

Function:

Completion of a continuous PID controller with subsequently arranged switching steps, optionally installed in the controller or in external accessory units. In principle, the operation, handling and optimization of the continuous controller remain unchanged. However, the continuous control signal is not led to the outside but immediately converted internally to an appropriate number of switched on relay switching steps, based on the actuating variable 0...100%.

In the factory setting, the switching points of the steps are evenly distributed throughout the entire adjustment range, however they may be changed as desired. An installed switch-on delay prevents simultaneous switch on of all steps and thus load jumps in the supply mains. It is set jointly for all steps.

All relays are potential free change over contacts, a spark quenching unit is installed for the normally open contacts. Relays which are not needed may be switched off through switch point >100%. The first step may be configured as switching output if desired. This causes an adaption of the power jumps between two steps and thus an almost infinitely variable behaviour.

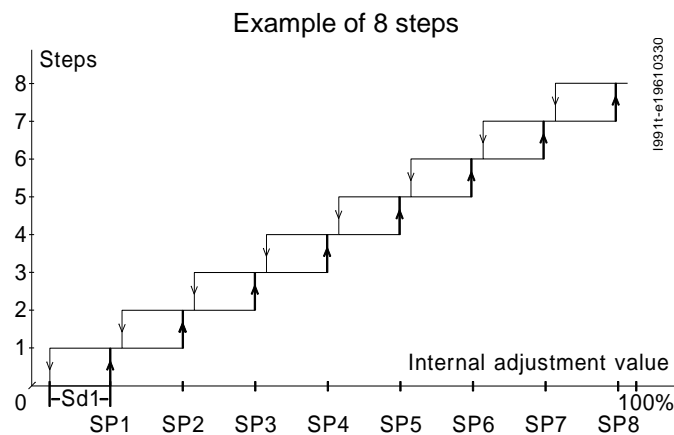
Version for automatic change-over of the steps

Every change in the output steps causes an automatic change-over of the active steps by activating the next higher output step for power increase and deactivating the lowest output step for power decrease. This forces an approximately even use of all steps including the connected load.

Version for different output powers:

In order to achieve an approximately uniform power change per step even with different output powers, one or more outputs are switched for each step depending on the calculated power in versions without continuous output. The other settings of the step parameters remain unchanged by this.

In versions with continuous output the percentage of the output power relating to the common output power can be adjusted for each step. The other settings of the step parameters are calculated automatically resp. are presetted by factory. A changing of these values is admissible in special exceptional cases only.

**Versions:**

Internal controller switching

Division of the contin. control signal into max. 20 actuating values (for example 4,8,5,6...20mA)

Recommended supplement for heater controls:

accessory equipment to display the return flow temperature

Option:

First step cycling, relay / logical output

First step as a continuous output 0/4...20mA

ditto, but with adjustable power allocation of the steps

version with different output powers of the steps

automatic change-over of the steps

Switching stages in external devices see list sheet 991tz8

List No.:

991t..

991ty

99ax.

..t / ..tL

..y

..p

..c

....Z

Special features of step controllers

Configuration level (supplement):

Factory setting

tE	Switch-on delay per step 1...60sec	5sec
SP..	Switch-on points for step 1...8, based on output 0...100% (or deactivation with setting 101%)	see table
Sd..	Switching differences %	see table

optional:

rel	Switching behaviour of first step: St (normal step) / CY" (cycling)	St
cy"	Cycle for cycle behaviour (2...120 sec)	20 sec

type 991t..0z only

st	function of the steps static ("stat") or automatic change-over of the steps ("auto")	auto
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Settings SP.., Sd..

in %, based on internal control signal 0...100%

	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	Sd..
for switching behaviour St= normal									
3 Steps	34	66	97						31
4 Steps	27	50	74	97					24
5 Steps	21	40	59	78	97				18
6 Steps	17	33	49	65	81	97			14
7 Steps	16	30	43	57	70	84	97		11
8 Steps	13	25	37	49	61	73	85	97	10

for switching behaviour CY= step1 cycling

3 Steps		34	66						0.1
4 Steps		27	50	74					0.1
5 Steps		21	40	59	78				0.1
6 Steps		17	33	49	65	81			0.1
7 Steps		16	30	43	57	70	84		0.1
8 Steps		13	25	37	49	61	73	85	0.1

type 991t...v only:

Example: Relay arrangement with 3 different output powers (relationship ideal 1:2:4)

	step 1	step 2	step 3	step 4	step 5	step 6	step 7
relay 1	x		x		x		x
relay 2		x	x			x	x
relay 3				x	x	x	x