

## QUALITAIR

### INSTALLATION MANUAL



### ICUS CONDENSING UNIT

**IF SUPPLIED AS A SYSTEM (ICC, QLC)  
PLEASE REFER TO INDOOR UNIT INSTALLATION MANUAL**

Eaton-Williams Ltd  
Oldfields Business Park, Birrell Street, Fenton, ST4 3ES  
Tel: +44 (0)1782 597124 Fax +44(0)1782 316633  
[www.eaton-williams.com](http://www.eaton-williams.com)

# ICUS CONDENSING UNIT INSTALLATION MANUAL

<b>CONTENTS</b>		<b>Page</b>
<b>1.</b>	<b>Installation &amp; Safety</b>	<b>3</b>
1.1	Installation	3
1.2	Handling	3
1.3	Application	3
1.4	Electrical connection	3
1.5	Warranty	3
1.6	Safety Procedures	3
<b>2.</b>	<b>Introduction to Units</b>	<b>4</b>
2.1	ICUS Outdoor Unit	4
2.2	Sizes & Weights	4
<b>3.</b>	<b>Location &amp; Mounting of Outdoor Unit</b>	<b>5</b>
3.1	Location	5
3.2	Fixing	5
3.3	Service Connection	5
3.4	Air Entry	5
<b>4.</b>	<b>Outdoor Unit Access</b>	<b>6</b>
4.1	Access Details / Fixings	6
<b>5.</b>	<b>General Service Connection</b>	<b>7</b>
<b>6.</b>	<b>Power &amp; Control Connections</b>	<b>8</b>
6.1	Wiring up the unit	9
6.2	Wiring Requirements	9
6.3	Terminations	9
6.4	Wiring Diagrams	9
<b>7.</b>	<b>Refrigerant Pipe Connections</b>	<b>10</b>
7.1	Expansion Device	11
7.2	Pipe Installation	10
7.3	Unit Connections	10
7.4	Insulation	10
7.5	Recommended Line Sizes	11
7.6	Example of Line Sizes	12
<b>8.</b>	<b>Refrigeration Commissioning</b>	<b>13</b>
8.1	Evacuation, Charging & Refrigerant Procedures	13
<b>9.</b>	<b>Disposal Procedures</b>	<b>16</b>
<b>10.</b>	<b>Final Checks</b>	<b>17</b>
	Wiring Diagrams	18
	C E Certificate	19

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 1. INSTALLATION & SAFETY

### 1.1 Installation

The units making up the Air Conditioning System must only be installed by a qualified engineer, following the mandatory and local codes of practice.

### 1.2 Handling

Care must be taken when the units are moved or lifted to ensure that everyone and everything is safe. When lifting equipment is used, it must be suitable and approved.

### 1.3 Application

Ensure that the unit is only used for suitable purpose/application.

### 1.4 Electrical connection

Electrical work and connections must only be made by authorised electricians, in accordance with mandatory regulations and local codes of practice.

### 1.5 Warranty

Failure to comply with the manufacturer's installation instructions could affect the performance of the unit and invalidate the warranty. Warranty is also subject to the implementation of a planned service/maintenance agreement as documented in the warranty booklet supplied with the unit.

### 1.6 Safety Procedure

#### General

1. All works must be carried out in accordance with the manufacturer's installation and operating procedures.
  2. Good working practices must be followed at all times so that Mechanical and Electrical hazards are kept to a minimum.
  3. The equipment has been fitted with doors and covers to prevent access during operation. These must be kept in place and additional guards fitted, if necessary.
  4. The equipment must be connected to an external electrical isolator if one is not supplied fitted to the unit.
  5. Servicing and maintenance must only be carried out by fully qualified and competent staff. Before any work is started, electrically isolate the units to make sure that they cannot be switched on accidentally and allow sufficient time for isolated parts to come to rest before removing panels. Electrical isolation switches must be labelled to show that they are OFF during servicing and maintenance operations.
- Note:** Some units are dormant in standby mode and can restart without warning if they are not electrically isolated.
6. Care must be taken not to touch components or pipework which may be extremely hot or cold, for a period after the unit is electrically isolated.
  7. After completing any tasks ensure all guards, covers and doors are correctly refitted before restoring the power supply to the unit.
  8. Air conditioning equipment may generate unacceptable noise levels. If noise levels are unacceptable sound and vibration attenuators may be required. For noise level guidance refer to technical literature, or contact the supplier for advice.

#### **SPECIAL NOTE**

IF ANYTHING IS NOT CLEAR, PLEASE CONTACT YOUR LOCAL SUPPLIER FOR CLARIFICATION.

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 2. INTRODUCTION TO UNITS

### 2.1 ICUS Outdoor Unit

The ICUS unit is a floor-standing condensing unit which can also be wall mounted using the ICUS Wall Bracket Option Kit. The unit is supplied complete with axial fan and guard, hermetic compressor, shut-off service valves, fan speed controller, low pressure switch, high pressure switch, start delay timer, winter start and an electrical section.

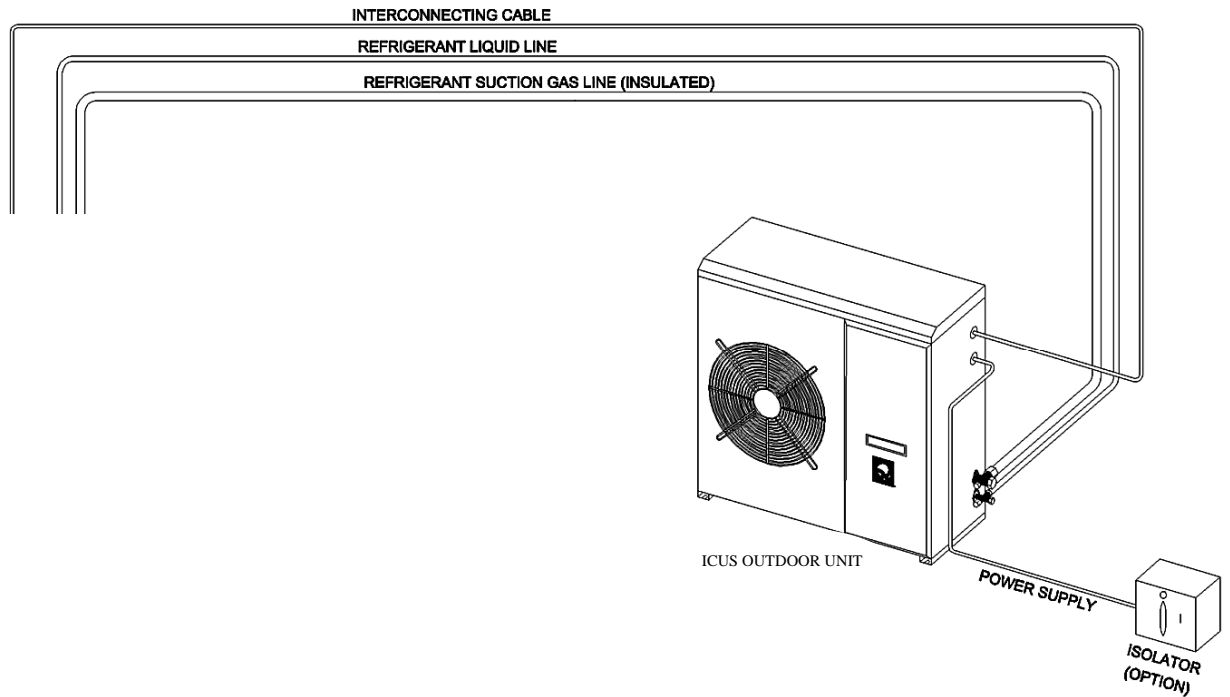


FIGURE 2.1

### 2.2 ICUS Sizes & Weights

	ICUS30	ICUS40	ICUS55	ICUS80
Width mm	720	720	800	800
Height mm	610	610	765	765
Depth mm	250	250	320	320
Weight kg	40	40	60	61

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 3. LOCATION & MOUNTING OF OUTDOOR UNIT (ICUS)

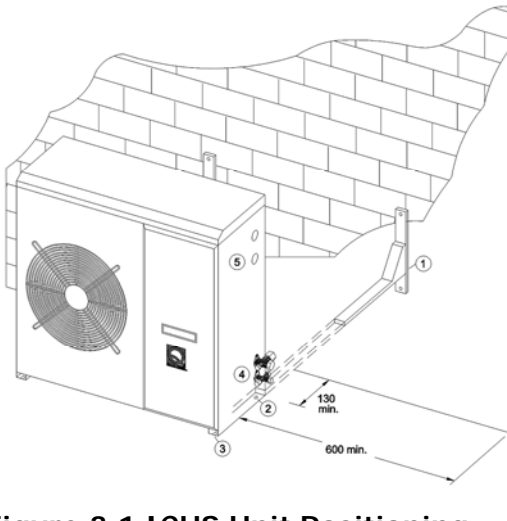


Figure 3.1 ICUS Unit Positioning

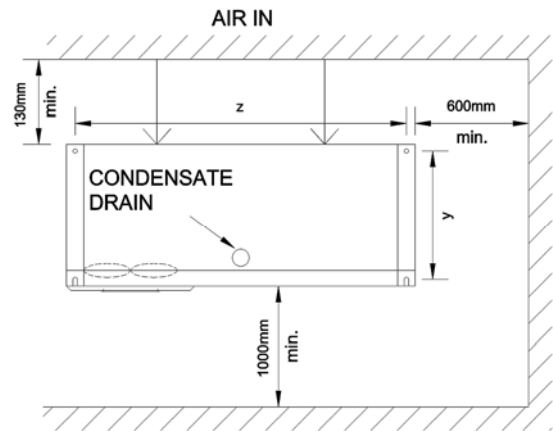


Figure 3.3 – ICUS Wall Bracket

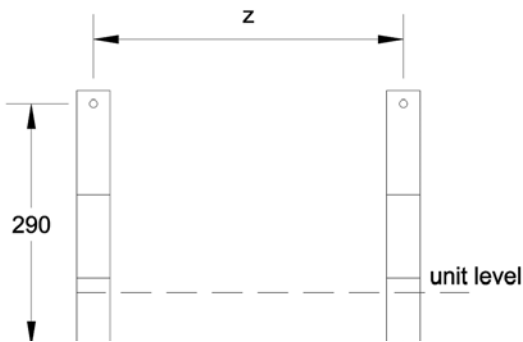


Figure 3.2 ICUS Unit Fixing

	ICUS30	ICUS40	ICUS55	ICUS80
Dim 'y'mm	220	220	290	290
Dim 'z'mm	670	670	750	750

### 3.1 Location

The unit can either be mounted on a level surface or suspended from a vertical wall using the wall mounting Optional kit (1). The unit should always be mounted on a load bearing wall and not a partition wall. Ensure there is sufficient free area around the unit as detailed in Figure 3.2.

### 3.2 Fixing

Two-off hole fixings (2) and two-off slot fixings (3) suitable for M10 fixings are provided in the base of the unit to secure the unit to a suitable plinth, or to the wall mount bracket kit. If required, the contractor should install the unit on anti-vibration pads.

### 3.3 Service Connections

The refrigerant pipe (4) and electrical connections (5) are located at the right hand end of the unit.

### 3.4 Air Entry

Ensure there is adequate air entry at the back of the unit as detailed in Figure 3.2 above.

#### **SPECIAL NOTE**

ENSURE CONDENSER HAS ADEQUATE CLEARANCE AROUND IT AND IS NOT AFFECTED BY NEIGHBOURING CONDENSING UNITS AND OTHER OBSTRUCTIONS.

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 4. OUTDOOR UNIT ACCESS (ICUS)

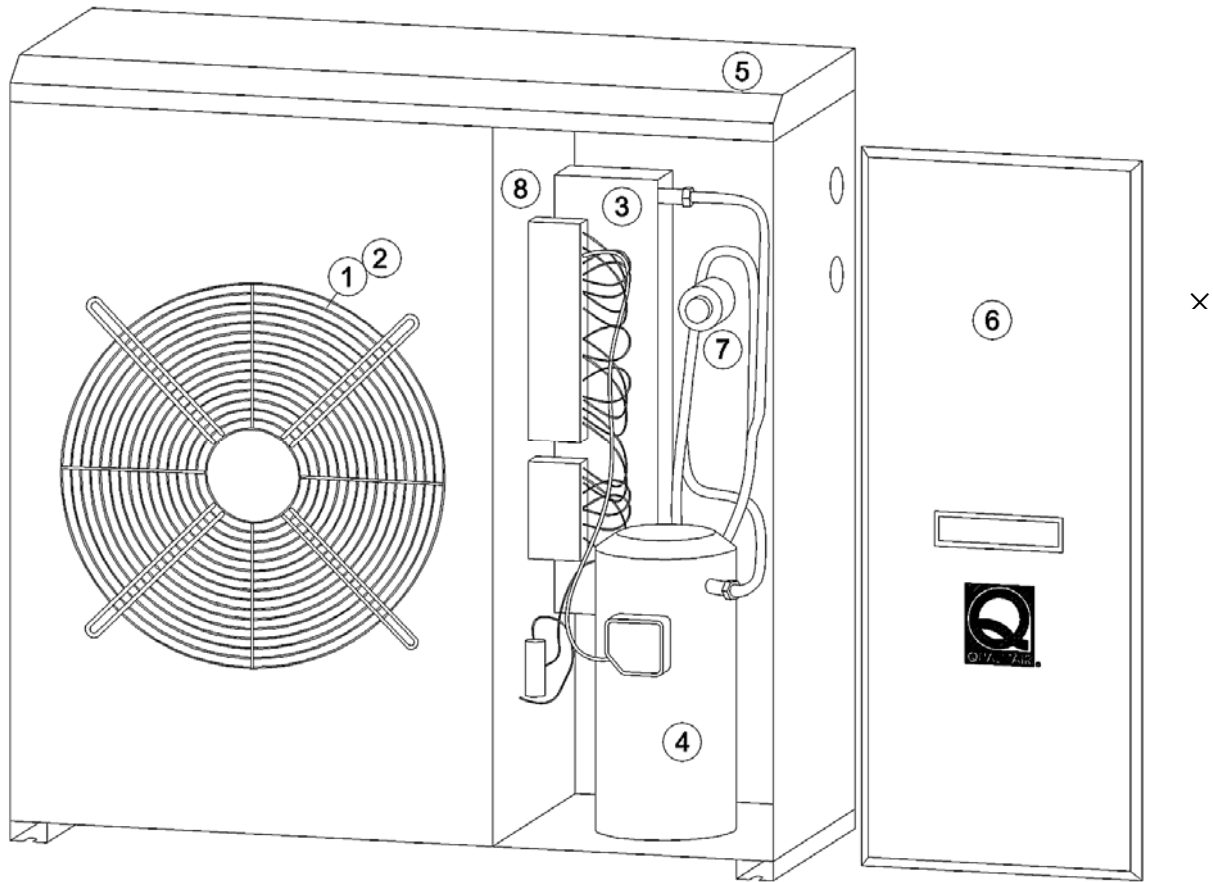


Figure 4.1 – Unit Internal Access

### 4.1 Access Details/Fixings

Item No.	Unit Component	Access Details/Fixings
(1)	Fan guard	Front access set screw fixings
(2)	Fan/motor ((fixed to rear of fan guard)	Front access set screw fixings on guard
(3)	Condenser coil	Access from rear of unit
(4)	Compressor	Remove "service access panel"
(5)	Removable top panel	Front and side access screw fixings
(6)	Service access panel	Front access screw fixings
(7)	Reversing valve (Heat pump unit only) HP & LP cut-outs.	Remove "service access panel"
(8)	Electrics/customers connection	Remove "service access panel"
(9)	Unit wiring diagram	Remove "service access panel"

#### **SPECIAL NOTES**

CHECK THAT INDOOR UNIT IS CORRECTLY MATCHED TO THE OUTDOOR UNIT. ALL PIPEWORK, INSULATION AND ELECTRICAL CABLING IS TO BE SUPPLIED BY OTHERS.  
UNIT WIRING DIAGRAM IS FIXED TO INSIDE OF FRONT ACCESS PANEL (6),  
HP SWITCH IS LOCATED ON THE COMPRESSOR DISCHARGE; LP SWITCH ON THE COMPRESSOR SUCTION CONNECTION.

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 5. GENERAL SERVICE CONNECTIONS

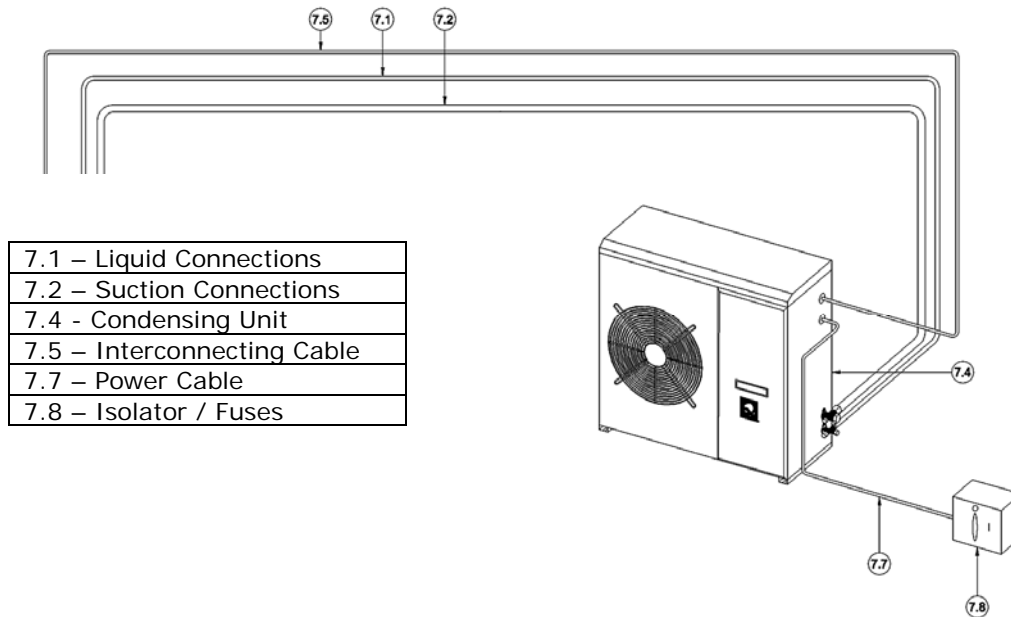


Figure 5.1 – Unit Connections and Interconnections

### **SPECIAL NOTES**

CHECK LOCAL REGULATION FOR INDOOR / OUTDOOR ELECTRICAL ISOLATION REQUIREMENTS AND REFRIGERATION PIPEWORK STANDARDS.

### **Refrigerant Connection Sizes – Refer to Section 8 for Extended Pipework**

	ICUS30	ICUS40	ICUS55	ICUS80
Liquid 7.1	1/4"	1/4"	1/4"	3/8"
Suction 7.2	5/8"	5/8"	5/8"	3/4"

### **Mains Power Cable – No of Cores**

	ICUS30	ICUS40	ICUS55	ICUS80
Single Phase System	3	3	3	3
Three Phase System	N/A	N/A	N/A	N/A

### **ICUS 1 Phase Fuse Rating**

	ICUS30	ICUS40	ICUS55	ICUS80
Run Current (A)	2	6.6	10.6	16.1
Locked Rotor Current (A)	28	28	53	82
HRC Fuse Rating (A)	10	10	16	20

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 6. POWER & CONTROL CONNECTIONS

### ICUS SINGLE PHASE COOLING ONLY

ICUS Terminal	Customer Connections
PE	Customer Earth Connection
E	
N	Customer Neutral Connection
N	
L	Customer Live Connection
C	Cooling Signal (From Indoor Unit)

Table 6.1 – Electrical Connection Details

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 6. POWER & CONTROL CONNECTIONS Cont

### 6.1 Wiring-up the Unit

Electrical terminations should be made onto the screw terminal side of the outdoor unit terminal blocks.

### 6.2 Wiring Requirements

Power supply – Connection of isolation power supply to the outdoor unit.

Interconnecting Wiring – Power and signal cables run between outdoor and indoor unit.

**Details of the fuse ratings and cable requirements are given in the tables in Section 5 Page 7, of this manual.**

### 6.3 Terminations

Details of cable terminations and interconnections are given in Table 6.1.

### 6.4 Wiring Diagrams

These are fitted to the inside of the access door.

#### **SPECIAL NOTES :**

REFER TO KIT INSTRUCTIONS FOR ELECTRICAL CONNECTION OF SITE OPTION KITS!!  
DO NOT MEGGER OR FLASH TEST WITH ELECTRONIC PCB'S IN CIRCUIT!!  
INDOOR AND OUTDOOR UNITS SHOULD HAVE LOCAL ELECTRICAL ISOLATORS.

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 7. REFRIGERANT PIPE CONNECTIONS

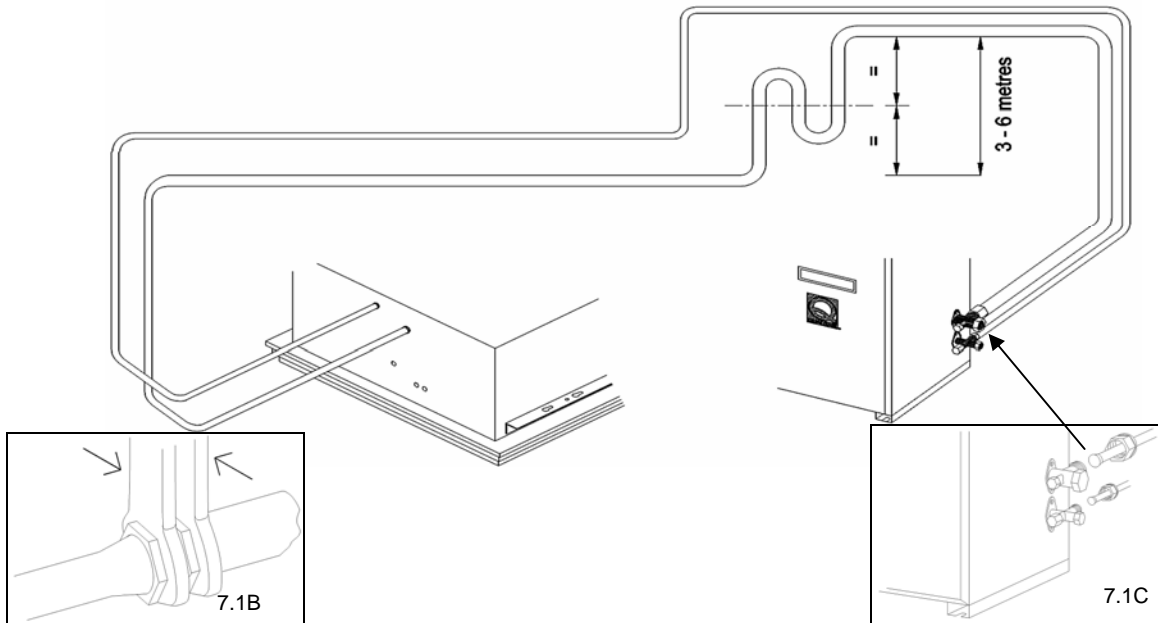


Figure 7.1 – Refrigerant Pipe Connections

### 7.1 Expansion Device

❑ ICUS Cooling Only Units DO NOT HAVE an expansion device as this is supplied with the indoor unit.

### 7.2 Pipe Installation

Run the suction and liquid lines in appropriately sized refrigeration copper tubing, using the detailed tables on pages 11 & 12 of this manual as a guide. When calculating the effective run take into account any bends or oil traps as described in table 7.1 on page 12.

A filter drier and site glass should be fitted in the liquid line.

Where the vertical separation exceeds 3 metres, oil traps must be fitted at half the vertical distance as shown on Figure 7.1 above. Ensure the refrigerant lines are adequately supported using refrigerant pipe clips

### 7.3 Unit Connections

The ICUS unit connections are terminated in male flare connections as detailed in the tables in Section 5, page 7, of this manual. Place flare nuts onto the copper tube before preparing the tube with a flaring tool (7.1C). When connecting to the male flares ensure both surfaces are clean and coat the flared surface with refrigerant oil to help ensure a leak-free joint. When tightening the joint use two spanners to prevent twisting of the connections as detailed in figure 7.1B above.

### 7.4 Insulation

Suction lines must be insulated to a minimum thickness of 3/8". Hot areas should be avoided when routing liquid lines and consideration should be given to separate insulation of liquid lines, where required, to prevent heat absorption.

#### **SPECIAL NOTE**

SLEEVE, SEAL AND WATERPROOF ANY BUILDER WORKS HOLES!  
IT IS RECOMMENDED THAT A FILTER / DRIER IS FITTED IN THE REFRIGERATION CIRCUIT.

# ICU CONDENSING UNIT INSTALLATION MANUAL

## 7.5 ICUS – RECOMMENDED LINE SIZES

### R407 Cooling Units

#### Horizontal or Downflow application (Suction Line)

Based on 5psi (0.35bar) Pressure drop

		Table A					
		5	10	15	20	25	30
ICUS30	Suction	3/8"	1/2"	1/2"	1/2"	1/2"	5/8"
	Liquid	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"
ICUS40	Suction	1/2"	1/2"	1/2"	5/8"	5/8"	5/8"
	Liquid	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"
ICUS55	Suction	1/2"	5/8"	5/8"	5/8"	5/8"	3/4"
	Liquid	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
ICUS80	Suction	5/8"	5/8"	3/4"	3/4"	3/4"	3/4"
	Liquid	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"

#### Upflow application (Suction Line)

		Max Size	Max Lift	Additional Oil
ICUS30	Suction	3/8"	5	None
	Liquid			
ICUS40	Suction	1/2"	8	None
	Liquid			
ICUS55	Suction	1/2"	10	None
	Liquid			
ICUS80	Suction	3/4"	10	None
	Liquid			

Note:

- a) Maximum pipe run stated in Table A, must include the reduction allowance (equivalent length) for vertical lifts and fittings indicated in Tables in this section.

## ICUS CONDENSING UNIT INSTALLATION MANUAL

Fitting	Pipe Size			
	3/8"	1/2"	5/8"	3/4"
45° Bend	0.12	0.15	0.18	0.21
90° Bend Short Radius	0.37	0.43	0.49	0.55
90° Bend Long Radius	0.24	0.27	0.30	0.37
180° Bend Short Radius	0.73	0.91	1.10	1.28
180° Bend Long Radius	0.46	0.55	0.64	0.76
90° Elbow	0.67	0.85	1.04	1.25

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 8. REFRIGERATION COMMISSIONING

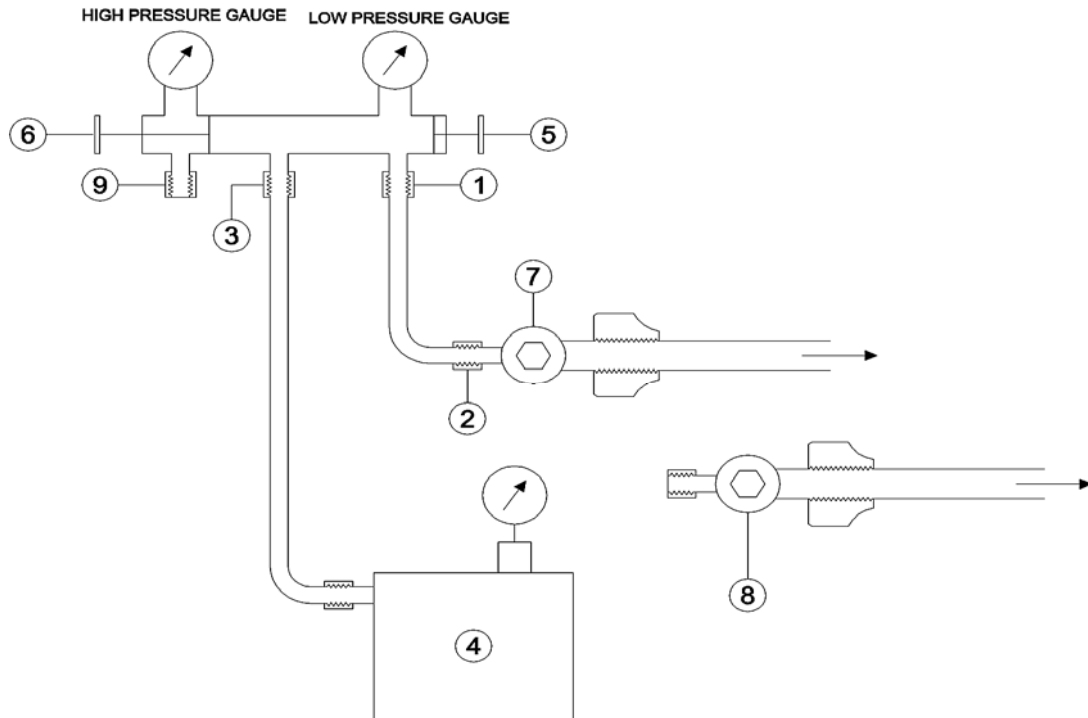


Figure – 8.1 Evacuation and Charging Connections

### 8.1 Evacuation, Charging and Refrigerant Procedures

After completing the refrigerant connections the following steps should be followed with reference to Figure 8.1 above.

- 1) Service gauges - Connect the low pressure port (1) of a manifold gauge set to the suction line outdoor unit shut off valve service port (2).
- 2) Vacuum Pump - Connect the centre line port (3) of the manifold gauge set to the vacuum pump (4) and operate the pump to ensure a vacuum of 200 microns.  
Note: Ensure gauge low pressure port (5) is open and high pressure port (6) is closed.
- 3) System Isolation - After achieving the specified system vacuum close the gauge low pressure port (5) and switch off the vacuum pump. Leave the system for 1 hour and check that the vacuum is maintained. If not, check for leaks, rectify and repeat the pumping down to 200 microns.
- 4) Refrigerant Charging - Open both the outside unit shut off valves (7 & 8). Weigh in the appropriate charge using a charging station.
- 5) Disconnect the vacuum pump and connect the gauge high pressure port (9) to the discharge line of the outdoor unit shut-off valve (10), ensuring that the gauge central port (3) is closed. Run the system, allow pressures to stabilise and ensure correct operation. After final commissioning remove the gauge set, fit all valve caps and carry out a final refrigerant leak test.

**This being a stand-alone condensing unit, the match to the indoor unit and appropriate charge are the responsibility of the installer.**

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 9. DISPOSAL PROCEDURES

**NOTE!**

All refrigerant, oils and other waste materials must be disposed of in a professional and responsible manner in strict adherence to environmental regulations.

**NOTE!**

The greatest possible care should be taken at all times to avoid the release of refrigerants to atmosphere.

The de-commissioning, dismantling and disposal of air handling units should be undertaken only by experienced personnel and in full adherence to all safety rules, in particular protection of lungs, eyes and skin from refrigerants, dust, etc. Only approved lifting gear and power tools should be used and access to the work area be restricted to authorised personnel.

- Disconnect the unit from the electrical supply.**
- Reclaim all refrigerant from the unit using approved reclaiming equipment according to the manufacturer's instructions. Recovery of refrigerant must be carried out only by operatives registered to refrigerant safe handling.**
- Dispose of the reclaimed refrigerant through an approved recycling facility.**
- Separate the unit sections and remove to approved recycling facilities.**

**SPECIAL NOTE:**

**ENSURE ALL CONNECTIONS EXTERNAL TO THE UNIT CASING AND DRAIN PIPEWORK ARE ADEQUATELY INSULATED TO PREVENT FREEZING OR CONDENSATION.**

# ICUS CONDENSING UNIT INSTALLATION MANUAL

## 10. FINAL CHECKS

	<b>Check</b>
1) Have all options kits been fitted ?	
2) Have units been mounted level and correct drainage been checked?	
3) Have the suction line, expanded liquid line (if required) and condensate drains (if required) been adequately insulated?	
4) Has correct HRC external fusing / isolating been installed.	
5) Has additional extended pipe-run refrigerant charge been measured into the system, where necessary or heat pumps been charged correctly?	
6) Is there adequate room and access to remove the access panels ?	
7) Has the control system been explained to the customer and the operating manual sheet handed over with the appropriate sections completed?	
8) Has the warranty booklet been read and completed? Note: - If a service contract is not taken out only a 1-year warranty is applicable.	

## ICUS CONDENSING UNIT INSTALLATION MANUAL

### 11. WIRING DIAGRAM NUMBERS

This page gives wiring diagram numbers for each type of ICUS Outdoor Unit. The diagrams themselves are supplied with the unit and are located in the electrical section. Please ensure the correct issue drawing is used with the relevant system – refer to supplier if necessary.

<b>Unit Ref</b>	<b>Function</b>	<b>Type</b>	<b>Phase</b>	<b>Wiring Diagram</b>	<b>Part N°</b>
ICUS30, 40	Cooling Only	Condensing Unit	1-ph	LBD170 LBD170	J91133 J91143
ICUS55, 80	Cooling Only	Condensing Unit	1-ph	LBD171 LBD171	J91163 J91183

# ICUS CONDENSING UNIT INSTALLATION MANUAL

CE CERTIFICATE

## *Eaton-Williams Air Conditioning*

*(Eaton-Williams Ltd)*

*Station Road – Edenbridge - Kent - TN8 6EG - England*

*Telephone ... 44 (0)1732 866055*

*Telefax ... (0)1732 863461*

### ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

89/336/EEC

### MACHINERY DIRECTIVE

EC Declaration of Conformity

As Defined by the EC Council Directive on Machinery

89/392/EEC Annex IIA and amended by

91/368/EEC - 93/44/EEC & 93/68/EEC

We declare that the equipment designated below,  
on the basis of design and construction in the form marketed by us and  
when installed and operated in accordance with our information and instructions,  
conforms to the EMC Directive, the PED and the essential Health and Safety requirements of the Machinery  
Directive.

If alterations are made to this equipment without our approval,  
this declaration becomes invalid. Furthermore, this equipment may be  
assembled into other systems which may also constitute machinery and shall  
not be put into service until the assembled system has been declared in conformity  
with the Machinery Directive.

Model  
Serial N°  
Standards Applied

BS EN 292-Pt2

EMC

BS EN50081-1

EMC

BS EN50082-1

Low Voltage

EN60204 pt1

Pressure Equipment

prEN14276-2

Controls Applied

BS EN ISO 9001: 1994

BSI Registered Company Q5026

Gerry Stapley

Gary Martin

**Managing Directors**

# ICUS CONDENSING UNIT INSTALLATION MANUAL

The logo for Qualitair, featuring the word "QUALITAIR" in white, uppercase, sans-serif font, centered within a solid purple rectangular background.

**OLDFIELDS BUSINESS PARK  
BIRRELL STREET  
FENTON  
ST4 3ES  
TEL: (01782) 597124  
FAX:(01782) 316633**

**AN EATON-WILLIAMS COMPANY**

As part of the policy of continuous product improvement, we reserve the right to alter specifications without notice