

## R4348B

### INDUSTRIAL FLAME SWITCH

#### INSTRUCTION SHEET



#### APPLICATION

The R4348B flame switch is for application in large commercial and industrial burner installations.

The function is:

flame safeguard primary controls capable of providing system „safe start“ check and flame sensing functions.

The unit can also be used in installations using an 7800-series microcomputer-based burner control system to extend the number of burners being controlled.

The unit include a 3-pole flame relay which is energized when flame is sensed and de-energized when „no-flame“ is sensed and a 3-pole line voltage „load relay“.

- Standard is a green LED which is illuminated when the flame relay is energized.
- Option:
  - LED bar and 4-20mA output for indicating and / or recording the flame current strength.
- 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.

## SPECIFICATIONS



### WARNING

To avoid the risk of electrical shock which could cause personal injury, follow all safety notices in this documentation.

#### MODEL:

R4348B industrial flame switch with 3-pole flame relay and 3-pole load relay

MODEL NUMBERS	NOTES <sup>1)</sup>
R4348B1008	standard model
R4348B1057	with 4-20mA output and LED-meter

<sup>1)</sup> see OPTIONS also

#### ELECTRICAL RATINGS:

can operate on 110/120/127 or 220..240V 50/60Hz

#### POWER CONSUMPTION:

less than 18VA

#### ENCLOSURE:

IP40

#### AMBIENT TEMPERATURE LIMITS:

Operating: - 20°C to + 60°C.

Storage: - 40°C to + 80°

#### CLASSIFICATION:

OOCRXB

#### APPROVALS:

Installation and cabling for both intermittent and continuous operations must be in accordance with relevant standards (i.e. EN298)

#### OPTIONS: (see MODELS also)

LED-METER. A series of color 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).

4-20mA OUTPUT. The flame current value can be registered and/or displayed at a local or remote location. Load : 0 to 750Ω.

Load	Typical power factor	Maximum current rating (continuous operation)		Maximum In-rush current
		230V	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

#### CONTACT RATINGS:

If more than one safety shut-off valve is to be actuated by the R4348B 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. Relay contact enables remote indication of flame presence to be made.

#### MOUNTING :

Can be wall, DIN rail or panel mounted.

Mounting sub base : 46176612-501

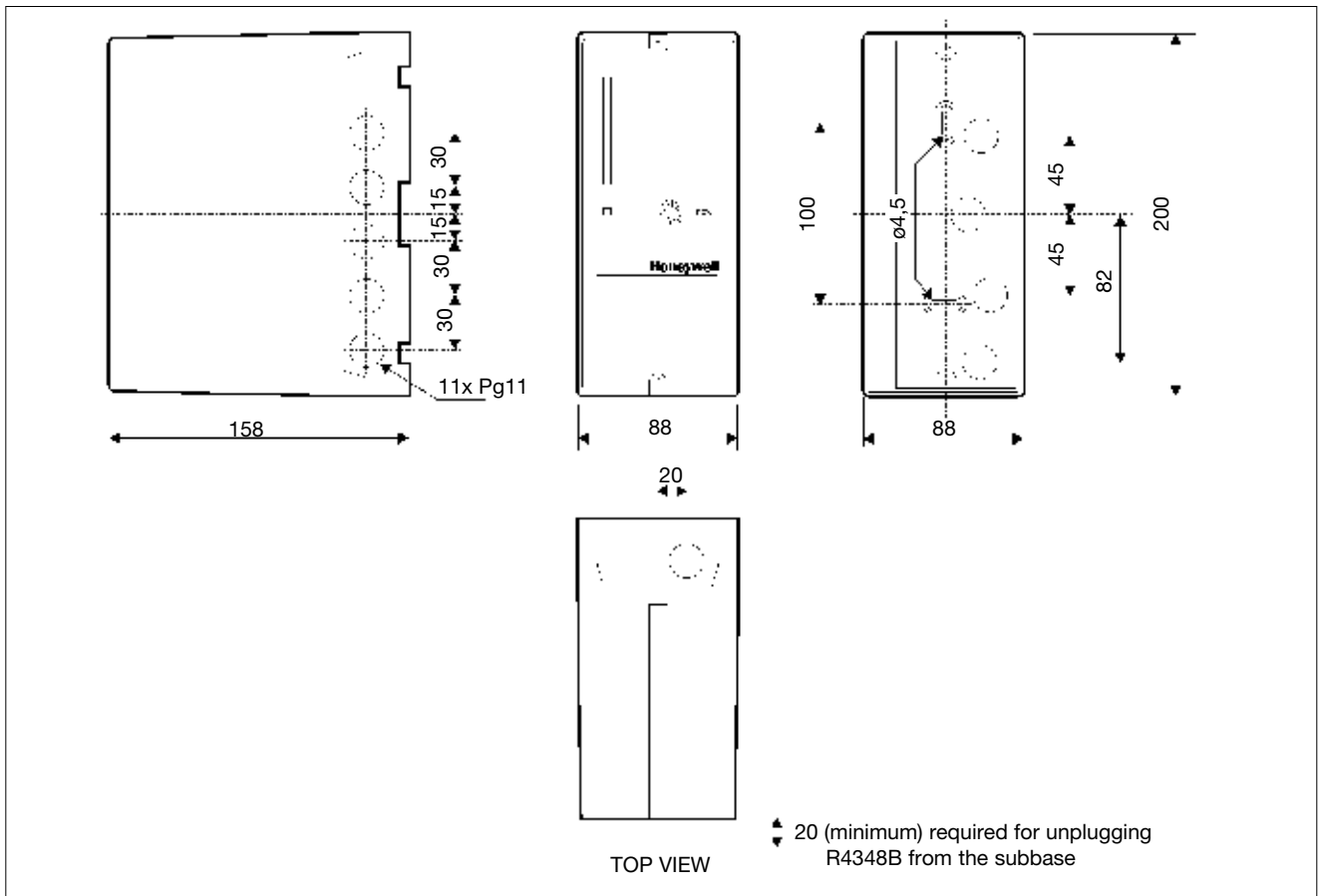


FIG. 1 Dimensions in mm.

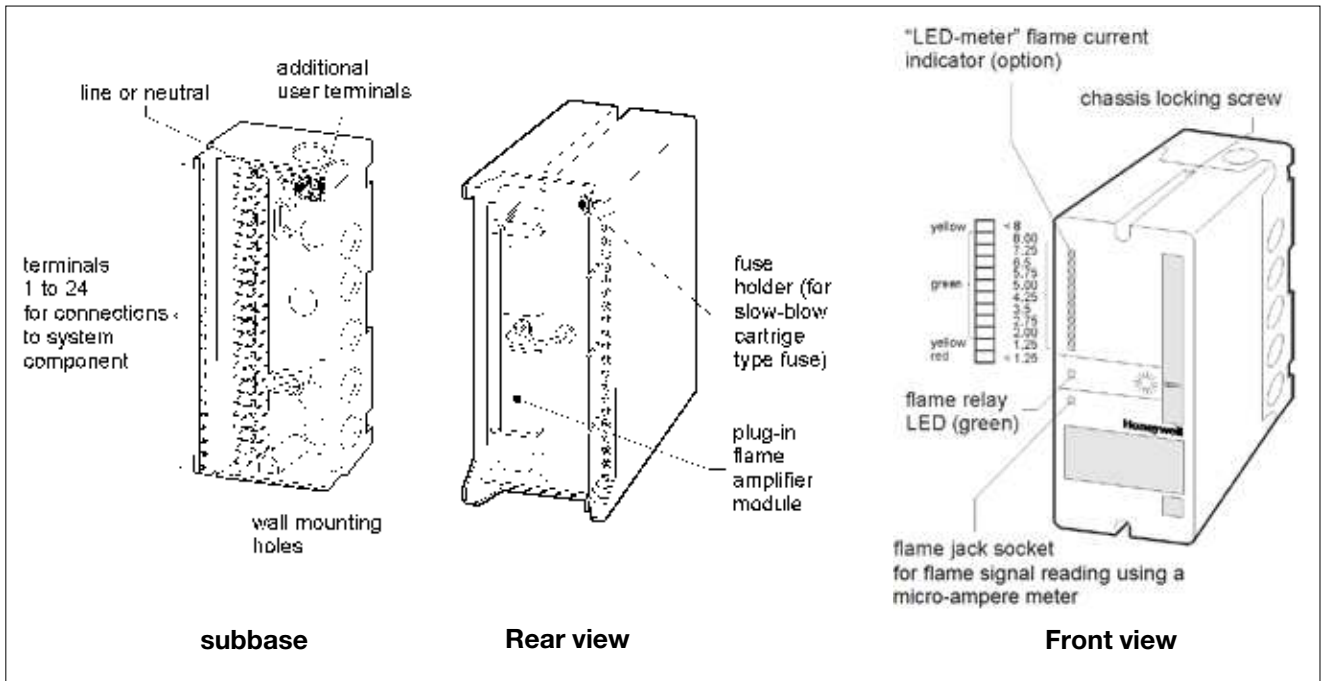


FIG.2 Main features

**ACCESSORIES:**

Subbase : 46176612-501 : for IP40 (to be ordered separately)

**FLAME DETECTION SYSTEM:**

PLUG-IN FLAME AMPLIFIERS					APPLICABLE FLAME DETECTORS			
DETECTION-MODE	COLOR	SELF CHECKING	MODEL	FLAME FAILURE RESPONSE TIME (MAX.)	FUEL	TYPE	MODELS	MINIMUM FLAME CURRENT (µA)
RECTIFICATION	GREEN	NO	R7321A	1 sec.	Gas	Rectifying flame rods	Complete assemblies C7008/C7009	2
			R7321B	2-3 sec.	Gas, Oil, Coal	Ultraviolet	C7012 A OR G	
	YES	R7247B <sup>2)</sup>	1 sec., 2 sec. or 3 sec. max.	Gas	Rectifying flame rods	Complete assemblies : C7008/C7009/	1,25	
		R7247C <sup>1)</sup>	2 sec. or 2-3 sec.	Gas, Oil, Coal	Ultraviolet	C7012 E or F	2 <sup>3)</sup>	
ULTRA VIOLET	VIOLET	NO	R7323A R7323B	1 sec. 2-3 sec.	Gas, Oil,	Ultraviolet	C7027/C7035/ C7044	3,5
	BLUE	YES	R7476B <sup>1)</sup>	2 sec. or 2-3 sec.	Gas, Oil, Coal	Ultraviolet (adustable sensitivity)	C7076 A or F	2,5 <sup>3)</sup>
	VIOLET	YES	R7061A	1 sec. or 2 sec.	Gas, Oil, Coal	Ultraviolet	C7061 A or F	2,5

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

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

3) C7012E, F and C7076A, F 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 R4348B 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 R4348B industrial flame switch can be wall, DIN rail or panel mounted. When panel or DIN rail mounting the R4348B the appropriate kit must be ordered separately.

### WIRE THE SUBBASE

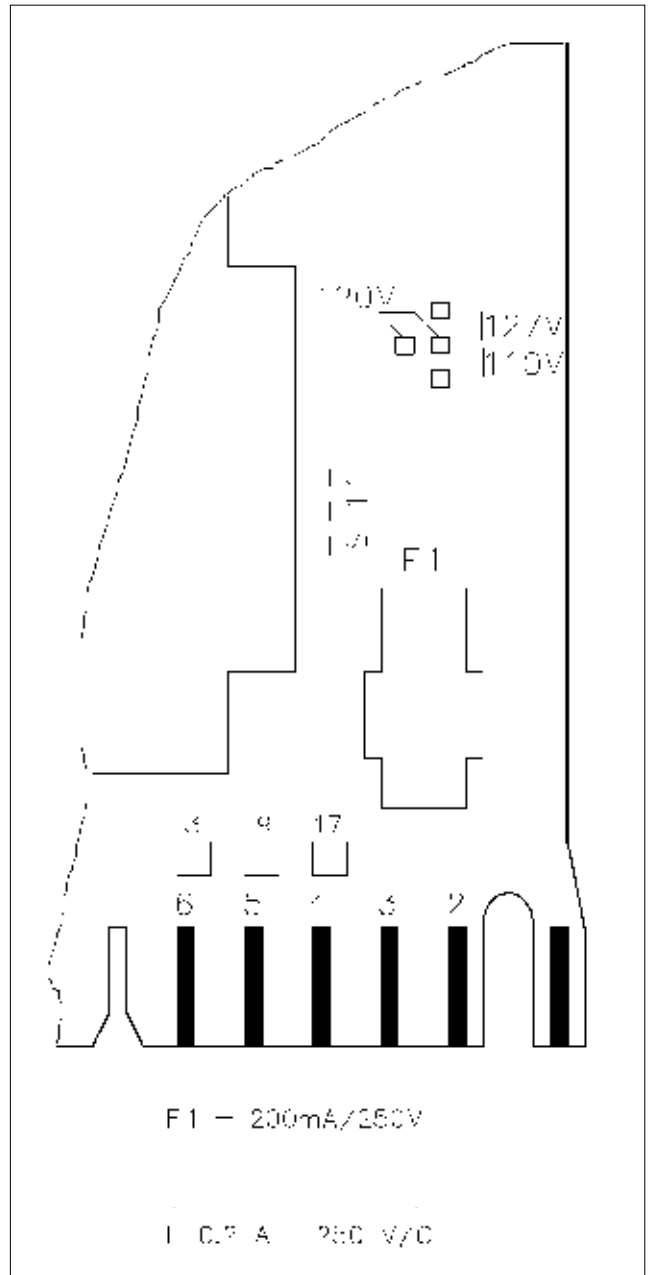
- 1 All wiring must comply with local codes ordinances and regulations.
- 2 Ensure that loads do not exceed the terminal ratings.

### SELECTING THE OPERATING VOLTAGE

To match the R4348B 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
220..240V	2 and 1	

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



## 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 length, 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 microammeter which is plugged into a jack socket on the face of the R4348B.
- 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 color 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 R4348B INTO THE SUBBASE

- 1 Plug the selected amplifier into the back of the R4348B (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.
- 4 In case of B1057 model, plug the cable into the back-side of the amplifier.

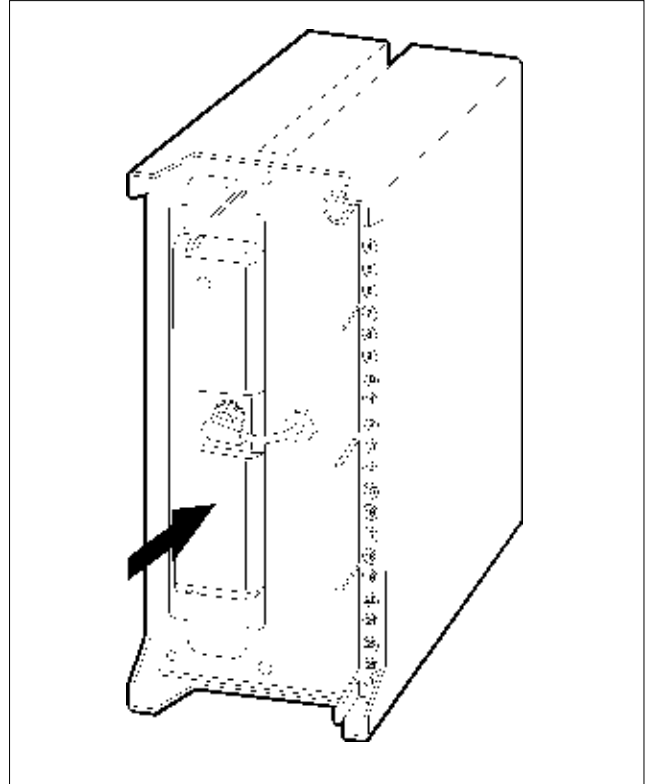


FIG. 3 Installing a plug-in flame current amplifier

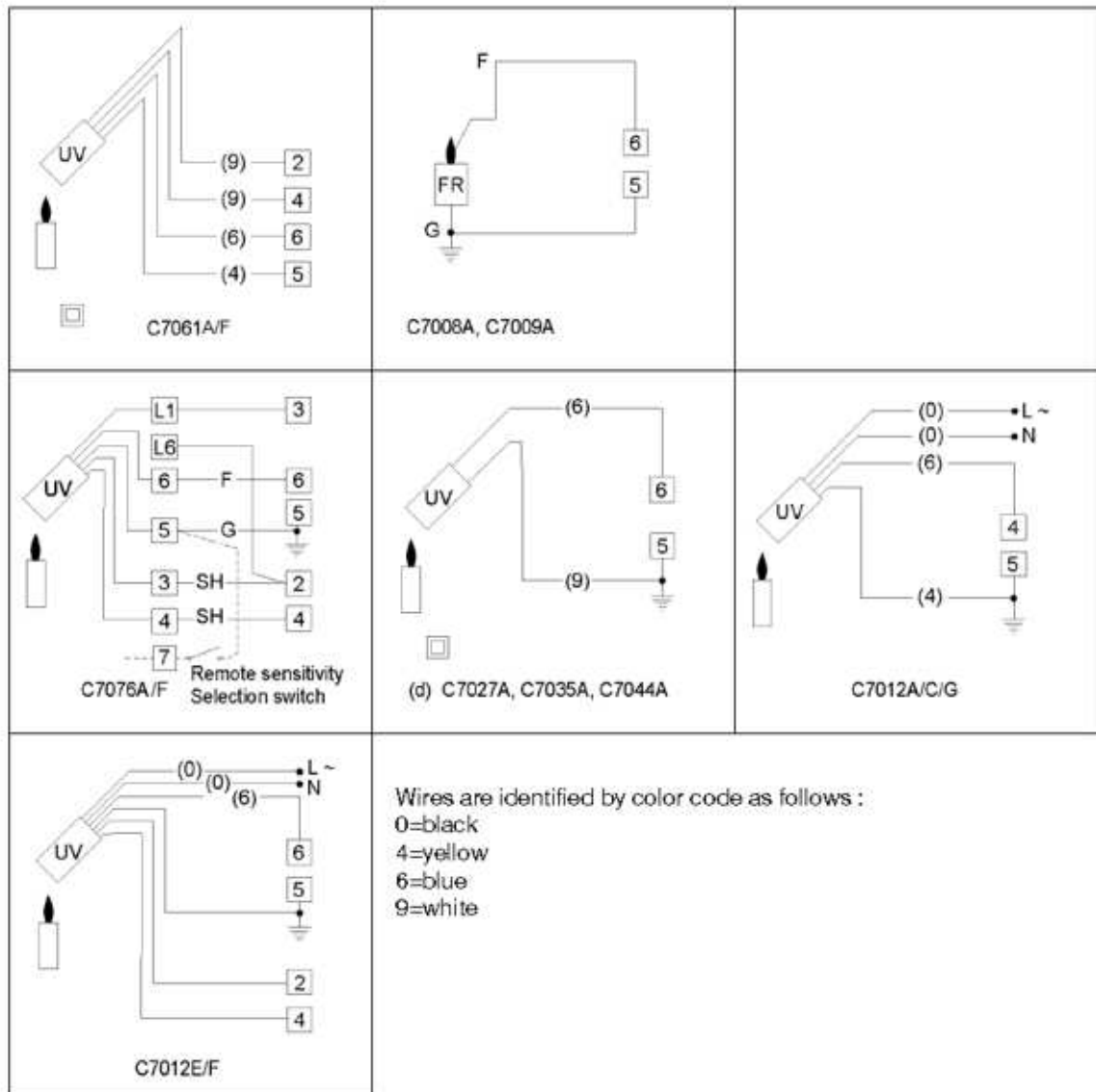


FIG. 4 Flame detector wiring diagrams

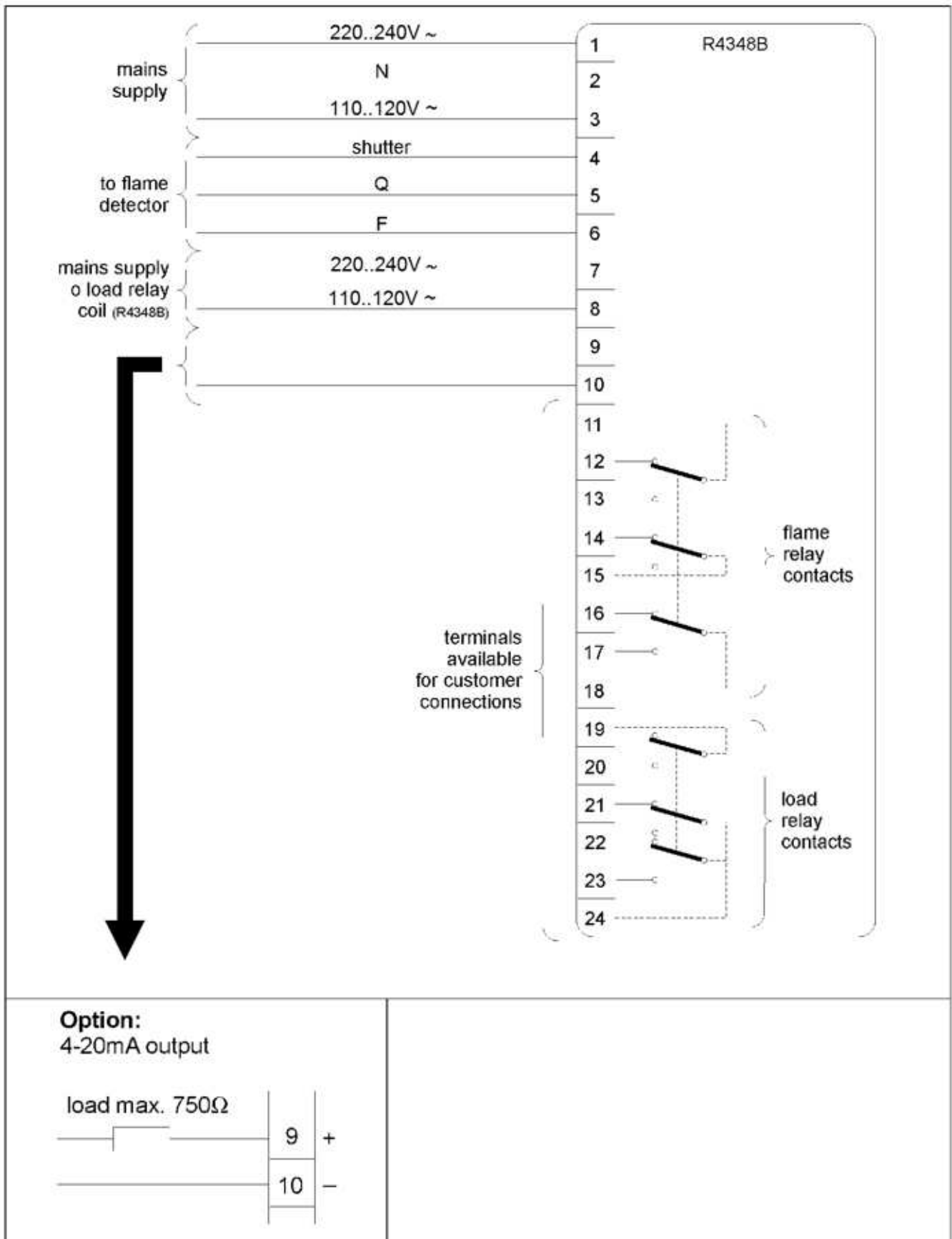


FIG. 5 Industrial flame switch - terminal location



## 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 12.

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 R4348B has the possibility of measuring / recording the flame current value in various ways, as follows : (see also MODELS).

- 1 Using a micro-ammeter which is plugged into a socket on the face of the R4348B.
- 2 By reference to an LED-meter on the face of the R4348B 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 1mA, 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 C7008A C7009A	2.50 µA	7.00 µA	Sufficient earthing area Good earth connection Proper positioning of flame rod in flame
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 3.00 µA 2.50 µA	7.00 µA 7.50 µA 7.50 µA 7.50 µA 7.00 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

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