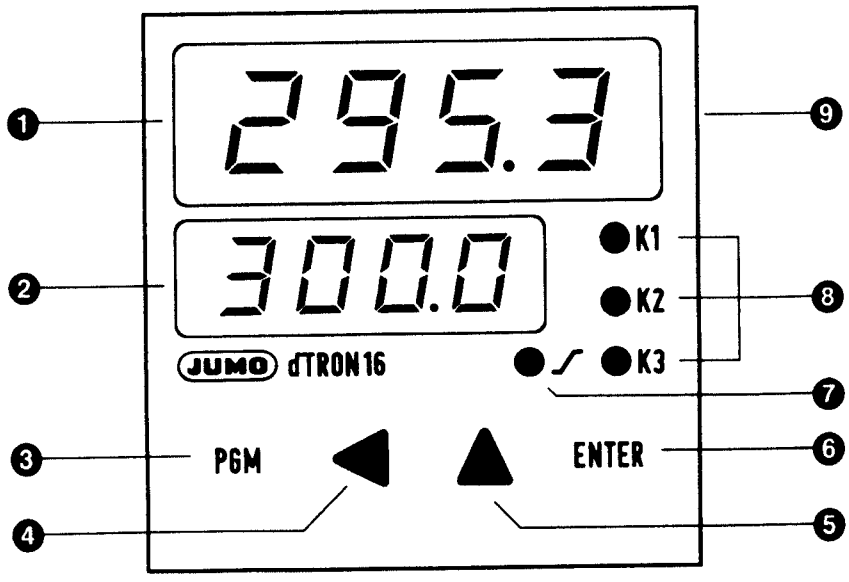
JUMO dTRON 16
Compact Microprocessor Controller
bezel 48 x 48 mm



1. 4-digit process display
2. 4-digit setpoint display
3. PGM key
   for parameter selection
4. digit key for selection of
   digit to be altered
5. Increment key
   to alter the selected digit
6. Key for entering value
7. LED for ramp function
   (alight when configured)
8. Status indication output 1 – 3
9. Instrument label, see also page 1

Note

All necessary settings and, where appropriate, alterations are described in these Operating Instructions. If, however, any difficulties should arise during start-up please do not carry out any manipulations on the instrument which are not permitted – you could endanger your rights under the instrument warranty. Please contact the nearest office or the main factory.

B 70.3010

5.92 00074191

Operating Instructions

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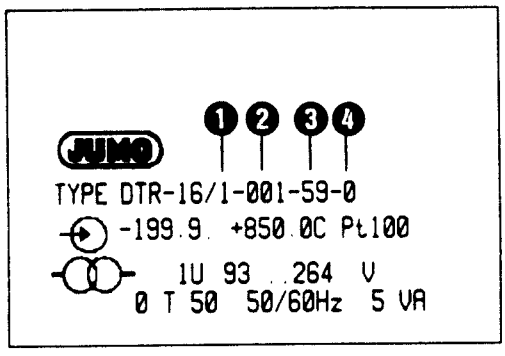
TYPE DESIGNATION

The instrument label is affixed to the left of the case. The type designation contains all the information on controller function, inputs and outputs. The supply voltage must agree with the voltage shown on the label.



❶ Controller function

Single-setpoint controller with max. contact (relay de-energised above setpoint), feedback structure can be configured — 1

Single-setpoint controller with min. contact (relay de-energised below setpoint), feedback structure can be configured — 2

Double-setpoint controller feedback structure can be configured — 3

❷ Signal input

Resistance thermometer in 3-wire circuit

Pt 100	−200...+ 850°C	001

Thermocouples

Fe-Con „J"	−200...+ 900°C	040
Cu-Con „U"	−200...+ 600°C	041
Fe-Con „L"	−200...+1000°C	042
NiCr-Ni „K"	−200...+1400°C	043
Pt10Rh-Pt „S"	0...+1800°C	044
Pt13Rh-Pt „R"	0...+1800°C	045
Pt30Rh-Pt6Rh „B"	0...+1820°C	046
Nicrosil-Nisil „N"	−100...+1300°C	048

Linearised transducers (cannot be configured)

0...1 mA	051
0...20 mA	052
4...20 mA	053
0...10 V	063

❸ Relay output 2

Controller output double-setpoint controller (min. contact) — 60

Limit comparator output:

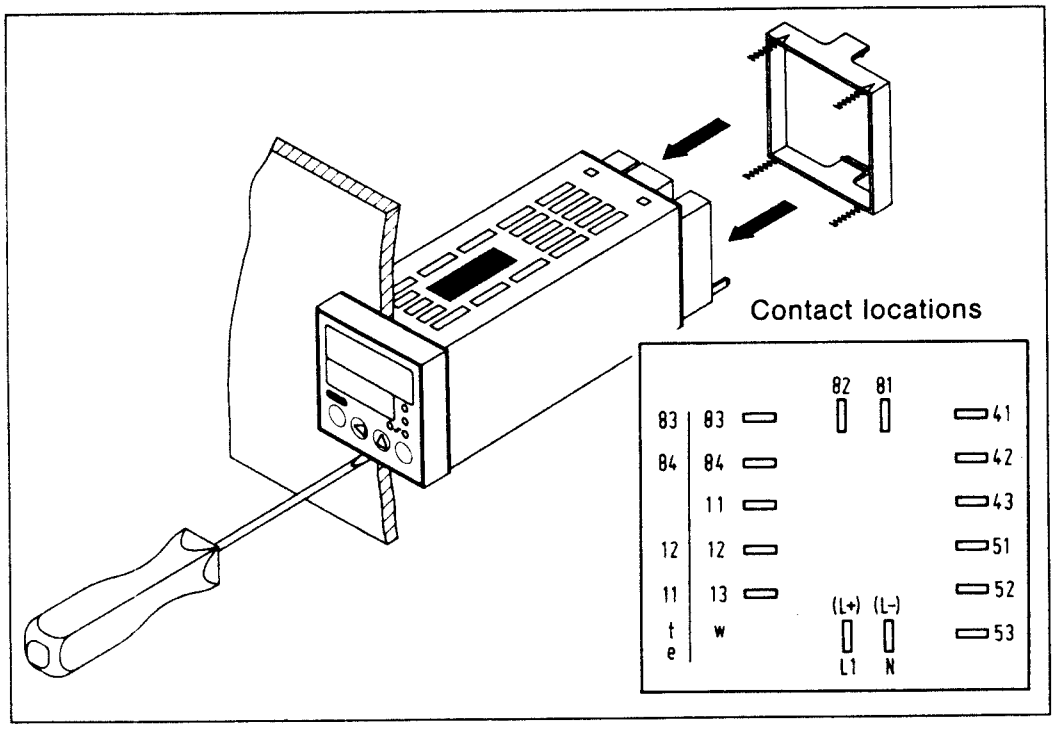
function lk1	51
function lk2	52
function lk3	53
function lk4	54
function lk5	55
function lk6	56
function lk7	57
function lk8	58
programmable function	59

❹ Function of the additional inputs and outputs

Logic input 1	Logic input 2	or[1] output 3	Logic output parallel to	
key inhibit	–	lk output	output 1	0
ramp stop	–	lk output	output 1	1
key inhibit	ramp stop	–	output 1	2
key inhibit	–	lk output	output 2	3
ramp stop	–	lk output	output 2	4
key inhibit	ramp stop	–	output 2	5

[1] on the same terminals

INSTALLATION



Installation

The instrument location should as far as possible be free from vibrations. The ambient temperature may be between 0 and 50°C at a relative humidity not exceeding 75%. Corrosive vapours reduce the life of the instrument.

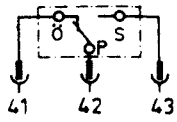
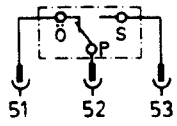
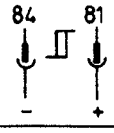
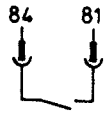
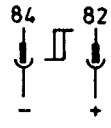
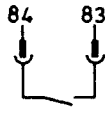
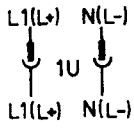
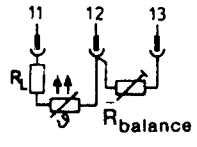
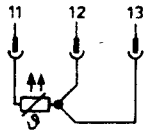
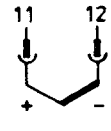
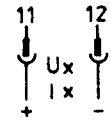
Insert the controller from the front into the panel cut-out. Sliede the fixing frame over the back and push it against the back of the panel. To remove the controller chassis, push the tab under the front panel lightly with a screwdriver and pull out the chassis.

Further technical details please see data sheet 70.3010

Installation notes

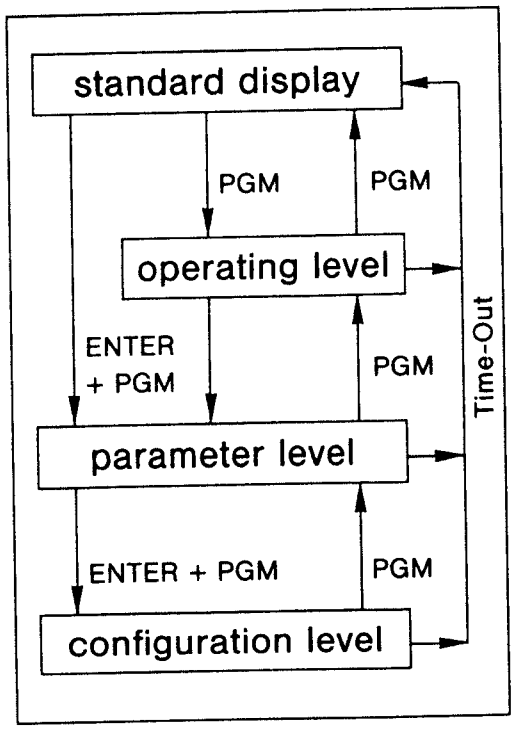
- ☐ All work must be carried out with due regard to the specification of VDE 0100 or the appropriate local regulations.
- ☐ Any work on the instrument must only be carried out within the extent described and, like the electrical connection, only by specialist personnel.
- ☐ All sensor and control cables must as far as possible be run separately from supply cables.
- ☐ Use screened signal lines and ground them only at one end.
- ☐ Input, logic output and logic input are not isolated from each other (common ground).
- ☐ If possible do not connect any contactor circuits to the supply terminals of the controller.
- ☐ Avoid inductive loads in the neighbourhood of the controller and suppress them with RC modules.
- ☐ Observe the appropriate safety regulations to monitor against overtemperature.

TABLE OF CONNECTIONS

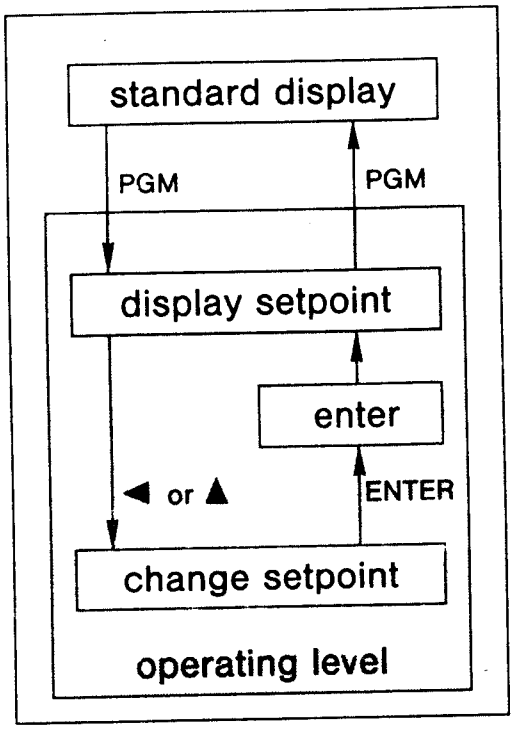
Connection for	Terminals	Diagram
Output 1 controller output K1	41 n. c. (opening) 42 common 3 A, 250 V AC 43 n. o. (closing)	
Output 2 Double-setpoint controller output or Ik output K2	51 n. c. (opening) 52 common 3 A, 250 V AC 53 n. o. (closing)	
Output 3 Ik output 0/5 V (0/12 V) K3 $R_{Load} \geq 450\ \Omega$ (1 k Ω)	81 (+) 84 (–) } Ik output	
Logic input 2	or ramp stop	
Logic output K1/K2 0/5 V	82 + parallel to 84 – output 1 or output 2	
Logic input 1	83 key inhibit 84 or ramp stop	
Supply as on label	L1 line N neutral or + – on d. c.	
Resistance w thermometer in 2-wire circuit	11 12 13 $R_L = R_{balance}$	
Resistance w thermometer in 3-wire circuit	11 12 13	
Thermocouple t	11 + 12 –	
standard signal e	11 + 0... 1 mA, R_i = 50 Ω 12 – 0(4)...20 mA, R_i = 2.5 Ω 0... 10 V, R_i = 100 kΩ	

OPERATION

The adjustments are made at three different levels. Starting from the standard display (top display = process, bottom display = setpoint), the next level is reached by pressing PGM or by pressing ENTER and PGM simultaneously. The configuration data can only be checked in this way.
If there is no input during 30 seconds the controller automatically returns to the standard display (time-out).

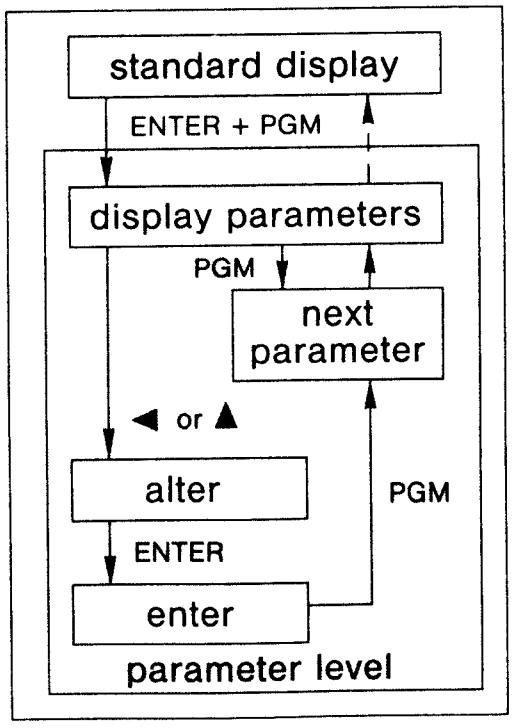


Operating level
The setpoint (SP) can be altered at the operating level. The digit is selected with key ◄ and the value increased in steps with key ▲ .



PARAMETER LEVEL

The controller parameters are set at this level. The first parameter AL appears on pressing ENTER + PGM simultaneously. The other parameters (see Table) are called up with PGM. The value on display can be altered (if required) with the keys ◄ or ▲ and entered with ENTER.
After the last parameter (ra.Sd) the controller returns to the operating level and display the setpoint SP. Pressing PGM again returns to the standard display.



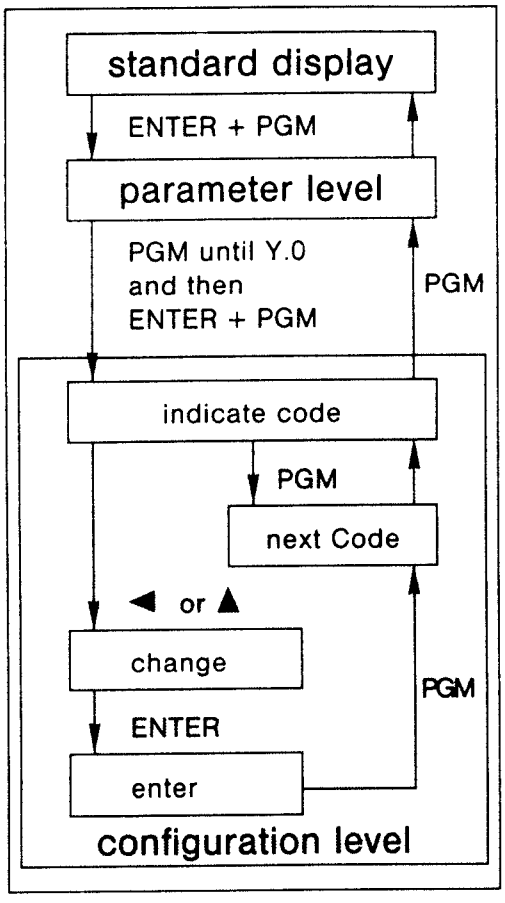
Operating Point Correction with Y.0
The adjustment range of operating point corresponds to the differential (HYS.1) for controllers without feedback and to the proportional range (Pb.1) for controllers with P or PD feedback.

Parameter	Symbol	Feedback structure none[3]	PD	PDD	PID	PI/ PID	Adjustment range	standard setting
Limit value (lk)	AL.	■	■	■	■	■	-1999...+9999	0
Proportional band 1	Pb.1	0	■	■	■	■	0...9999	0
Proportional band 2[1]	Pb.2	0	■	■	■	■	0...9999	0
Rate time	d.t	–	0	■	0	■	0... 999 s	80 s
Reset time	r.t	–	0	0	■	■	0...9999 s	350 s
Cycle time 1	CY.1	–	■	■	■	■	0... 99,9 s	20.0 s
Cycle time 2[1]	CY.2	–	■	■	■	■	0... 99,9 s	20,0 s
Contact spacing[1]	d.b	■	■	■	■	■	0...9999	0
Differential 1	HYS.1	■	–	–	–	–	0...9999	1
Differential 2[1]	HYS.2	■	–	–	–	–	0...9999	1
Working point	Y.0	■	■	■	–	–	-100...+100 %	0
Ramp slope[2]	rA.Sd	■	■	■	■	■	0... 999	0

[1] on double-setpoint controller [2] °C/min or °C/h, see configuration code C 111
[3] Pb=0 means feedback switched off
■ Adjustment within the adjustment range
– Adjustment not required (will be ignored)

CONFIGURATION LEVEL

Select the parameter level with ENTER + PGM. With PGM move up to parameter Y.0 and press ENTER + PGM again. The first code C 111 of the configuration level is displayed. Using PGM call up the remaining codes C 112, SP.L, SP.H, OFFS; they are described below. The indicated codes or values can be altered with the keys ◄ and ▲, if required, and entered with ENTER. Following OFFS, pressing the PGM key again displays all parameters of the parameter level before the controller returns to the standard display.



Configuration code C 111

input on model Pt 100-/ thermocouple:

0	Pt 100,	- 200 ...+ 850°C
1	Pt 100,	-199,9...+850,0°C
2	Fe-Con „L"	-200...+1000°C
3	NiCr-Ni „K"	-200...+1400°C
4	Pt10Rh-Pt „S"	0...+1800°C
5	Pt13Rh-Pt „R"	0...+1800°C
6	Pt30Rh-Pt6Rh „B"	0...+1820°C
7	Cu-Con „U"	-200...+ 600°C
8	Nicrosil-Nisil „N"	-100...+1300°C
9	Fe-Con „J"	-200...+ 900°C

Input on standard signal model:

A* Display 0 . . . 100 %
b* Display 0.0 . . . 100.0 %

* The standard signal is determined in hardware, see instrument label

Ramp function

0 Ramp off
1 Ramp on, gradient K/min
2 Ramp on, gradient K/h (rising or falling)

Controller model

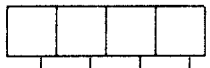
0 Single-setpoint controller with max. contact (relay de-energised above setpoint)
1 Single-setpoint controller with min. contact (relay de-energised below setpoint)
2 Double-setpoint controller

Unit, digital filter[1)]

0 ° C or %, filter on
1 ° C or %, filter off
2 ° F or %, filter on
3 ° F or %, filter off

[1)] digital low-pass filter for smoothing the input signals

CONFIGURATION LEVEL

Configuration code C 112 

Limit comparator (Ik)

0	Ik off
1	Ik 1
2	Ik 2
3	Ik 3
4	Ik 4
5	Ik 5
6	Ik 6
7	Ik 7
8	Ik 8

Output signals on overrange or underrange

	Controller output	Limit comp.
0	0 %	Ik off
1	100 %	Ik off
2	-100 %	Ik off*
3	0 %	Ik on
4	100 %	Ik on
5	-100 %	Ik on*

* on double-setpoint controller

Supply frequency adjustment

0	50 Hz
1	60 Hz

Function of the additional inputs and outputs

	Logic input 1	or[1] Logic input 2	or[1] Output 3	Logic output parallel to:
0	key inhibit	–	Ik output	output 1
1	ramp stop	–	Ik output	output 1
2	key inhibit	ramp stop	–	output 1
3	key inhibit	–	Ik output	output 2
4	ramp stop	–	Ik output	output 2
5	key inhibit	ramp stop	–	output 2

[1] on the same terminals

Lower setpoint limit SP.L
Upper setpoint limit SP.H

The selectable setpoint range can be limited with the parameters

SP.L = Setpoint Low
(lower setpoint limit, standard setting 0 °C)
and
SP.H = Setpoint High
(upper setpoint limit, standard setting 400 °C)

Process correction OFFS

Using the process value correction OFFS (Offset) the display can be adjusted to the desired value. For example when several controllers are mounted side by side on a panel. The offset value is added to or subtracted from the process value.

Example:

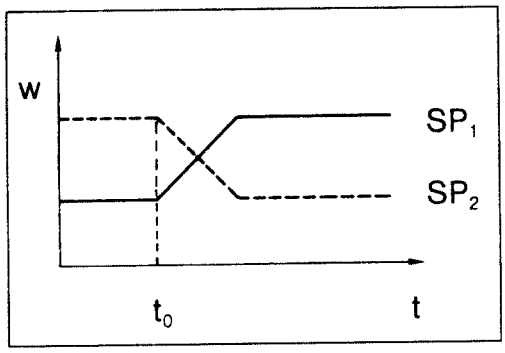
Display before:		Offset:		Display after:
294.7	+	0.3	=	295.0
295.3	-	0.3	=	295.0

FUNCTIONS

Ramp function

Both a rising and a falling ramp are available. The setpoint SP changed at t_0 is the final value of the ramp which is approached at a programmed slope rA.Sd. The standard display shows the current setpoint. The ramp function can be held up through logic input 1 or 2 (contact closed). The setpoint is flasching during hold-up.

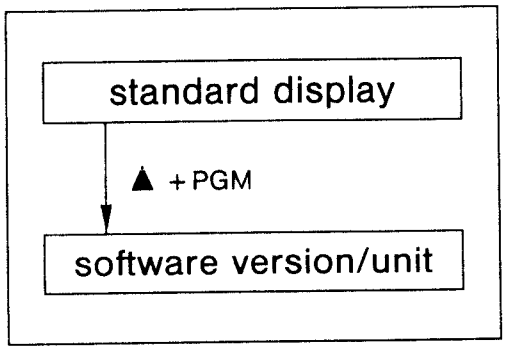
After a supply failure the controller takes the current process value as setpoint and continues the ramp at the set slope until the seleceted setpoint SP is reached.



Parameter	Symbol	Level
Ramp on/off and slope	–	Configuration level code C 111
Slope	rA.Sd	Parameter level
Setpoint	SP	Operating level

Display of software version and unit

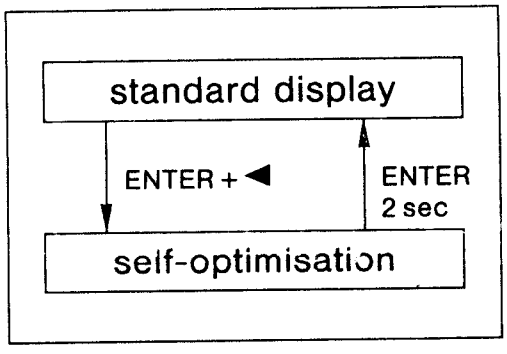
As long as the keys ▲ and PGM are held down together the upper display shows the software version and the lower display the configured unit (°C, °F, or %).



Autotune

(not when ramp function is configured)

Performs self-optimisation in the region of the subsequent working point. Before the start (keys ENTER + ◀) the difference between setpoint and process must be at least 10 % of the control range. The lower display flashes "tunE". After optimisation (no flashing) the data are accepted or the procedure aborted by pressing the ENTER key for approx. 2 seconds.



Key inhibit

The keys can be inhibited through an external contact, e. g. a key switch (contact closed).

Overrange or underrange sensor break or short-circuit

In this case the process display flashes "1999". The action of the controller ouputs is as set under code C 112.

FUNCTIONS

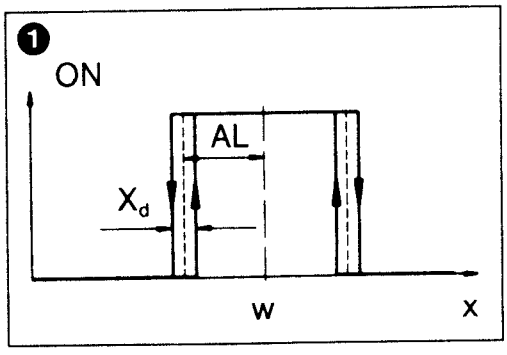
Limit comparator

The controller has a single limit comparator (alarm contact). The limit value AL is set at the parameter level, the function lk1 – lk8 under the configuration code C 112. The output consists of a logic output (81/84) on double-setpoint controllers, or a relay (51/52/53) together with one or two logic ouptus (81/84 and 82/84) on single-setpoint controllers. The switching differential X_d is ± 2 digits.

❶ Function lk1

Window function: the relay is energised when the process value is within a specified range.

Example: W=200, AL=30
Process value increasing:
ON at 172°C, OFF at 232°C
Process value decreasing:
ON at 228°C, OFF at 168°C

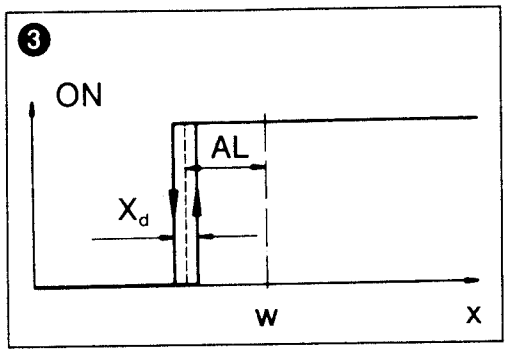


❷ Function lk2

as lk1 but relay action reversed

❸ Function lk3

low-alarm, relay is de-energised when process value is below (setpoint – alarm setting)

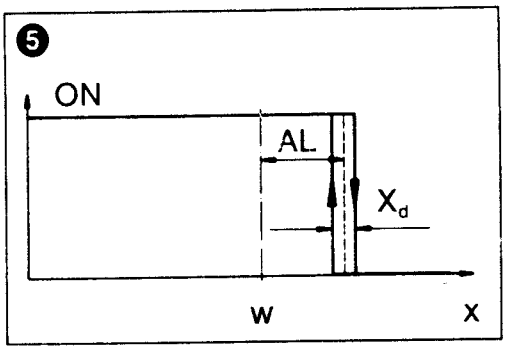


❹ Function lk4

as lk3 but relay action reversed

❺ Function lk5

high alarm, relay is de-energised when process value is above (setpoint + alarm setting)



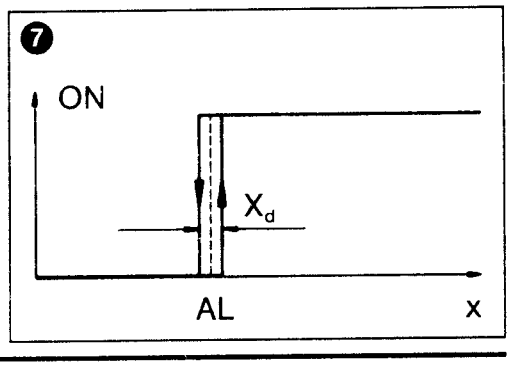
❻ Funkcion lk6

as lk5 but relay action reversed

❼ Function lk7

switching point is independent of controller setpoint, determined by alarm setting AL alone.

Relay is energised when process value is above alarm setting.



❽ Function lk8

as lk7 but relay action reversed