Crouzet
More than a standard

Crouzet
Syrelec

PID Microprocessor temperature controllers CTD43 - CTD46 - CTH46



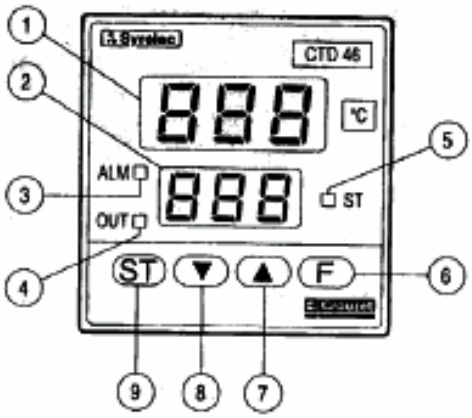


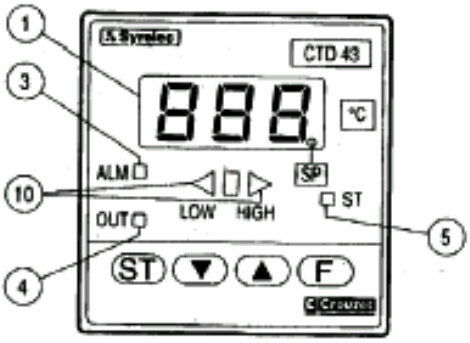
Display

1. Red measurement display (or the set point for CTD 43 by pressing ▲, indicated by a flashing decimal point).
2. Green display of set point.
3. Red LED indication:

   CTD43 / CTD46 : alarm output enabled

   CTH46 : cold output enabled
4. Red LED indicator for main output on.
5. Green LED indication for auto-tune function (flashing indicator) and auto-adaptive function (continuously lit).
6. Parameter selection and validation key.
7. Parameter increase and modification key.
8. Parameter decrease and modification key.
9. Enables or disables the auto-tune or auto-adaptive functions (SMART function).
10. Deviation indicators with respect to set point.. central green, upper and lower red.





Configuration

Key functions in configuration mode

F : For memorizing the new value of the selected parameter and going to the next parameter.

ST: For scrolling back up the menu without memorizing the new parameters.

▲: For increasing the value of the selected parameter.

▼: For decreasing the value of the selected parameter.

Configuration procedure

1. Remove the instrument from its housing
2. Set the dip switch to the open position (Fig. 1)
3. Return the instrument to its housing
4. Switch the instrument on
5. "CnF " (indicating configuration) appears on the display.
6. Press F to start configuration.

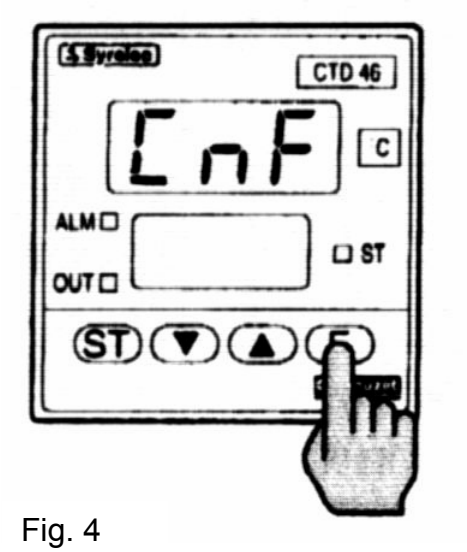


Fig. 4

Note: If you press the ▲ key by mistake:

"Cal. " is displayed. To return to the configuration mode ("CnF" displayed on the screen (Fig.4)) press ▲ again.

"CaL" stands for calibration. If you should access the calibration mode by mistake, do not modify any of the parameters, as this will alter the calibration. Simply disconnect the equipment. When it is powered up again, "CnF" will be displayed.

Description of the display:

- CTH46 - CTD 46: the lower display shows the parameter code and the upper display shows the current parameter value.
- CTD 43 : the display shows the parameter code and its value alternately.

P1 Input type and standard range

0	=	TCL	0 / 800 DC
1	=	TCJ	0 / 800 °C
2	=	TCK	0 / 999 °C
3	=	TCN	0 / 999 °C
4	=	RTD Pt 100	- 199 / 500 °C
5	=	RTD Pt 100	- 19.9 / 99.9 °C
8	=	TCL	0 / 999 °F
9	=	TCJ	0 / 999 °F
10	=	TCK	0 / 999 °F
11	=	TCN	0 / 999 °F
12	=	RTD Pt 100	- 199 / 999 °F

P2 Minimum scale value
Ignored when P 1 = 5

P3 Maximum scale value
Ignored when P 1 = 5

Note: - PID parameters will be calculated on this new scale amplitude by the calculation algorithm

- The minimum input span (P3 - P2) is 300 °C (or 600 OF) for a TC probe and 100 °C (or 200 OF) for an RTD

P4 Main output action
On the CTH46, P4 is ignored if P5 = 5.
r = reverse action (warm)
d = direct action (cold)

P5 Alarm function
0 = none
1 = absolute alarm
2 = band alarm
3 = deviation alarm
4 = measurement fault alarm
5 = cold output (CTH46 only)

Note: for CTH46, if P5 = 5 then P4 is forced to "r".

P6 Alarm operating mode for CTD43 and CTD46
Cooling mode for CTH46

CTD43 and CTD46 :

If P5 = 0 or 4 : P6 ignored

If P5 = 1, 2, or 3 : P6 can be configured as :

H = high alarm or outside limits for a band alarm

L = low alarm or inside limits for a band alarm

CTH46

If P5 = 5 : P6 selects the cooling mode

AIR: air

OIL: oil

H2O: water

Note: A change in cooling mode results in automatic modification of parameters rC (relative gain) and C2 (cold cycle time) set in parameter mode.

P7 Alarm relay action

Ignored when P5 = 0 or 5 r = reverse action (relay de-energized when alarm is enabled)

d = direct action (relay energized when alarm is enabled)

P8 Alarm with inhibit sequence

Ignored when P5 = 0 or 4 or 5

OFF = without inhibit

ON = with inhibit: the alarm inhibit function is activated when the instrument is switched on and after changing the set point for an alarm band and deviation alarm. For an absolute alarm, it functions only at start-up.

P9 OFFSET: input offset

- 19.9/ 19.9 DC for scale 5

- 199 / 199 DC/oF for all other scales.

The offset is algebraically added to the measurement.

P10 SOFT-START function threshold

The SOFT-START function limits the maximum output power "OLH" for a time "tOL" (OLH and tOL should be programmed in parameter definition mode) when, at start-up the measurement is below the threshold value programmed for this stage.

Enter this threshold value.

P11 Parameter lock

0 = device parameters unlocked.

All parameters can be modified.

1 = device parameters locked.

No parameter can be modified except for the set point SP.

2 to 499 = select a secret code (to be remembered) between these two values. In parameter definition mode, when scrolling through the menu, the display will show the following:

1) either

OFF	meaning that the device parameters 'OFF I are not locked and that all parameters can be modified.
nnn	To lock the parameters, key in a figure or number different to the secret code. Now, no parameter can be changed except the set point SP.

2) or

ON	meaning that the device parameters are locked and that none of the parameters can be modified except the set point SP.
nnn	To unlock the parameters, key in your secret code.

500 to 999 = select a secret code (to be remembered) between these two values.

The principle is the same as that above but this time, when the parameters are locked, the only values that can be changed are the set point SP and the alarm AL.

P12 Maximum rate of change of output power.

Adjustable from 1 %/s to 10%/s; above this rate, the display indicates "Int" meaning that there is no limit

P13 Measurement/set point deviation bargraph resolution (for CTD 43 only)

Resolution of 2 to 200 °C

If P13 = 5, resolution is 2.5° above and below the setpoint.

The central green LED lights up when the measurement/set point deviation is less than half the value of P 13.

The red LED (left or right) lights up when the measurement/set point deviation is greater than P 13/2 but less than 312 of P13.

The red LED (left or right) flashes when the measurement/set point deviation is greater than 3/2 of P13.

Example: if P13 = 10, P13/2 = 5 and P13 x 3/2 = 15

Green LED lit for deviation (M - C) < 5°

Red LED lit for 5° < (M - C) < 15°

Red LED flashing for (M - C) > 15°

The display indicates "- . - . - .” meaning that configuration of your instrument is complete.

If you wish to restart the configuration procedure, press F and "CnF" will once again appear on the display.

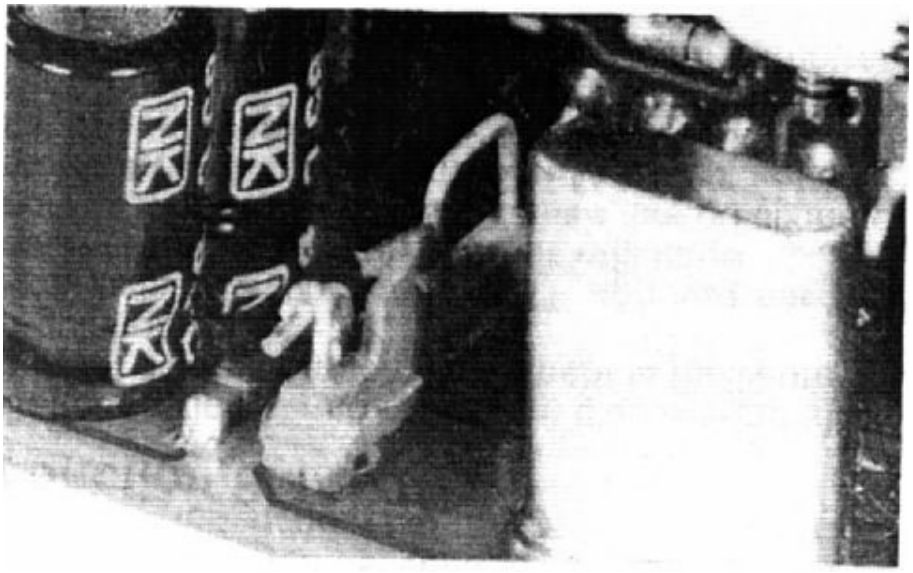
If not, you may proceed to parameter definition mode.

Parameter definition

1 Remove the instrument from its housing

2 Set the switch to the closed position (Fig. 2)

Fig. 2



3 These instruments can detect an input circuit break which will be indicated as a scale over range. However, if an input circuit break is required to be shown as a scale under range, set SH40 1 and CH401 (Fig. 3) as shown in the table below:

SH 401	CH 401	Indication
open closed	closed open	overrange (STD) underrange (the output will be "ON" at 100%)

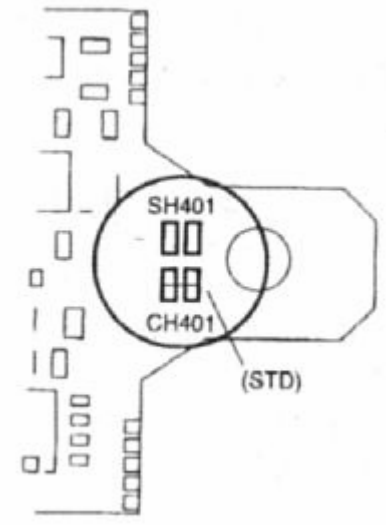


Fig. 3

4 If a readout in of has been selected at the time of configuration, the following must be stuck on the front of the instrument, in order to cover the I'°C" symbol.

°F	

5 Return the instrument to its housing - CTH46 - CTD 46 : the upper display indicates the measurement value, and the lower display the set point (this display condition is defined as the "normal display mode ")

- CTD 43 .. the display indicates the measurement value or the set point (in this case, the red LED on the display marked "SP", flashes). If you wish to change your display mode, press ▲.

(the measurement display condition is defined as the "normal display mode")

Key functions in parameter definition mode

F : for memorizing the new value of the selected parameter and going to the next parameter.

ST: for enabling or disabling the SMART function.

▲: for increasing the value of the selected parameter.

▼: for decreasing the value of the selected parameter.

Note: During the parameter definition stage, if no key is pressed for 10 5, the instrument reverts to "normal display mode". The new value of the last parameter modified is memorized only if the F key has been pressed.

SMART function

This auto-tune and adaptive tune function is used to obtain the optimum PID control automatically. To activate the SMART function, press ST when the instrument is in "normal display mode".

The “ST" LED will be lit continuously or flashing, thereby showing that the SMART function is operational. .

If the SMART function is activated, it is possible to display but not modify the control parameters (Pb, ti, td).

If you wish to adjust the PID control parameters (Pb, ti, td), press the ST key again to disable the SMART function

The instrument retains the current control parameters and it is possible to modify them.

Note: 1) In discrete control mode (Pb = 0), the SMART function is disabled.

2) A security code (see P11) can be entered to lock the SMART function as enabled or disabled (as required).

Direct access to the set point

For direct access to the set point for modification purposes:

1) Press ▲ or ▼ for more than 3 seconds to increase or decrease the current set point value.
2) When the desired set point value is reached, release the ▲ or ▼, key, and the new set point will automatically be memorized and operational after 3 seconds.

If, during this procedure, you decide that you do not wish to change the set point after all, simply press the F key. The instrument then reverts to "normal display mode" without memorizing the new value.

Note: with the CTD 43, to show the set point value on the display, press the ▲ key.

When the instrument displays the set point value, the red LED to the right of the display, marked "SP", flashes. To display the measurement value again, press ▲.

Disabling the power output (main output)

To disable the output power, first hold down the ▲ key and then press the F key. After holding down these two keys simultaneously for more than 3 seconds, the instrument displays "OFF" instead of the set point for the CTH46 and the CTD 46. For the CTD 43, as there is only one display, after proceeding as described above, the instrument will show "OFF" instead of the measurement value (the bargraph and SP LEDs will flash to indicate that the instrument is operating in display mode only).

Note 1: if you wish to show the "normal display mode" :

- CTH46 - CTD 46 .. press the ▲ key for 3 seconds, the display then indicates the measurement value and the set point for 3 seconds; then "OFF" returns automatically on the lower display.
- CTD 43 : press the ▲ key, the display indicates the measurement value (the 3 bargraph LEOs are still flashing). To show "OFF" on the display again, press the ▲ key again.

Note 2: When the power output is disabled, the parameters can still be displayed and modified by pressing F.
(Caution: the instrument will still take P11 into account) .

Note 3: If the SMART function has been enabled, the PID control parameters (Pb, ti, td) cannot always be modified.

Note 4: If you wish to revert to normal control, hold down the ▲ key then press F and hold down both keys for 3 seconds. The instrument automatically reverts to "normal display mode".

Programming the parameters

SP : set point, value between P2 and P3

nnn : secret code to protect parameters (defined in P11) AI : alarm threshold, value between P2 and P3

HSA : alarm hysteresis, adjustable from 0.1 to 10.0 %

Pb : proportional band, expressed in % range defined in P2 and P3, CTD43 and CTD46 : adjustable from 1.0 to 99.9 %.

CTH46 : adjustable from 1.5 to 99.9 %.

(Caution: if Pb = 0%: ON/OFF is activated and the Ci, td, C, C2, rC, aLP, OLH and tOL parameters are no longer displayed)

HS : hysteresis in ON/OFF action, adjustable from O. 1 to 10 % (this parameter is only displayed if Pb = 0 %)

ti : integral time, expressed in min. s. (**minutes. seconds.**) with a resolution of 10 s., adjustable from 1.2 min.s. to 20.0 min.s. Above this value, the display goes blank and integral action does not have an effect.

td : derivative time, expressed in min. s. (**minutes. seconds.**) with a resolution of 1 s., adjustable from 1 s. to 9.59 min.s. If td = 0, derivative action does not have an effect.

C : cycle time, adjustable from 1 to 200 s.

C2 : cold cycle time (CTH46 only if P5 = 5) adjustable from 1 to 200 s.

rC : relative cold gain (CTH46 only if P5 = 5) adjustable from 0.20 to 1.00.

OLP : Dead band / overlap (CTH46 only if P5 = 5) adjustable from -20 % to +50 % of Pb.

Negative value = dead band.

rL : minimum set point value, adjustable from the minimum scale value (defined in P2) to the value of rH.

rH : maximum set point value, adjustable from the value of rL to the maximum scale value (defined in P3).

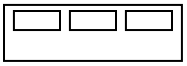
Note : if rL = rH, during operation, the user will not be able to change the set point value.

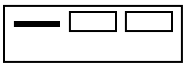
OLH : maximum output power limitation, adjustable from 0 to 100 %.

TOL : maximum output power limitation time, adjustable from 1 min to 100 min. Above this value, the display indicates "Int" and the duration of OLH is only limited when the measurement value reaches the limitation threshold (defined in P10).

Error messages Scale under range or over range

The instrument will shows a scale overshoot or undershoot condition on the display:

 : over range

 : under range

In the event of an over range, the main output is disabled (if reverse action) or enabled (if direct action)

In the event of an under range, the main output is disabled (if reverse action) or enabled (if direct action)

The alarm output, if programmed as a measurement value fault indicator (defined in P5), indicates the over range or under range. Opening of the input circuit is indicated as a scale over range. For a TC type input, it is possible to select a scale under range (see point 3 in "PARAMETER DEFINITION").

Errors

If a fault condition is detected, the lower display indicates "Err" and the upper display shows the code of the detected error (or alternately for a CTD 43).

Code	Description
100	Memory write error
200	Incorrect access in a protected memory zone
201-2xx	Incorrect configuration: the last two digits indicate the number of the faulty parameter (Note 1) (e.g. : 209 Err indicates an error on parameter P9)
301	RTD input calibration error
305	TC input calibration error
307	Reference junction calibration error
400	One or more control parameters are outside scale limits (Note 2)
500	Self zero error
502	Cold junction measurement error
510	Incorrect measurement during calibration

Note:

1 When a configuration error is detected, the operator simply has to return to the configuration procedure and check the specified value of the parameter.

2 If a 400 error is detected press ▲and ▼ simultaneously to load the default parameters and define new parameters.

3 For all other errors, return the instrument to your supplier.

Connection

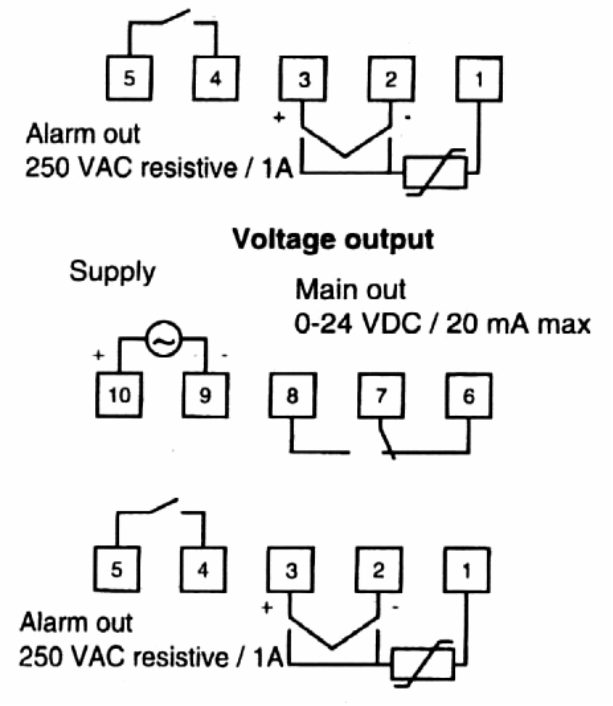
Relay outputs

01) Supply

02) Main output 250 V AC resistive / 3 A

03) CTD43/ CTD46 : alarm output
Contact NO 250 VAG / 1 A resistive
CTH46 : cold output
Contact NO 250 VAG / 1 A resistive

04) Connection of thermocouple or resistance thermometer



Logic output

01) Supply

02) Main output 0-24 VDC / 20 mA max

03) CTD43 / CTD46 : alarm output
Contact NO 250 V AC / 1 A resistive
CTH46 : cold output
Contact NO 250 V A C / 1 A resistive

04) Connection of thermocouple or resistance thermometer

Dimensions

