TT-S6/D

Step controller with 6 steps, binary or in sequence

TT-S6/D is a micro processor based step controller for control of electric heaters, etc. Stegkopplaren styrs med 0…10 V signal från effektregulator TTC25/TTC40F eller annan reglercentral/DUC.

- **6 steps in sequence or 64 steps binary**
- **Control signal 0…10 V**
- **Analogue output for control of TTC25/40F integrated with step activation**

- **Supply air fan provides run-on-time delay**
- **Settable limit for number of steps**
- **Built in testing function for simple start-up testing**

TT-S6 is a step-controller designed for controlling electric heaters etc. It can also be used to step-control cooling processes. It has six relay outputs for controlling heater groups and an analogue output for sequential control of electric heaters. Alternatively the sixth relay can be used as a run on time relay for heater after-cooling. In this case the step-controller works with five steps.

Operating mode and step setting

The operating mode is selected by means of the slide switch on the front, binary or in sequence. In the sequential mode (S) the six (five) steps are activated one after the other. In binary mode (B) TT-S6/D can control up to 64 (32) steps. The figures in brackets refer to number of steps when using the after-cooling function of the sixth relay. The required number of steps is set by means of the rotating switch on the front.

Supply-air fan provides run on time as required

When heating is required the input signal exceeds zero, relay 6 will be activated for a three-minute run on time once the unit is switched off.

The relay contact is wired to the control circuit of the supply-air fan to provide aftercooling. If no heating is required when the unit is switched off, the run on time function will not be activated since it is not necessary.

Time delays

In order to reduce start-up time while still maintaining stable control, the TT-S6/D has a specially developed time-delay function for activating/deactivating output steps. When increasing or decreasing power output there is a 10 second delay between steps. For change of direction (from increase to decrease or vice-versa) there is a 30 second delay.

Heater power-distribution

To achieve more balanced control the analogue output on the TT-S6/D is used for continuous control of part of the heater via TTC25/TTC40F. The remainder is controlled by means of output steps from the step controller. When running in sequential mode (S) all loads in the heater should be of equal size. When running in binary mode the first load on the step controller should be of the same size as the part-load controlled by the TTC25/40F.

For running in binary mode with part of the load being controlled continuously the heater must be split 1+1+2+4+8+16+32. At three-phase 400V the TT-S6/D in conjunction with TTC40F, can control (binary) up to 1600kW and at three-phase 230V up to 960kW.

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Controlling together with TTC25/TTC40F

TTC25/TTC40F has a built-in temperature controller which is connected to the control input of TT-S6/D.

The analogue output of the step controller is connected to the power control input of TTC25/40F which is run together with the step control to equalize the relay steps.

When increased power is required the output to the power control of TTC25/40F is increased. When this is at full power the step controller activates the next step at the same time as the power control output to TTC25/40F is set to zero.

Increased power requirement is provided by an increase in output from TTC25/TTC40F.

The corresponding function in reverse applies in the event of reduced power requirement.

Controlling from a controller/ DDC

TT-S6/D can also be controlled by a 0...10V signal from a DDC or other controller.

When a part of the heater is to be controlled continuously the analogue output on the TT-S6/D is connected to TTC25X / 40FX.

Test function

If the rotary switch is set to T on start up the TT-S6/D will start in test mode. In test mode the relays are force activated by turning the rotary switch. Also, the analogue output signal will be incremented by 1 V / step.

To exit test mode, restart with the switch set to a position other than T.

Technical data

Supply voltage	24 V AC +/- 15%, 50-60 Hz
Power consumption	6 VA
Ambient temperature	0...50°C, non condensing
Storage temperature	-40...50°C
Ambient humidity	Max 90%RH
Size (BxHxD)	101 mm (6 modules) x 85 mm x 75 mm
Protection class	IP20

CE **Low Voltage Directive (LVD) standards:** This product conforms to the requirements of the European Low Voltage Directive (LVD) 2006/95/EC through product standards EN 60669-1 and EN 60669-2-1.

EMC emissions & immunity standards: This product conforms to the requirements of the EMC Directive 2004/108/EC through product standards EN 61000-6-1 and EN 61000-6-3.

RoHS: This product conforms with the Directive 2011/65/EU of the European Parliament and of the Council.

Indicators	Red LED (6) indicates activated output relay.
	Red LED indicates power supply.

Input

Control input	0...10 V DC from TTC25/TTC40F or other controller/DUC.

Outputs

Control output	0-10 V DC to TTC25/TTC25X or TTC40F/TTC40FX.
Relay contact data	6 relays, single pole closing, 240V 2A total. Relay 1...5 have a common supply pole. Relay 6 is single pole change-over.

Settings

Binary/sequential switch	Binary (B), Sequential(S)
Rotary switch	For setting the maximum number of output steps to be activated, 1...6. Relay 6 may, depending on the setting of the rotary switch, be used either as a sixth output relay or for run-on time delay to shut off the fan on shutting down the system.

Wiring and dimensions

1	Relay 1 out	13	0 - 10V DC input	
2	Relay 2 out	14	Signal conv. 10-2V DC in	
3	Relay 3 out	15	Signal neutral	
4	Relay 4 out	16	Not connected	
5	Relay 5 out	17	Not connected	
6	Not connected	18	Not connected	
7	Relays 1-5 in common	19	0 - 10V DC output	
8	Not connected	20	Signal conv. 0-10V DC out	
9	Relay 6 common pole	21	Signal neutral	
10	Not connected	22	Not connected	
11	Relay 6 normally open	23	24V AC in	Supply
12	Relay 6 normally closed	24	Neutral	voltage

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