

# CSS Range

Full Sequence Control in an IP40 enclosure with integral spark generator



technology factfile

The Pactrol CSS range of full sequence controls, with integral spark generator, is fully approved and proven for use on gas-fired appliances, particularly where an IP40 enclosure is required. The range includes a wide selection of variants offering different timings and flame detection sensitivities.

The CSS range is particularly relevant to many commercial appliances where access to the control is required without the use of tools.

The CSS range of full sequence controls is ideal for use with atmospheric burners, with either single or 2-stage ignition sequences. The range offers volatile lockout and has an integral spark ignition generator for operation in dual or single electrode applications. 1 or 2-stage ignition is standard with various options available for both timings and flame detector sensitivities.

All versions lockout on failure to ignite, and recycle following a flame failure condition in the run state. Lockout is reset by interruption of the electrical supply for more than 5 seconds. If probe detection is not feasible, then all Pactrol's CS(X) range of controls can be used in conjunction with its UV head (Part No. 401500).

The CSS range is well proven for use in many commercial applications and, over the years, has become an industry standards, with its high-impact, flame retardant, IP40 housing, screw connectors and a wide variety of options.



## Typical applications

- Commercial Boilers
- Commercial Air Heaters
- Radiant plaque heaters
- Commercial Water Heaters
- Packaged Burners
- Small furnaces

## key features

- Fully protected IP40 enclosure
- Plug-in base with screw connections
- Simple volatile lockout
- Integral spark and flame detector
- Compatible with Pactrol's UV head
- Single or dual electrode operation
- Single or 2- stage ignition sequence
- Compact size
- CE certificated to EN 298

## troubleshooting

NB Isolate from the electrical supply before removing the control. With the cover removed, the control presents potentially live connections, and operation in this condition should only be attempted by suitably qualified personnel.

The flame sensing circuit relies on the connection normally provided between neutral and earth on single-phase supplies. It is therefore important for the proper operation of the control that the supply has an established neutral to earth relationship, and that the burner (s) is earthed to the supply. If an isolated (2 phase) supply is all that is available, a resistor (of at least 2 megohm, 1250v rating) can be connected between the neutral terminal and earth to provide a return path for the flame current. Do not rely on pipework to provide an earth connection to the burner. Thread-tape or jointing compound can effectively insulate a burner.

Ultra-violet sensing can only be accomplished by the addition of the Pactrol UV head. Other makes of UV head are not suitable for use with Pactrol controls, nor are Pactrol UV heads suitable for use with others makes of control. Although the control will operate with reduced supply voltage, the UV head requires the supply to be within 15% of nominal. By connecting a rectifier-diode between the probe connection and earth (or neutral), with the cathode connection (marked with a band or chamfer) to earth, the flame relay will operate. The flame relay must be de-energised during the whole of the pre-purged period, at the end of which the timing relay will be energised. If the flame is not sensed during the time of operation of the timing relay, the relay will de-energise. If the timing relay operates, but gas valves do not, check the fuse.

This fuse protects the control against a short-circuit on the valve outputs, and these and the associated wiring should be carefully checked before replacing. Replacement fuses must be of the

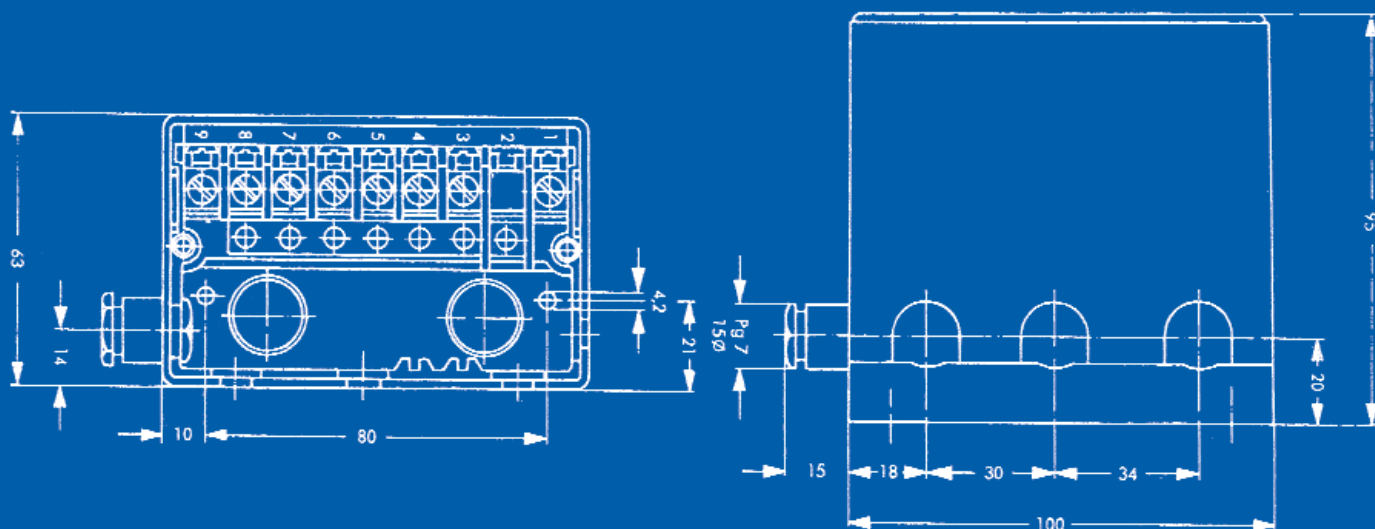
correct type and rating, and after replacing, check that the operation of the control is satisfactory and the sequence is correct.

NB The manufacturers warranty is invalidated if an incorrect fuse is fitted.

Problems may be experience with pilot burner ignition if insufficient time is allowed during the ignition safety period to establish a flame. This is usually evident if the control is operated after a long shut-down, during which air will have diffused into gas pipework downstream of the valves and will require purging before ignition can take place. Provided that the requirements for maximum energy release are observed, the ignition safety time could be extended to reduce the risk of ignition failure, by substituting a control with longer timed periods. The approval of the appropriate Test House must be sought before making a substitution on an approved appliance.

Frequent removal of a control from its base can result in the base contact-springs failing to make good contact with the edge of the printed circuit panel. Increasing the bow in the spring by carefully pressing down on the top edge should cure this problem.

## housing dimensions



To keep abreast of current developments, controls may be subject to change without notice. Such changes may affect the accuracy of information contained in this data-sheet, and the manufacturers advice should be sought if any problems arise.



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# Technical specification

<b>Electrical Supply</b>	
Voltage	230 V +10% -15%
Frequency	50/60Hz
Consumption	5VA
Internal fuse	20mm 2 Amp HRC
<b>Operating Conditions</b>	
Ambient temperature	-5 to +60°C
Humidity	maximum 95% RH
Mounting position	any
<b>Timings</b>	
CSS 01-12	(Part No.404700)
Prepurge (Tp)	Nominal at 240 V 9 s
Ignition safety (Ts)	9 ± 3 s
CSS 01-24	(Part No.406700)
Prepurge (Tp)	Nominal at 240 V 18 s
Ignition safety (Ts)	18 ± 6 s
Flame sensing	Flame rectification
Nominal flame current	6µA
Minimum flame current	2µA
Response time	Flame on .... 100ms
Response time	Flame off .... less than 1 s
Open-circuit probe voltage	180 v
source impedance (at 50Hz)	4 Mohms
Short circuit probe current	50µA
<b>Ignition</b>	
Type	integral electronic generator
Open circuit voltage	Peak, at 240 V, 15kV
Energy (WHITB)	At 240 V, 4mJ
Spark gap	2.5 to 4.0 mm
HT lead length	maximum 1 m
Repetition rate At 50 Hz 50 sps (sparks per sec.)	
Switching capacity	
Start gas valve (GV1)	0.5 A
Main gas valve (GV2)	0.5 A
Warning lamp (A)	0.5 A
Associated control and external fuse	5A
<b>Weights:</b>	
Control with base	345gm
Control without base	235gm

Note - please contact Pactrol for details of available options and variants

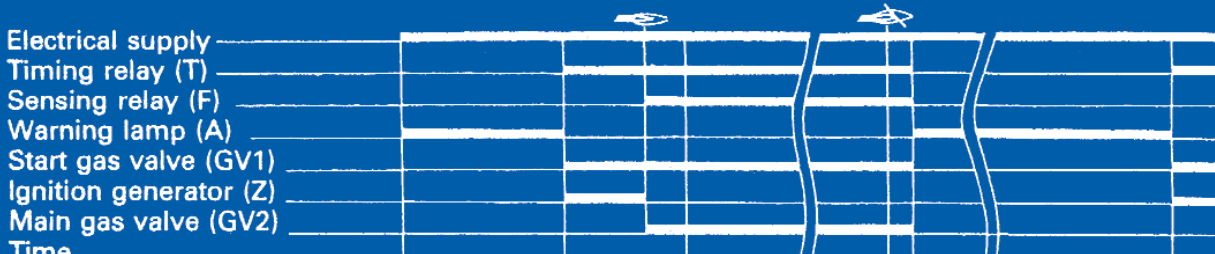
## operation

To start the ignition sequence, the electrical supply is connected to the control. The sequence commences with a pre-purge period (Tp) during which both relays are de-energised and the warning-lamp (A) is switched on. Provided that the flame relay (F) remains de-energised throughout, the pre-purge period ends with the timing relay (T) being energised, and the ignition safety period (Ts) commences. The operation of the timing relay switches off the warning lamp and switches on the start-gas valve (GV1) and the integral ignition spark generator. When the gas is ignited, the flame provides a rectifying path between the flame-sensing electrode and the earthed burner. The dc voltage produced by this flame-rectification is amplified to operate the flame relay. This switches off the ignition transformer, switches on the main-gas

valve, and holds the timing relay energised. If ignition has not taken place by the end of the ignition safety time, the timing relay will be de-energised, switching off the start-gas valve and ignition transformer, and switching on the warning lamp. Another ignition attempt will only be made if the electrical supply is interrupted for at least 5 seconds.

If the flame is extinguished after the end of the ignition safety time, both gas valves are switched off, the warning-lamp switched on, and the control will make a re-ignition attempt following the normal pre-purge period.

### TIMING CHART



## installation instructions

NB Before installing or replacing any control, check that the type number is correct for the applications. Never use a control which provides a longer ignition safety time than the one with which the appliance was approved.

To separate the control and base, fully loosen the two securing screws and carefully pull the control and base apart. The base should be mounted on a flat surface by means of two M4 clearance holes. Do not over tighten the mounting screws. There are two knock-outs in the bottom of the base for cable entry, and one or more of the rubber grommets may be removed for side entry.

### Wiring

'Comfort' controls such as thermostats should be connected in the Line supply to terminal 9. This supply should be fused at 5A and must be of the correct voltage and polarity with the respect to Neutral, Overheat or other 'limit' controls may, if desired be connected between the control and the start-gas valve (GV1) or in the common return from both gas valves, to lock-out the control in the event of a limit condition. It is not recommended that the control is wired for permanent-pilot operation with 'comfort' controls operating the main gas valve. The valve controlling start-gas (either to a pilot, or the main burner at reduced gas rate) is connected to the GV1 position, with the main or full-rate gas valve

at GV2. If the main burners is to be ignited directly at full gas rate, the gas valve will be connected in the GV1 position.

The flame sensing probe should be well insulated electrode of heat resisting steel. It should be placed with the tip within the outer visible edge of the flame. For pilot-burner systems, the probe should be in the junction of pilot and main burner flames, and both burners must be earthed. The flame current can be measured with a dc microammeter, and is normally about 3 to 5 microamps with a pilot flame, and 5 to 8 microamps with a main flame. The control will sense currents of 1 to 2 microamps, but as the current will fluctuate, loss of flame shutdowns may be frequent. The wiring between the control and sensing probe should have good quality insulation suitable for the temperature encountered. Long cable runs should be separate from other wiring. Co-axial screened cable is not recommended.

NB Under no circumstances should the ignition spark be allowed to jump to the sensing probe, and there must be no possibility of tracking between the high-voltage wiring and sensing probe wiring.

## wiring instructions

Terminal	Function
1	Spark ignition
2	Not connected
3	Earth input
4	Flame probe input
5	Neutral input
6	Gas Valve GV2 output
7	Gas Valve GV1 output
8	Alarm output
9	Live input

