



TA 239W

Domestic hot water temperature controller,
constant water temperature

C-23-5

1995.05



The TA 239W controller is part of the C80 system and is designed for the control of domestic hot water systems.

The output is a 2–10 V or a 0–10 V signal, which can position one or several (up to 10) actuators of the EM type in parallel.

Via the SPC input the setpoint can be increased or decreased.

For best results, TA 239W should be used in combination with the EGWS type fast temperature sensor.

TA 239W occupies one module on the terminal board and the power supply can be 16 V DC or 24 V AC.

TECHNICAL DATA

Part number, TA 239W with °C scale:

with cassette and terminal block..... 239-1010-800

with transformer TR mounted in a case ... 239-1010-0TR

Supply voltage 16 V DC $\pm 0,4$ V
24 V AC $\pm 20\%$, 50–60 Hz

Power consumption max. 25 mA

Temperature sensor thermistor type, EGWS

Control output Y:

Output voltage 2–10 V or 0–10 V, direct acting

Load max 2 mA; max. 10 control inputs,
short circuit proof

Control input Z1:

Permitted voltage max. 16 V DC

Input current max. 0,1 mA

Ambient temperature:

Operation 0 to +50°C

Storage –40 to +50°C

Ambient humidity max. 90% RH

Enclosure rating:

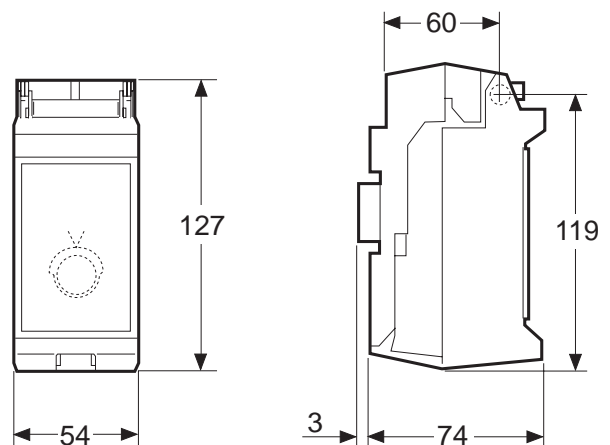
Cover IP 54 (similar to NEMA 13)

Terminals IP 31 (similar to NEMA 1)

Agency compliances:

Immunity EN 50082-1

Weight 0,1 kg



Also see data sheet C-01-5 for detailed information regarding the Control 80 system.

FUNCTION

PI control

TA 239W has proportional and integral (PI) action. The P action contributes to the control signal with a value proportional to the control offset, providing coarse correction of the offset. However, when only P control is used, there will be a residual offset in the water temperature, i.e. the temperature will be kept constant - but at a higher or lower value than the temperature setpoint. This is corrected by the I action which senses the magnitude and duration of any control offset.

The P action is set by adjusting the P-band knob (**Pb**). The P-band indicates the required change (in °C) of control offset to cause a 100% output signal change i.e. from 0/2 V to 10 V or reverse. The integral time T_i denotes the speed of the I action. A short integral time will give a fast I action, i.e. fast elimination of the residual offset, but normally also decreased stability.

Limitation of the control signal

The control signal is direct acting and limited to the range 2–10 V or 0–10 V.

The controller has a ramp limit function, which means that the maximum rate of change of the control signal is corresponding to the actuator stroke time. The control signal can not increase faster than the actuator will respond, thus avoiding the "reset wind-up" problem.

The actuator stroke time is set by means of the **ST** switch. The time can be set to 60 s (EM5 etc.) or 15 s.

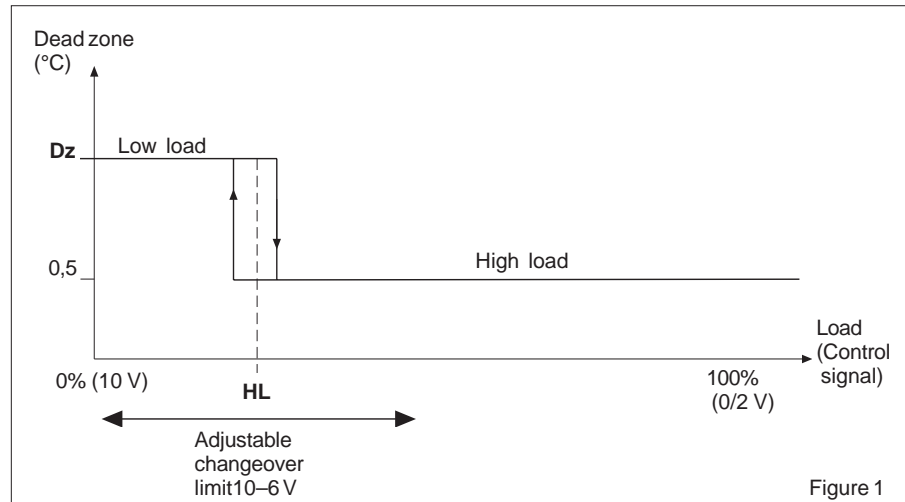


Figure 1

Figure 1 shows the adjustable dead zone.

Adjustable dead zone

To obtain high stability at low load, the controller is provided with a variable dead zone. The dead zone will hold the control signal constant at small control offsets.

The dead zone has two different values depending on the control signal value. The dead zone is fixed to 0,5 °C at high load, while the larger dead zone **DZ** is used at low load (high control signal). In this way unnecessary actuator wear is avoided when there is no hot water consumption. The **DZ** range is adjustable, see "Adjustments".

The changeover from low load to high load takes place when the control signal is 0,2 V below **HL**, the preset level for high load. To avoid control signal oscillation there is a changeover hysteresis when returning from high load to low load. This changeover is at a control signal 0,2 V higher than **HL**.

Sequence control

TA 239W can be used for sequence control in two or three steps. A TS auxiliary unit or a MS auxiliary unit should then be connected to the control output, see "System examples".

The **SC** switch is used to set TA 239W for sequence control in 1, 2 or 3 steps. This will result in a ramp limit corresponding to a total stroke time of **SC * ST** seconds.

Example:

ST = 15 and **SC** = 2 will give a total stroke time of 30 seconds.

SETPOINT CONTROL

The selected setpoint can be raised and lowered by an external control voltage, connected to Z1. By means of the **SPC** switch, two different values can be set, which correspond to SPC settings 32 or 6,7. The SPC value gives the setpoint displacement in degrees, when there is a 4 V change in the control voltage, i.e. 50% of the 2–10 V range.

The displacement as a function of the control voltage with these two values is shown in figure 2.

When no control voltage is connected, the input will be at 6 V. Then the displacement is 0, independent of the position of the SPC switch.

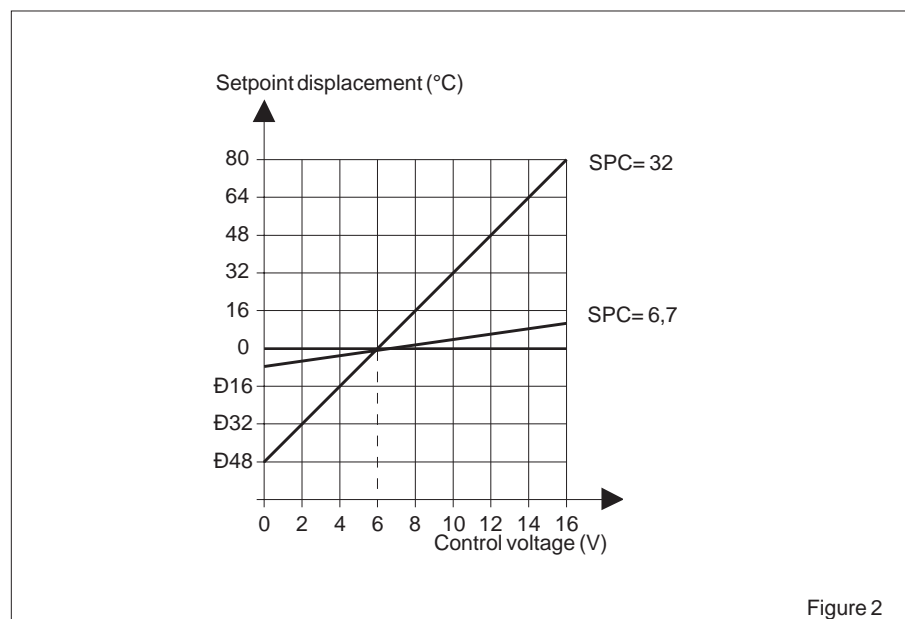
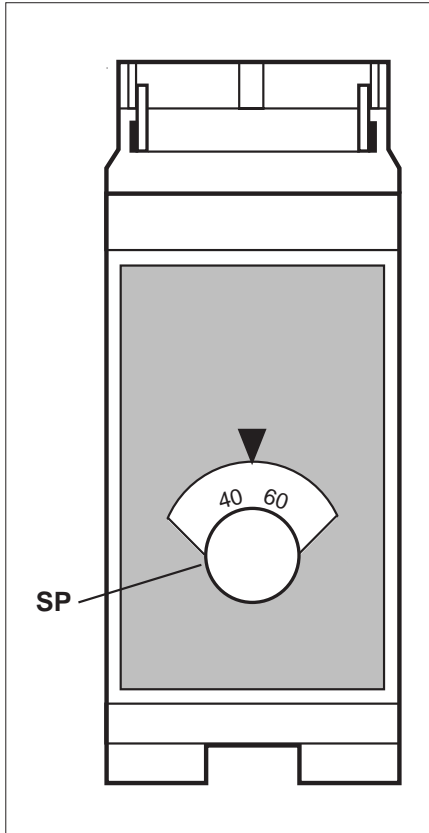


Figure 2

ADJUSTMENTS

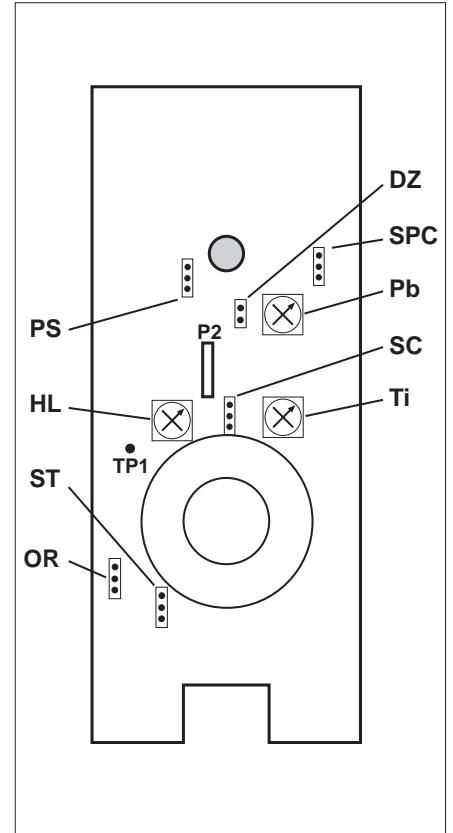


On the front:

SP:
Setpoint
Range: 20–120 °C

Under the cover:

- Pb:**
Proportional band
Range: 17–200 °C
Factory setting: 50 °C
- Ti:**
Integral time
Range: 5–60 seconds
Factory setting: 10 seconds
- HL:**
High load changeover limit
Range: 6–10 V control output signal
OFF = low load not in use
Factory setting: 9 V
- DZ:**
Low load dead zone
Jumper closed: 5 °C
Jumper open: 2 °C
Factory setting: 5 °C
- SPC:**
Setpoint control
Jumper in the upper position: SPC = 32
Jumper in the lower position: SPC = 6,7
Factory setting: SPC = 6,7
- ST:**
Actuator stroke time
Jumper in the upper position: 60 seconds
Jumper in the lower position: 15 seconds
Factory setting: 60 seconds
- SC:**
Sequence control
Jumper open: 3 steps
Jumper in the upper position: 2 steps
Jumper in the lower position: 1 step
Factory setting: 1 step
- PS:**
Power supply
Jumper in the upper position: 16 V DC
Jumper in the lower position: 24 V AC
Factory setting: 16 V DC



OR:

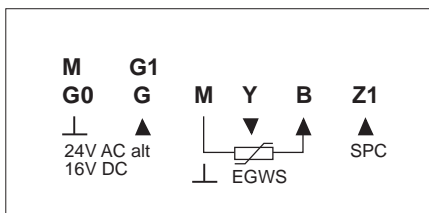
Y Output range
Jumper in the upper position: 2–10 V
Jumper in the lower position: 0–10 V
Factory setting: 2–10 V

For TAC service personnel only

- P2:**
Connection of flat cable to TM2
- TP1:**
Connection of test wire (6 V) to TM2

ELECTRICAL INSTALLATION

Connections of the terminal block



- G0** } 24 V AC neutral
M } External 16 V DC neutral
- G** } 24 V AC input
G1 } External 16 V DC input
- M** Measuring ground (Sensor signal ground)
- Y** Output 2–10 V/0–10 V signal ground is connected to M/G0
- B** Sensor
- Z1** SPC input signal ground is connected to M/G0

Length of cables

Max. 100 m of 1,5 mm² (AWG 16) cable for power supply.

Max. 200 m of 0,5 mm² (AWG 20) cable for all other connections.

The connection of TA 239W is identical with TA 219W and TA 229W. Therefore it can directly replace a TA 219W or TA 229W, without alteration of the connections.

Note: If TA 239W is 24 V AC supplied, the actuator must be of half-wave rectified type e.g. EM5, or else the controller and the actuator must have separate transformers.

ACCESSORIES

Mounting kit for mounting of a terminal block unit on a 35 mm DIN-rail:
Part number: 912-1140-000.

Mounting kit for flush panel mounting of case:
Part number: 912-1120-000.

Padlock:
Part number: 080-402

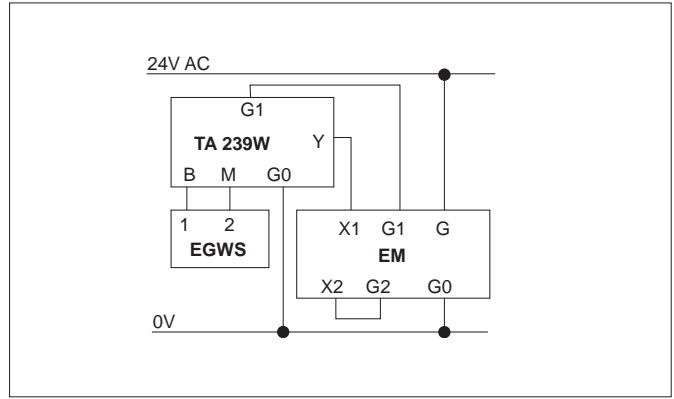
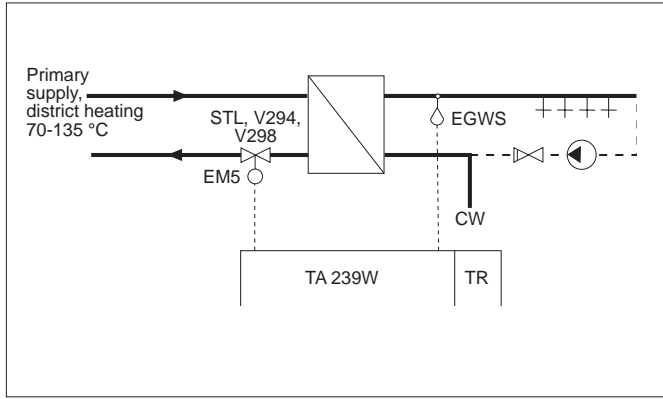
MAINTENANCE

All units in the Control 80 system are maintenance free but should be kept dry and cleaned externally, when necessary.

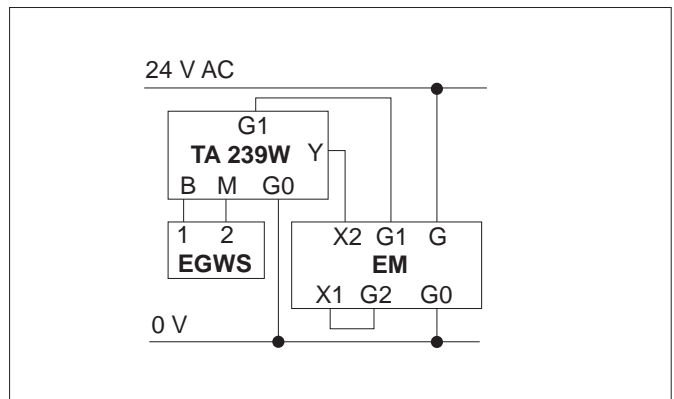
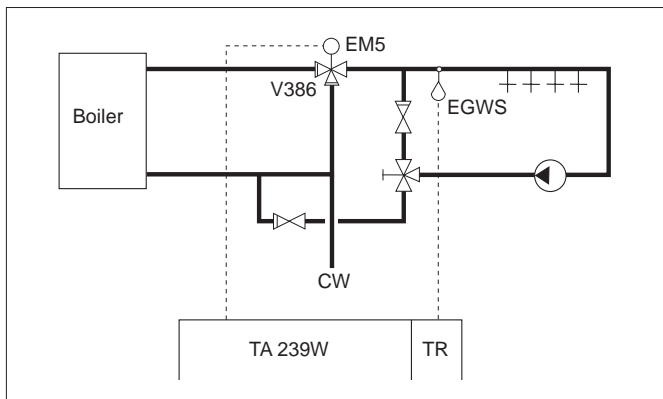
A functional test should be performed annually.

SYSTEM EXAMPLES

Parallel heat exchanger



Boiler/hot water tank



2-stage heat exchanger

