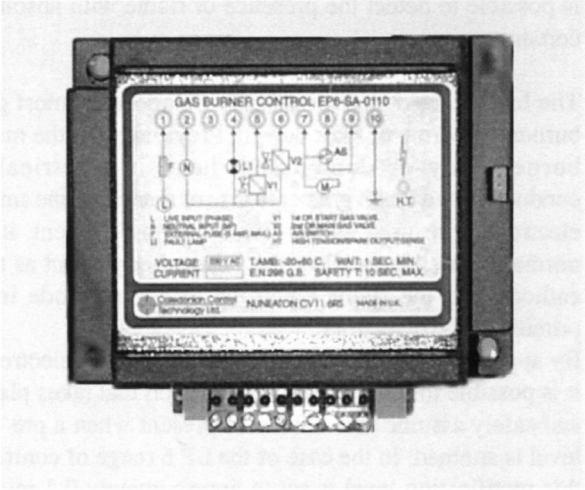
E P 6 SERIES OF GAS BURNER CONTROLS

A range of high performance full sequence automatic gas burner controls



- AVAILABLE IN 230 OR 110 VOLT
- IGNITION RESTORING FEATURE
- RAPID CYCLE VERSION
- MULTIPLE SPARK OPTIONS
- PLUG IN DESIGN
- TWO STAGE VALVE OPERATION
- APPROVED TO EN 298

SPECIFICATION

This range of gas burner flame failure controls has been developed to satisfy the durability and reliability requirements of industrial and commercial burners. Versions of the control are suitable for atmospheric and fan assisted gas burners and is certified by the relevant notified body as satisfying the essential requirements of the European standard for gas burner controls EN 298.

Applications are typically found in Furnaces, Kilns and Commercial Catering equipment. Whilst superficially similar to controls developed for residential and domestic appliances the EP 6 controls differ in several important areas:

IGNITION

Several options are available.

1) External Ignition Transformer.

2) Inbuilt Spark Generator

3) Remote Ignition Coil Type YC 25

Note: Conventional ignition transformers are highly inductive and care should be taken not to exceed the EP6's switching capacity, this is particularly important with 110 volt systems.

If in doubt contact our application engineers

External ignition transformers are recommended when using burners known to be difficult to light, for example high velocity air blast burners. Here it is always better to fit a high power conventional transformer local to the burner.

In most applications the well proven CCT LTD's high energy inbuilt spark generator will prove to be a satisfactory means of ignition, a stream of high energy sparks at a rate of 50 per second are delivered throughout the safety period or until the flame is established. Each spark occurs at around the mains zero crossing point thus reducing EMC problems. A single probe spark and detect option is also available with inbuilt ignition controls. A novel remote ignition coil Type YC 25 may be fitted to a special version of the EP6 allowing up to 50 meters between control unit and burner.This s ystem is particularly useful on multi burner applications as the absence of long HT runs allows easy EMC compliance.

Caledonian Control Technology Ltd.

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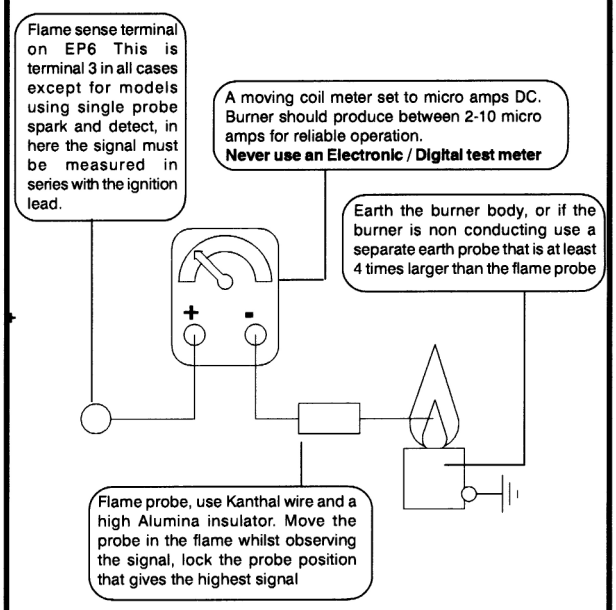
FLAME DETECTION

All EP6 controls use the " Ionisation" method of flame sensing. The basic principal of operation being that as all flames produce a highly ionised field within and immediately around themselves, by polarising this field it is possible to detect the presence of flame with absolute certainty.

The Ionised field is automatically polarised on most gas burners by virtue of their design. Providing that the main burner body or combustion head is electrically conductive and much greater in size or mass than the small electrode wire used as the flame sensing element, it is normally possible to allow the burner body to act as the cathode and the flame electrode to act as anode in a primitive form of rectifier.
By applying an alternating voltage to the sense electrode it is possible to monitor any rectification that takes place and safely assume that a flame is present when a pre-set level is attained. In the case of the EP 6 range of controls this rectification level is set to approximately 0.4 micro amps for the 230 Vac controls and 0.9 micro amps for the 110 Vac units.
(See Fig 1 for signal strength measurment arrangement)

Fig 1 Test and measurement of flame signal



All controls in the EP 6 range have several important features built in to the flame recognition circuit to give outstanding reliability and performance. The high sensitivity that allows even very small flames to be monitored reliably under adverse conditions of Low voltage - Turbulence - Fluctuating gas pressure etc. is coupled with carefully defined hysterisis of both switching differential and reaction time.

OPERATION

The EP6 uses solid state electronics throughout, thus giving a long and stable performance of all important functions. When the temperature control or other controlling device powers the EP6 it immediately runs a self check on it's safety critical components - Flame detection - Air detection in the case of blown air burners etc.

If all of the safety interlocks are in a safe position the control will begin it's start up procedure (T0):

In the case of fan assisted burners the fan will be started and when the external air proving device has operated a purge timer will start to operate (T1). This purge time can be from a few seconds up to a minute depending on the application. At the end of the purge time the start gas valve and the ignition system will be powered. At this stage a second timer known as the safety timer will begin to operate, this safety timer controls the " Trial for ignition" period (T3). Effectively the trial for ignition is a period of time when Air- Gas - Spark are allowed to operate for a few seconds to allow ignition to take place.

If a flame is detected within the trial for ignition period (T2) the ignition source will be turned off and the main gas valve will be powered. The burner will continue running until the regulating device - Switch or Thermostat is satisfied (T4).
The start up and operating procedure is similar with the controls designed for non fanned burners. Here there is no need for the fan or air proving functions.

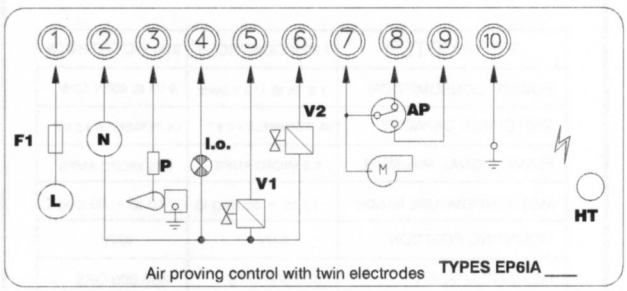
FAILURE TO IGNITE

If the trial for ignition time is exceeded - i.e. no flame detected during the allocated time (T3), the EP6 will go to volatile lock out. The control will shut the gas valve and turn off the ignition but will leave the fan in the case of fan assisted burners running. In order to attempt a re-start the electrical supply must be interrupted for at least one second. Upon lock out re-set the control will begin the complete start up sequence over again.

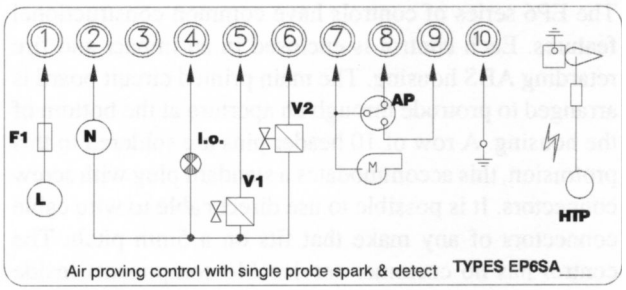
RUNNING FLAME FAILURE

The condition known as "Running flame" failure occurs when a burner has initially fired up correctly but then loses flame during a firing run (T4). The EP6 range offers either an immediate shut down and lockout after flame loss of 1 second. *By selection of the appropriate control version* Or in it's standard form spark restoration. Burners rarely fail during a firing cycle unless a serious loss of gas or voltage occurs, but on some applications the flame detector may temporarily lose sight of the flame due to process movement or in catering applications steam being drawn into the burner. It is therefore common practice to "Recycle" the control - This involves shutting down the system and restarting the burner. The EP6 however does not shut down the burner but restores the ignition in an effort to stabilise the flame. The ignition restoration will occur as often as necessary but never for longer than the safety time. Ignition restoration has been proved over many years to significantly improve reliability of gas equipment.

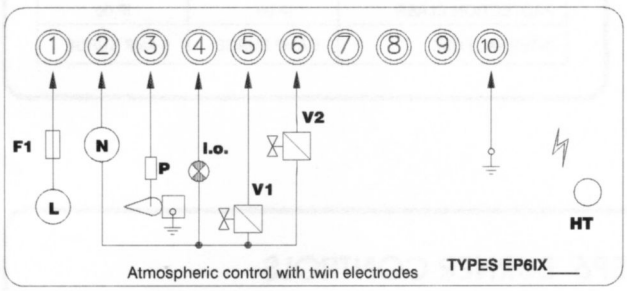
Fig 2 Basic wiring for the main types of EP6 controls



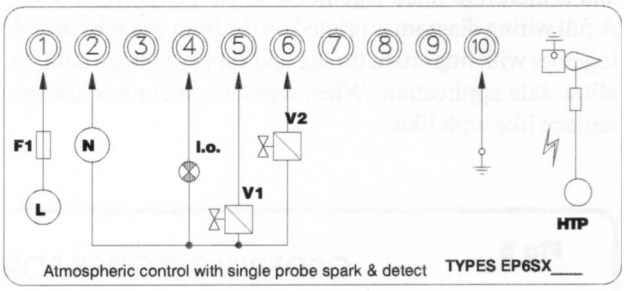
Air proving control with twin electrodes **TYPES EP6IA___**



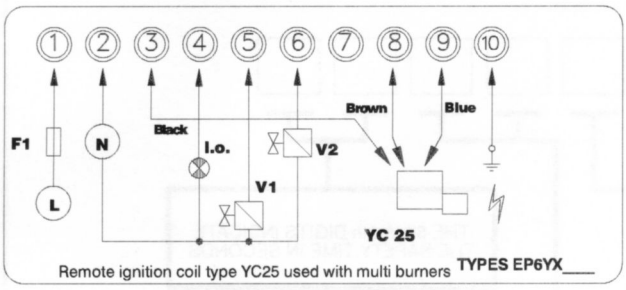
Air proving control with single probe spark & detect **TYPES EP6SA___**



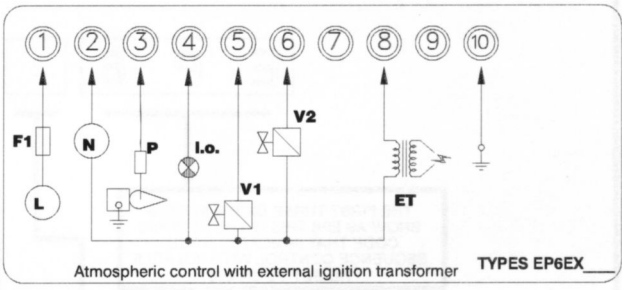
Atmospheric control with twin electrodes **TYPES EP6IX___**



Atmospheric control with single probe spark & detect **TYPES EP6SX___**



Remote ignition coil type YC25 used with multi burners **TYPES EP6YX___**



Atmospheric control with external ignition transformer **TYPES EP6EX___**

LEGEND

F1 = FUSE 4 AMP FAST	HT = SPARK OUTPUT	L1 = LIVE INPUT	YC25 = REMOTE IGNITION COIL
GV1 = START GAS VALVE	HTP = FLAME SENSE + SPARK	N = NEUTRAL INPUT	P = FLAME PROBE
GV2 = MAIN GAS VALVE	ET = EXTERNAL IGNITION TRANS.	i.o. = REMOTE LOCK OUT INDICATION	AP = AIR PROVE SWITCH

M = FAN MOTOR

Fig 3a Normal start up and run

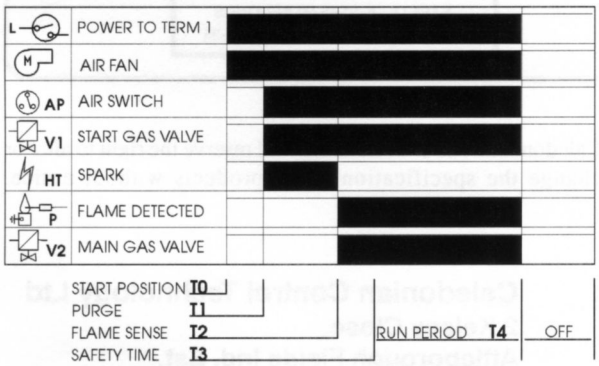


Fig 3b Start attempt flame not established during T3

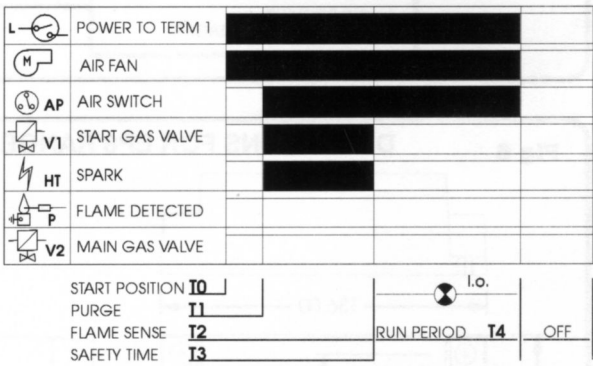


Fig 3c Running flame failure relights with spark restore

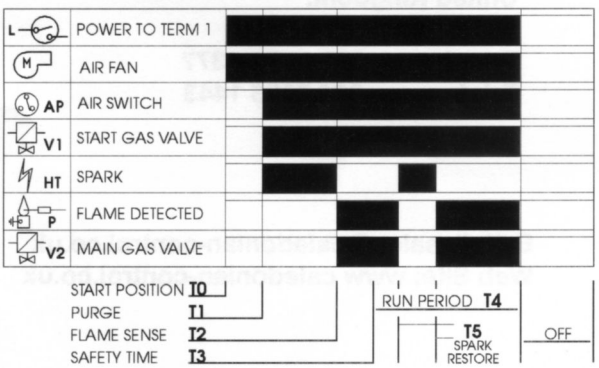
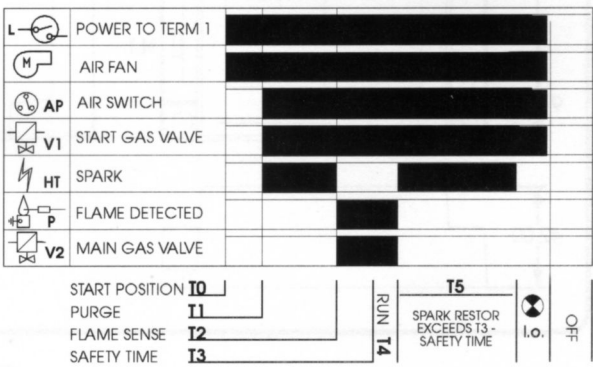


Fig 3d Running flame failure reignition period exceeds T3



CONSTRUCTION

The EP6 series of controls have common constructional features. Each control is enclosed in an impact and fire retarding ABS housing. The main printed circuit board is arranged to protrude through an aperture at the bottom of the housing. A row of 10 header pins are soldered to this protrusion, this accommodates a standard plug with screw connectors. It is possible to use direct cable to wire cable connectors of any make that fits on a 5mm pitch. The control has no customer serviceable components inside and is therefore fixed together with tamper proof screws. A full wiring diagram is printed on the front of each control together with important timing and supply voltage data, to allow safe application. When replacing a control always replace like with like.

Fig 4 Electrical ratings

PARAMETER	110 V CONTROLS	230 V CONTROLS
POWER CONSUMPTION	1.5 VA @ 110 V 50Hz	5 VA @ 230 V 50Hz
SWITCHING CAPACITY	1A TERMINALS 4 5 6 7	1A TERMINALS 4 5 6 7
FLAME SIGNAL MINIMUM	0.9 MICRO AMPS	0.45 MICRO AMPS
AMB. TEMPERATURE RANGE	0 - 60 deg C	0 - 60 deg C
MOUNTING POSITION	ANY	ANY
LIFE EXPECTANCY	500,000 OPS	500,000 OPS
PROTECTION CLASS	IP 00	IP 00
INTERNAL FUSE	5 AMP SURGE	5 AMP SURGE

Fig 5

ORDERING CODES FOR EP6 BURNER CONTROLS

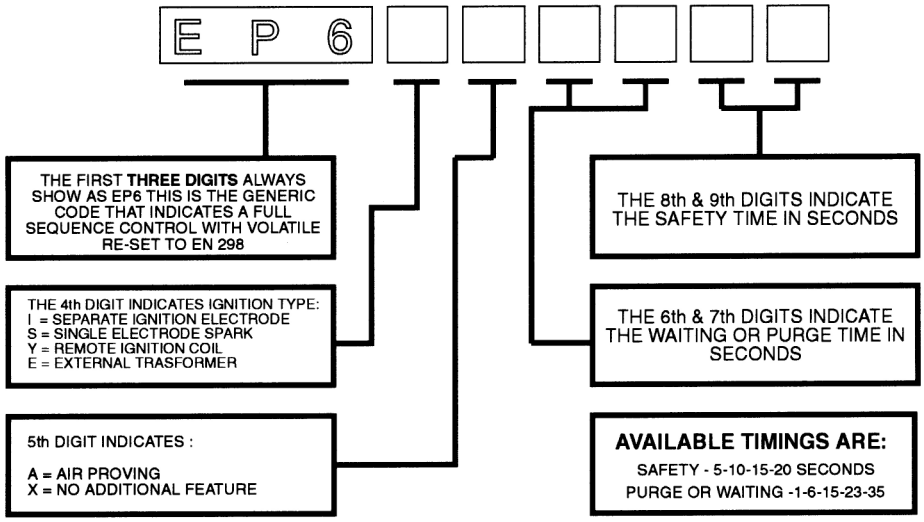
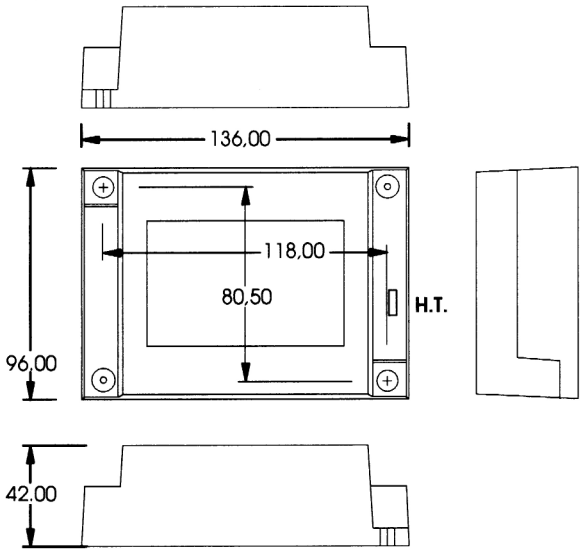


Fig 6 **DIMENSIONS FOR EP6 RANGE**



Caledonian Control Technology Ltd reserve the right to alter or change the specification of its products without notice.

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