



## REFRIGERANT DETECTION SYSTEMS AND CITY MULTI VRF PUMP DOWN PACKAGE

# Application and Installation Manual

Information for :-

Refrigerant Detection Systems and City Multi VRF Pump Down Package

For safe and correct use please read the installation manuals supplied with the equipment.

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## Safety precautions

### Before installation and electric work

Before installing the unit, make sure you read all the "Safety precautions".

The "Safety precautions" provide very important points regarding safety. Make sure you follow them.

#### Symbols used in the text



Warning: Describes precautions that should be observed to prevent danger of injury or death to the user.



Caution: Describes precautions that should be observed to prevent damage to the unit.



Warning: Carefully read the labels affixed to the main unit.



#### Warning:

- Ask the dealer or an authorised technician to install the unit.  
Improper installation by the user may result in water leakage, electric shock, or fire.
- Use the specified cables for wiring. Make the connections securely so that any outside forces acting on the cables are not applied to the terminals. Inadequate connection and fastening may generate heat and cause a fire.
- Never repair the unit. If the controller must be repaired, consult the dealer.  
If the unit is repaired improperly, electric shock, or fire may result.
- When handling this product, always wear protective equipment. EG: Gloves, full arm protection namely boiler suit, and safety glasses.  
Improper handling may result in injury.
- If refrigerant gas leaks during installation work, ventilate the room.  
If the refrigerant gas comes into contact with a flame, poisonous gases will be released.
- Install the controller according to this Installation Manual.  
If the unit is installed improperly, electric shock, or fire may result.  
Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard", "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit.
- If the power source capacity is inadequate or electric work is performed im-properly, electric shock and fire may result.  
Keep the electric parts away from any water - washing water etc...  
Contact may result in electric shock, fire or smoke.
- After completing installation work, make sure that refrigerant gas is not leaking.  
If the refrigerant gas leaks and is exposed to a fan heater, stove, oven, or other heat source, it may generate noxious gases.
- Do not reconstruct or change the settings of the protection devices.  
If the pressure switch, thermal switch, or other protection device is shorted or operated forcibly, or parts other than those specified by Mitsubishi Electric are used, fire or explosion may result.

To dispose of this product, consult your dealer. Do not use a leak detection additive.

### Precautions for devices that use R410A refrigerant





#### Caution:


- Do not use the existing refrigerant piping.  
The old refrigerant and refrigerator oil in the existing piping contains a large amount of chlorine which may cause the refrigerator oil of the new unit to deteriorate. Use refrigerant piping made of C1220 (CU-DHP) phosphorus deoxidized copper as specified in the JIS H3300" Copper and copper alloy seamless pipes and tubes". In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shav-ing particles, oils, moisture, or any other contaminant.  
Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.
- Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing.  
(Store elbows and other joints in a plastic bag.) If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor problems may result.
- Use ester oil, ether oil or alkylbenzene (small amount) as the refrigerator oil to coat flares and flange connections.  
The refrigerator oil will degrade if it is mixed with a large amount of mineral oil.
- Use liquid refrigerant to fill the system.  
If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.
- Do not use a refrigerant other than R410A.  
If another refrigerant (R22, etc.) is used, the chlorine in the refrigerant may cause the refrigerator oil to deteriorate.
- Use a vacuum pump with a reverse flow check valve.  
The vacuum pump oil may flow back into the refrigerant cycle and cause the refrigerator oil to deteriorate.  
Do not use the following tools that are used with conventional refrigerants. (Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, refrigerant recovery equipment.)
- If the conventional refrigerant and refrigerator oil are mixed in the R410A, the refrigerant may deteriorate.  
If water is mixed in the R410A, the refrigerator oil may deteriorate.  
Since R410A does not contain any chlorine, gas leak detectors for conventional refrigerants will not react to it.
- Do not use a charging cylinder. Using a charging cylinder may cause the refrigerant to deteriorate.  
Be especially careful when managing the tools.
- If dust, dirt, or water gets in the refrigerant cycle, the refrigerant may deteriorate.

## Safety precautions

### Before installation

-  **Caution:**
- Do not install the unit where combustible gas may leak.  
If the gas leaks and accumulates around the unit, an explosion may result.
-  **Caution:**
- Ground the unit.  
Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground lines. Improper grounding may result in electric shock.
  - Install the power cable so that tension is not applied to the cable.  
Tension may cause the cable to break and generate heat which may, in turn, cause fire.
  - Install a leak circuit breaker, as required.  
If a leak circuit breaker is not installed, electric shock may result.
  - Use power line cables of sufficient current carrying capacity and rating.  
Cables that are too small may leak, generate heat, and cause a fire.
  - Use only a circuit breaker and fuse of the specified capacity.  
A fuse or circuit breaker of a larger capacity or a steel or copper wire may result in a general unit failure or fire.
  - Be very careful regarding product transportation.  
Two people should be used to carry products of 20kg or more.
  - Some products use PP bands for packaging. Do not use any PP bands for a means of transportation.
  - Safely dispose of the packing materials.  
Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.  
Tear apart and throw away plastic packaging bags so that children will not play with them - If children play with a plastic bag which has not been torn apart, they face the risk of suffocation.

### Before starting the test run

-  **Caution:**
- Do not touch the switches with wet fingers.  
Touching a switch with wet fingers can cause electric shock.
  - Do not touch the refrigerant pipes during and immediately after operation.  
During and immediately after operation, the refrigerant pipes may be hot or cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. Your hands may suffer burns or frostbite if you touch the refrigerant pipes.
  - Do not operate the air conditioner with the panels and guards removed.  
Rotating, hot, or high-voltage parts can cause injuries.
  - Do not turn off the power immediately after stopping operation.  
Always wait at least five minutes before turning off the power. Otherwise, water leakage and other problems may occur.

### Disclaimer

#### **Warranty:**

All products manufactured on behalf of Mitsubishi Electric UK are warranted against defective materials for a period of three years from the date of delivery to the original purchaser.

#### **Warning:**

Mitsubishi Electric UK assumes no liability for damages consequent to the user of this product. We reserve the right to change this manual at any time without notice. The information furnished by us is believed to be accurate and reliable. However, no responsibility is assumed by us for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

## Overview of VRF Refrigerant Pump Down Application

### The need for Refrigerant Detection Systems EN378 / BREEAM

Mitsubishi Electric air conditioning systems use refrigerant, which if installed and maintained correctly are designed to never leak into the atmosphere.

To protect against a worst case scenario, EN378, is in place as safety guidance for calculating the critical concentration of refrigerant if it were all to leak into an occupied space, which for R410A refrigerant is 0.44kg/m<sup>3</sup>. On an environmental aspect for sustainable buildings, BREEAM Pol 01 aims to minimise pollution under the unlikely event of leakage of refrigerant from the air conditioning system. Designed to reduce such pollution, the system provides an option which can help achieve recognition within BREEAM, subject to evaluation by an accredited BREEAM assessor.

### Refrigerant Detection Systems

Refrigerant detection systems are designed to supply a total refrigerant gas detection package to detect air conditioning leaks with the option of providing pump down of City Multi VRF R2 systems.

These systems help safeguard against refrigerant levels exceeding permitted concentration levels and react effectively in the event of leaks.

#### Key Features

- Enables compliance with EN378 - Safety of Building Occupants, critical in hotel applications.
- Can help achieve recognition within BREEAM Pollution Prevention Assessment, ideal for assisting the in design of modern, sustainable buildings.
- Robust and tested leak detection (set to maximum of 2000 ppm or lower\*) with pump down option.
- Flexible refrigerant gas detection systems - semi-conductor or infra-red, in standalone or cost effective aspirated panel options.
- Pump down panel incorporating all elements required for safety and environmental protection along with ease of installation.
- Actuated ball valves to isolate refrigerant on pump down.

REFRIGERANT DETECTOR	KSGD-01W	KSGD-01S	KSIR-01	KS8-IR8C	KS8-IR16C	KS8-IR32C
						
Description	Standalone white exposed	Standalone silver back box	Standalone exposed	Aspirated panel	Aspirated panel	Aspirated panel
Sensing Type	Semi-conductor	Semi-conductor	Infra-red	Infra-red	Infra-red	Infra-red
Power Supply	12VDC (via KSTR12)	12VDC (via KSTR12)	24VDC (via KSTR) & 240VAC	240VAC	240VAC	240VAC
Number of rooms	1	1	1	8 (16 maximum)	16 (32 maximum)	32 (64 maximum)
Audible alarm	✓	✓	✓	X	X	X
Visual alarm	✓	✓	✓	X	X	X

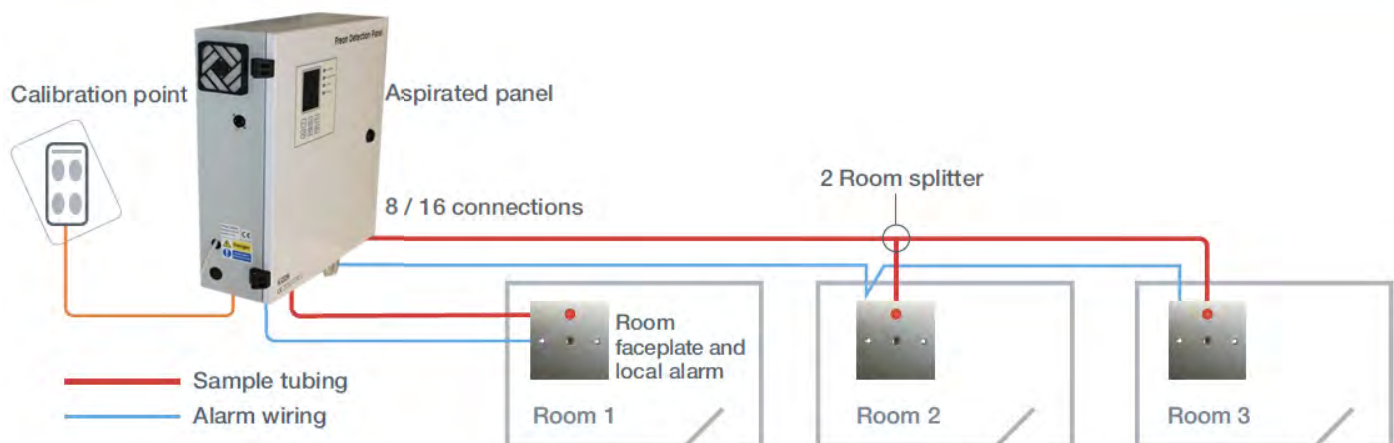
TECHNOLOGY	SENSOR	HOW IT WORKS	APPLICATION
Semi-conductor	Metal oxide sensor	High resistance with oxygen (air). Resistance drop occurs when the oxygen is replaced with another gas	Open, clean environments (i.e. office)
Infra-red	A gas sample tube with infra-red light emitter and sensor at opposite ends	Different gases absorb different wavelengths of infra-red light, so accurate detection is possible	Any. Ideal for hotel applications as only refrigerant can set off the alarm

## Overview of Pump Down Application

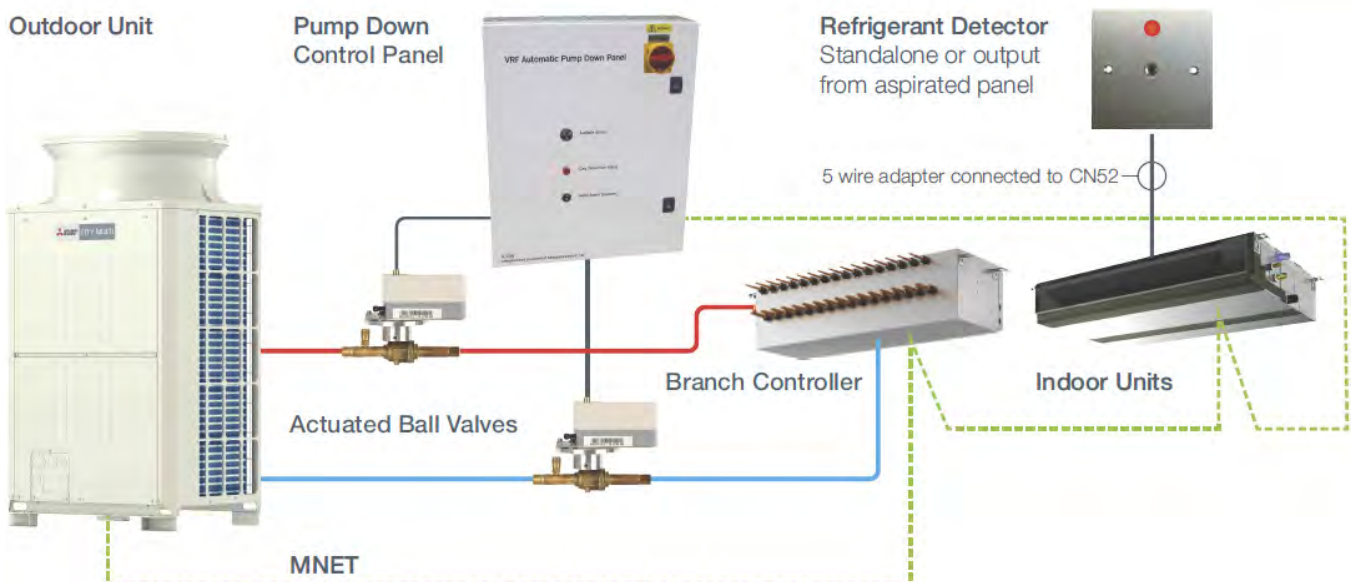
ADDITIONAL ITEMS REQUIRED FOR DETECTION SYSTEMS	MODEL REF.
Transformer 12VDC	KSTR12
Transformer 24VDC	KSTR24
100m drum sampling tube for aspirated panel (black)	KS8-BST100
250m drum sampling tube for aspirated panel (black)	KS8-BST250
Inline Filter for Aspirated Panel	KS8-IF
End of line filter for aspirated panel (calibration)	KS8-EF
Stainless steel room faceplate for aspirated panel	KS8-SSFP
Stainless steel room faceplate with alarm for aspirated panel	KS8-SSFPA
Sampling tube straight connector for aspirated panel	KS8-STSC
Sampling tube two way manifold for aspirated panel	KS8-ST2M
Room alarm indicator (visual and audible alarm)	KSRA1

Please note: Commissioning is required on pump down systems.  
It is recommended that system design is completed with your local Mitsubishi Electric sales office.

### Aspirated System Diagram Example:



### Refrigerant Gas Detection with City Multi VRF Automatic Pump Down Installation Example:





## Overview of Pump Down Application

Components required <i>per</i> refrigerant system	CONFIRM
City Multi R2 system – PURY-(E)P**Y(S)HM or PURY- P**Y(S)JM or PURY-EP**Y(S)KM	
Automatic VRF Pump Down Panel OC1 - OC8 (1-8 systems)	
<b>Detector System Options</b>	
<b>OPTION 1</b> - KSGD-01W/S Semi Conductor Detector (optional PAC-SA88HA-EP 5 wire adaptor required for pump down system) Not recommended for use in Hotel room applications.	
<b>OPTION 2</b> - KSIR-1 Infra Red Detector (optional PAC-SA88HA-EP 5 wire adaptor required for pump down system)	
<b>OPTION 3</b> - KS8-IR8C 8 Channel Aspirated Infra Red Detector (optional PAC-SA88HA-EP 5 wire adaptor required for pump down system)	
<b>OPTION 4</b> - KS8-IR16C 16 Channel Aspirated Infra Red Detector (optional PAC-SA88HA-EP 5 wire adaptor required for pump down system)	
<b>OPTION 5</b> - KS8-IR32C 32 Channel Aspirated Infra Red Detector (optional PAC-SA88HA-EP 5 wire adaptor required for pump down system)	
<b>OPTION 6</b> - Third Party Leak Detectors (optional PAC-SA88HA-EP 5 wire adaptor required for pump down system)	
2 x Actuated ball valves sized at full bore for low pressure and high pressure pipes between each outdoor unit and BC.	
System commissioning @ £500 per day / 4 systems (as long as they are addressed and wired correctly) to maintain system warranty (by MEU-UK engineer)	



Automatic VRF Pump Down Panel KS8-OC1/8



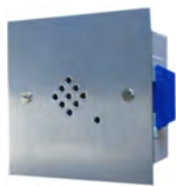
Actuated Ball Valve

PAC-SA88HA  
5 wire adaptor

### Refrigerant Leak Detectors



KSGD-01W



KSGD-01S



KSIR-01



KS8-IR8/16-C &amp; 32-C

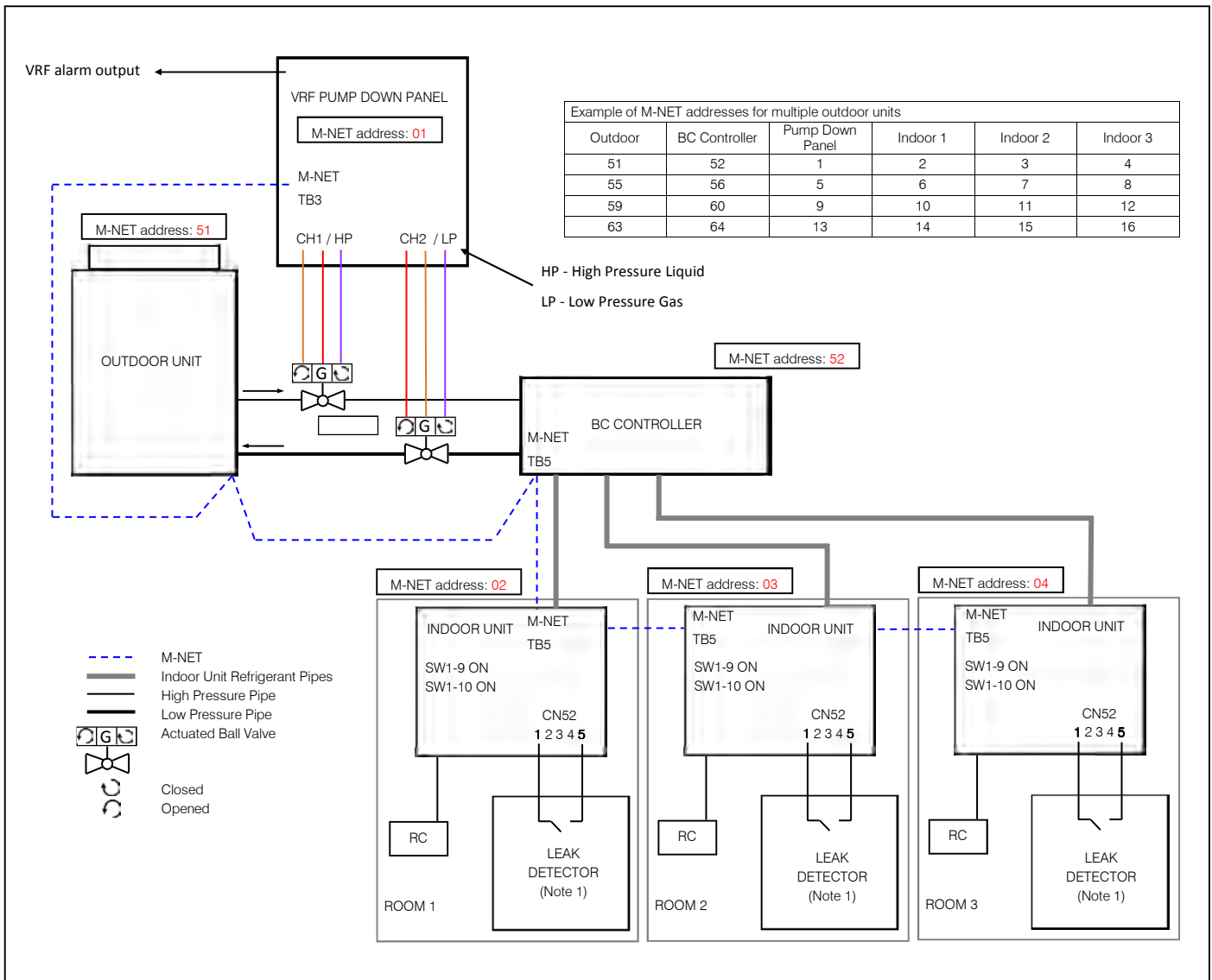
## VRF PUMP DOWN APPLICATION MANUAL

For safe and correct use please read the installation manuals supplied with the equipment.



# System Wiring Diagram

## Installation Example (Single Condenser)



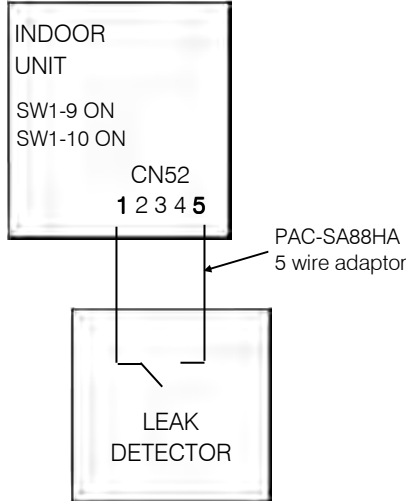
Please refer to the pump down panel wiring diagram which is enclosed in the control panel.

Control Panel Supply Voltage: 240V ac, 50/60Hz, +/- 10% 13 amp

### Note 1

KSGD-1 S/W	Semi Conductor	Terminal Connections 4 & 5
KSIR-1	Infra Red Standalone	Terminal Connections CONN 2B NO & C
KS8-SSFPA	(Aspirated) Face Plate with Alarm	Terminal Connections 4 & 5
<b>Please note :</b>	Commissioning is required on Pump Down Systems	

## System Checklist

<b>Outdoor units</b>		<b>CONFIRM</b>
Outdoor must be R2 system, YHM, YJM ,YKM or YLM.		
Outdoor unit firmware must be upgraded on site once system is installed and operational (by MEU-UK commissioning engineer)		
<b>Indoor unit</b>		<b>CONFIRM</b>
5 wire adapters should be wired to CN52 pins 1 +5		
Dip SW 1-9 and 1-10 must be ON when 5 wire adapter is connected to leak detection system.	 <p>INDOOR UNIT SW1-9 ON SW1-10 ON CN52 1 2 3 4 5</p> <p>PAC-SA88HA 5 wire adaptor</p> <p>LEAK DETECTOR</p>	
<b>PAC-YG66DCA ( Located in Pump Down Panel) OC1 - OC8</b>		<b>CONFIRM</b>
PAC-YG66DCA within the pump down panel must be addressed [outdoor unit MNET address] minus [50]. E.g. outdoor unit 51, PAC-YG66DCA 01, indoor units 02-50. If using PWFY on same system consider MNET / MA control.		
<b>Detection system</b>		<b>CONFIRM</b>
See individual Manuals for details.		
If multiple leak detectors are installed they can be wired to the nearest associated indoor unit or the unit within the same room.		
<b>Actuated ball valves (KS8-5/8 ABV to KS8-1 3/8 ABV)</b>		<b>CONFIRM</b>
Should be installed between outdoor unit and BC on both refrigerant pipes		
Should be installed as near to the BC as possible		
One actuated ball valve on high pressure pipe and one on low pressure pipe*		
High pressure actuated ball valve should be wired to CH1 as per pump down electrical diagram		
Low pressure actuated ball valve should be wired to CH2 as per pump down electrical diagram		

\*The valve body must be protected against excessive heat during installation to prevent damage to the seals. See previous pages for ball valve installation instructions.

## System Operation

On detection of refrigerant the detector will close volt free contacts Pin 1+5 on CN52 on the indoor unit.

A signal via the M-NET is sent to the outdoor unit. (Can take up to a maximum of one minute to receive signal)

The outdoor unit sends a signal to the pump down panel to close the high pressure valve installed between the outdoor unit and the branch controller.

Error code 1510 will appear on the remote controller and centralised controller.

Typically the actuated ball valves take between 110-150 seconds to fully close.

The system will be forced into test run cooling and will start to pump down. (Compressor start)

Local remote controller will be prohibited within pump down mode.

The outdoor unit will continue to run, collecting refrigerant.

The pump down panel will close the low side valve and stop the outdoor unit compressor when one or more of the following occur.

Refrigerant will be recovered to the outdoor unit and refrigerant pipes between outdoor unit and actuated ball valves. If outdoor unit has been running for short time, both valves close at start of pump down operation.

Check for leaks (by F-Gas registered engineer)  
System should be checked for leaks and any remedies implemented.

After the system leak is repaired, a strength and pressure test should be carried out. Ensure system is fully charged with refrigerant to the required level.

To re-start system, everything must be powered off / on outdoor unit and pump down panel.

System should be reset to original setting and tested to ensure it is running as expected.

OC1 example schematic



Detector Example

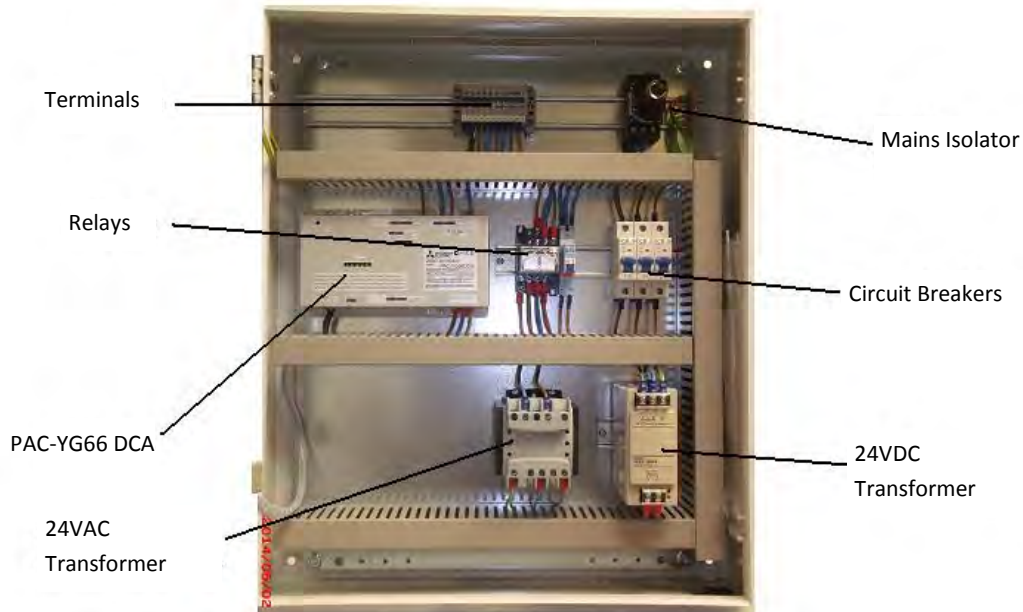
1. 15 minutes has passed since pump down operation begun
2. 63LS (low pressure sensor in outdoor unit) = <0.39Mpa(55psi)
3. Error occurs

Instructions for :-

Pump Down Panel KS8-OC1/8

For safe and correct use please read the installation manuals supplied with the equipment.

## Internal view VRF Pump Down Panel (Example shown KS8-OC1)



In the event of a refrigerant leak the VRF Pump Down Panel is designed to control and ensure the safe removal and storage of the full system refrigerant charge. The panel gives visual and audible alarm to assist safe evacuation of personnel.

## Technical Specification KS8-OC1/8

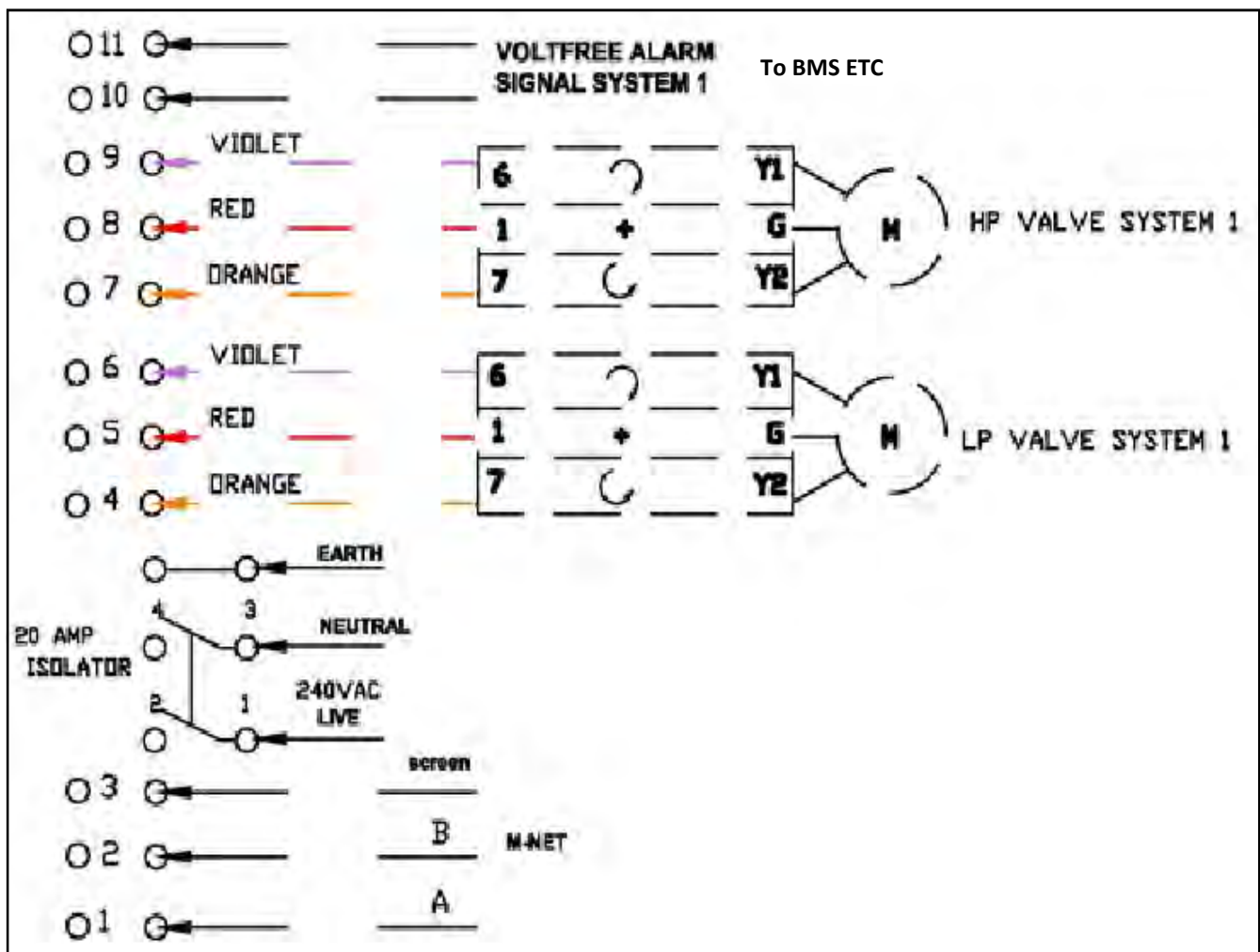
Enclosure	Steel Powder Coated
Power	240V AC 50Hz
Fuse Rating	13A
BMS Output	Volt Free per system (Rated 240v 10A / 24V 10A)
Visual indication	Red LED
Buzzer	85 dB

VRF Pump Down Panel	Weight Kg	Dimensions mm
KS8-OC1	18.5	600 X 500 X 155
KS8-OC2	19	600 X 500 X 155
KS8-OC3	37.5	800 X 600 X 210
KS8-OC4	38.5	800 X 600 X 210
KS8-OC5	46.5	800 X 800 X 210
KS8-OC6	47	800 X 800 X 210
KS8-OC7	57	1000 X 800 X 260
KS8-OC8	58	1000 X 800 X 260

## Pump Down Panel Terminal Drawings

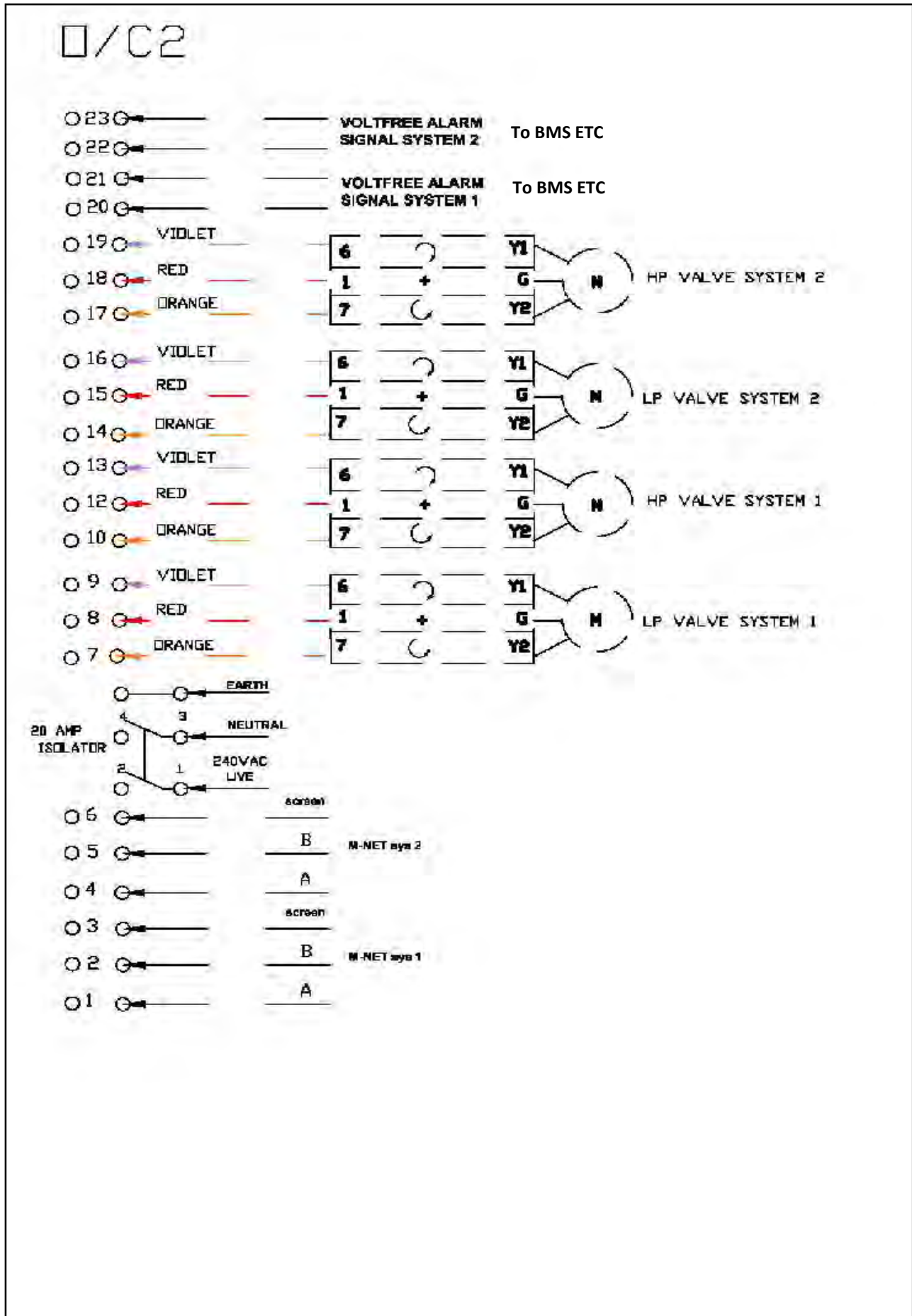
Models KS8-OC1/8

## OC1 Pump Down Panel Terminal Diagram



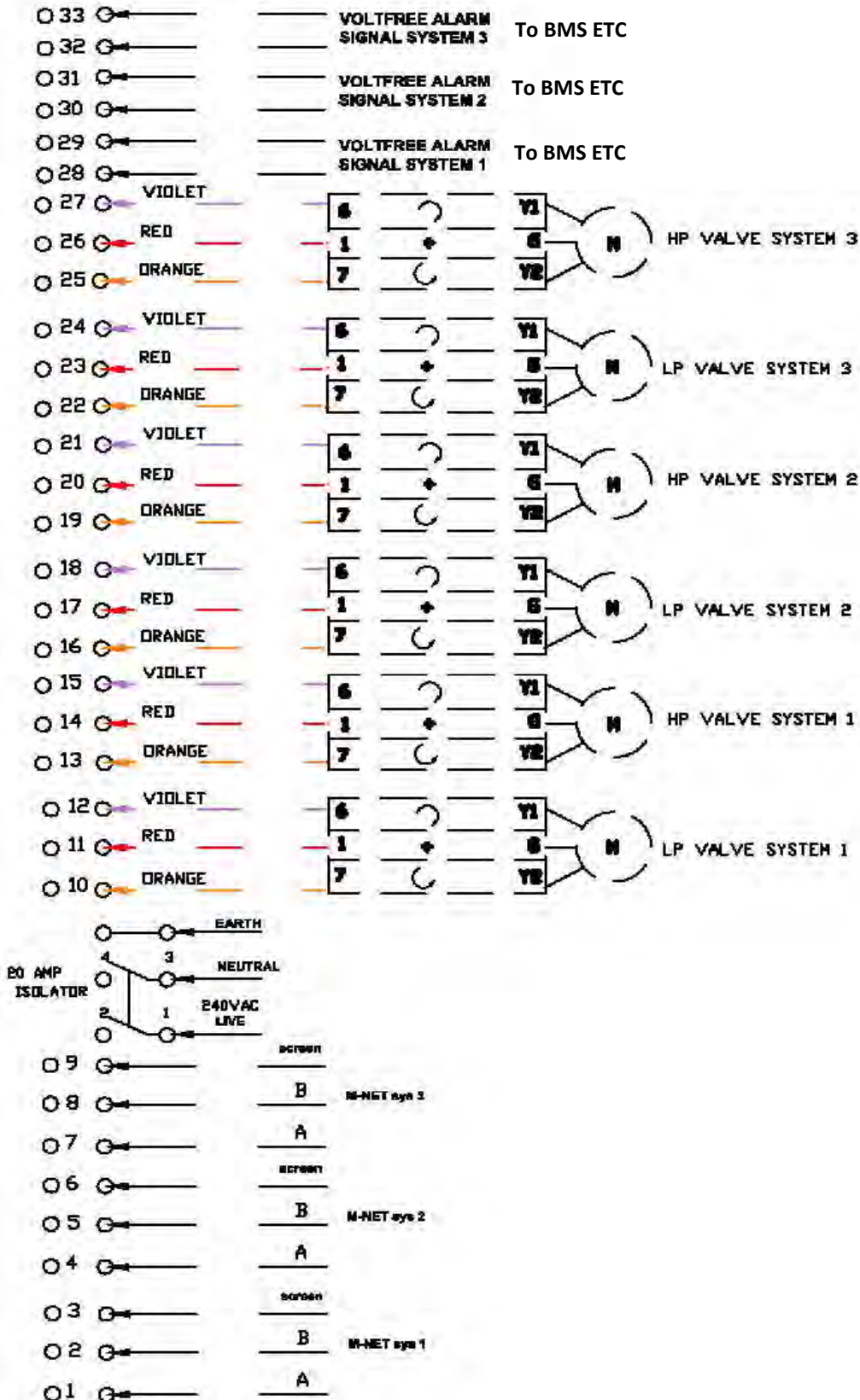


## OC2 Pump Down Panel Terminal Diagram



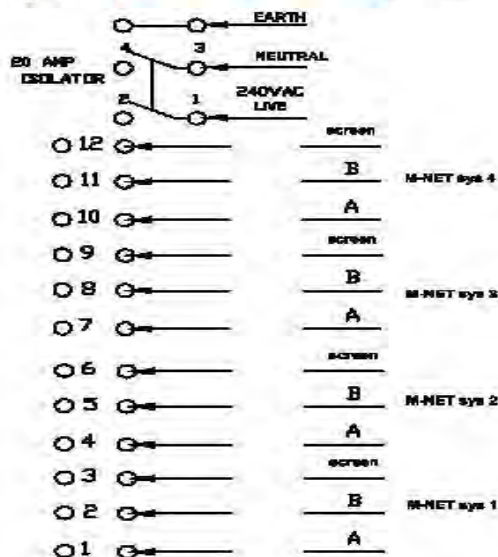
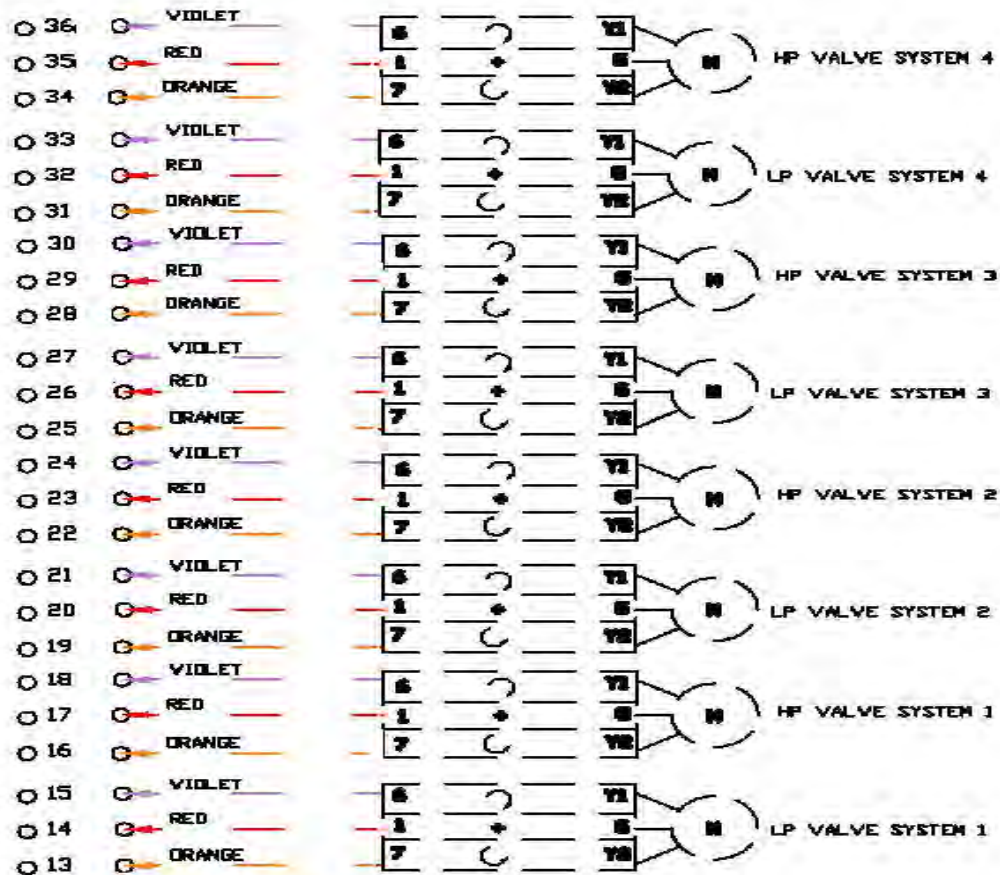
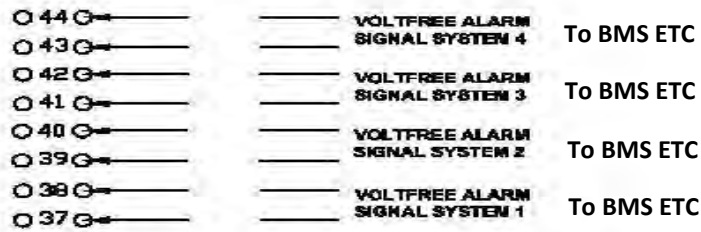
## OC3 Pump Down Panel Terminal Diagram

□/C3



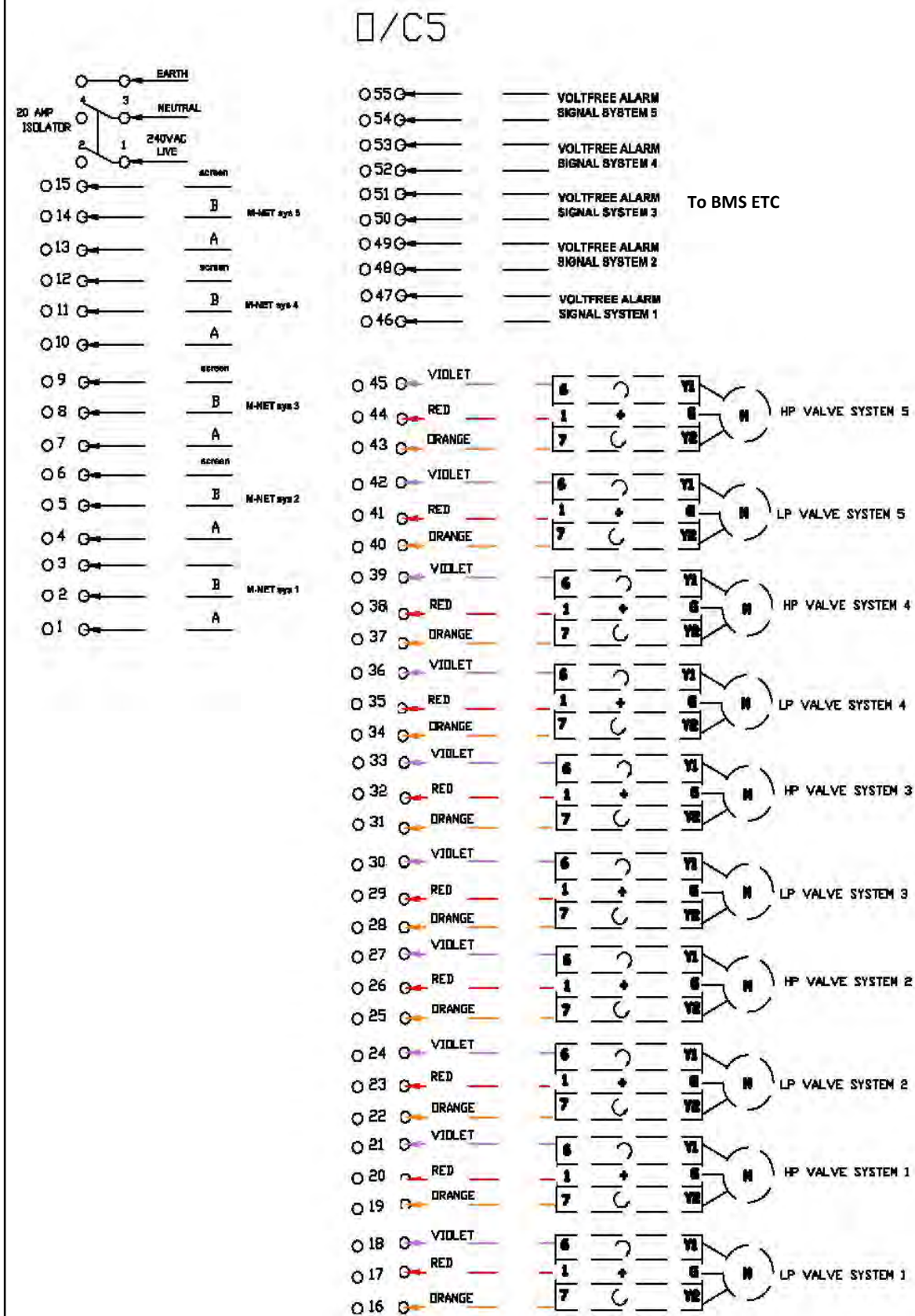
## OC4 Pump Down Panel Terminal Diagram

□/C4



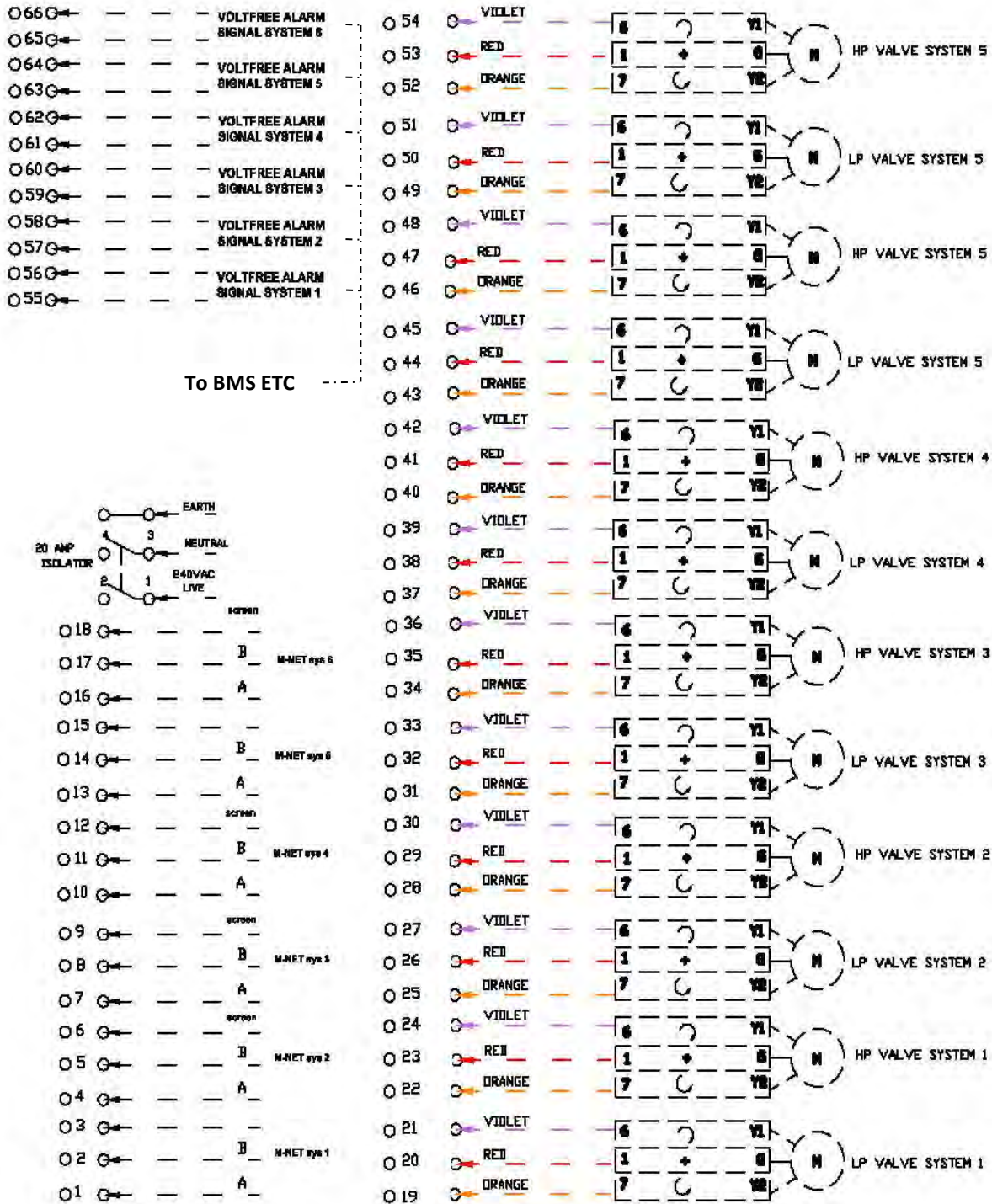


## OC5 Pump Down Panel Terminal Diagram



## OC6 Pump Down Panel Terminal Diagram

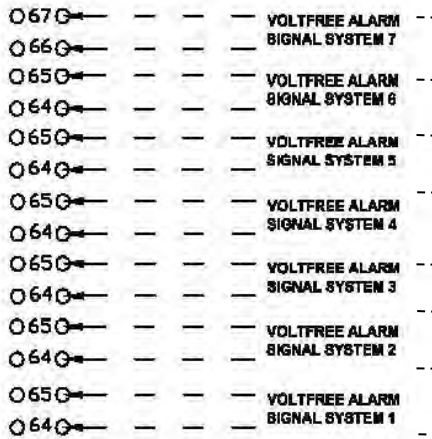
□/C6



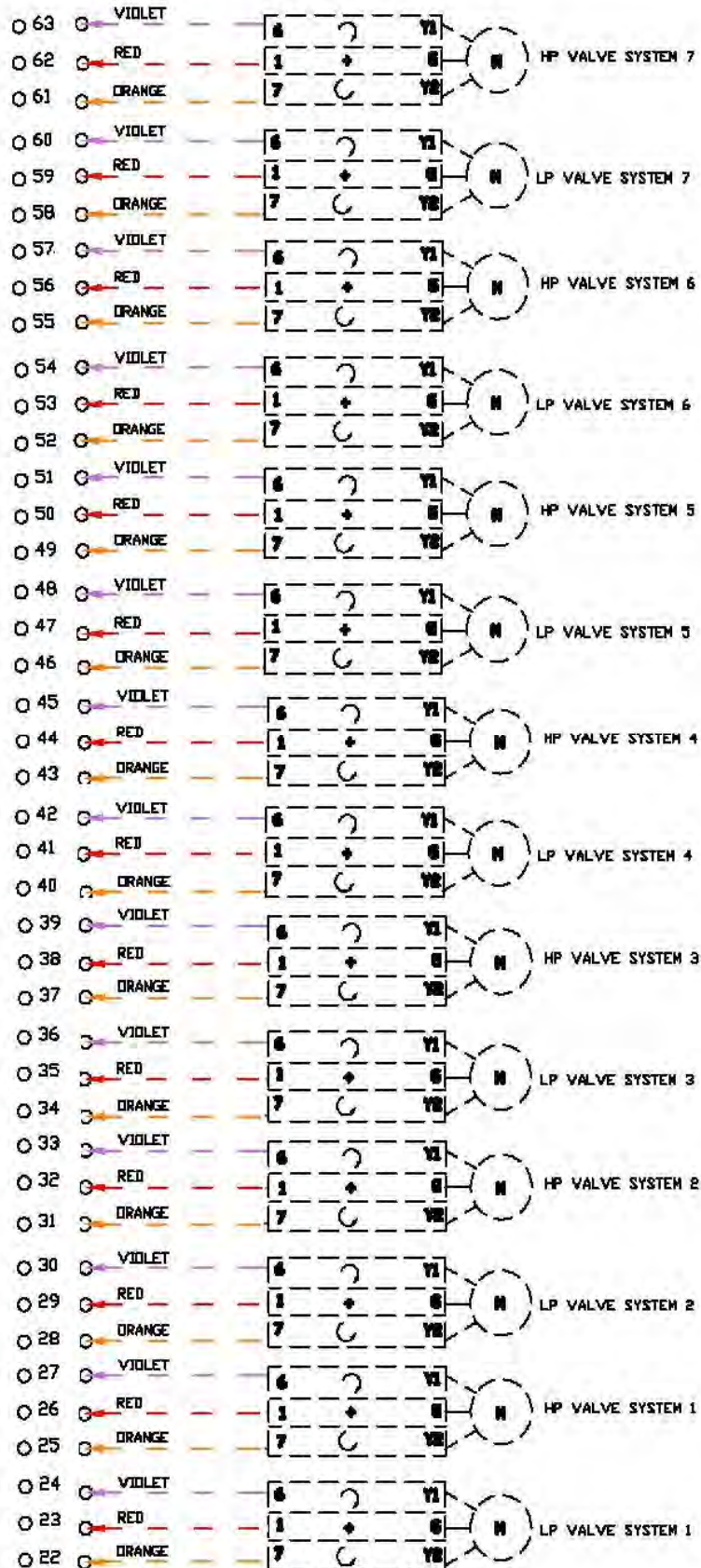
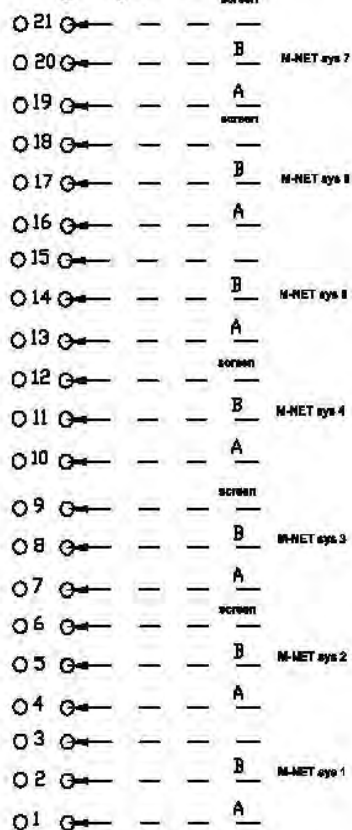
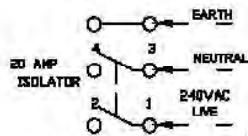


## OC7 Pump Down Panel Terminal Diagram

□/C7



To BMS ETC







Instructions for :-

## KS8-5/8 ABV - KS8-1 3/8 ABV Actuated Ball Valve Installation

For safe and correct use please read the installation manuals supplied with the equipment.

## Actuated Ball Valve Sizing

### R2 YJM-A

Outdoor Unit Size	High Pressure Valve Size	Product Code	Low Pressure Valve Size	Product Code
200	KS8-5/8 ABV	70040081	KS8-3/4 ABV	70040082
250	KS8-3/4 ABV	70040082	KS8-7/8 ABV	70040083
300	KS8-3/4 ABV	70040082	KS8-7/8 ABV	70040083
350	KS8-3/4 ABV	70040082	KS8-1.1/8 ABV	70040084
400	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
450	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
450A1	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
500	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
550	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
600	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
650	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
700	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085
750	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085
800	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085
850	KS8-1.1/8 ABV	70040084	KS8-1.5/8 ABV	70040086
900	KS8-1.1/8 ABV	70040084	KS8-1.5/8 ABV	70040086

### R2 YKM-A

Outdoor Unit Size	High Pressure Valve Size	Product Code	Low Pressure Valve Size	Product Code
200	KS8-5/8 ABV	70040081	KS8-3/4 ABV	70040082
250	KS8-3/4 ABV	70040082	KS8-7/8 ABV	70040083
300	KS8-3/4 ABV	70040082	KS8-7/8 ABV	70040083
350	KS8-3/4 ABV	70040082	KS8-1.1/8 ABV	70040084
400	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
450	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
500	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
550	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
600	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
650	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
700	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085

## Actuated Ball Valve Sizing

### R2 P/EP Y(S)LM-A

Outdoor Unit Size	High Pressure Valve Size	Product Code	Low Pressure Valve Size	Product Code
200	KS8-5/8 ABV	70040081	KS8-3/4 ABV	70040082
250	KS8-3/4 ABV	70040082	KS8-7/8 ABV	70040083
300	KS8-3/4 ABV	70040082	KS8-7/8 ABV	70040083
350	KS8-3/4 ABV	70040082	KS8-1.1/8 ABV	70040084
400	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
450	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
450A1	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
500	KS8-7/8 ABV	70040083	KS8-1.1/8 ABV	70040084
550	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
600	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
650	KS8-1.1/8 ABV	70040084	KS8-1.1/8 ABV	70040084
700	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085
750	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085
800	KS8-1.1/8 ABV	70040084	KS8-1.3/8 ABV	70040085
850	KS8-1.1/8 ABV	70040084	KS8-1.5/8 ABV	70040086
900	KS8-1.1/8 ABV	70040084	KS8-1.5/8 ABV	70040086

## Ball Valve Installation Instructions

**When installing ball valves it is very important to note that when applying heat it should only be for a matter of seconds, not minutes.**

For soft soldering - Use oxygen-acetylene or equivalent type heating torches.

For Silver Brazing - ONLY use an oxygen-acetylene heating torch capable of raising the temperature of the tube socket to the required brazing temperature within a time period of approximately one minute. Oxygen Free Nitrogen should be purged through the connecting pipework while brazing.

**IMPORTANT :** Before installing the valve in the line, remove the actuator and schrader valve and turn the stem to the open position.



**WARNING :** Damage may result if the actuator is not re fitted correctly after installation of the ball valve, see instructions overleaf.

### Recommended procedure for silver brazing to copper tubing

- Cut tube ends square. Remove burrs.
- Remove all grease and oil from joint area and clean the outside of the tube with emery cloth.
- Insert tube to full depth of connection socket to ensure proper fit. Withdraw tube half way out of the socket, apply brazing flux evenly over the tube and outside of the socket and reinsert tube.
- Wrap a wet cloth around the valve body and bonnet, but away from the socket to be brazed. With the torch adjusted to a reducing flame apply heat to the entire circumference of the tube over a distance of approximately 15mm to 50mm from the valve socket to expand the tube and carry the heat down inside the socket.
- Continue heating until the flux on the tube becomes liquid at which time the flame should be directed on the valve socket as well as the tube but pointed away from the valve body.
- When the flux has become very fluid and watery in appearance apply the brazing alloy against the heated tube starting at the bottom of the junction of the tube and valve socket. If the joint is at the proper temperature the brazing alloy will flow quickly around the tube and into the socket. If the alloy does not flow readily continue heating until the proper temperature is reached.
- Remove the flame as soon as the liquid brazing alloy has covered the entire joint and penetrated down to the socket. After a few seconds when the alloy has set, apply a water soaked cloth to the joint and to the entire valve to carry away excess heat as quickly as possible and remove residual flux.
- When the temperature has been lowered so that the valve is cool enough to touch, proceed in the same manner to complete the second brazed joint. Remove all excess flux using a wire brush if necessary. Finally, check joints for refrigerant leakage.

# Actuated Ball Valve Installation Instructions

## Components

Ball Valve with schrader



Actuator plate / actuator shaft



Actuator Shaft Clamp



Actuator

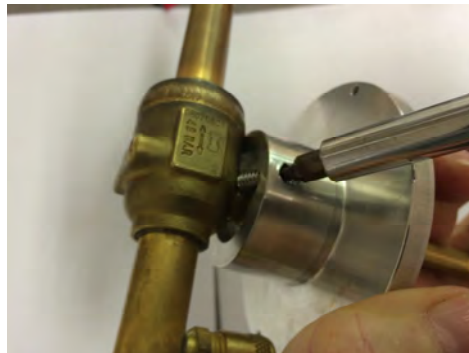


After brazing the ball valve into position fit the actuator plate / actuator shaft assembly to the ball valve (Fig.1) ensuring it is screwed firmly into place and that the shaft aligns with the valve mechanism. Next tighten the two grub screws located on each side of the actuator plate to secure to the ball valve body (Fig.2).

Fig.1



Fig.2



Insert the actuator shaft clamp into the bottom of the actuator ensuring it is fitted in alignment with the in the correct position as indicated in Fig.3 & Fig.4.

Fig.3 (bottom view)

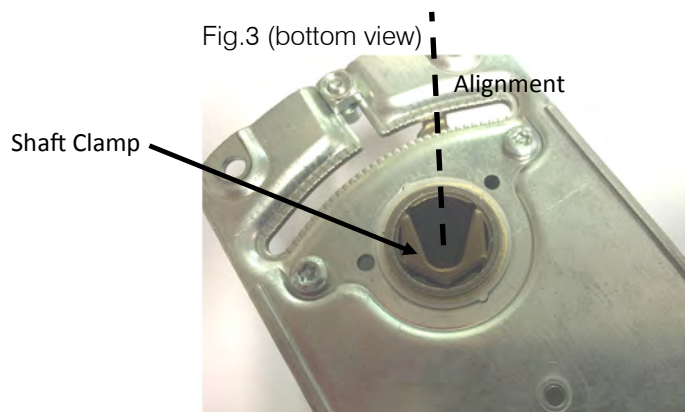
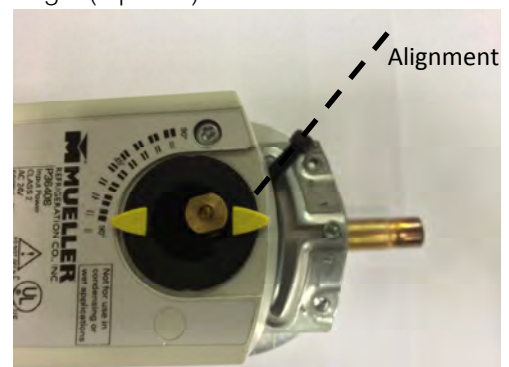


Fig.4 (top view)



## Actuated Ball Valve Installation Instructions

Place the actuator in position on the actuator plate / shaft. Slide the button as shown (Fig.5) back to move the actuator from position in Fig.6 to position in Fig.7 to enable access to the screw fixing points. Insert and tighten screws supplied.

Fig.5



Fig.6



Fig.7



Return the actuator back to the position shown on Fig.6 ensuring that the yellow direction indicators are aligned with the valve and tighten as shown in Fig.8.

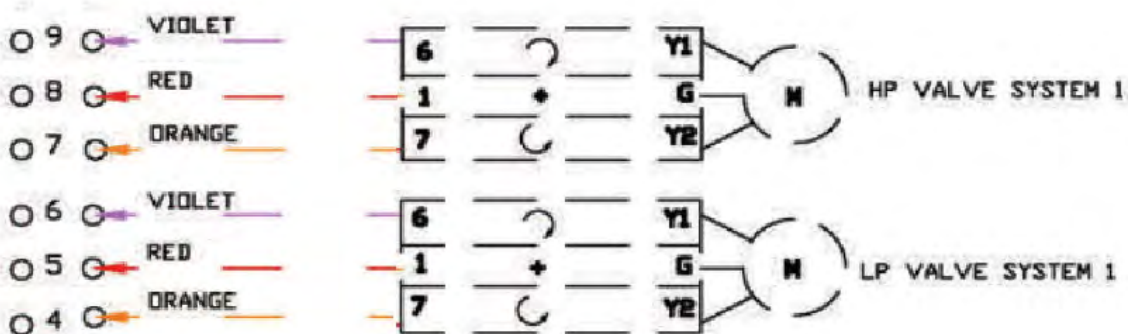
Fig.8



Complete the installation by wiring the high pressure actuator to CH1 and the low pressure actuator to CH2 in the Pump Down Control Panel.

### KS8 ABV Ball Valve Actuator Wiring to Pump Down Panel

(Example shown for KS8-OC1 Panel)



Instructions for :-

KSGD-01W/S Semi Conductor Standalone Refrigerant Leak Detector

For safe and correct use please read the installation manuals supplied with the equipment.



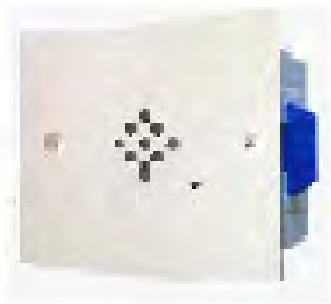
## General

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### KSGD-01 STAND ALONE (SEMI-CONDUCTOR)

The detector is a microprocessor based refrigerant leak detector for air conditioning systems designed primarily for use in offices, and residential properties. Not recommended for use in hotel or bedroom applications when connected and used in conjunction with pump down system.

The compact size and design enable it to be easily fitted into room without being intrusive.



KSGD-01W



KSGD-01S

## Features

---

Detects R410a HFC refrigerant.

Healthy, fault and leak LED indication

Audible leak alarm

Factory calibrated

Easily installed

12-24 V AC/DC supply - (supplied separately - 12VDC order ref KSTR12, 10100230)

OR

Power via KS8-RAD32 or KS8-RAD64 (24Vac + comm's 4 core cable, see install connections)

### CAUTION

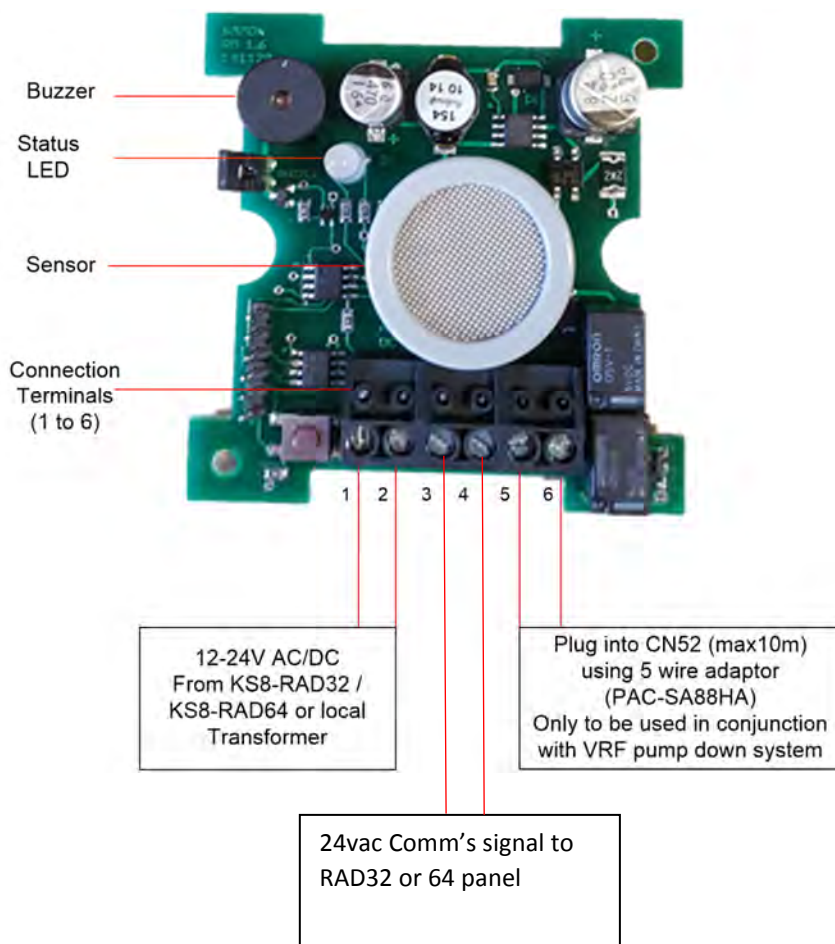
Mount the sensor unit as close as practical from the floor or ground (150mm - 250mm), preferably directly beneath the air conditioning unit.

The sensor unit should be installed in a location where it is easily accessible for repairs.

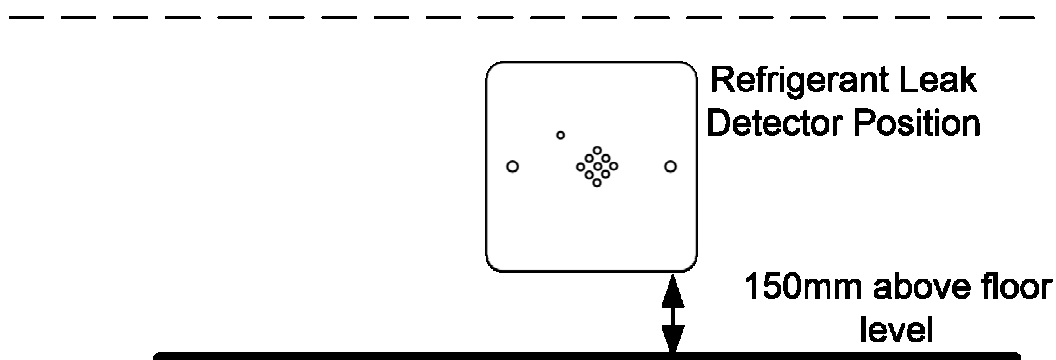
Mount the sensor unit in a position that minimises the risk of mechanical damage.

## Installation Instructions (KSGD-01W/S-A)

Use the supplied 5-wire adapter (PAC-SA88HA) to wire detector to fan coil unit, if operated with VRF pump down system.



### Positioning Guide



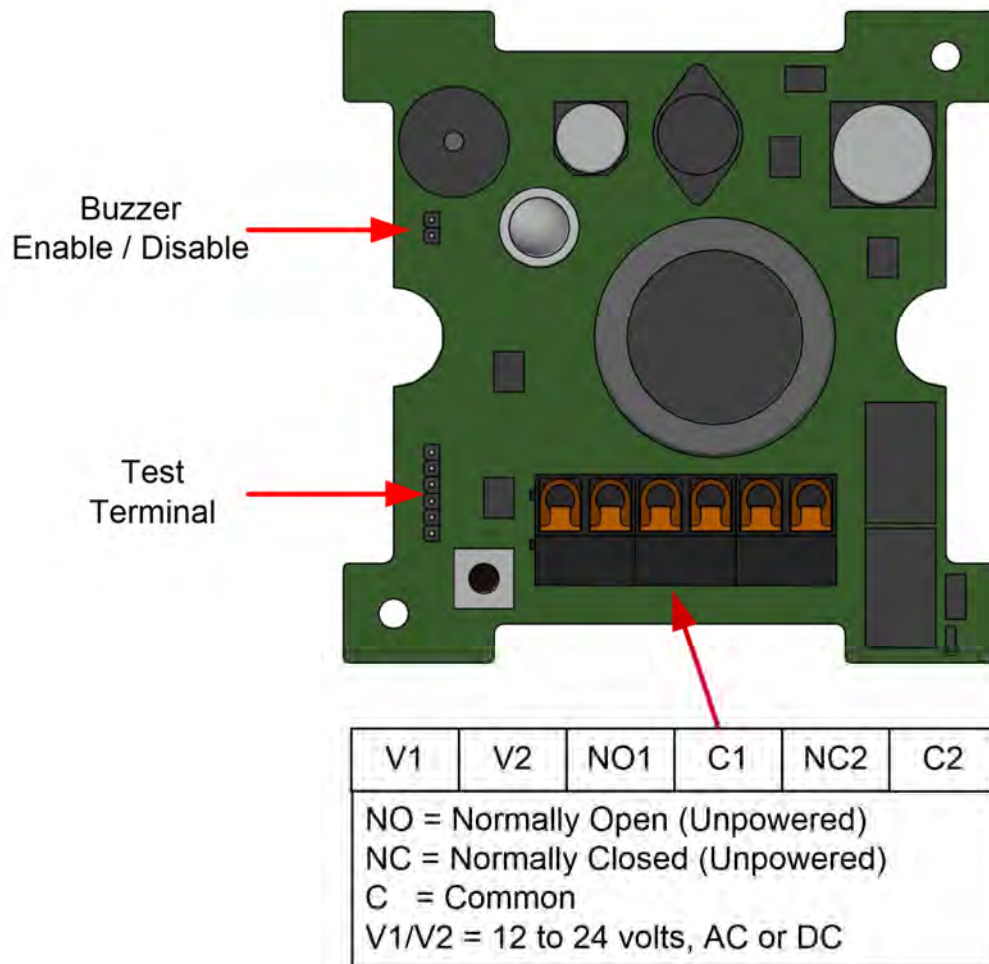
Mount the sensor unit as close as practical from the floor or ground (150mm - 250mm), preferably directly beneath the air conditioning unit.

The sensor unit should be installed in a location where it is easily accessible for repairs.

Mount the sensor unit in a position that minimises the risk of mechanical damage.

## Installation Instructions

### Fault Contact Rated load



<b>Load:</b>	Resistive load ( $\cos\phi = 1$ )
<b>Rated Load:</b>	0.5 A at 125 VAC; 1 A at 24 VDC
<b>Contact Material:</b>	Ag (Au alloy)
<b>Rated Carry Current:</b>	2 A
<b>Max. switching voltage:</b>	125 VAC, 60 VDC
<b>Max. switching current:</b>	1 A
<b>Max. switching power:</b>	62.5 VA, 30 W

## Operation

When the power supply is applied, a green LED will flash to indicate power “ON.” After approximately 5 minutes, the green LED will be illuminated permanently and the detector is operational. At alarm the LED will flash red/amber, the buzzer will start and the relay will change status. In case of sensor fault, the LED will flash red with an amber pulse, the relay will change status, and the buzzer will give a sound every minute.

## Technical Specification

Housing	White plastic (KSGD-01W)	or	Silver Facia (KSGD-01S)
Power	12-24V AC/DC		12-24V AC/DC
Visual indication	3-coloured LED		3-coloured LED
Output	Relay 125VAC, 15VA		Relay 125VAC, 15VA
Buzzer	85 dB 2300Hz (+/-300Hz)		85 dB 2300Hz (+/-300Hz)
Screw Terminal Connections	Terminal 5 x 2.5mm		Terminal 5 x 2.5mm
Size	85 x 85 x 32 mm		86 x 86 x 50 mm
Weight	85 grams		160 grams
Power consumption	Max 2.5VA, normal 1VA		Max 2.5VA, normal 1VA

## Operation Matrix

Status	Relay contacts	LED	Buzzer
Power Supply 12/24V AC/DC	1 & 2	Constant Green	Off
Power off	4 & 5 Closed	Off	Off
Warm-up (5 minutes)	3 & 4 Closed	Green/Red (1 Hz) Flashing	Off
Normal operation	3 & 4 Closed	Constant Green	Off
Sensor fault	4 & 5 Closed	Flashing red (1 Hz) + one (1) Amber flash per minute	Pulses 1/minute
Indications and alarms as gas concentrations increase:			
B) $\geq 1000\text{ppm}$ & $> 2$ seconds & $< 30$ minutes	3 & 4 Closed	Flashing Red (2 Hz)	Off
B) $\geq 1000\text{ppm}$ & $> 30$ minutes	4 & 5 Closed	Flashing Red/Amber (2 Hz)	Pulses (2 Hz)
A) $\geq 4000\text{ppm}$ & $> 30$ seconds	4 & 5 Closed	Flashing Red/Amber (4 Hz)	Pulses (4 Hz)
Auto Reset			
After 60 seconds delay	3 & 4 Closed	Constant Green	Off

Note: Normal operating Conditions: Activation of the semi-conductor sensor will occur after 5 minutes. The Green light will be constant.

Terminals 4 and 5 will remain open until alarm activation (refrigerant leak detected fault closed red light and Buzzer sounding).

Instructions for :-

## KSIR-01 Infra-Red Standalone Refrigeration Gas Detector

For safe and correct use please read the installation manuals supplied with the equipment.

## KSIR-01 Installation

The KSIR-01 HFC Sensor is designed to be installed in a vertical position with the side louvres at the top. The sensor should be sited in a position out of direct sunlight and in an area not subject to washing with jets of water.

To ensure continued reliable operation of the KSIR-01 HFC Sensor, the following installation guidelines should be observed:

### CAUTION

The calibration of the sensor may be affected by excessive direct sunlight. If it is necessary to install the sensor unit in a sunlit area, provide an adequate sunshade for the sensor unit.

**The IR sensing element (Figure 1 below) must not be tampered with or removed from the enclosure. Precautions should be taken to ensure that debris, dust and dirt does not enter the IR sensing element.**

Mount the sensor unit in a position that minimizes the risk of mechanical damage.

Care should be taken not to install sensors near devices that may emit electrical interference.

### MECHANICAL INSTALLATION

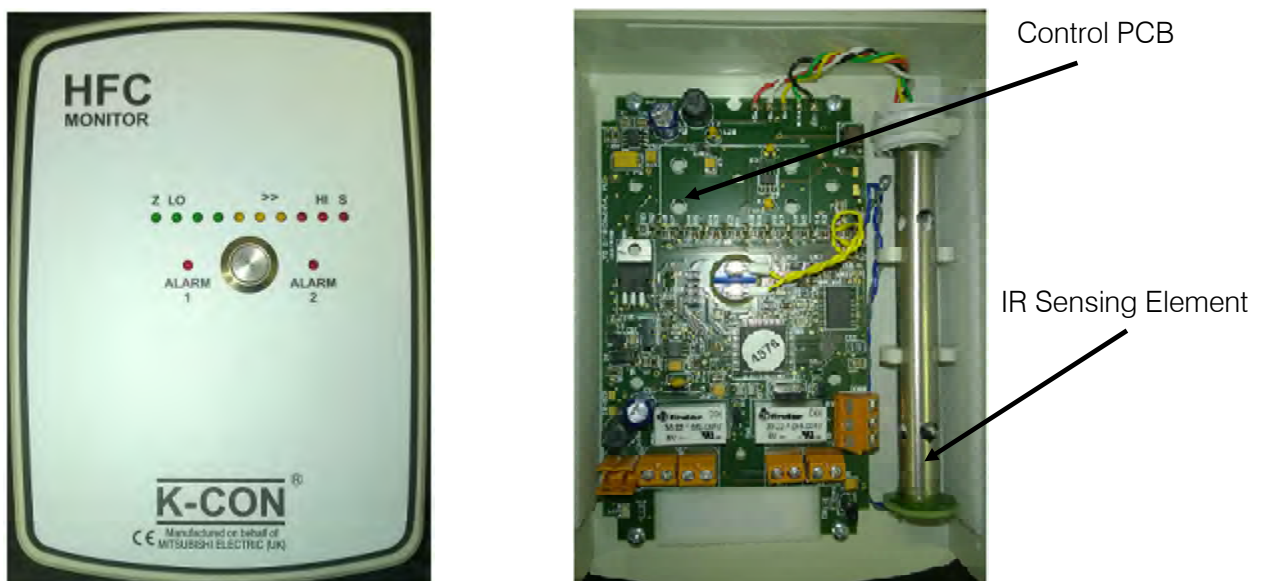
The enclosure is provided with four 4mm predrilled holes for mounting on a wall etc. It is important that screws used for mounting the enclosure should not be tightened excessively thus damaging the enclosure. The case dimensions and the hole positions are given in Figure 2.

Access to the inside of the enclosure is gained by removing the 4 screws at the edges of the enclosure, carefully removing the lid. Protect the exposed printed circuit board components during installation. The inside of the case is shown in Figure 1 and 3.

Mount the sensor unit as close as practical from the floor or ground (150mm - 250mm), preferably directly beneath the air conditioning unit.

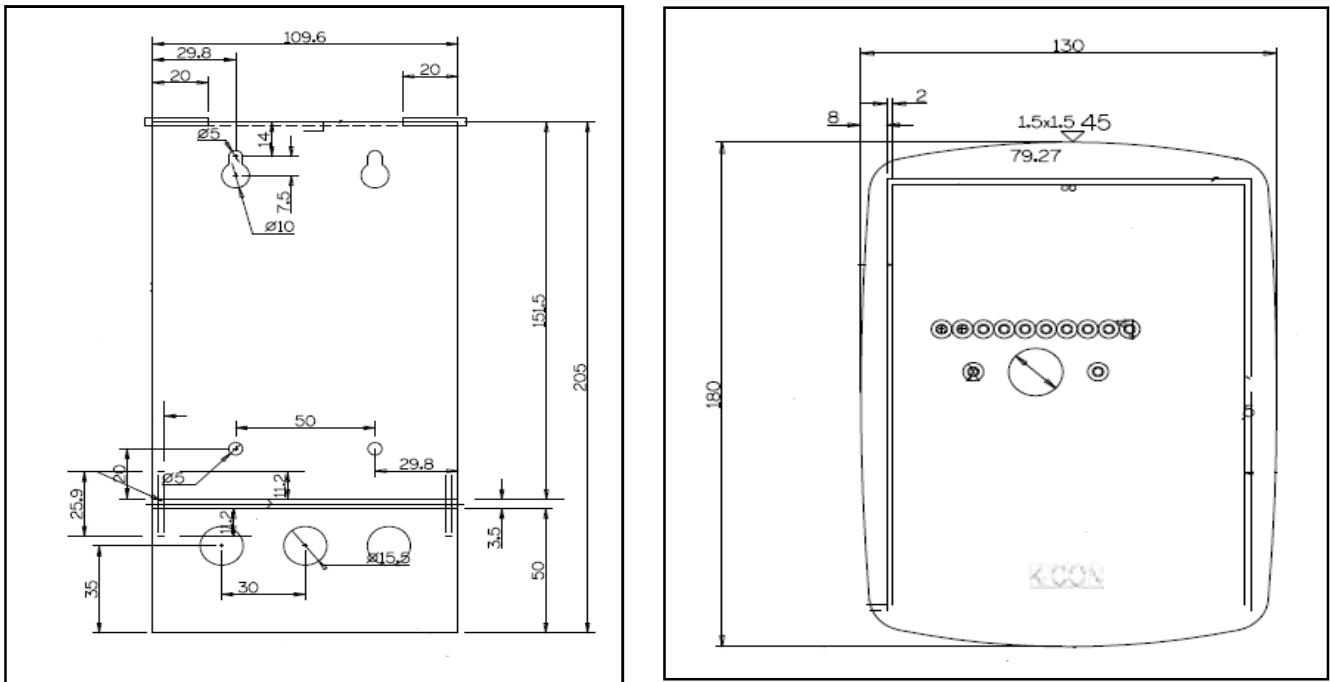
The sensor unit should be installed in a location where it is easily accessible for repairs.

Figure 1:-



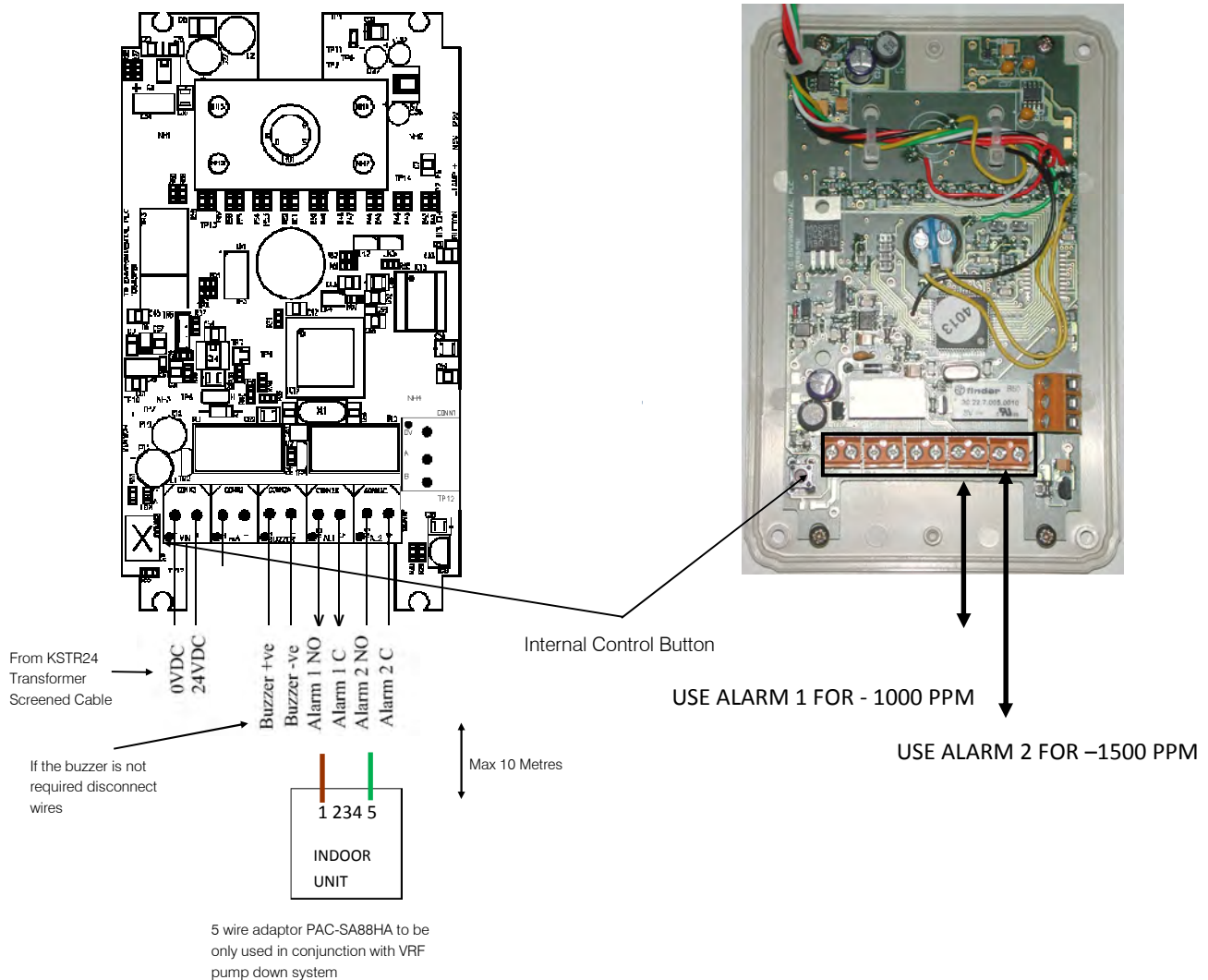
# KSIR-01 Installation

### Figure 2 – Showing the Case Dimensions



## ELECTRICAL INSTALLATION

### Figure 3:- Electrical Connections





## KSIR-01 Installation

**Table 1:- Electrical Connections**

Connection	Function	
CONN 3 V IN -	Power 0v	Screened cable must be used
CONN 3 V IN +	Power +9 to +24 v DC	
CONN 2A BUZZER +	Connection for external buzzer	
CONN 2A BUZZER -	Connection for external buzzer	
CONN 2B AL1 NO	Volt free alarm contact (AL1) (1000ppm R410A)	
CONN 2B AL1 C	Volt free alarm contact (AL1)	
CONN 2C AL2 NO	Volt free alarm contact (AL2) (1500 ppm R410A)	
CONN 2C AL2 C	Volt free alarm contact (AL2)	

### Notes:-

The buzzer can be disconnected by removing connections CONN 2A + & 2A-.

### Connection & Terminal Functions.

Figure 3 & Table 1 show the electrical connections. Electrical cable entry to the enclosure should be through the bottom of the enclosure.

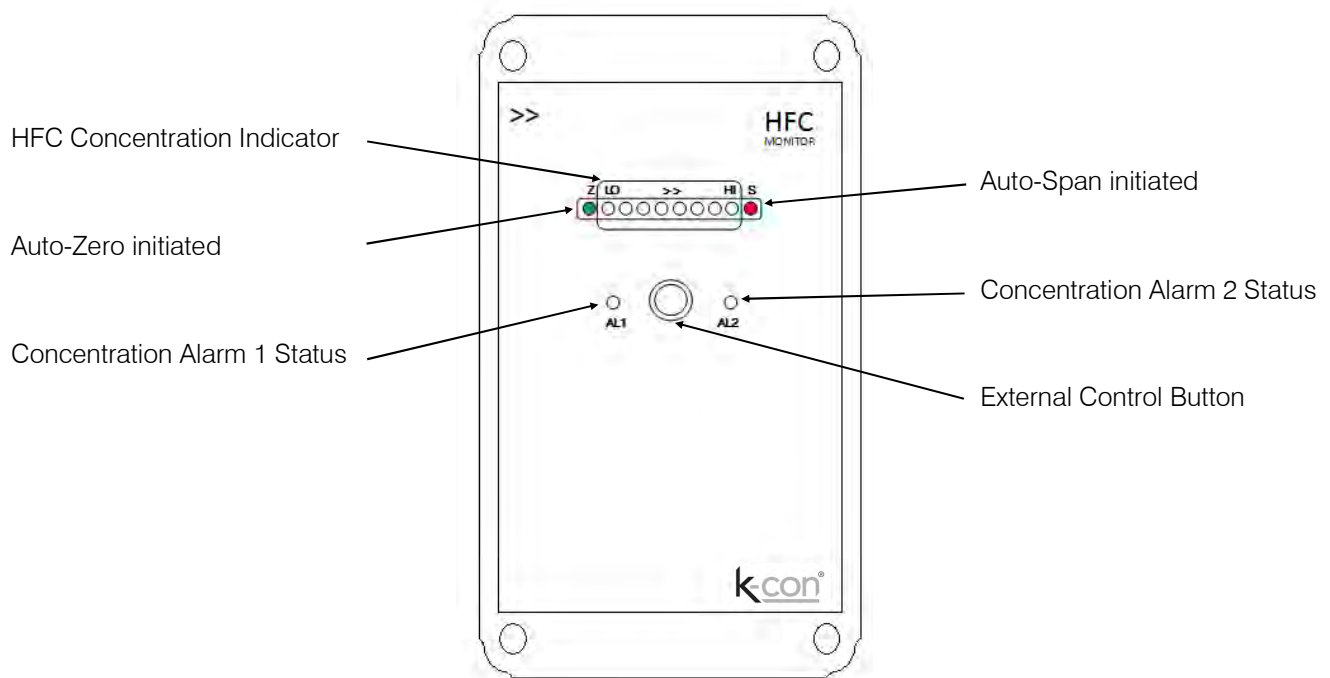
Predrilled holes for cable glands are NOT provided. It is recommended that PG7 type glands be used; the number required being determined by the application.

Two holes are provided in the bottom of the enclosure. These are drain and vent holes and should not be obstructed.

After wiring the lid with sensor assembly shall be screwed back onto the enclosure ready for commissioning.

## KSIR-01 Installation

Figure 4:- Front Panel Functions



Please refer to Figure 4 for the position of LEDs and button.

The HFC concentration is displayed visually on the **"HFC Concentration Indicator"**. Lower HFC concentrations are displayed by the green LEDs at the left of the display (marked "LO") and the highest on the red LEDs at the right of the display (marked "HI"). As the concentration of Freon increases the number of LEDs illuminated will increase from left to right (8 in total). All 8 LEDs will illuminate when the concentration reaches and exceeds the range of the **KSIR-01**.

The red LEDs marked **"Concentration Alarm 1 (AL1)"** and **"Concentration Alarm 2 (AL2)"** will illuminate when the Freon concentration exceeds the set point value. At the same time the alarm relays (if fitted) will actuate and the associated contacts for buzzer and alarms will change state. The set points for the alarms and latch facility are factory set only.

### STARTUP

Ensure the voltage applied to the PCB is between 12 and 24Vdc.

On application of power, the LEDs associated with the **"HFC Concentration Indicator"** will flash in sequence for a few seconds and the sensor will commence its warm up procedure. This is indicated by the flashing of the green **"Auto-Zero initiated"** LED. The sensor will steady after five minutes, but allow approximately one hour to settle to ambient temperature.

At the end of the warm up period (5 minutes) the **"HFC Concentration Indicator"** will be "steady".

The zero point (0ppm HFC) will have been established in the factory using nitrogen or HFC free air. In its intended application the **KSIR-01 HFC Sensor** may have its zero point set using air thus eliminating any offset due to the natural presence of HFC's in the atmosphere. Please refer to Auto-Zero Initiation overleaf.

## KSIR-01 Installation

### OPERATION

#### Internal & External Control Buttons

These buttons may be used to initiate Auto-Zero, Auto-Span and cancel any latched concentration alarms.

The “**Internal Control Button**” (see Figure 1 for location) will perform all the above functions. However, the “**External Control Button**” will only allow any concentration alarms to be reset unless fully activated at the factory. All alarms are factory set to be non latching.

The functions of the Control Buttons are activated as follows:-

Press the “**Internal Control Button**” (see Fig3) then release the button when the required sequence of LED's are lit. This will colour sequence the “**HFC Concentration Indicator**”. (DO NOT RELEASE ON YELLOW STATUS)

The “**HFC Concentration Indicator**” will continue to sequence its colours whilst the button remains pressed.

The sequence of colours on the display is as follows:-

All LEDs on the “**HFC Concentration Indicator**” illuminated. The **KSIR-01 Freon Sensor** will return to normal operation, no action will have been initiated.

All 3 **RED** LEDs illuminated. This will cancel all latched concentration alarms. NB the alarms will immediately be reactivated if the HFC concentration is above its alarm set point after cancellation.

All 3 **GREEN** LEDs illuminated. This will start the Auto Zero procedure. The green LED marked “Z” will illuminate during this automatic procedure. This will not operate or show if the “External Control Button” is pressed.

All 3 **YELLOW** LEDs illuminated. DO NOT RELEASE THE INTERNAL BUTTON WHEN ALL 3 LED's ARE LIT. This is a function that should only be carried out by a qualified engineer, please contact Mitsubishi Electric if this action is accidentally achieved.

#### Auto-Zero

This function will set the output to 0ppm HFC (0% HFC), 4.0 mA based upon the concentration of HFC inside the enclosure. If a true zero-point at 0ppm HFC is required instead of the HFC concentration inside the enclosure then nitrogen gas should be used to fill the enclosure.

## KSIR-01 Installation

### ROUTINE MAINTENANCE

The design of the sensor unit is such that no adjustment or calibration should be necessary for extended periods of 2 years or longer. However, it is recommended that a system function check is performed more frequently at 3 to 6 monthly intervals depending on the application and local ambient conditions.

To perform this task, simply allow a small amount of test gas (acetone) to be released around the perimeter of the sensor (please ensure front cover is fitted and ensure that the sensor alarms are activated. Then cancel the alarms using the front button (if the sensor is not latched).

Use the internal control button on the PCB board if you have a latched sensor. Press the button on the internal board until all 3 red LED lights are illuminated and release, this will cancel any latched alarms.

Please note; that during this procedure, if there is still a presence of gas in the air, then the LED display and alarms will again be activated.

The sensor should return to a single green LED being lit once the presence of the test gas has been cleared. Routine Maintenance complete.

If the unit ever becomes defective then it is necessary to refer the unit to Mitsubishi Electric UK.

Please note there are no User Serviceable parts on the **KSIR-01 HFC Sensor**.

### WARRANTY

When the **KSIR-01 HFC Sensor** is operated in accordance with conditions described in this Manual the **Standard Warranty is 12 months from the date of purchase.**

### SPARES

There are no spare parts associated with the **KSIR-01 HFC Sensor**

Instructions for :-

KS8-IR8/16C & 32C Infra-Red Aspirated Refrigerant Gas Detector

For safe and correct use please read this installation manual.

## Installation Instructions

### System Overview

The KS8-IR8/16C & 32C panel is the heart of the refrigerant leak detection system where the air is analysed and the results are displayed. A pump located within the KS8-IR8/16C & 32C panel sequentially samples air from each of the channels on a continuous basis. Small bore sampling pipe work is installed between the KS8-IR8/16C & 32C panel and the potential refrigerant leak source to deliver the air for analysis. An inline filter is fitted to each sampling pipe immediately prior to the KS8-IR8/16C & 32C panel to provide additional protection to the analyser from dirt or grit which may impede the operation of the system. To provide additional sampling locations in close proximity to the potential leak source the sampling pipe work can be split up to 2 ways using manifolds.

Once the installation is complete it is essential the system is commissioned by a suitably qualified technician. Errors or problems with the installation can be identified during the commissioning process. A system which has been incorrectly installed or not commissioned properly may NOT detect leaking refrigerant and hence this process is paramount to the operation and effectiveness of the equipment.

### Locating the KS8-IR8/16C & 32C Enclosure

The main considerations when deciding where to locate the KS8-IR8/16C & 32C panel are:-

- Locate centrally to minimise sample tube lengths.
- Availability of 230 volt power supply, interface to communication networks and alarm indication equipment.
- Ambient conditions. RH<95%; Temperature range 5 to 50 Deg. C.
- Close to maintenance staff or management for monitoring purposes.
- Easy access for viewing and acknowledging alarms.
- Easy access for service and maintenance.
- Outside of potentially contaminated area.
- Potential damage.
- Operational noise.

Although the sampling tubes can be run up to 100 metres per channel it is advisable to maintain lengths to a minimum to reduce pressure drops and allow sampling times to be minimised.

The KS8-IR8/16C & 32C panel requires a Single phase 230 volt, 50Hz, 1 amp power supply, which should be suitably protected and have local isolation.

Maintenance is required periodically so suitable access for technicians to conduct the work without obstructing others should be given consideration.

We advise that the KS8-IR8/16C & 32C panel should NOT be installed in locations where potential leaks may occur as interrogation of the equipment would only be possible by entering the contaminated area.

The panel should be mounted with the display at eye level for ease of use when viewing data or alarms.

Suitable mechanical protection may be required around the KS8-IR8/16C & 32C panel to prevent accidental damage if installed in working areas.

The pump inside the KS8-IR8/16C & 32C panel operates continuously and due to the mechanical noise the panel should not be installed in quiet office areas where it may become a nuisance.

## Installation Instructions

### Choosing End of Line Positions

The principle considerations when deciding where to monitor for potential leak sources are:-

1. Highest potential for refrigerant leaks.
2. Restricted areas where leaking refrigerant may accumulate.
3. Working areas where leaking refrigerant can potentially exceed health and safety limits.
4. Density of gas being monitored.
5. Air flow around sampling location and possible collection point.

For general monitoring sample points should be at low level below the air conditioning unit approximately 150mm - 250mm above floor level is a good starting point as this would normally keep the filters out of harm.

Restricted spaces and working areas should be monitored if the Health and Safety limits could potentially be exceeded if all the refrigerant in the system escaped into the space.

The exact location of the sampling point is essential once the area to be monitored has been determined, as an incorrectly positioned end of sampling line may cause a delay in sensing a leak or may result in the KS8-IR8/16C & 32C panel sucking back liquids.

The density of the gas being monitored is an important factor in choosing positions; HFC refrigerants will fall towards the floor.

Extract fans, condenser fans, fan coil units and ventilation louvres will however, influence the situation and should be considered when selecting the sampling location.

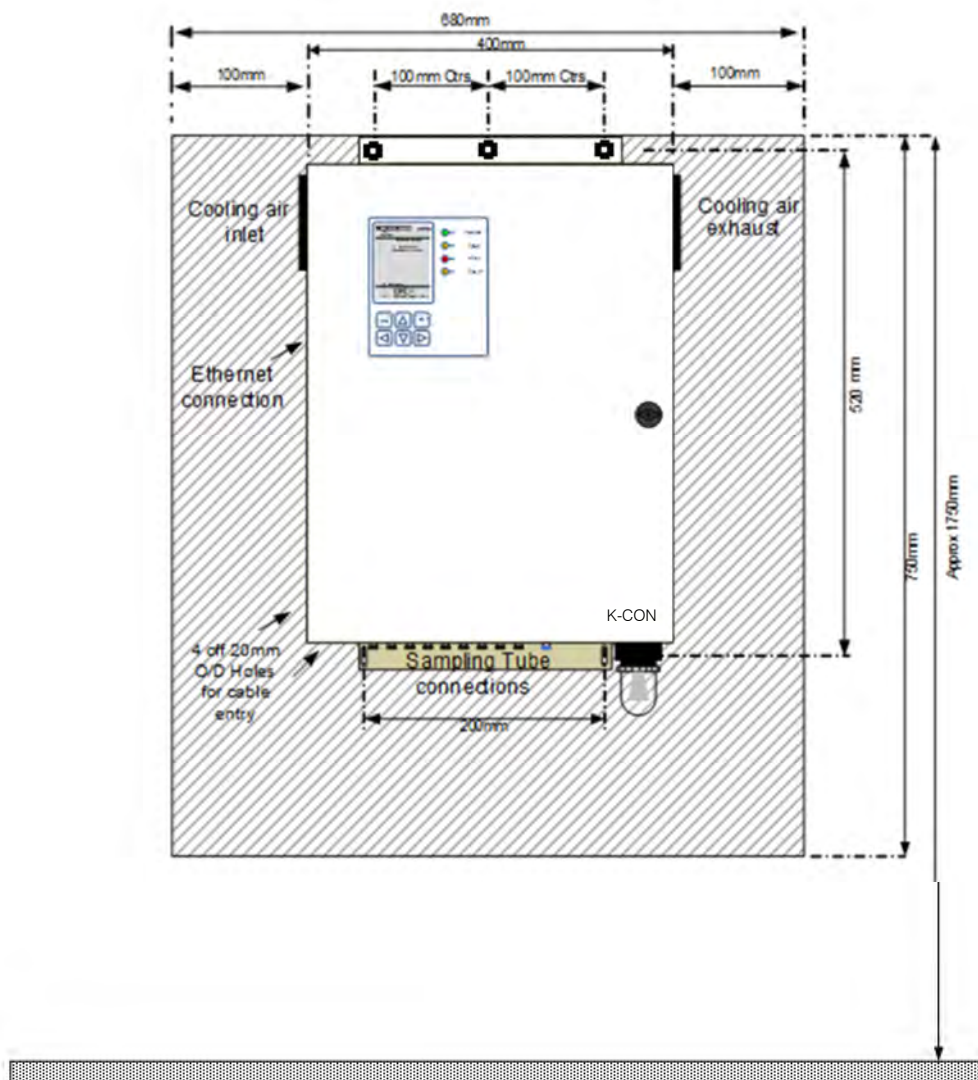
## Installation Instructions

### Equipment Installation

#### Locating the KS8-IR8/16C panel

The KS8-IR8/16C panel should be mounted vertically on a flat static surface with the display at eye height. Five of M6 or equivalent fixings should be used to secure the enclosure to the wall. Sufficient free space must surround the analyser to allow the electrical and pneumatic services to be installed together with cooling air and service/maintenance access. Fig 1 indicates a suitable arrangement. The sampling pipe work which connects to the bottom of the KS8-IR8/16C panel may be routed vertically up or down from the analyser so sufficient space should be allowed when deciding on the location. The KS8-IR8/16C panel should be located in a clean dry environment where the ambient conditions do not exceed the recommended limits.

Fig 1.



KS8-IR8 / 16C Installation Arrangement



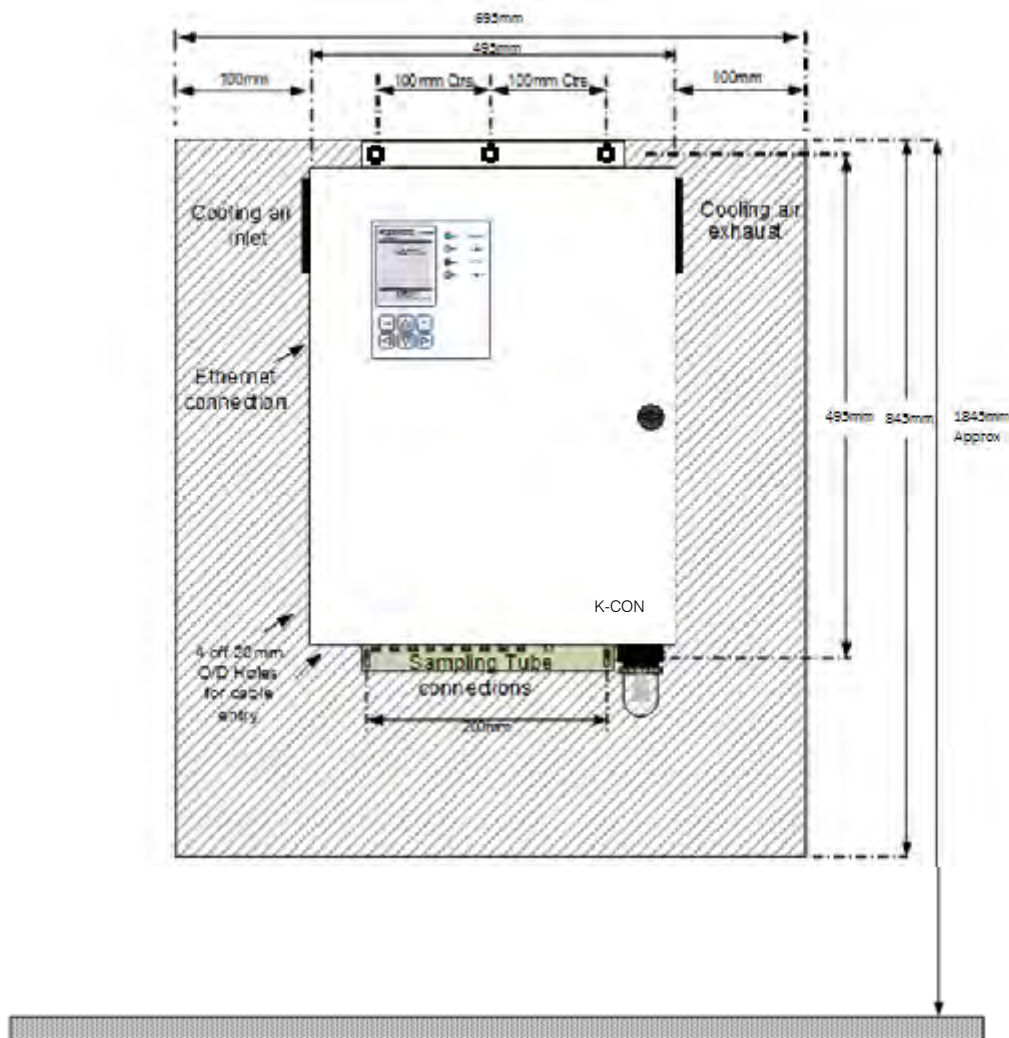
## Installation Instructions

### Equipment Installation

#### Locating the KS8-IR32C panel

The KS8-IR32C panel should be mounted vertically on a flat static surface with the display at eye height. Five of M6 or equivalent fixings should be used to secure the enclosure to the wall. Sufficient free space must surround the analyser to allow the electrical and pneumatic services to be installed together with cooling air and service/maintenance access. Fig 1 indicates a suitable arrangement. The sampling pipe work which connects to the bottom of the KS8-IR32C panel may be routed vertically up or down from the analyser so sufficient space should be allowed when deciding on the location. The KS8-IR32C panel should be located in a clean dry environment where the ambient conditions do not exceed the recommended limits.

Fig 1.



KS8-IR32C Installation Arrangement

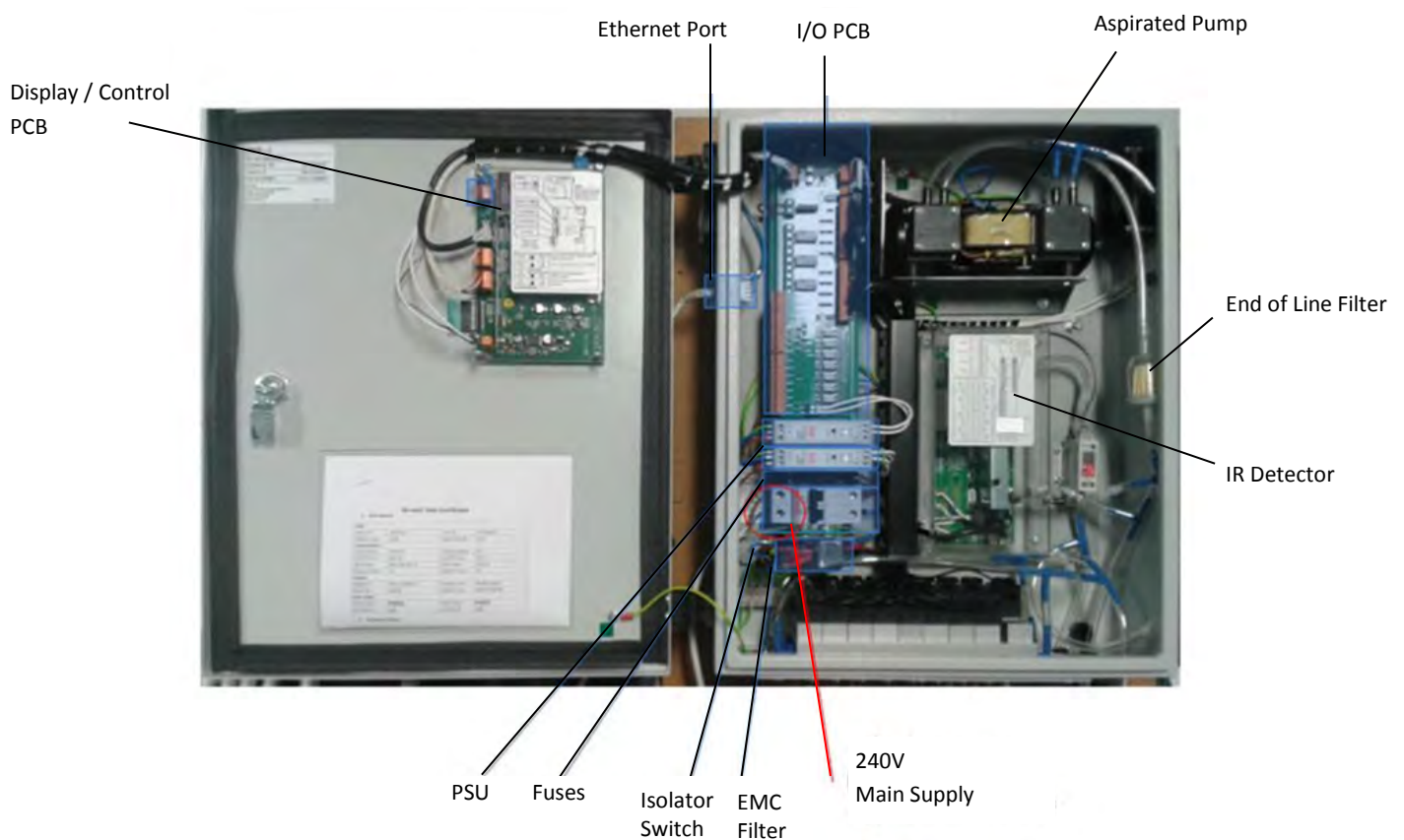
## Installation Instructions

### Electrical Connection

Four of 20mm Cable entry locations are located on the KS8-IR8/16C panel enclosure for power, communications and volt free alarm contacts. An Ethernet socket for connection to a PC or Local Area Network is located on the outside of the enclosure. The cutting of any additional holes into the enclosure will automatically invalidate the manufacturer's warranty. Fig.2 shows the panel wirings.

A 230 volt, 50Hz, single phase power supply rated at 1 amp is required to power the KS8-IR8/16C panel. The supply should be fused or suitably protected. Our preference is an un-switched fused spur located adjacent to the KS8-IR8/16C panel with a suitable method of remote electrical isolation.

Fig 2. **KS8-IR8/16C** Electrical Panel Wiring



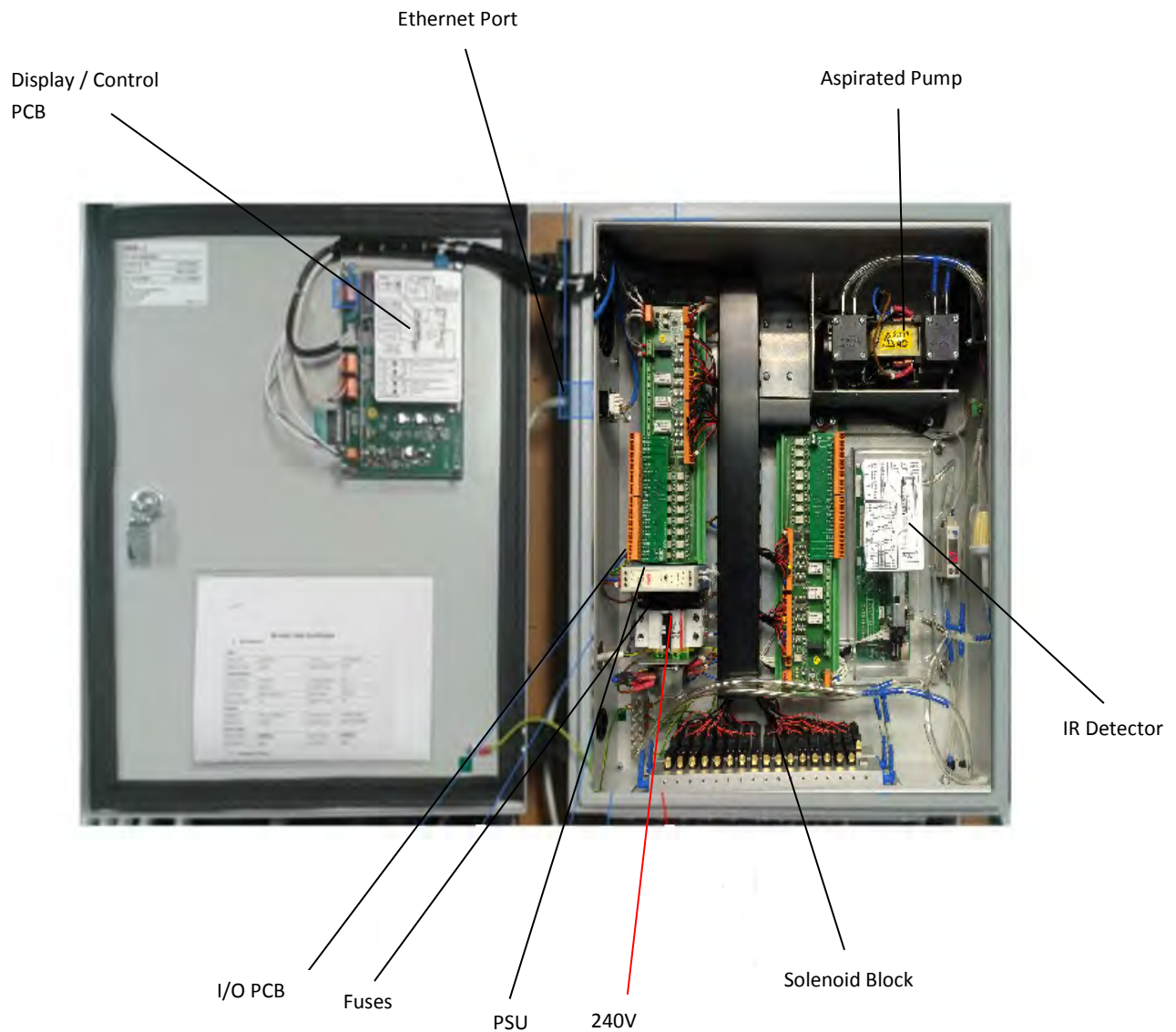
## Installation Instructions

### Electrical Connection

Four of 20mm Cable entry locations are located on the KS8-IR32C panel enclosure for power, communications and volt free alarm contacts. An Ethernet socket for connection to a PC or Local Area Network is located on the outside of the enclosure. The cutting of any additional holes into the enclosure will automatically invalidate the manufacturer's warranty. Fig.2 shows the panel wirings.

A 230 volt, 50Hz, single phase power supply rated at 1 amp is required to power the KS8-IR32C panel. The supply should be fused or suitably protected. Our preference is an un-switched fused spur located adjacent to the KS8-IR32C panel with a suitable method of remote electrical isolation.

Fig 2. **KS8-IR32C** Electrical Panel Wiring



## Installation Instructions

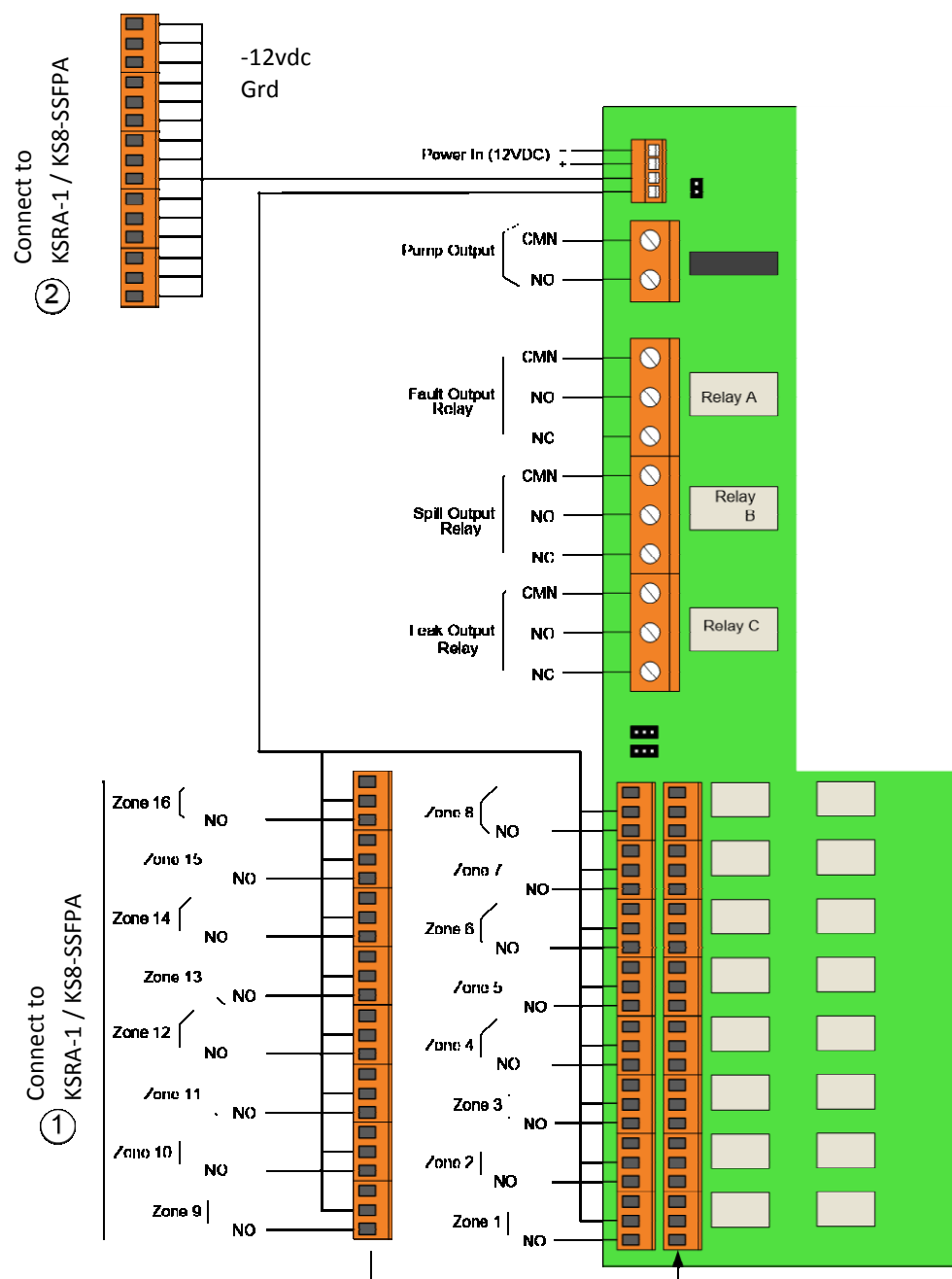
### I/O PCB Connection Terminals

The unit provides connection terminals for interfacing the unit with external equipment, and connecting to other devices within the unit. All connection terminals (with the exception of the RS485 interface) are located on the I/O PCB. Fig.3 shows the I/O PCB and volt free contacts points.

**IMPORTANT:** All cabling must enter the unit using the gland holes provided.

**Do not drill the enclosure – this will invalidate the unit warranty.**

Fig 3 - I/O PCB Connections



## Installation Instructions

### Sampling Tube

KS8-BST100	100M Drum - Black	10100218
KS8-BST250	250M Drum - Black	10100219

Black pipe work is provided to deliver the air from the potential leak source to the KS8-IR8/16C panel for analysis.

It is essential that the appropriate tool is used to cut the sampling pipe work. This provides a clean and square cut without any burr or swarf being produced. The tubing is 6mm O/D and manufactured from nylon. The recommended maximum sampling tube length from the KS8-IR8/16C & 32C panel to the sampling location is 100m.

The pipe work should be installed carefully with as long a radius bend as possible to reduce pressure drops. Care must be taken to ensure the tube is not kinked, burnt (from copper pipe brazing) or cut during the installation. The sampling pipe work should be adequately supported on cable tray, ladder rack, basket or inside trunking or conduit and secured as appropriate. The pipe work can be run alongside refrigeration pipe however it should NOT be laid on refrigeration pipe work where the surface temperature may fall below zero. Although insulation is fitted around suction pipes the joints are not always sealed adequately and ice can form which ultimately surrounds the sampling tube.

**Note:** - Any installation outside should be run in flexible conduct or similar to provide protection from UV degradation.

### Reference Fresh Air

During warm up and periodically during normal operation the KS8-IR8/16C/32C panel requires clean air to set a zero reference point.

An inlet port adjacent to the main sampling channels delivers the clean air when required. The reference clean air should ideally be sourced from outside the building or alternatively from a location where there is no opportunity for the gases being monitored to be sampled. An inline (KS8-IF) and end of line filter (KS8-EF) must be fitted to the clean air reference to protect the KS8-IR8/16C/32C panel and the sampling pipe work.

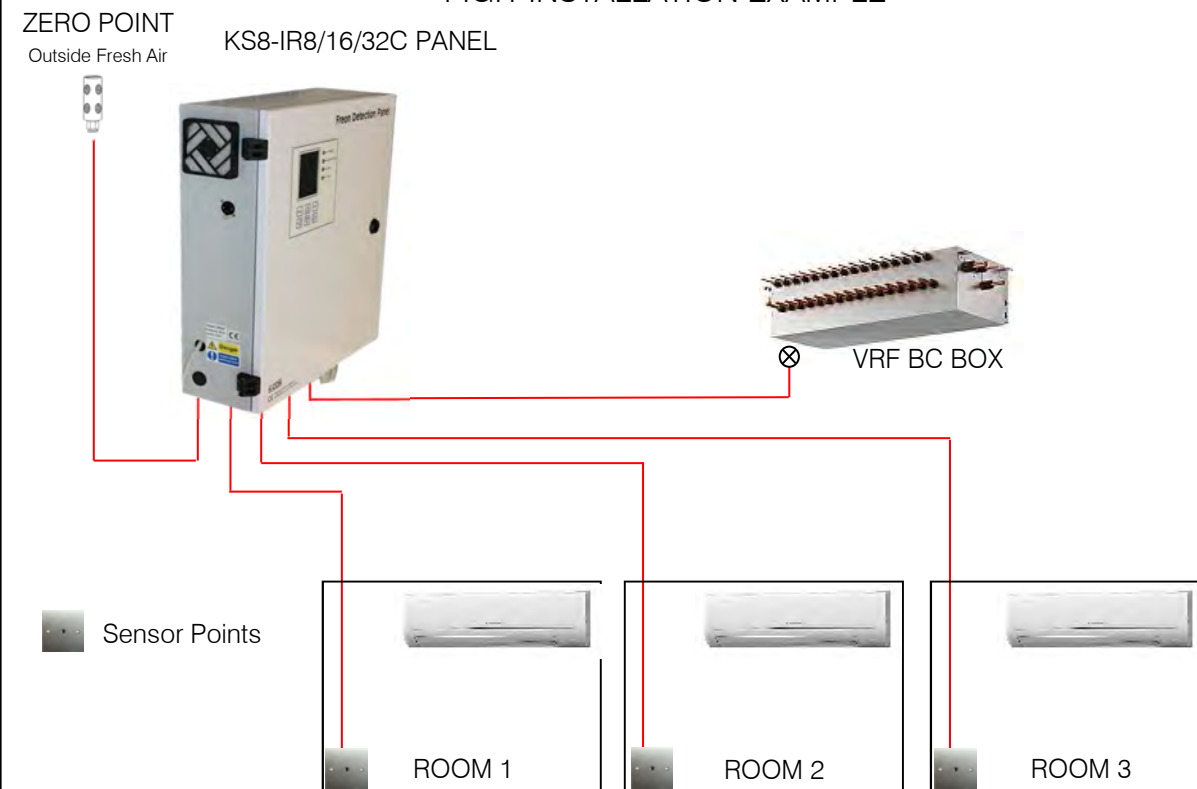
## Installation Instructions

### Sample Points

The leak detection system works by drawing samples of air into the control panel for analysis. Sample therefore should be taken from areas close to potential leaks or from areas where a build up of gas could occur. For general monitoring sample points should be at low level below the air conditioning unit approximately 150mm - 250mm above floor level is a good starting point as this would normally keep the filters out of harm.

Additional sample points can be added as required and could include branch controller boxes and fan coil units . However these could influence the situation and should be considered when selecting the sampling location.

FIG.1 INSTALLATION EXAMPLE



### Sample Lines

For general installations 6mm OD, 4mm ID nylon tubing is supplied (KS8-BST100/250). When routing sample lines, be aware that short runs will facilitate faster response times. If possible, sample lines should be run in one continuous length, as using pipe joining couplings will cause flow restrictions. ( In practice the cost of a single length of tubing is often less than the coupling. ) Avoid tight bends as this will kink nylon tubing causing blocked lines. Sharp corners on framework etc can also cut the sample lines over time, especially on vibrating machinery.

It is best to run pipework at head height or above where it is less likely to encounter mechanical damage, such as being cut or crushed by machinery. Be careful not to cause a hazard to personnel however by suspending pipework across open areas. Also avoid heat sources and hot pipework as this will melt nylon tubing. If a more mechanically resistant tubing is called for, small bore copper tubing can be used in these areas. Tubing should be clipped and tied to framework and walls at regular intervals, similar to cable installations. Avoid unsupported loops and sags that can cause damage to pipework and personnel.

## Installation Instructions

### Accessories

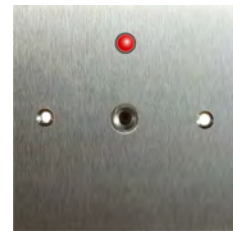
#### Sampling Pipe Fittings

All the sampling tube fittings have push fit connections for ease of use. Provided the sampling tube is cut correctly these fittings are very effective. To connect the sampling pipe to a fitting just push the tube into the fitting whilst holding the outside body of the fitting. To remove the sampling pipe work the outer collar requires depressing before pulling the tube. If the tube is pulled before depressing the outer collar the barbs on the fitting may imbed into the tube and make removal more difficult.

#### Face Plate

Part Number:      KS8-SSFP    10100222  
                          KS8-SSFPA   10100226

KS8-SSFP

KS8-SSFPA  
Complete with Alarm

The KS8-SSFP/A is an aesthetic stainless steel effect flush mounted plate. The sampling tube can be brought into the back of the plate horizontally or vertically.

Mount the face plate as close as practical from the floor or ground (150mm - 250mm), preferably directly beneath the air conditioning unit.

Please follow installation instructions contained within this manual.

#### Sampling Tube

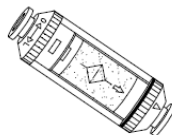
Part Numbers:      KS8-BST100   100 Metre Black      10100218  
                          KS8-BST250   250 Metre Black      10100219

Black sampling tube is available in 100M and 250M lengths.

Although the sampling tubes can be run up to 100 metres per channel it is advisable to maintain lengths to a minimum to reduce pressure drops and allow sampling times to be minimised.

#### Inline Filter

Part Number:      KS8-IF      10100221



The Inline Filter is fitted with a fine filtration element and is used to prevent the ingress of dust particles, etc. into the KS8-IR8/16/32C panel which can impair its operation. The inline filters are fitted in series with the main sampling pipe on each channel immediately prior to the inlet port on the KS8-IR8/16/32C panel. The filter element should be replaced when it becomes clogged or dirty. The warranty on the KS8-IR8/16/32C panel will be invalidated if inline filters are not fitted when the unit is in operation.

## Installation Instructions

### Accessories

#### End of Line Filter (Fresh Air)

Part Number: KS8-EF 10100223



The End of Line Filter is fitted at the end of the fresh air sampling pipe work. The filter is slightly coarser than the inline filter and is used to prevent the ingress of debris into the sampling pipe which may result in a blockage. The end of line filter has push fit connections and the procedure for inserting and removing the pipe work is the same as for the inline filters. The filter element should be replaced when it becomes clogged or dirty. End of line filter elements should be adequately supported so water, oil or any other liquids cannot be sucked into the pipe work.

#### Two Way Manifold



Part Number: KS8-ST2M 10100225

The 2 Way Manifold is a Y-piece that is used to split the sampling tube for a single channel into 2 ends to provide a local spread of sampling close to the required sampling location (i.e. to enable a single sampling channel to be used to measure two adjacent rooms. To ensure the air is equally sampled from each of the legs it is essential to maintain equal lengths. Excessive sampling pipe on one leg can be neatly coiled and tie wrapped. We recommend that the maximum distance between the manifold and the end of line filter does NOT EXCEED 5 METRES ON EACH LEG.

#### Straight Connector

Part number: KS8-STSC 10100224



The straight connector is used for joining 6mm O/D tube to 6mm O/D tube. It can be used for joining sampling pipe work to copper tube or simply to replace sections of pipe work if they become damaged. Joints should be avoided whenever possible as they can be a potential source of air ingress into the sampling pipe work.



Instructions for :-

## KSRA-1 Remote Alarm Panel

For safe and correct use please read this installation manual.

## Installation Instructions

### General

#### KSRA-1 Remote Alarm Panel

This product accepts a 12VDC input signal and can provide an output for pump down activation.



### Specification

Flush Mounting

Fits square single gang BS box

Protrudes 8mm from wall

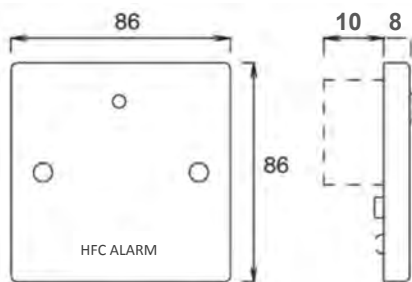
Buzzer 68dB at 1m

Enclosure Colour : White suitable for room mounting.

Type	Description	Supply	Operation	Consumption	Mounting
KSRA-1	1 Channel	12VDC	Light & Buzzer	70mA	Flush

### Dimensions

KSRA-1



### Wiring

Alarm condition is indicated by LED and buzzer switching on.

The LED and buzzer only switches off when the input returns to normal.

Terminals 0.5 - 1.5mm min signal cable size 7/0.2mm Max length 100m.

Screened cable is recommended. The screen should be earthed at controller end only.

Keep control signal wires away from power cables / units which may cause interference.

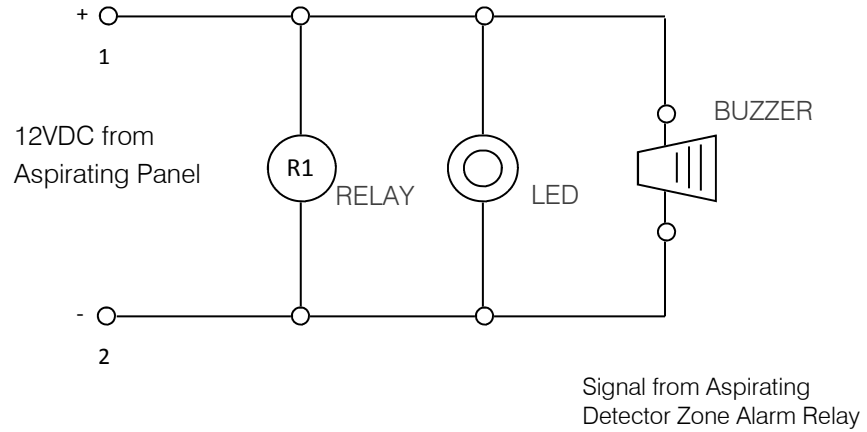
# Installation Instructions

## Remote Alarm Panel KSRA-1 Example Wiring Diagram

### KSRA-1

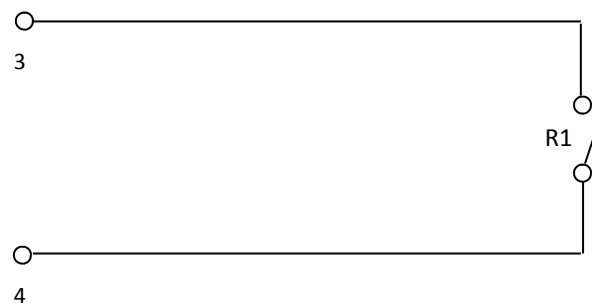
#### Alarm Indicator

12VDC



Connect pins 1 & 5 of 5 wire adaptor PAC-SA88HA not supplied  
Max extendable length 10M  
Connect to CN52 of indoor unit

5 wire adaptor to be only used in conjunction with VRF pump down system



Instructions for :-

KS8-SSFPA Face Plate with Alarm

For safe and correct use please read this installation manual.

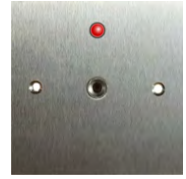
## Installation Instructions

### General

KS8-SSFPA aspirated HFC detector face plate with built in alarm buzzer and light. For use in conjunction with KS8-IR8/16C/32C Aspirated Panel.

This product accepts a 12VDC input signal and can provide an output for pump down activation.

The sampling tube can be brought into the back of the plate horizontally or vertically. Mount the face plate as close as practical from the floor or ground (150mm - 250mm), preferably directly beneath the air conditioning unit.



### Specification

Flush Mounting

Fits square single gang BS box 30mm internal depth required

Protrudes 1.5 mm from wall

Buzzer 68dB at 1m

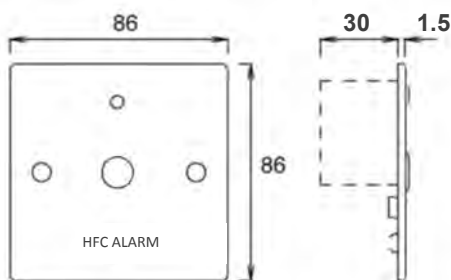
Enclosure Colour : Silver Stainless Steel.

86 x 86 x 31.5 mm

Type	Description	Supply	Operation	Consumption	Mounting
KS8-SSFPA	1 Channel	12VDC	Light & Buzzer	70mA	Flush

### Dimensions

KS8-SSFPA Face Plate with Alarm



### Wiring

Alarm condition is indicated by LED and buzzer switching on.

The LED and buzzer only switches off when the input returns to normal.

Terminals 0.5 - 1.5mm min signal cable size 7/0.2mm Max length 100m.

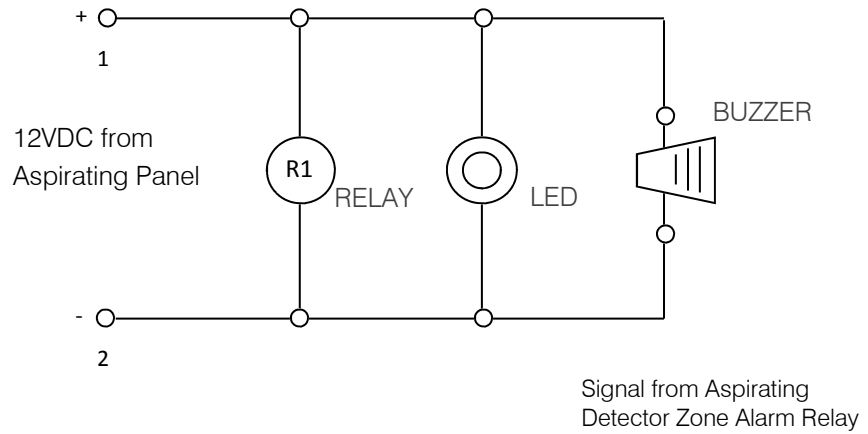
Screened cable is recommended. The screen should be earthed at controller end only.

Keep control signal wires away from power cables / units which may cause interference.

# Installation Instructions

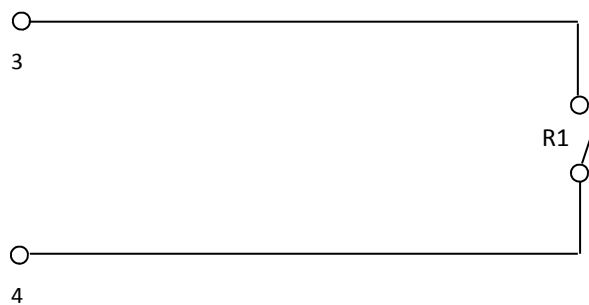
## Face Panel KS8-SSFPA Wiring Diagram

KS8-SSFPA Face Plate  
with alarm indicator and  
buzzer 12VDC



Connect pins 1 & 5 of 5 wire  
adaptor PAC-SA88HA not supplied  
Max extendable length 10M  
Connect to CN52 of indoor unit

5 wire adaptor to be only used in  
conjunction with VRF pump down system





## Installation Instructions

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NOTES:

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Please be sure to put the contact address/telephone number  
on this manual before handing it to the customer.

**mitsubishi** **ELECTRIC UK**

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