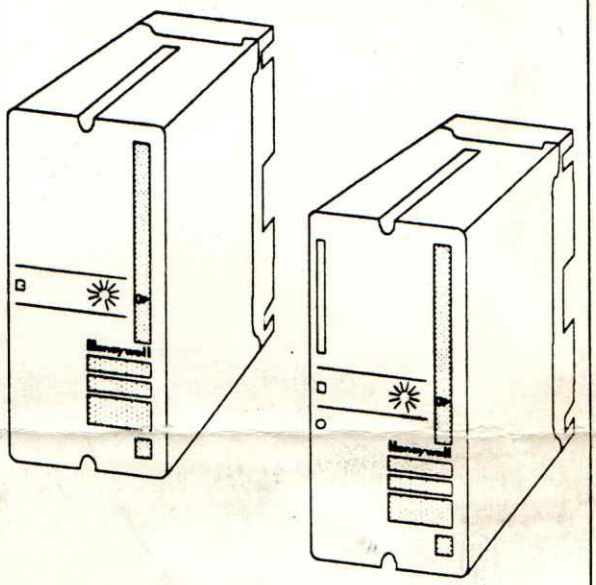
Honeywell

INDUSTRIAL FLAME SWITCHES



R 4348 A & B

MU1R 6027

These flame switches are for application in large commercial and industrial burner installations where they can be used :

(i) as simple flame switches - model R4348A- indicating the presence or absence of a flame, or,

(ii) as flame safeguarded primary controls - model R4348B - capable of providing system "safe start" check and flame sensing functions.

They can also be used in installations using an R7241 microcomputer-based burner control system - to extend the number of burners being controlled.

Both models include a 3-pole flame relay which is energised when flame is sensed and de-energised when "no-flame" is sensed ; the "B" model additionally includes a 3-pole line voltage "load relay".

- R4348A with 3-pole flame relay performs flame detection function only.
- R4348B with 3-pole flame relay and 3-pole line voltage "load relay" can perform flame detection and burner "safe-start" functions.
- Standard on all models is a green LED which is illuminated when the flame relay is energised.
- Options include :
  - a variety of methods for indicating and/or recording the flame current strength.
  - logic to communicate relay status to a computer based system.
  - manual alarm facilities.
- Unpowered relay outputs enable Honeywell sensors and amplifiers to be used with a wide range of logic schemes according to customer needs.
- Plug-in unit makes wiring and servicing easy.
- Plug-in flame signal amplifiers available to match a wide range of flame sensors.

Issue 2 (12.89)

SPECIFICATIONS

MODELS R4348A industrial flame switch with 3-pole flame relay.
R4348B industrial flame switch with 3-pole flame relay and 3-pole load-relay.

MODEL NUMBERS		NOTES[a]
R4348A	**R4348B**	
R4348A1000	R4348 B1008	Standard models
R4348A1018	R4348 B1016	with flame current jack socket
R4348A1026	R4348 B1024	with LED-meter
R4348A1034	R4348 B1032	with 4-20mA output
R4348A1042	R4348 B1040	with 4-20mA output and flame current jack socket
R4348A1059	R4348 B1057	with 4-20mA output and LED-meter
R4348A1067	R4348 B1065	with logic output
R4348A1075	R4348 B1073	with logic output and flame current jack socket
R4348A1083	R4348 B1081	with logic output and LED-meter
R4348A1091	R4348 B1099	with marginal alarm and LED-meter

[a] see OPTIONS also

ELECTRICAL RATING : can operate on 110V - 120V -127V- 220V - and 240V - 50/60Hz

POWER CONSUMPTION : less than 15VA

ENCLOSURE : IP40 or IP54 depending on the model and base.

AMBIENT TEMPERATURE LIMITS (°C) :
storage : - 40° to + 80° C
operating : - 20° to + 60° C

OPTIONS : (see MODELS also)

(I) LED-METER. A series of colour coded LED's on the face of the unit which give a direct indication of flame current strength. Green LED's indicate normal flame current strength. Yellow LED's indicate marginal signals. Red LED's indicate unsatisfactory flame signal strength (see fig. 2).

(II) JACK SOCKET. Allows the flame signal strenght to be measured using a Honeywell W136 micro-ammeter (or equivalent).

(III) 4-20mA OUTPUT. The flame current value can be registered and/or displayed at a local or remote location. Load : 0 to 750 Ω : isolation VDE 110. Group C 250 Vac.

(IV) LOGIC OUTPUT. A voltage output state (0 or1) which indicates the absence/presence of a flame - which may be utilised in a computer based system. Level 1 : 10V/10mA max. Isolation : VDE 11C Group C. 250 Vac.

(V) MARGINAL ALARM : When the flame current value drops to an unsatisfactory level this option provides an "early warning" of the condition. Contact output rating 1A, power factor 0,4 . Isolation : VDE 110. Group C. 250Vac.

SPECIFICATIONS

CONTACT RATINGS :

Load	Typical power factor	Maximum current rating (continuous operation)		Maximum In-rush current
		220V 240V	110V 120V 127V	
Solenoid valve	0.4	1.5A	2A	10 x rated current
Motorized valve	0.5	2A	4A	3 x rated current
Burner motor	0.6	3A	3A	5 x rated current
Ignition transformer	0.2	2.5A	4A	rated current
Other	0.95	4A	4A	rated current

If more than one safety shut-off valve is to be actuated by the R4348 it is recommended to use separate relay contacts rather than paralleling from one contact.

MAXIMUM RELATIVE HUMIDITY : 90 % RH at 40° C

(not to exceed saturation point)

WEIGHT : 1,5 Kg

FLAME SENSORS AND AMPLIFIERS : will accept any of the plug-in amplifiers and appropriate sensor listed .

FLAME INDICATION : Green LED on face of unit when illuminated indicates presence of flame. Logic output (see OPTIONS) enables remote indication of flame presence to be made.

MOUNTING : Can be wall, DIN rail of panel mounted.

Panel mounting kit : 46176553-502

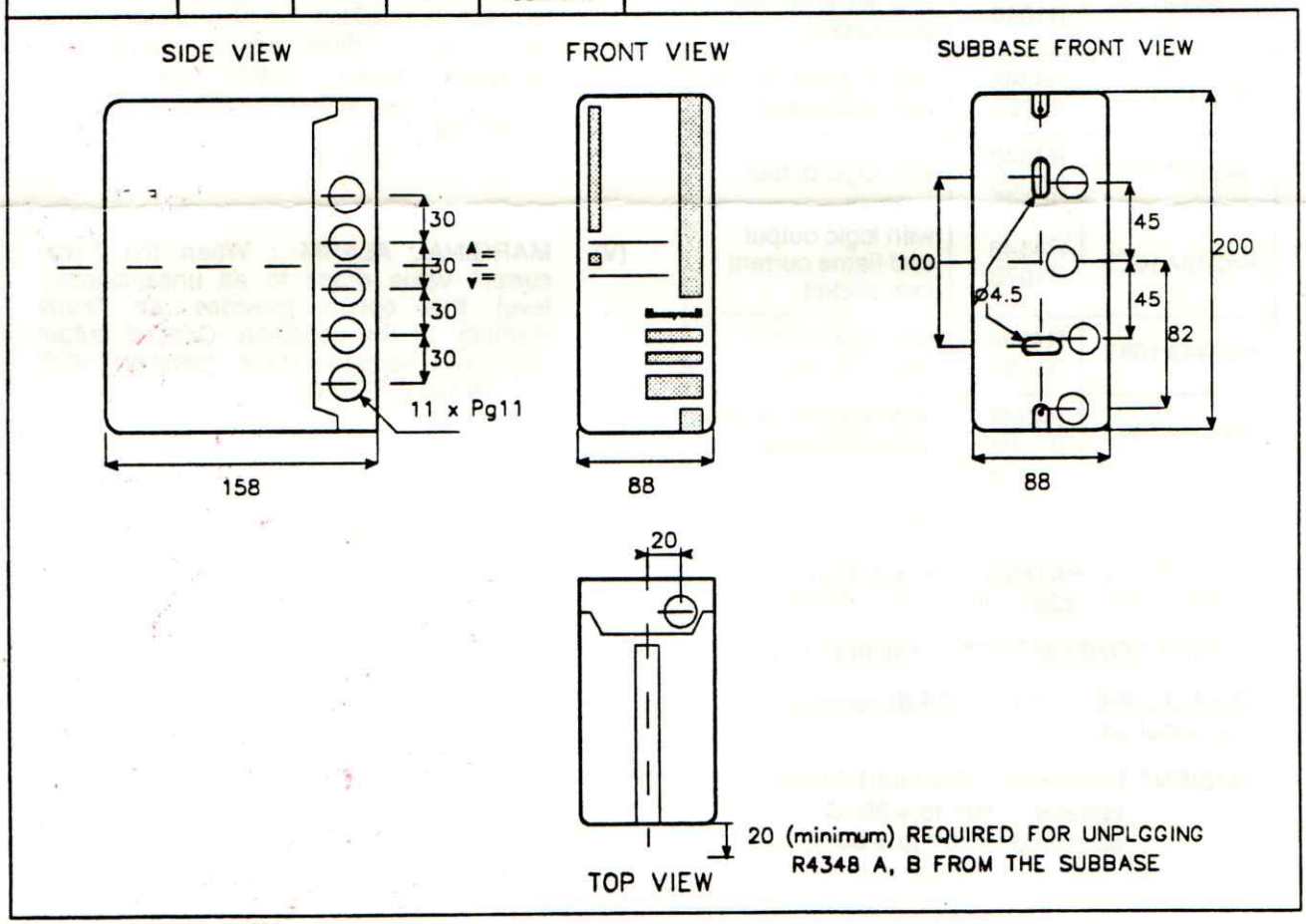


FIG. 1 R4348 A, B Dimensions in mm.

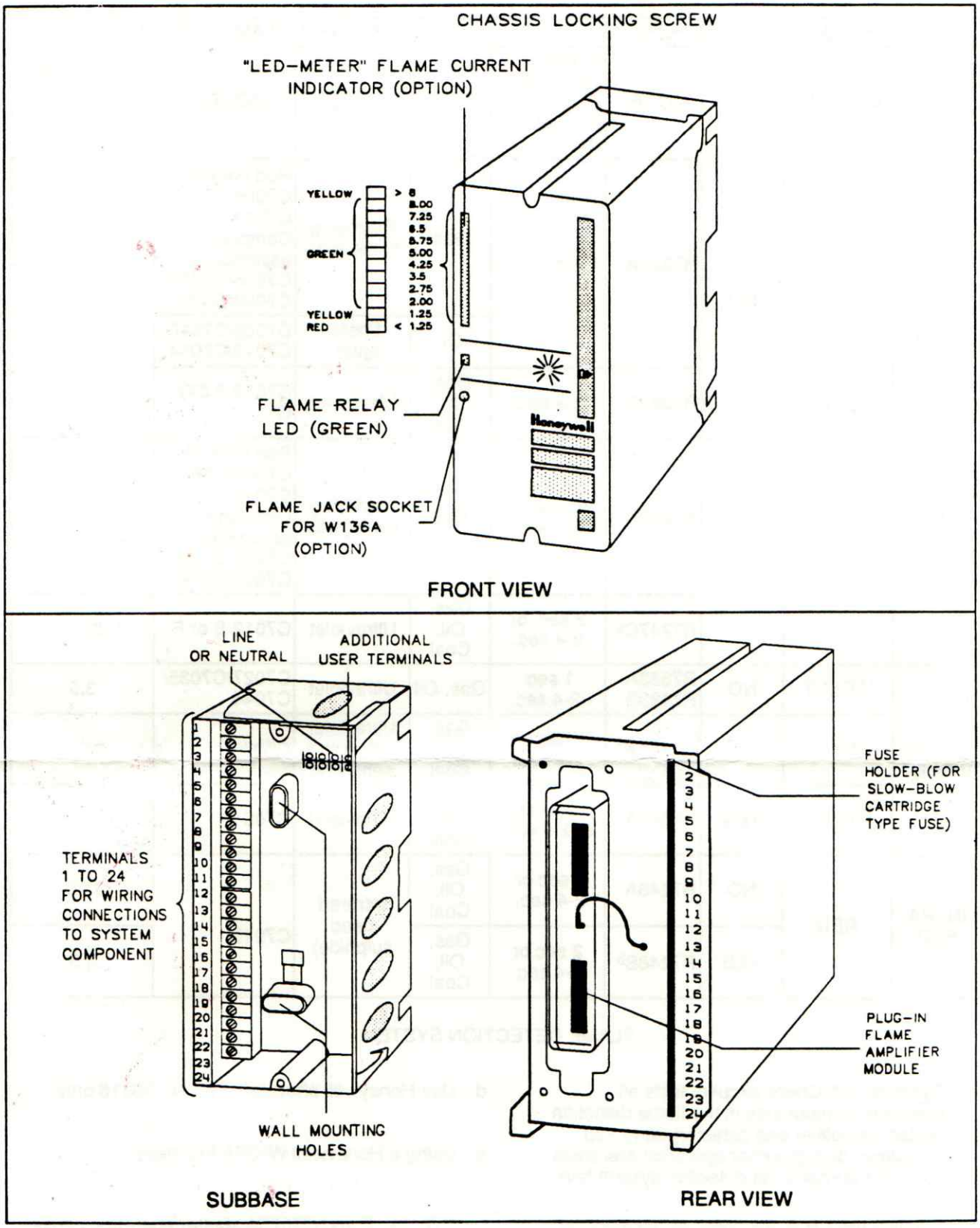


FIG.2 R4348 A, B Main features

ACCESSORIES : Subbase : 46176612-501 : for IP40 (to be ordered separatly)
Subbase : 46176612-502 : for IP54 (to be ordered separatly)
Panel mounting kit : 46176553-502

PLUG-IN FLAME AMPLIFIERS					APPLICABLE FLAME DETECTORS			
DETEC-TION MODE	COLOUR	SELF CHECK ING	MODEL	FLAME FAILURE RESPON-SE TIME (MAX)	FUEL	TYPE	MODELS	MINIMUM FLAME CURRENT (uA) (e)
RECTIFICATION	GREEN	NO	R7321A	1 sec.	Gas	Rectifying flame rods	Rod holders[c] : C7004/C7007/ C7011 Complete assemblies : C7005/C7008/ C7009/Q179	2
					Oil	Photo-cells[d]	C7003/C7010/ C7013/C7014	
			R7321B	2-4 sec.	Gas, Oil, Coal	Ultraviolet	C7012 A OR G	
		YES	R7247B[b]	2 sec. or 2-4 sec.	Gas	Rectifying flame rods	Rod holders[c] : C7004/C7007/ C7011 Complete assemblies : C7005/C7008/ C7009/Q179	1.25
			R7247C[a]	2 sec. or 2-4 sec.	Gas, Oil, Coal	Ultraviolet	C7012 E or F	2[f]
ULTRA VIOLET	VIOLET	NO	R7323A R7323B	1 sec. 2-4 sec.	Gas, Oil	Ultraviolet	C7027/C7035/ C7044	3.5
	BLUE	YES	R7476A[a]	2 sec.or 2-4 sec.	Gas, Oil, Coal	Ultraviolet (adjustable sensivity)	C7076	2.5[f]
	VIOLET	YES	R7061A	1 or 2 sec. or 2-4 sec.	Gas, Oil, Coal	Ultraviolet	C7061A	2.5
INFRA RED	RED	NO	R7248A	2 sec.or 2-4 sec.	Gas, Oil, Coal	Infrared (lead sulphide)	C7015	2.25
		YES	R7248B[b]	2 sec.or 2-4 sec.	Gas, Oil, Coal			3.5

FLAME DETECTION SYSTEM

a Dynamic Self Check circuitry tests all electronic components in the flame detection system (amplifier and detector) 60 to 120 times/min. during burner operation ans shuts down the burner if the detection system fails.

b Circuitry tests only the flame signal amplifier during burner operations and shuts down the burner if the amplifier fails.

c Order flame rod separately, see instruction sheet for the holder

d Use Honeywell photocell. Part No 36316 only.

e Using a Honeywell W136A test meter.

f C7012E, F and C7076A shutter operation causes fluctuations in the current reading. Read the average stable current - disregard peaks.

INSTALLATION

IMPORTANT

1 The installer must be a trained, experienced flame safeguard technician.

2 When installing the subbase and R4348 industrial flame switch refer to the instructions provided by the burner manufacturer. When these are not available follow the instructions packed with the product.

3 Disconnect power supply before beginning the installation.

MOUNT THE SUBBASE

The R4348 industrial flame switch can be wall, DIN rail of panel mounted. When panel or DIN rail mounting the R4348 the appropriate kit must be ordered separately.

WIRE THE SUBBASE

1 All wiring must comply with local codes ordinances and regulations.

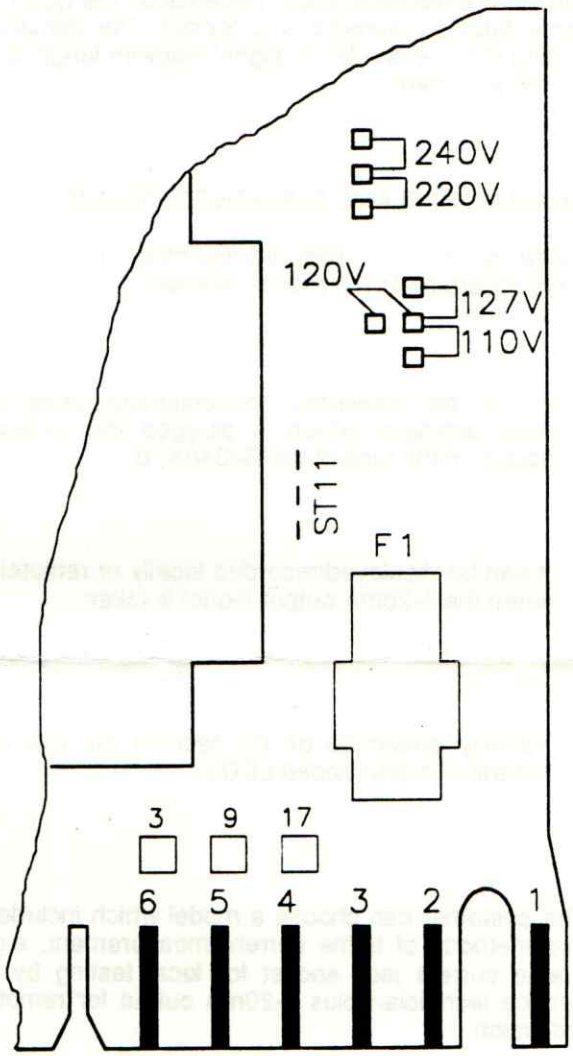
2 Ensure that loads do not exceed the terminal ratings.

SELECTING THE OPERATING VOLTAGE

To match the R4348 to the supply line voltage, select the proper terminals and the internal connector position per the following table.

SUPPLY VOLTAGE	CONNECT SUPPLY TO TERMINALS...	SET INTERNAL STRAP TO ...
110V	2 and 3	110V
120V	2 and 3	120V
127V	2 and 3	127V
220V	2 and 1	220V
240V	2 and 1	240V

To have access to the internal connector, remove the 4 cover retaining screws and slide out the PC board.



F1 = 200mA/250V
46173048-001
(Minimum order 10)

INSTALL THE FLAME DETECTOR

The performance of the flame safeguard system depends upon correct flame detector installation. Refer to the instructions packed with the flame detector and also the burner manufacturer's instructions for details. (See also figure 4).
Keep the flame signal leadwires from the flame detector to the wiring subbase as short as possible. Capacitance increases with leadwire lenght, reducing the signal strength. The maximum permissible leadwire length depends on the type of flame detector, leadwire, and conduit. The ultimate limiting factor in the flame signal leadwire length is the flame current.

MEASURING FLAME CURRENT STRENGTH

Flame current is measured/recorded in different ways according to the model selected

1 It can be measured conventionally using a micro-ammeter which is plugged into a jack socket onthe face of the R4348A, B.

2 It can be displayed/recorded locally or remotely when the 4-20mA output model is taken.

3 Visually presented on the face of the unit by means of colour coded LED's.

The customer can choose a model which includes two methods of flame current measurement. e.g. Flame current jack socket for local testing by a service technician plus 4-20mA output for remote indication.

PLUGGING THE R4348 INTO THE SUBBASE

1 Plug the selected amplifier into the back of the R4348 (see fig. 3). Make sure the correct combination of amplifier and flame detector is used.

2 Check that wiring connections are correct and that all terminal screws are tight.

3 Plug the chassis into the subbase and tighten the two captive screws.

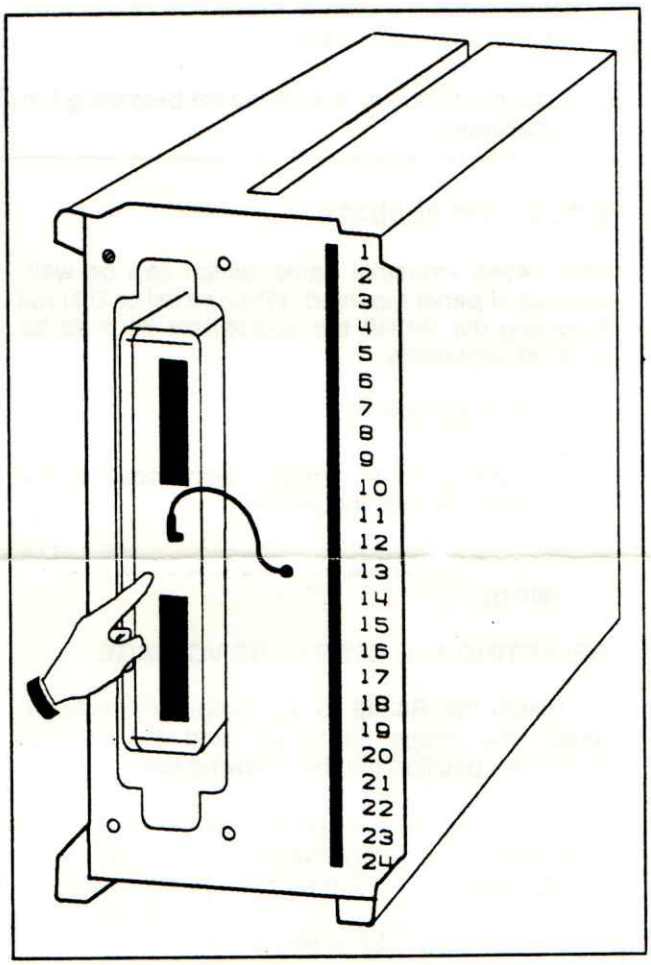
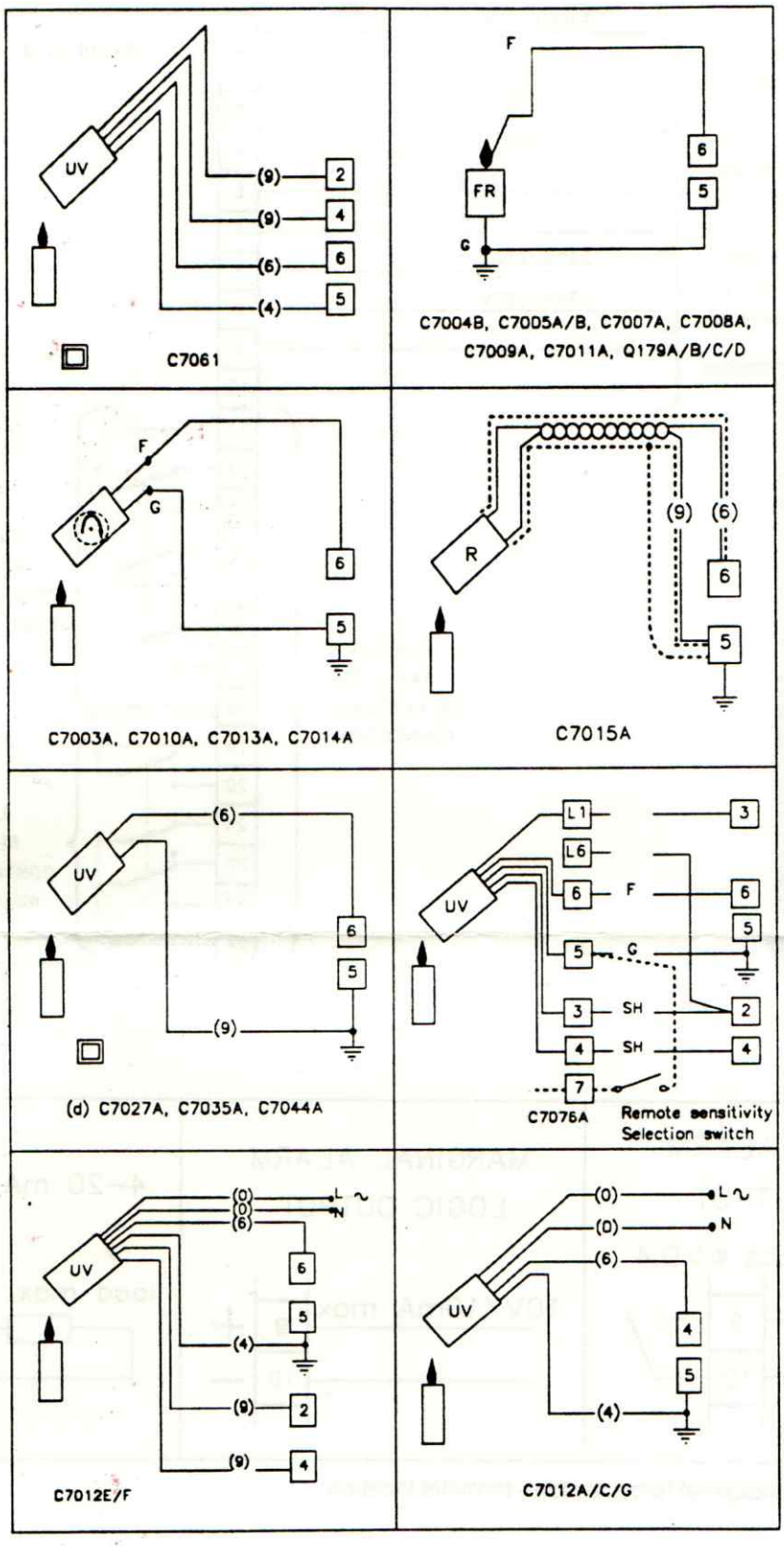


FIG. 3 Installing a plug-in flame current amplifier



Wires are identified by colour code as follows : 0=black 4=yellow 6=blue 9=white

FIG. 4 Flame detector wiring diagrams

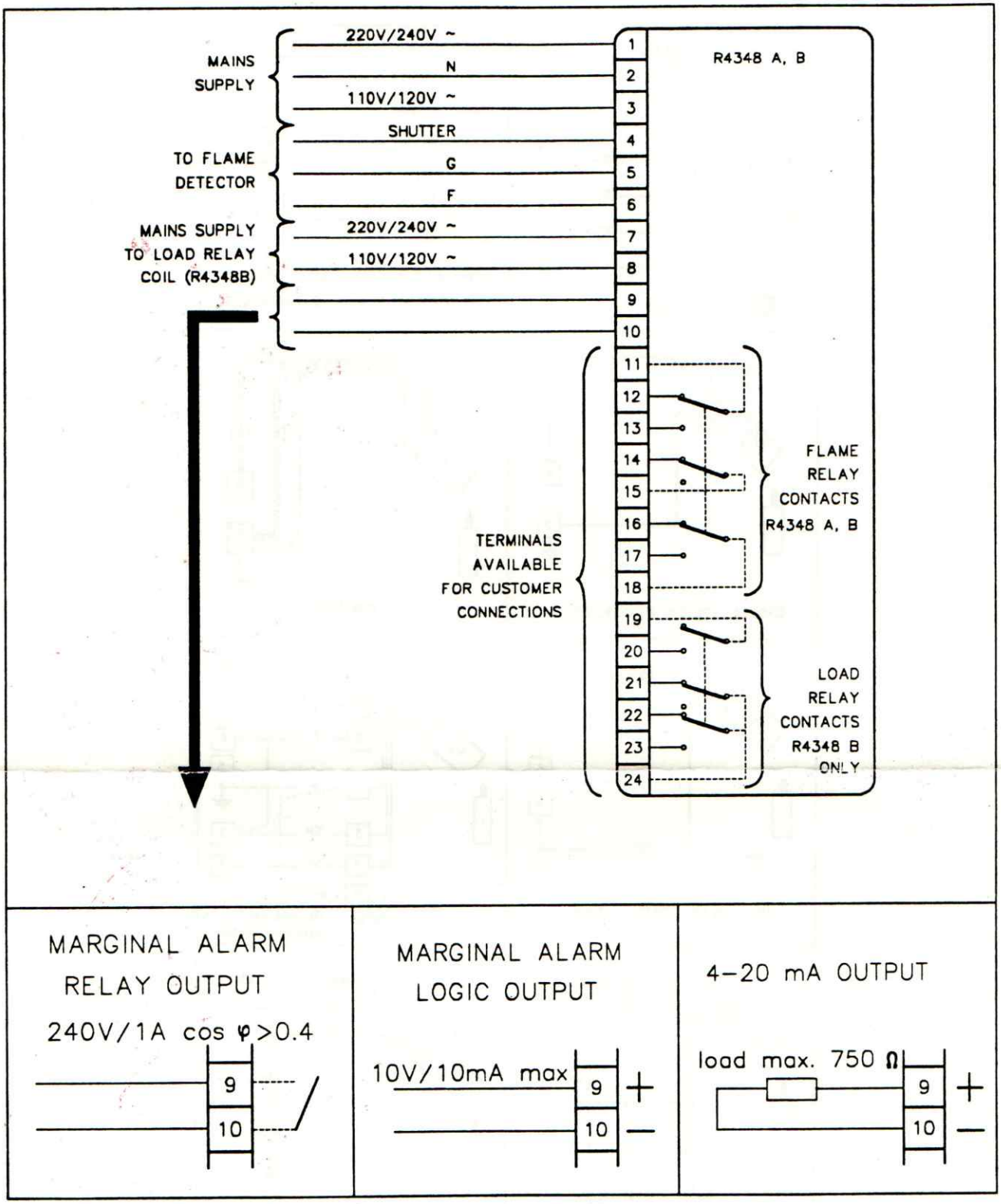


FIG. 5 R4348 A, B industrial flame switch - terminal location

CHECK OUT AFTER INSTALLATION

INSTALLATION CHECKOUT

Preliminary inspection - make certain that :

1 System overload protection is correct (5A max.).

2 Wiring connections are correct and all terminal screws tight.

3 Flame detector installation is complete.

4 The correct flame detector is used. Refer to table page 5.

5 Burner is completely installed and ready to fire with the fuel lines purged of air.

6 Combustion chamber and flues are clear of fuel.

7 Power is on at the system main switch.

FLAME DETECTOR CHECKOUT

The best guide to the performance of a flame detector is given by the FLAME CURRENT value.
The expected maximum and minimum values of flame current for the various types of flame detectors are given in the table page 11.
Note that the following have an influence on flame sensing performance :

1 Position, size and burning characteristic of the flame.

2 Refractory - when refractory temperature exceeds 1370°C/2500°F some ultraviolet radiation may occur. Lower refractory temperature may affect photocells. See relevant data sheets.

3 Temperature at flame detector

- Flame rods : ensure suitable rod is being used
- Other detectors : see relevant data sheet.

The R4348A, B has the possibility of measuring / recording the flame current value in various ways, as follows :
(see also MODELS).

1 Using a Honeywell W136A micro-ammeter which is plugged into a socket on the face of the R4348.

2 By reference to an LED-meter on the face of the R4348 which gives the value "at-a-glance".

3 By relaying the current to existing customer recording/indicating equipment.

HOT REFRACTORY TEST

In applications using caesium oxide detectors (rectifying photocells) it is important to determine that hot refractory does not simulate a flame after the end of normal run. If this happens a flame condition is simulated after the real flame is extinguished and a system restart is made impossible.

Test for this condition by operating the burner until the refractory reaches maximum temperature and then stop the burner fuel supply. At this point the flame current should drop below 1µA, followed by a lockout within 0,8 to 1 second . If this does not happen the photocell may be influenced by the hot refractory.

THIS CONDITION MUST BE CORRECTED.

Try sighting the photocell at a cooler and/or more distant refractory background. If that does not eliminate the trouble try adding an orifice of filter to the detector. Continue to adjust and test until the hold-in problem is eliminated.

NOTE : Repeat all flame detector tests after ALL adjustments have been completed. All tests must be satisfied at the FINAL flame detector position.

PILOT TURN-DOWN TEST

Ensure that any pilot which can be detected by the flame sensing system is powerful enough to light the main burner reliably.

FLAME DETECTOR	MIN. ACCEPTABLE STEADY CURRENT	MAXIMUM CURRENT EXPECTED *	WHAT TO CHECK IF FLAME CURRENT IS UNSTEADY OR WEAK
Flame rod C7004B C7005A/B C7007A C7008A C7009A C7011A Q179A/B/C/D	2.50 µA	7.00 µA	Sufficient earthing area. Good earth connection Proper positioning of flame rod in flame.
Rectifying photocell C7003A C7010A C7013A C7014A	2.50 µA	5.00 µA **	Proper sighting Clean lens.
Ultraviolet C7012A/E/F/G C7027A C7035A C7044A C7061A C7076A	2.00 µA 3.50 µA 3.50 µA 3.50 µA 3.00 µA 2.50 µA	7.00 µA 7.50 µA 7.50 µA 7.50 µA 7.00 µA 5.50 µA	Proper sighting Clean lens. An unsteady signal indicates the detector is viewing an unstable part of the flame.
Infrared C7015A	2.25 µA	5.00 µA	Same as for Ultraviolet.

* At rated conditions

** Do not permit signal to exceed 5 µA as it could shorten the photocell life.