

# CSA Range

## Full Sequence Control in an IP40 enclosure



technology factfile

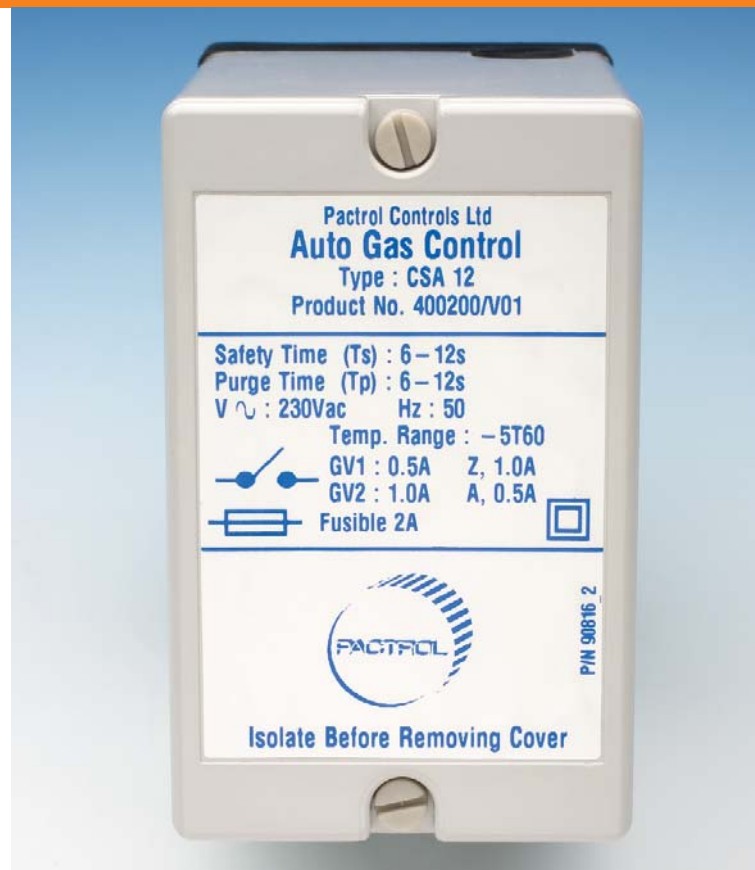
The Pactrol CSA range of full sequence controls is fully approved and proven for use on gas-fired appliances, particularly where an IP 40 enclosure is required.

The CSA range is particularly useful in many commercial and industrial appliances, where access to the control is required without the use of tools and a remote spark ignition source is in use.

The CSA range of full sequence controls is ideal for use with industrial atmospheric burners, with either single or 2-stage ignition sequences. The range offers volatile lockout and has outputs to supply a remote spark generator and 1 or 2-stage gas valves.

All types go to volatile lockout on failure to ignite or flame failure. 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 UV head (Part No. 401500)

The CSA range is well proven and fully meets the requirements of the European Gas Appliance Directive.



## Typical applications

- Packaged burners
- Industrial furnaces and kilns
- Industrial appliances
- Commercial boilers
- Commercial air heaters
- Commercial water heaters

## key features

- Fully protected IP40 enclosure
- Plug-in base with screw connections
- Simple volatile lockout
- Integral flame detector and remote ignition output
- Compatible with Pactrol's UV head
- 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.

Because there is no earth connection to the control, 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. If the flame does not have a large area of contact with the burner, sensing may be affected by the voltage from the ignition transformer. Reversing the input connections to the transformer, or substituting an electronic spark generator may help in this case.

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 other makes of control. Although the control will operate with reduced supply voltage, the UV head requires the supply to be within 15% of nominal.

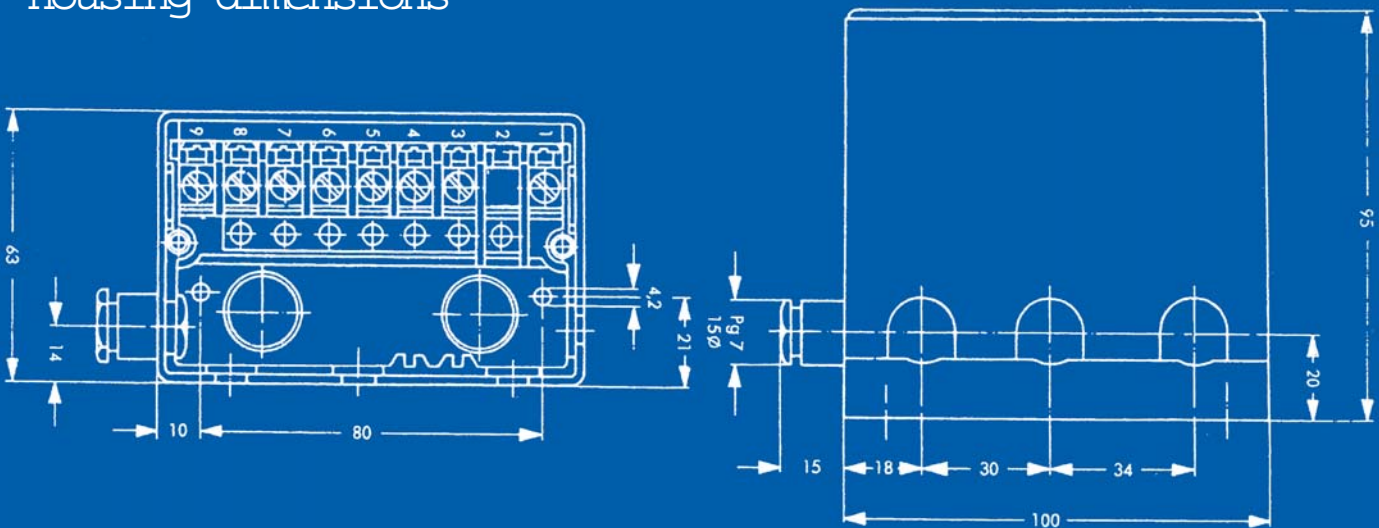
By connecting a rectifier-diode between the probe connection and earth (or neutral), with the cathode connection (marked with a band or chamfer) to earth, the flame relay will operate. The flame relay must be de-energised during the whole of the pre-purge period, at the end of which the timing relay will be energised. If a 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 and ignition transformer do not, check the 2A fuse. This fuse protects the control against a short circuit on the valve or transformer outputs, and these and the associated wiring should be carefully checked before replacing the fuse. Replacement fuses must be of the correct type and rating and after replacing, check 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 experienced 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 down stream 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 such 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



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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.

## Technical specification

Electrical Supply:	
Voltage	230(-15%)...240(+10%) V
Frequency	50...60Hz
Consumption	5 VA
Internal fuse	20mm HRC 2 A
Ambient temperature	-5... +65°C
Humidity	maximum, 95 % RH
Mounting position	any
Timing: CSA6:	
Pre-purge (Tp)	nominal, at 240V, 5 s
Ignition safety (Ts)	4.5 ± 1.5 s
Timing: CSA12:	
Pre-purge (Tp)	nominal, at 240V, 10 s
Ignition safety (Ts)	9 ± 3 s
Timing: CSA24:	
Pre-purge (Tp)	nominal, at 240V, 20 s
Ignition safety (Ts)	18 ± 6 s
Flame sensing:	
nominal flame current	flame-rectification
minimum flame current	5 µA
response time	2 µA
response time	flame-on, 100 ms
response time	flame-off, 1 s
open-circuit probe voltage	180 V
source impedance	at 50 Hz, 4 Mohms
short-circuit current	50 µA
Ultra-violet:	Pactrol UV head (optional)
Switching capacity:	
Start-gas valve (GV1)	0.5A
Ignition transformer (Z)	1.0A
Main-gas valve (GV2)	1.0A
Warning-lamp (A)	0.5A
Associated controls and external fuse	5A
Weights:	
control with base	290gm
control without base	177gm

Note: Please contact Pactrol for details of available options and variants.

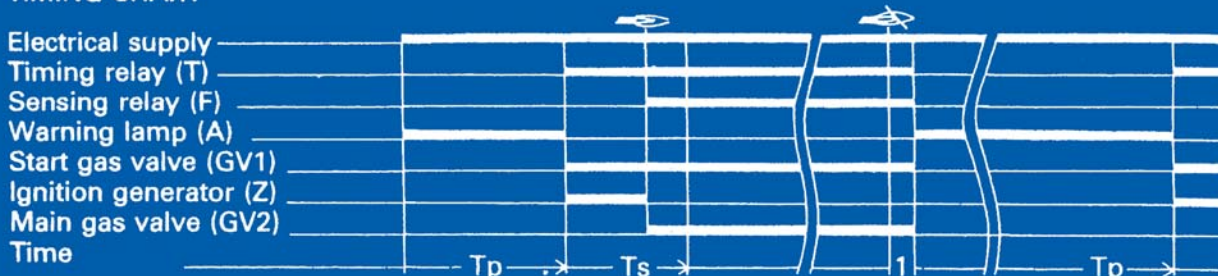
## operation

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 output (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 ignition transformer (Z). 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 1 second.

If the flame is extinguished after the end of the ignition safety time, both relays will be de-energised, closing both gas valves, and switching on the warning-lamp. Re-ignition will not take place unless the electrical supply is interrupted for at least 1 second.

### 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 mantle above 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	Live input
2	Gas Valve GV1 output
3	Alarm output
4	Ignition output
5	Gas Valve GV2 output
6	Not connected
7	Neutral valve connectors
8	Neutral input
9	Flame probe input

