** time in minutes
		oFF	Auto Power Off deactivated
	Adr.	01,11..91	Base **address** of interface
SEt AL.	**Set Alarm: Settings Of Alarm Function**		
	AL.	On	Alarm an, mit Hupe
		no.So	Alarm an, ohne Hupe
		OFF	Keine Alarmfunktion
	(AL. In)	dif	(not if AL.oFF) Alarm monitoring only of DIF (channel 1 –2)
		CH1	(not if AL.oFF) Alarm monitoring only of channel 1 (CH1)
		CH2	(not if AL.oFF) Alarm monitoring only of channel 2 (CH2)
		CH1.2	(not if AL.oFF) Alarm monitoring of channel 1 and channel2
	(AL. Lo)	SensorMin ... AL.Hi	(not if AL.oFF) Min-Alarm-limit
	(AL. Hi)	AL.Lo ... SensorMax	(not if AL.oFF) Max-Alarm-limit
Set ** LoGG	**Set Logger: Settings Of Logger Function**		
	Func	CYCL	**Cyclic**: logger function ‚cyclic logger'
		Stor	**Store**: logger function ‚individual value logger'
		OFF	no logger function
	(CYCL)	1..3600	(only if CYCL is chosen) Cycle time of cyclic logger [seconds]
Set CLOC	**Set Clock: Setting Of Real Time Clock**		
	CLOC	HH:MM	**Clock**: Setting of time hours:minutes

	YEAr	YYYY	**Date**: Setting of time day.month
	dAtE	TT.MM	**Year**: Setting of time year

- Note: If the logger memory contains data already, the menues/parameters marked with (**) can not be invoked! If these should be altered the logger memory has to be cleared before! (p.r.t. chapter 3)

2.0 Configuration

To change device settings, press key: ´set/*Menu*´ for 2 seconds. This will call the configuration menu (main display: „SEt“).
Pressing key: ´set/*Menu*´ changes between the menues, pressing key: ´Tara´ ?jumps to the refering parameters, which can be selected with key: key: ´Tara´.
The parameters can be changed with key: ´Min´ or ´Max´. Pressing key: ´set/*Menu*´ again jumps back to the main configuration menu and saves the settings.
Key: *Quit* finishes the configuration and returns to standard measuring operation.

2.0 (Typ) Different types of thermocouples

- Make sure that the correct type of thermoelement is set (p.r.t. "Configuration of The Instrument")! Otherwise a wrong
temperature will be displayed. The measuring device has been optimised for measurements with a type K probe.
- If other thermoelements but type K (NiCr-Ni) are used already the smallest temperature difference between plug and
instrument will result in measuring errors. Therefore wait for the temperatures to adjust after plug-in or touching a
sensor plug (depending on temperature ~15min.)
- Thermoelements are suitable to measure within a large temperature range. But keep in mind the allowed temperature range
of your specific temperature probe!

2.1 (rES) Display resolution

Standard setting: 'Auto',i.e. the device automatically switches over to the optimum resolution between 1° and 0.1°.
If temperatures to be measured are near the switching threashold, a fixed resolution may be better, e.g. for easy recording.
In such a case please select the optimum resolution manually..

2.2 (Unit) Temperature unit

The measured temperature can be displayed in °C or °F.

2.3(Corr) Display Correction Factor
This factor is applied to both sensor channels.
temperature displayed [°C] = temperature measured [°C] * Corr
or temperature displayed [°F] = (temperature measured [°F]-32°F) * Corr + 32°F
Standard setting: 'off' =1.000
This factor is used to compensate for losses of transfer in case of surface measurements, occurring if the object to be
measured is extremely hot but will be cooled by lower ambient temperatures. The same can be true for sensors with a large
mass. Unless 'off' is set, this value will be displayed shortly after the device is switched on; during operation it will be
identified by means of the Corr-arrow in the display.

2.4(OFFS) Zero Displacement/Offset
A zero displacement can be carried out for each of the two channels CH1 or CH2.
temperature displayed = temperature measured - offset
Standard setting: 'off' = 0.0°, i.e. no zero displacement will be carried out. The zero displacement is mainly used to
compensate for sensor deviations. Unless 'off' is set, this value will be displayed shortly after the device is switched on;
during operation it will be identified by means of the offset arrow in the display.

2.5(P.oFF) Power Off Time
If there won’t be pressed any key and no interface communication takes place for the time of the power off time setting (P.Off), the device will be switched off automatically to save battery power.
If P.oFF = oFF then the automatic switch off is deactivated.

2.6 (Adr.) Address
In preparation for a 5 channel-Interface converter

2.7(AL.) Alarm
There are three possible settings: Alarm off (AL. oFF), on with horn sound (AL. on), on without horn sound (AL. no.So).
Under point „AL.In“ must be selected, which channel should be monitored by the alarm function:
CH 1: alarm monitoring of channel 1
CH 2: alarm monitoring of channel 2
CH 1.2: alarm monitoring of channel 1 and 2
dif: alarm monitoring of the difference (channel 1 – channel 2)
Following conditions will display an alarm, when the function is activated (on or no.So):
- Value is below lower (AL. Lo) or above upper alarm rail (AL.Hi).
- Sensor error (Sens Erro)
- Low battery (bAt)
- Fe 7: System error (always with sound)

In case of an alarm, the alarm arrow flashes, and when polling the interface the prio-flag is set in the returned interface message.

(CLOC) Real Time Clock
The real time clock is used for the logger function: Recorded values are also containing the point of time, when they were measured. Please check the settings when necessary.
If the battery was replaced the refering menu ‚CLOC‘ will automatically be started.

3 Operation of Logger

The device supports two different logger functions:
„Func-Stor“: each time when the key: ´store/Quit´ is pressed a measurement will be recorded.
„Func-CYCL“: measurements will automatically be recorded each interval, which was set in the logger menu ‚CYCL‘ until the logger will be stopped or the logger memory is full. The recording is started by pressing key: ´store/Quit´ for 2 seconds.

For the evaluation of the data the WIKA software GSOFT has to be used. The software also allows easy configuration and starting of the logger.

When the logger is activated (Func Stor or Func CYCL) the hold function is no more available, the key: ´store/Quit´ is solely used for the operation of the logger functions.

3.1 „Func-Stor“: Storing Single Measurements

Each time when key:´store/Quit´ is pressed a measurement and its time stamp will be recorded. The recorded data can be viewed either in the display (when calling the configuration an additional menu „REAd LoGG“ is displayed, see below) or by means of the interface and a PC with GSOFT-software.

Max. number of measurings: 99

A measuring max. contains:
- Sensor 1 current value at point of storage
- Sensor 2 current value at point of storage
- Current difference of Sensor 1 – Sensor 2 at point of storage
- Time and date of storage

After each recording „St. XX“ will be displayed for a short time. XX represents the number of the recording.

If logger memory contains recordings already:
When key: ´store/Quit´ is pressed for 2 seconds, the choice for clearing the logger memory will be displayed:

clear all recordings

clear the last recording

clear nothing (cancel menu)

The selection can be made by key: ´▼/Min´ and key: ´▲/Max´. Key: ´store/Quit´ enters the choice..

If the logger memory is full, the dis 

show:

Viewing Recorded Measurings
Within the „LoGG Stor“ function the measurings can be viewed directly in the display not only by means of a computer (like at „Func CYCL“): press 2 seconds ´set/Menu´. The first menu displayed now is „rEAd LoGG“ (read logger data). After pressing ?key: ´▶/Tara´ the measurement recorded last will be displayed, changing between the different values refering to the measurement also is done by pressing ?? key: ´▶/Tara´.
Changing the measurement is done by pressing the key: ´▼/Min´or key: ´▲/Max´.

3.2 Func-CYCL“: Automatic Recording With Selectable Cycle-Time

The Logger-Cycle-Time is setable (p.r.t. Configuration). For example „CYCL“ = 60: A measuring is recorded after each 60 seconds.

Max. number of measurings: 5400.
Cycle time: 1...3600 seconds (=1h), selectable in the configuration

A measuring max. contains:

- Sensor 1 current value at point of storage
- Sensor 2 current value at point of storage
- Current difference of Sensor 1 – Sensor 2 at point of storage
- Time and date of storage

Starting a recording:
By pressing "Store" (key 6) for 2 seconds the recording will be initiated. After that the display shows ‘St.XXXX‘ for a short time whenever a measuring is recorded. XXXX is the number of the measuring 1... 5400.

If the logger memory is full, the display will show:

The recording automatically will be stopped

Stopping the recording manually:
By pressing key: ´store/Quit´ the recording can be stopped manually. Then the following choice appears:

Stop the recording

Do not stop the recording

The selection can be made by key:´▲/Max´and key: ´▼/Min´. ´store/Quit´) enters the choice.

Note: If you try to switch off the instrument in the cyclic recording operation. You will be asked once again if the recording is to be stopped.
The device can only be switched off after the recording has been stopped!

The Auto-Power-Off-function is deactivated during recording!

Clear Recordings:
When key: ´store/Quit´ is pressed for 2 seconds, the choice for clearing the logger memory will be displayed:

clear all recordings

clear nothing (cancel menu)

The selection can be made by key: ´▲/Max´and key: ´▼/Min´
key: ´store/Quit´ enters the choice.

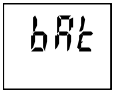
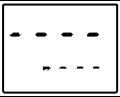
4 The Serial Interface

By means of the serial interface and a suitable electrically isolated interface adapter the device can be connected to a computer for data transfer, to visualise the data with the WIKA GSOFT-software (see valid price list CtH6450). To avoid transmission errors, there are several security checks implemented e.g. CRC.

5 Available sensors

The device is designed to be connected to all sensors of the CTH-series. Therefore a great variety of replaceable sensors in a range of for e.g -200...1150°C can be connected to the device. (see valid price list CTH6450)

6 Error And System Messages

Display	Meaning	What to do?
	Low battery power, device will only continue operation for a short period of time	Replace battery
	Battery empty	Replace battery
	Mains operation without battery: wrong voltage	Check power supply, replace it when necessary
 or Err.9	No sensor connected	Switch off device and connect sensor
	Connected sensor or device defective	If second sensor available, check if device is ok. Return defective device/sensor to manufacturer for repair
	Logger data are read by the interface	When transfer completed the device will automatically return to normal measuring display, no remedy necessary
No display or strange symbols, device is not responding to input	Battery empty	Replace battery
	Mains operation without battery: wrong voltage or polarity	Check power supply, replace it when necessary
	System error	Disconnect battery and power supplies, wait shortly, then reconnect
	Device defective	Return to manufacturer for repair
Err.1	Measured value above allowable range	Check: pressure not within sensor range? -> measuring value to high
	Sensor defective	Return to manufacturer for repair
Err.2	Measured value below allowable range	Check: pressure not within sensor range? -> measuring value to low
	Sensor defective	Return to manufacturer for repair
Err.4	Out of range	At DIF-chanal and Difference<-1999°: switch sensors. CH1 <->CH2 (Offseteinstellung beachten!)
Err.7	-system error -Out of range	Return to manufacturer for repair Do not leave the specified range
Err.11	Value couldn´t be calculated (no sensor or defect)	Change sensor

7 Calibration Services

DKD-certificates – other certificates:
If device should be certificated for its accuracy, it is the best solution to return it with the refering sensors to the manufacturer.
Only the manufacturer is capable to do efficient recalibration if necessary to get results of highest accuracy!

8 Specification

Digital instrument

Sensor connections	2 sensor connections (with Type K thermo-voltage free)
Thermocouples	J, K, N, S, T (as Immersion, Penetration and Surface probe available)
Measuring range	
Type K:(NiCr-Ni)	-199.9 ... +999.9°C or -220 ... +1370°C
Type J:(Fe-CuNi)	-120.0 ... +700.0°C or -200 ... +1100°C
Type N:(NiCrSi-NiSi)	-199.9 ... +999.9°C or -200 ... +1300°C
Type S:(Pt10Rh-Pt)	-50.0 ... +999.9°C or -50 ... +1750°C
Type T:(Cu-CuNi)	-120.0 ... +400.0°C or -200 ... +400°C
Accuracy	+/-1digit (at nominal temperature)
Type K:-199,9 ... +999,9°C.	+/-0.03%of m.v. +/-0.05%FS (T>-60°C); +/-0.2%of m.v. +/-0.05%FS (T<-60°C)
-220 ... +1370°C	+/-0.08%of m.v. +/-0.1%FS (T>-100°C); +/-1°C +/-0,1%FS (T<-100°C)
Type J: -120,0 ... +700,0°C	+/-0.03%of m.v. +/-0.08%FS (T>-80°C); +/-0.2%of m.v. +/-0.08%FS (T<-80°C)
-200 ... +1100°C	+/-0.08%of m.v. +/-0.1%FS (T>-150°C); +/-1°C +/-0,1%FS (T<-150°C)
Type N:-199,9 ... +999,9°C	+/-0.03%of m.v. +/-0.05%FS (T>-60°C); +/-0.2%of m.v. +/-0.05%FS (T<-60°C)
-200 ... +1300°C	+/-0.08%of m.v. +/-0.1%FS (T>-100°C); +/-1°C +/-0.1%FS (T<-100°C)
Type S: -50,0 ... +999,9°C	+/-0.05%of m.v. +/-0.08%FS (T>-200°C); +/-1°C +/-0.08%FS (T<-200°C)
-50 ... +1750°C	+/-0.1%of m.v. +/-0.1%FS (T>-200°C); +/-1°C +/-0.1%FS (T<-200°C)
Type T: -120,0 ... +400,0°C	+/-0.03%of m.v. +/-0.1%FS (T>-70°C); +/-0.2%of m.v. +/-0.1%FS (T<-70°C)
-200 ... +400°C	+/-1°C (T>-100°C); +/-1°C +/-digit (T<-100°C)
Display	large LCD-display to show two 4-digit values and extra-info
Range	of display max. -1999 to 9999 digit, depending on sensors used
Units	°C, °F
Resolution	0.1K or 1K respectively
Temperature drift	0.01%/K
Point of comparison	+/- 0.3K
Nominal temperature	20°C
Working temperature	0 to +50°C
Relative humidity	0 to 95% (non-condensing)
Storage temperature	-20 to +70°C
Key-functions	Min, Max, Hold, Tara(Zero-correction by diff.-measurement)
Power-off function	Device will be automatically switched off if no key is pressed/no interface communication takes place for the time of the power-off delay. The power-off delay can be set to values between 1 and 120 min.; it can also be completely de-activated.
Min/max alarm	The measuring value is constantly monitored for the min. and max. limits set. Alarm is given by integrated horn, display and interface.
Data logger	2 functions: individual value logger (Store) and cyclic logger (Cycle)
Memory space	Store: 99; Cycle: 5400
Cycle time	1 to 3600 seconds
Real time clock	integrated clock with date and year
Power supply	9V battery, type IEC 6F22 (included in scope of delivery) as well as additional power supply pin jack (1.9 mm inside diameter) for external stabilised 10.5 - 12V direct-current voltage (see accessories for suitable power supply)
Charging rate	approx. 3.0 mA
Change battery	signal warning sign and `bAt`
Interface	serial interface. Connection to RS232-interface via suitable electrically insulated interface
Housing	(digital instrument) impact- resistant ABS, membrane keyboard, transparent panel
Ingress protection	IP 65 (front)
Dimensions	142 x 71 x 26 mm (L x W x D)
EMC / CE-conformity	The CTH 6450 device corresponds to the essential protection ratings established in the regulations of the Council for the Approximation of Legislation of the member countries regarding electromagnetic compatibility (89/336/EWG)

Sensors

Probes available	Immersion, Penetration and Surface probe
Accuracy	class 1for thermocouples acc. to EN 60584
Temperature range	
- Immersion probe	- 200 ... +1150°C
- Penetration probe	-65 ... +1000°C
- Surface probe	-65 ... +500°C
Material wetted parts	Immersion probe: Inconel, Penetration probe: V4A, Surface probe: V4A and Cu-probe-head
Electrical connection	DIN-plug with silicon cabel

9 Accessoires

Accessoires like software, power supply unit, accu charger, accus, etc.
see valid pricelist CTH 6450.