# AquiTron | AT-RLM2

Refrigerant Leak Monitor

## INSTALLATION INSTRUCTIONS

aquilar

leak detection solutions

# AT-RLM2
## Gas Sensing System

Please read these instructions carefully and keep them in a safe place (preferably close to the module) for future reference. These instructions must be followed carefully to ensure proper operation.

## A. GENERAL INFORMATION

The AT-RLM2 is the heart of the refrigerant leak detection system where the air is analysed and the results are displayed. A pump located within the AT-RLM2 sequentially samples air from each of the channels on a continuous basis.Small bore colour coded sampling pipe work is installed between the AT-RLM2 and the potential refrigerant leak source to deliver the air for analysis. End of line filters are fitted at the sampling location to prevent dirt or grit entering the pipe work and potentially causing a blockage. An inline filter is fitted to each sampling pipe immediately prior to the AT-RLM2 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 4 ways using manifolds. Aquilar Ltd offer a range of auxiliary interface panels which offer a comprehensive range of control and alarm outputs. Contact Aquilar Ltd for further details. 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.

## B. LOCATING THE AT-RLM2 ENCLOSURE

The main considerations when deciding where to locate the AT-RLM2 are:-

1. Locate centrally to minimise sample tube lengths.
2. Availability of 220 volt power supply, interface to communication networks and alarm indication equipment.
3. Ambient conditions. RH<95%; Temperature range 5 to 45 Deg C
4. Close to maintenance staff or management for monitoring purposes
5. Easy access for viewing and acknowledging alarms
6. Easy access for service and maintenance.
7. Outside of potentially contaminated area.
8. Potential damage
9. Operational noise

Although the sampling tubes can be run in excess of 150 metres per channel (Contact Aquilar Ltd to discuss during design stage) it is advisable to maintain lengths to a minimum to reduce pressure drops and allow sampling times to be minimised.

The AT-RLM2 requires a 220 volt, 50Hz, 0.5 amp power supply which should be suitably protected and have local isolation. Frequently the AT-RLM2 is interfaced to third party management systems via an RS485 serial network or an Ethernet network so access to these should be considered. Where remote alarm indication panels are to be installed there will be a requirement for installing interconnecting wiring. Corridors and main walkways are ideal locations as maintenance personnel and management can monitor the system and via the keypad and display interrogate the equipment when appropriate. Maintenance is required periodically so suitable access for technicians to conduct the work without obstructing others should be given consideration. We advise the AT-RLM2 is NOT installed in locations where potential leaks may occur as interrogation of the equipment would only be possible by entering the contaminated area. When monitoring potentially explosive gases such as ammonia it is essential that the AT-RLM2 is located in an ammonia free environment as

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the enclosure is not ATEX rated.
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 AT-RLM2 to prevent accidental damage if installed in working areas.The pump inside the AT-RLM2 operates continuously and due to the mechanical noise the panel should not be installed in quiet office areas where it may become a nuisance.

## C. 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 and with ammonia potentially cause an explosion
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

The main locations for monitoring for leaks are around equipment where the potential for leaks is greatest and/or where personnel safety may be compromised. Mechanical parts such as valves and compressors and parts undergoing compression and expansion through pressure or heat have a greater tendency to leak. Locations where leaking refrigerant may accumulate such as roof voids for ammonia or non ventilated plant rooms or basements for HCFC/HFC refrigerants and carbon dioxide should be monitored. Restricted spaces and working areas should be monitored if the Health and Safety limits could potentially be exceeded if the entire refrigerant in the system escaped into the space. Contact Aquilar Ltd for further advice.The exact location of the sampling point is essential once the area to be monitored has been determined as an incorrectly positioned end of line filter may cause a delay in sensing a leak or may result in the AT-RLM2 sucking back liquids. The density of the gas being monitored is an important factor in choosing filter positions; heavier than air gases (HCFC/HFC refrigerants and CO2) will fall towards the floor whilst lighter than air gases (Ammonia) will rise towards the ceiling. Extract fans, condenser fans, body cooling fans, evaporator fans and ventilation louvres will however influence the situation and should be considered when selecting the sampling location.When monitoring cold rooms operating below 0 Deg C special considerations should be given to avoid ice blockages at the end of line filter. Since the filter will be at a temperature below zero it is essential to ensure condensation does not form as a result of door openings or assisted defrost which slowly accumulates and eventually blocks the tube.

## D.EQUIPMENTINSTALLATION

### LOCATING THE AT-RLM2

The AT-RLM2 should be mounted vertically on a flat static surface with the display at eye height. Five off 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.

The diagram below indicates a suitable arrangement. The sampling pipe work which connects to the bottom of the AT-RLM2 may be routed vertically up or down from the analyser so sufficient space should be allowed when deciding on the location. The AT-RLM2 should be located in a clean dry environment where the ambient conditions do not exceed the recommended limits.

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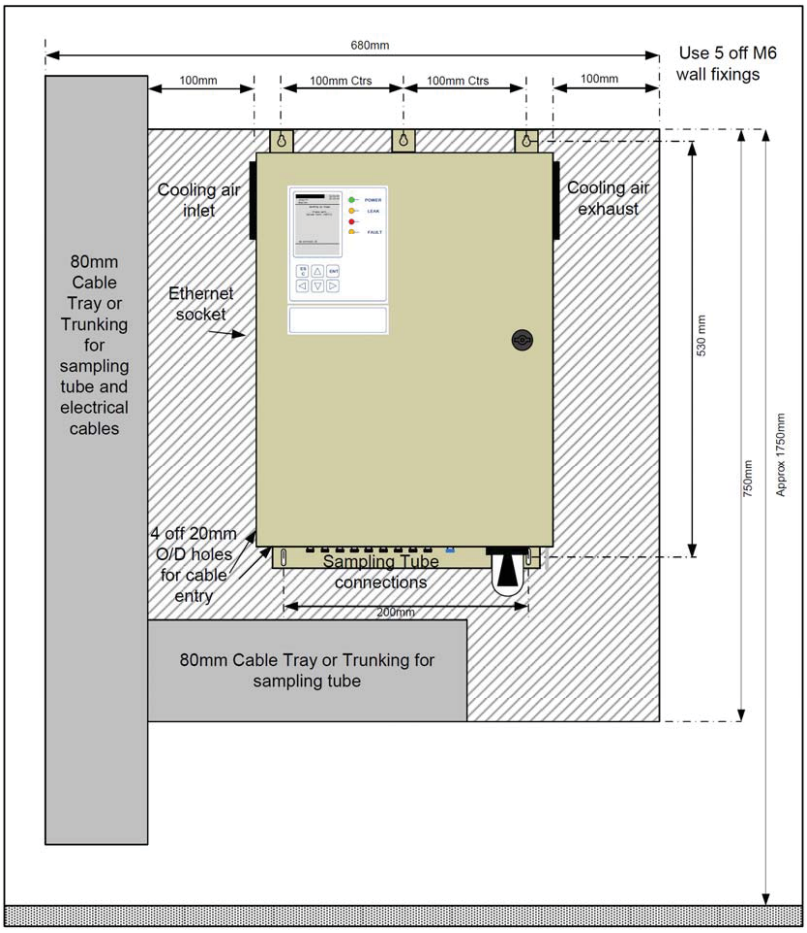
### ELECTRICAL CONNECTION

Four of 20mm Cable entry locations are located on the AT-RLM2 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.

A 230 volt, 50Hz, single phase power supply rated at 1 amp is required to power the AT-RLM2. The supply should be fused or suitably protected. Our preference is an un-switched fused spur located adjacent to the AT-RLM2 with a suitable method of remote electrical isolation.




### E. SAMPLING TUBE

Colours available -

- Dark Blue
- Dark Green
- Natural Red
- Dark Brown
- Orange
- Yellow Black
- Grey
- Light Green
- Light Blue
- Light
- Pink
- Violet
- Brown
- White (Reference Clean Air)

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Colour coded pipe work is provided to deliver the air from the potential leak source to the AT- RLM2 for analysis. The tubing is supplied in 17 different colours to make each channel easily identifiable. A different colour pipe should be used for each of the 16 channels together with white for the fresh air reference channel. A common colour should be installed for both the main run and the legs. Sampling pipe work is supplied in either 100m or 250m drums. 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 with a UV protector. The maximum sampling tube length from the AT- RLM2 to the sampling location is 150m. For longer distances contact Aquilar in advance of the installation. Some applications require specialist fire retardants and/or low smoke and fume (LSF) sampling pipe work. Contact Aquilar for any special requirements. 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 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. Where the sampling location is inside a cold room which operates below zero it is essential that the minimum length of pipe is inside the room and it is run vertically. Under no circumstances should sampling tube be installed horizontally in rooms operating below zero as moisture can condense and freeze with a resultant blockage. If the installation necessitates horizontal routes through low temperature rooms, trace heating will be required.

## F. REFERENCE FRESH AIR

During warm up and periodically during normal operation the AT-RLM2 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. If a guaranteed fresh air reference cannot be obtained specialist air scrubbers can be fitted to overcome the problem. The use of air scrubbers should be avoided wherever possible as they require periodic replacement as these filters have a limited life. Contact Aquilar for further details. An inline and end of line filter must be fitted to the clean air reference to protect the AT-RLM2 and the sampling pipe work.

## G. TUBE CUTTER

To ensure the sampling pipe is correctly cut we strongly recommend the correct tool is used. Stanley knives or similar blades do NOT cut the sampling pipe work cleanly and can result in swarf circulating around the system. We strongly recommend the appropriate tool is used which can be purchased from Aquilar or any pneumatic supplier.

## H. 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

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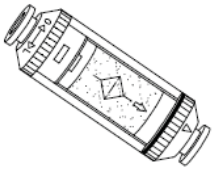
the outer collar requires depressing before pulling the tube. If the tube is pulled before depressing the outer collar the barbs on the fitting may imbed into the tube and make removal more difficult.

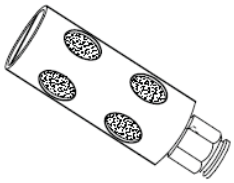
## I. INLINE FILTER

The Inline Filter is fitted with a fine filtration element and is used to prevent the ingress of dust particles, etc. into the IR-em2 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 AT-RLM2. The filter element should be replaced when it becomes clogged or dirty. The warranty on the AT-RLM2 will be invalidated if inline filters are not fitted when the unit is in operation.



## J. END OF LINE FILTER

The End of Line Filter is fitted at the end of the sampling pipe work at the sampling location. 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. When installing the end of line filter it is essential to consider whether the gas being detected is lighter (NH3) or heavier (HCFC's, HFC's, CO2) than air together with any air movement which may influence the path of any potential leak. End of line filter elements should be adequately supported so water, oil or any other liquids cannot be sucked into the pipe work.



## K. FILTER BRACKET

The filter bracket is a simple P clip which can be used to secure the end of line filter in position. The bracket can be secured by a single self tapping screw to any suitable material. The clip should secure around the tube fitting and not the main body which may impair airflow.

## L. TWO WAY MANIFOLD

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 (ie. to enable a single sampling channel to be used to measure from both the left hand and right hand side of a multi-compressor pack without using a second sampling channel). 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.

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## M. THREE WAY MANIFOLD

The 3 Way manifold is a 4 way manifold with one port closed off and is used to provide a further localised spread of sampling. All legs should sample air from around a common location. Legs should NOT be installed into different rooms as this may potentially cause confusion as the dilution of the air sample may result in leaks not being detected. It is essential that the distance between the manifold and the end of line filter on each leg does NOT exceed 5 metres and each leg is of equal length.

## N. FOUR WAY MANIFOLD

The 4 Way manifold is used when a further localised spread of sampling is required. As the air flow in each leg is reduced by a quarter we recommend these fittings are avoided wherever possible. Sampling pipe work should NEVER be split more than 4 ways. All legs should sample from a common location and each leg should be of equal length to balance air flows.

## O. VENT LINE FITTING

Two options are available for detecting potential refrigerant leaks in un-pressurised pipe work such as the exhaust from pressure relief valves and the choice depends on the pipe material. A 1/8" male BSP threaded fitting, Pt No 44-5100-3, is used for steel pipe work whilst we recommend a 1/4" O/D copper tail is fitted into copper pipes and connected with a straight connector (Pt No. 44- 5101) to the sampling pipe work. Connections into the vent line should NOT be into the underside to prevent the ingress of oil into the system. Ideally connections should be into the top half of the pipe.

## P. STRAIGHT CONNECTOR

The straight connector is used for joining 6mm O/D tube to 6mm O/D tube or 6mm O/D tube to 1/4" O/D tube. It can be used for joining our 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.

## Q. BULKHEAD FITTING

Where there is a requirement for the sampling tube to pass through a steel plate or bulkhead the bulkhead fitting can be employed. The Bulkhead fitting has 6mm O/D push fit connections for the tube with a central M14 threaded body with 2 off locking nuts.

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## R. 4.16 COLLECTOR

Collectors are typically used when detecting ammonia where the gas being detected is lighter than air. Collectors are typically positioned at working height above potential leak sources and trap pockets of air which may contain ammonia and funnel them into the sampling pipe work. End of line filters are fitted in the centre of the collector to protect the sampling pipe work. The collector can be secured to the underside of steel beams or hung from threaded rods as required.



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