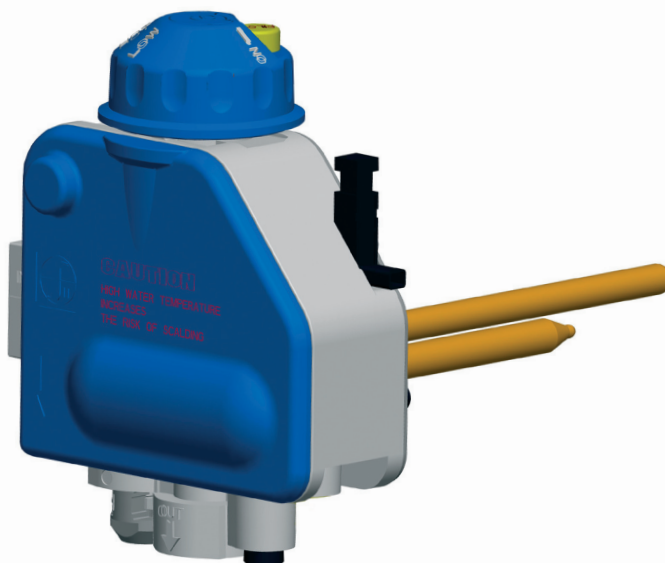




SITGroup

650 SERIES STORAGE WATER HEATER CONTROL



THERMOSTATIC GAS COMBINATION CONTROL FOR STORAGE WATER HEATER

Field of application

Gas-fired domestic or light commercial storage water heaters.

Normative reference

ANSI Z21.78, Z21.10.1.

Approvals

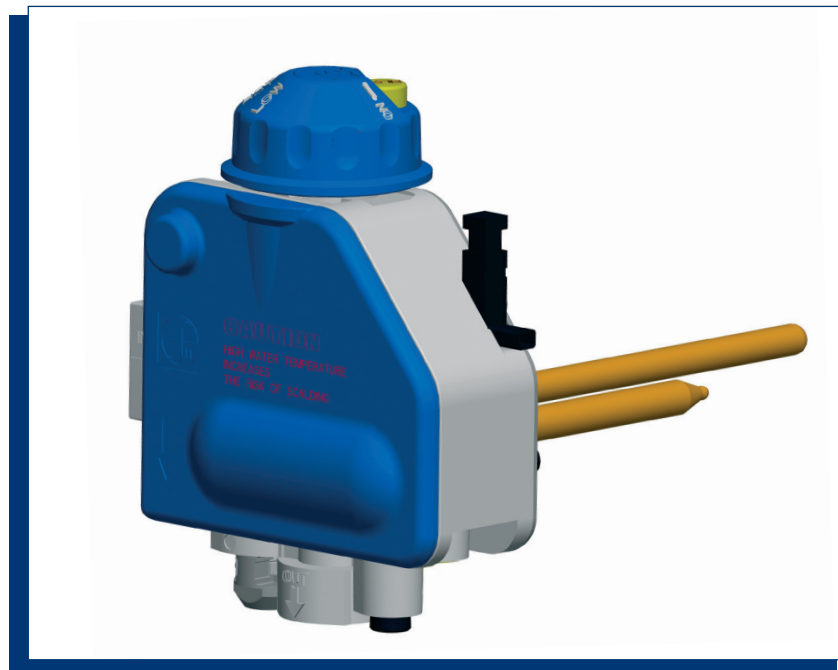
CSA international.

Features

Control and temperature selection knob.
Pressure regulator.
Thermoelectric flame failure device.
Energy Cut-Off Device (E.C.O.)



INTRODUCTION



650 Series is the new SIT gas combination control for gas-fired storage water heaters.

650 Series has been conceived, designed and developed with two main objectives in mind:

- to ensure customer satisfaction in terms of quality and performance, in compliance with SIT's general mission;
- to include innovative concepts in the product, both in function and manufacture.

THE 650 SERIES FEATURES

- Servo pressure regulator for superior regulation through a wide operating range.
- Optional integral piezo ignition.
- Integrated and independent pilot pressure regulator.
- Optional plastic cover: an attractive design, that can also be customised.

These are just some of the innovations in the 650 Series.

Many other options are available together with the product, including pilot burners, safety thermocouples and so on, which enable the customer to dispose of a complete and dependable system.

GENERAL DATA

CONSTRUCTION FEATURES

- Compact size
- Aluminum body casting
- Side main gas inlet
- Bottom main gas outlet
- Inlet and pilot gas filters
- Control and temperature selection knob
- Flame detection thermoelectric device
- Pressure regulator
- Direct immersion temperature sensing thermostat
- Energy Cut-Off Device (E.C.O.)
- Inlet and pilot filters.
- Inlet and outlet pressure test points
- Piezo (optional)
- Plastic cover (optional)

OPERATING SPECIFICATIONS

- Multi-Position mounting
- Gas families
- Maximum inlet operating pressure
- Pilot filter capacity
- Bending resistance
- Torsion resistance
- Working Ambient Temperature Range
- Capacity at 1 in. w.c.
- Storage temperature range
- Any position
- NG, LPG
- 1/2 psi
- ANSI Z21.35
- Max. 10 lb
- max. 375 lbf in
- 32...176 °F
- 45,000 BTU/h
- 40...176 °F

MECHANICAL CONFIGURATION

- Gas inlet thread
- Gas outlet thread
- Pilot outlet
- Pressure tubes
- Flange water thermostat connection
- Thermocouple connection
- 1/2" NPT
- 1/2" NPT
- 7/16" - 24 - NS.2 (ANSI B1.1)
- 1/8" NPT
- 3/4" NPT
- 11/32" ASA

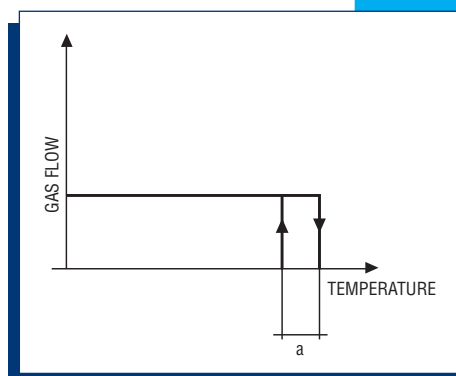
THERMOELECTRIC SAFETY DEVICE

- Magnetic unit resistance
- Pull-in current
- Drop-out current
- Number of cycles
- 18 ± 3 mΩ
- 60 mA to 220 mA
- 40 mA to 200 mA
- No less than 5,000 cycles

Other specs. available on request

FUNCTIONS

- Thermostat
- Energy Cut-Off Device (E.C.O.)
- Snap-acting
- Operating temperature range 95...158 °F
- Differential 16 °F NOMINAL
- Number of cycles no less than 100,000 cycles
- immersion, single use type
- setting temperature (standard version) at 186 ± 10 °F
- electrical resistance ≤ 2 mΩ



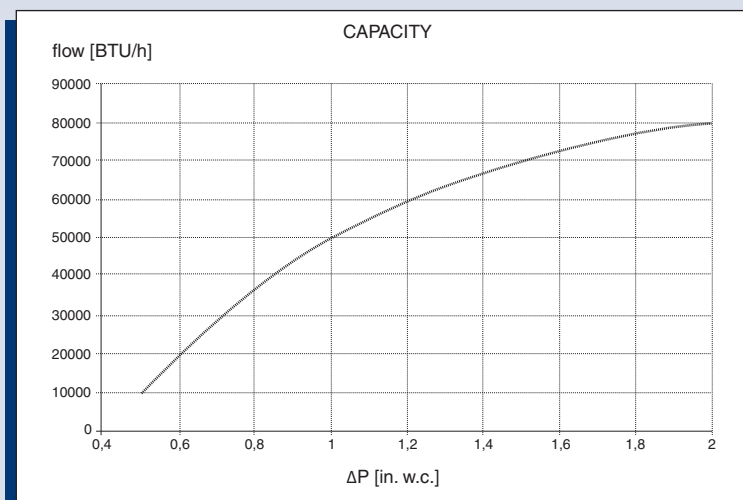


- Pilot pressure regulator

Fixed regulation
Flow Capacity Rating 150...1,100 BTU/h

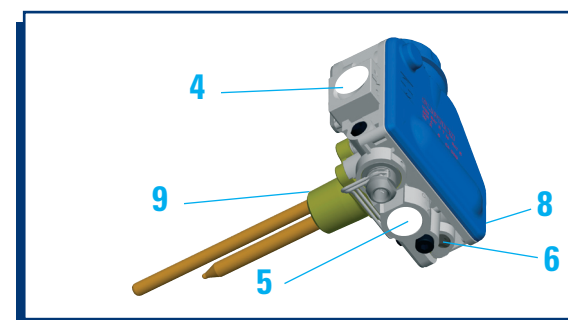
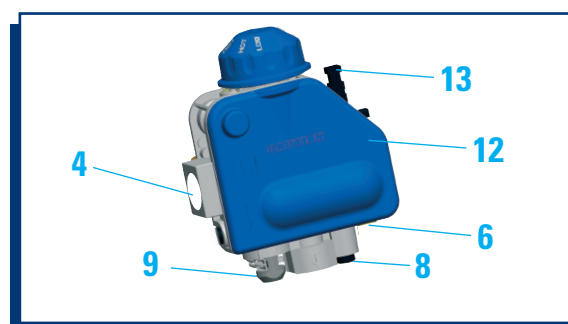
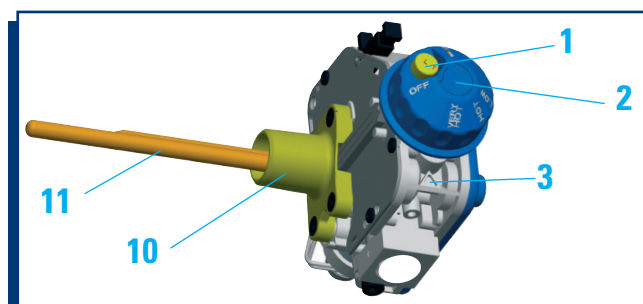
- Servo Pressure regulator

Fixed regulation
Flow Capacity Rating 10,000...80,000 BTU/h

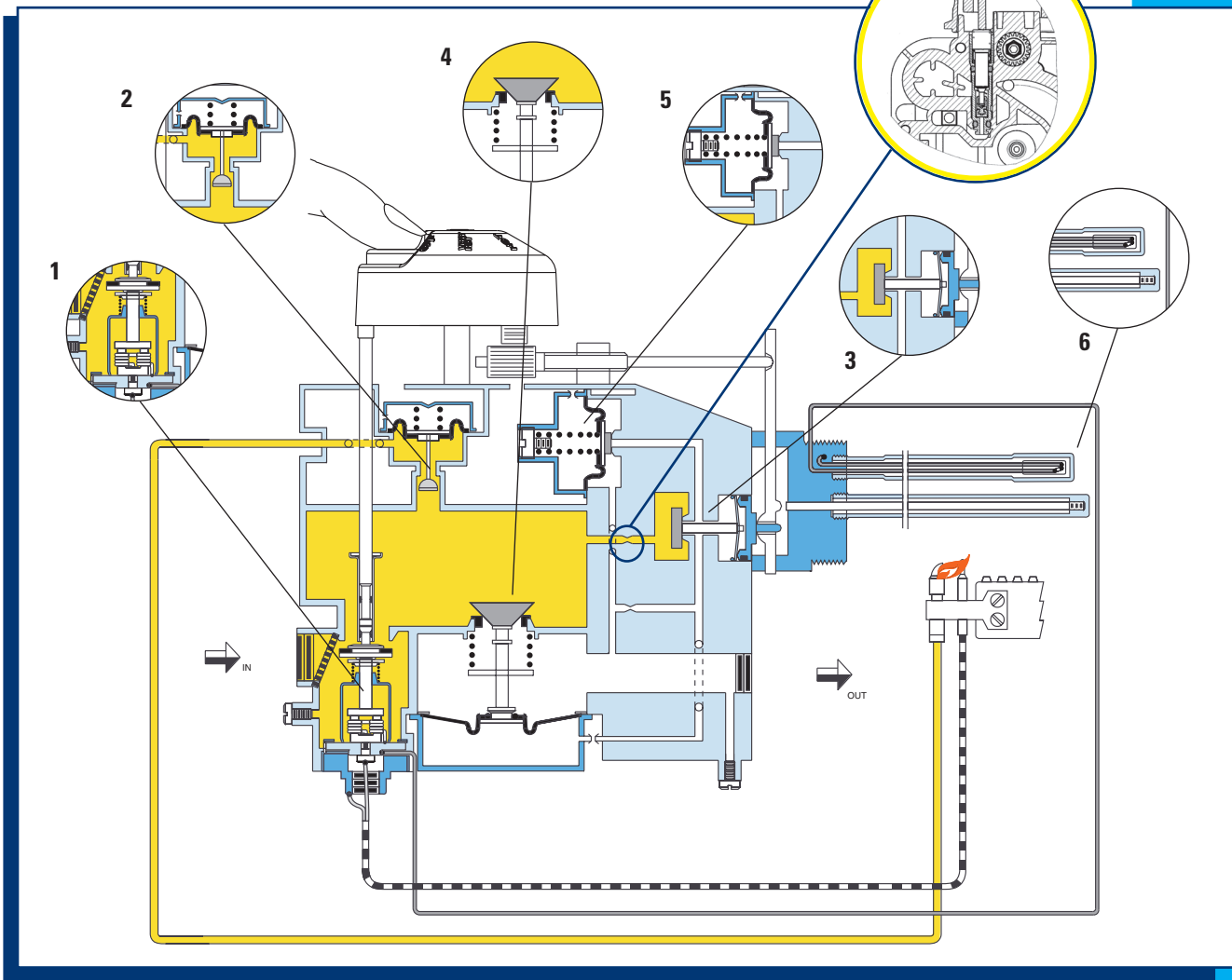


DESCRIPTION

- 1 Ignition button
- 2 Control knob
- 3 Reference notch
- 4 Gas inlet
- 5 Main gas outlet
- 6 Pilot outlet
- 8 Outlet pressure test point
- 9 Thermocouple connection
- 10 Mounting flange
- 11 Adjustment and safety thermostat bulbs
- 12 Plastic cover (optional)
- 13 Piezoelectric igniter (optional)



MAIN CHARACTERISTICS



The gas flows in 650 Series when the **magnet unit safety valve (1)** is open. The valve is kept open by the electromagnetic force produced by the pilot thermocouple.

With the magnet unit valve open the pilot circuit is enabled.

The pilot circuit is controlled by a separate, direct acting, **pilot pressure regulator (2)** which is pre-set at the factory. This circuit works independently of the main pressure regulator circuit.

The main burner is controlled by a servo-circuit. Gas is allowed to flow in the servo-circuit when the thermostat acts on the **snap spring and servo-valve assembly (3)**. Once the water temperature drops below the set-point temperature of the thermostat, the snap-spring forces the servo valve to open. This allows servo pressure to be applied to the main servo diaphragm which forces the **main valve (4)** open. When the set-point temperature is satisfied the the servo-valve closes, which in turn, closes the main valve.

Outlet pressure regulation to the main burner is controlled by the **servo pressure regulator (5)**. When the outlet pressure is greater than the preset value, the pressure regulator valve opens thus allowing the pressure under the main servo diaphragm to decrease which moves the main valve closer to the main valve seat. As a result, the outlet pressure decreases until a balance is reached between the setpoint pressure, and the outlet pressure. The opposite occurs when the outlet pressure is less than the setpoint pressure.

The Energy Cut-off Device (E.C.O.) (6) provides a gas safety shut off in case of excessive water temperature.

One switch (set at 186 °F) senses water temperature. If this switch is activated, it will de energize the magnet unit and shut off all gas flow through the control.



INSTALLATION

Water connection

Connection flange treaded 3/4" NPT.

Use a fit connector. Present some loops of seal material between flange and connector. Turn the valve with the key expected in the fixing flange. Tighten to 45 ÷ 60 ft lbf (61 ÷ 81 Nm) torque.

Main gas connection

The connection must be made using gas pipes with 1/2" NPT thread. Tighten inlet connection to recommended 30 ft lbs (40 Nm) torque, outlet connection to 20+10/-10 ft lbs (27+13/-13 Nm) torque.

Connection to the pilot burner

Pilot threads are 7/16" - 24 - NS.2 (ANSI B1.1)

Use appropriately sized nut and olive.

Tighten to 40 ÷ 70 in lbf (4.5 ÷ 8 Nm) torque.

Thermocouple connection

Connect the thermocouple to the magnetic group and ensure that the fixing connector has appropriately dimensions.

Torque: 10 ÷ 20 in lbf (1.1 ÷ 2.2 Nm).

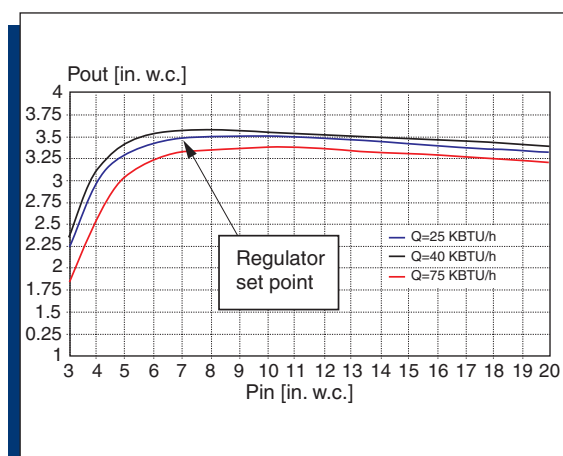
After carrying out all gas connections, ensure gas and water seal and the device correct working.

SETTING AND ADJUSTMENTS

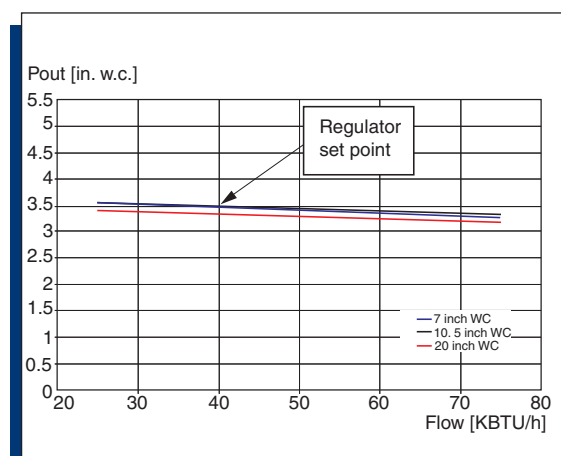
All settings and adjustments are preset at the factory, and are not field adjustable.

Verify the outlet pressure via the 1/8" NPT outlet pressure test ports. Upon completion of testing, the sealing screw must be reinstalled using a 3/16" hex key, with 22 in lbf of torque.

PRESSURE REGULATION CHARACTERISTICS



Main burner curve regulation for NG at different flows with an inlet pressure range from 2.4 in. w.c. to 20 in. w.c.



Main burner curve regulation for NG at different inlet pressure values with flows from 25 KBTU/h to 75 KBTU/h.

SEQUENCE OF OPERATION

All knob settings are referenced to the reference notch (1).

WARNING: Wait a minimum of (5) five minutes before attempting to re-light the pilot burner after the gas control has been switched to the OFF position and/or the pilot flame has been extinguished. Repeat the pilot ignition sequence starting from the OFF position. (Fig. 1)

Pilot flame ignition

Start from the OFF position (Fig.1). Rotate the control knob counter-clockwise to the PILOT position (Fig.2). Press and hold the ignition button PILOT ② for thirty (30) seconds or more and simultaneously press several times the Piezo Igniter button ③ to light the pilot flame (Fig.3). Release the ignition button PILOT and make sure that the pilot flame remains lit. If it goes out, repeat the ignition process, starting from the OFF position.

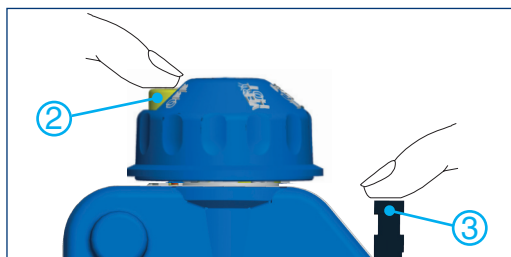


Fig. 3: Ignition button PILOT and Piezo Igniter button

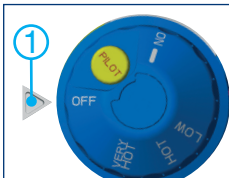


Fig. 1: OFF position



Fig. 2: PILOT position



Fig. 4: ON position

Main burner ignition

Turn the control knob counter-clockwise to the ON position (Fig.4). Gas will flow to the main burner when the water temperature stored within the appliance is lower than the set-point temperature.

Temperature setting

To increase the water temperature set-point rotate the control knob counter-clockwise to the desired temperature setting (Fig.5). The gas path to the main burner opens when the water temperature within the appliance is lower than the temperature set-point.

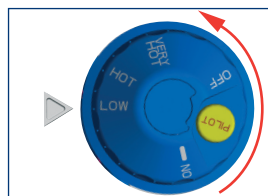


Fig. 5: LOW position

To decrease the water temperature set-point, rotate the control knob clockwise to the desired temperature setting (Fig.6). The gas path to the main burner opens when the water temperature within the appliance is lower than the temperature set-point.



Fig. 6: VERY HOT position

Stand-by

To maintain a flame at the pilot burner with the main burner off, turn the control knob clockwise to the PILOT position (Fig.7).



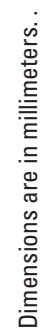
Fig. 7: PILOT position

Turning off

Turn the control knob clockwise to the OFF position (Fig.1).

General recommendations for use

- Do not tamper with sealed parts.
- Do not loosen assembly screws.
- Do not remove labels and marking.
- Avoid any damage to the device (knocks, falls, etc.). In case of fall of the valve, it is recommended not to use it.
- Only remove dust caps when installing.
- Do not exceed recommended torques.
- Make sure that the gas flows in the direction shown by the arrow on the device body.
- Use only specified spanner grips when making the connections.
- Avoid any foreign matter getting into the device, check inlet and outlet pipes for cleanliness.
- Do not immerse in water or subject the control to temperatures exceeding 176°F (80°C).
- Turn off the gas supply before starting the installation.
- Do not operate the device when the storage water heater is not filled with water.



www.sitcontrols.com – e-mail: situsa.headquarters@sitgroup.it