

# Brivis ICE Inverter

## INSTALLATION INSTRUCTIONS

### OUTDOOR



### INDOOR



#### Brivis System Models

Outdoor	Indoor
DONSC10Z71	DINLU10Z7
DONSC13Z71	DINLU13Z7
DONSC15Z71	DINLU15Z7
DONSC17Z71	DINXU17Z7

**PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE  
INSTALLING & USING THIS PRODUCT**



by **Rinnai**

# Table of Contents

<b>1.0 INTRODUCTION</b> .....	3
1.1 Brivis ICE R410a Inverter Range .....	3
1.2 Safety / Warnings .....	3
1.3 Codes / Regulations .....	3
<b>2.0 COMPONENTS</b> .....	4
2.1 Indoor Unit (Cooling Coil) .....	4
2.2 Starting Collars .....	5
2.3 P-Trap .....	6
2.4 Outdoor Unit .....	7
<b>3.0 TYPICAL INSTALLATION</b> .....	8
<b>4.0 INDOOR UNIT INSTALLATION</b> .....	9
4.1 Location .....	10
4.2 Condensate Drain / Safety Tray .....	10
4.3 Minimum Service Access .....	10
4.4 Electrical Connection .....	11
4.5 System and Ductwork Design .....	11
4.6 Brivis Heater Thermistor position (if applicable) .....	11
4.7 Filtration .....	11
4.8 General Arrangement Drawings .....	12
<b>5.0 OUTDOOR UNIT INSTALLATION</b> .....	13
5.1 Location .....	13
5.2 Electrical Connection .....	13
5.3 Thermostat Control Wiring .....	13
5.4 Wiring Diagrams .....	14
5.5 General Arrangement Drawings & Clearance Requirements Outdoor Unit .....	17
<b>6.0 REFRIGERATION CHARGE &amp; PIPE-WORK</b> .....	18
6.1 Piping Design .....	19
6.2 Pipe-work connection .....	20
6.3 Expelling the air with the vacuum pump .....	21
6.4 Charging the system .....	22
<b>7.0 START-UP AND COMMISSIONING</b> .....	23
7.1 Sequence of Operation .....	24
7.2 Cooling Capacity .....	25
7.3 Specifications .....	26
7.4 Commissioning Sheet .....	27

Specifications subject to change without notice. © 2018 Brivis Climate Systems Pty. Ltd.

# INSTALLATION, START-UP & MAINTENANCE INSTRUCTIONS

## 1.0 INTRODUCTION

Read all instructions before proceeding with the installation and start up.

- This equipment must be installed in accordance with all relevant regulatory authority and industry requirements.
- Only qualified, licensed technicians shall perform works on these units; failure to do so will result in warranty being void.
- Definitions:
  - “Shall” indicates a mandatory requirement of this manual
  - “Should” indicates a recommended requirement of this manual
- Deviation from these instructions, may at the discretion of Brivis, void the warranty. As a result, the homeowner and or installer may be charged a fee for non-product warranty related call outs. Also note that failure to comply with these instructions may preclude Brivis from being able to service the appliance.

**THE USER SHOULD RETAIN THIS MANUAL FOR FUTURE REFERENCE.**

## 1.1 Brivis ICE R410a Inverter Range

The Brivis Inverter ICE series is a refrigerated cooling split only type air conditioner designed for connection to compatible Brivis Ducted Gas Heaters. Brivis Inverter ICE utilises the heating system’s ductwork and air circulation fan to distribute cool, filtered refrigerated air.

ICE Outdoor Model	ICE Indoor Model	Nominal Cooling Capacity - kW	Recommended Brivis Gas Ducted Heater Model
DONSC10Z71	DINLU10Z7	10	Refer to latest Brivis Gas Ducted Heater Specifications for Maximum Recommended Add-On Cooling Capacity
DONSC13Z71	DINLU13Z7	13	
DONSC15Z71	DINLU15Z7	15	
DONSC17Z71	DINXU17Z7	17	

**Table 1 – Brivis ICE Models and Heater Compatibility**

- Some heaters may require a transition to modify its starting collar (pop) size to suit the inlet pop size of the ICE indoor coil. **DO NOT REDUCE POP SIZES ON INDOOR COIL OR HEATER.**
- Ensure minimum specified air quantity requirements passes through the ICE cooling coil at all times
- Ductwork and fittings must be sized to handle the total cooling airflow through the system on either whole home or zoned basis.

## 1.2 Safety / Warnings

The unit is designed to provide safe and reliable service when operating within design specifications. To avoid injury to personnel and damage to equipment or property when operating the equipment, the following safe practices should be observed as a minimum.

- Check the unit weight to be sure the lifting equipment is adequate
- Disconnect power to the unit before working on it
- Do not remove access panels or doors until fans have completely stopped
- Do not enter a fan cabinet while the fan is running
- Protect materials when welding or flame cutting. Use suitable cloth to contain sparks. Have a fire extinguisher at hand and ready for immediate use
- Do not place articles on or against this appliance
- Do not use or store flammable materials near this appliance
- Do not spray aerosols in the vicinity of this appliance while it is in operation
- Do not modify this appliance

**Note:** The communication cable installed between the indoor coil and outdoor unit shall be:

1. Field supplied
2. 2-core shielded cable
3. Earthed at the CDU end, refer to Fig.14

Failure to do so may prevent the correct operation of the unit

## 1.3 Codes / Regulations

Brivis ICE units must be installed, serviced or repaired in accordance with these instructions and related regulations, codes, standards, and authorities. These include but may not be limited to:

- Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995
- AS/ NZS 1677.2 - Australian Standard, Refrigeration systems, safety requirements for fixed applications
- AS 4211.3 Gas recovery or combined recovery and recycling equipment
- HB 276-2004 : A Guide to Good Practice for Energy Efficient Installation of Residential Heating, Cooling & Air Conditioning Plant & Equipment
- AS 4254 - Ductwork for air-handling systems in buildings
- Local Electricity Authority
- Local Building Regulations
- Environment Authorities
- Building Code of Australia (BCA)
- Brivis "SuperSizeGuide"

It is recommended the Brivis "SuperSizeGuide" be followed in estimating cooling requirements and for system design that will result in efficient installation and provide a higher level of comfort and economical operation.

Brivis assumes no responsibility for equipment installed in violation of any code or regulations and these installation instructions.

## 2.0 Components

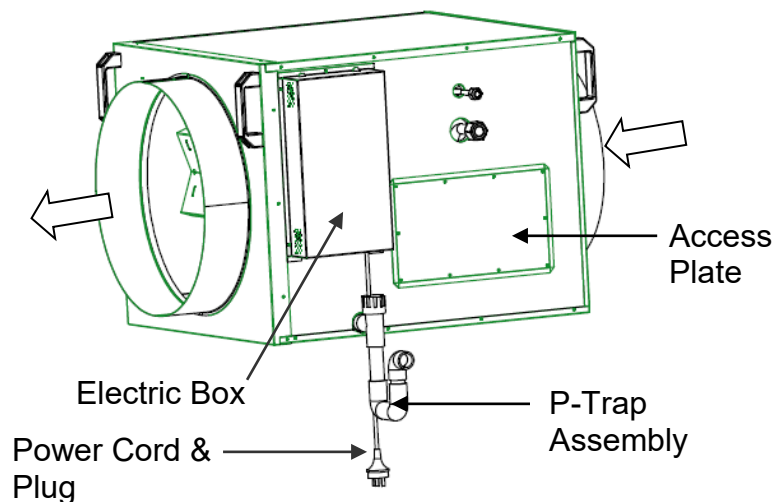
Upon receiving units, inspect for damage and ensure appliances match your order. In the event of damage, or incorrect delivery, notify supplier immediately. Brivis accepts no responsibility for installation of damaged or incorrect units.

### 2.1 Indoor Unit (Cooling Coil)

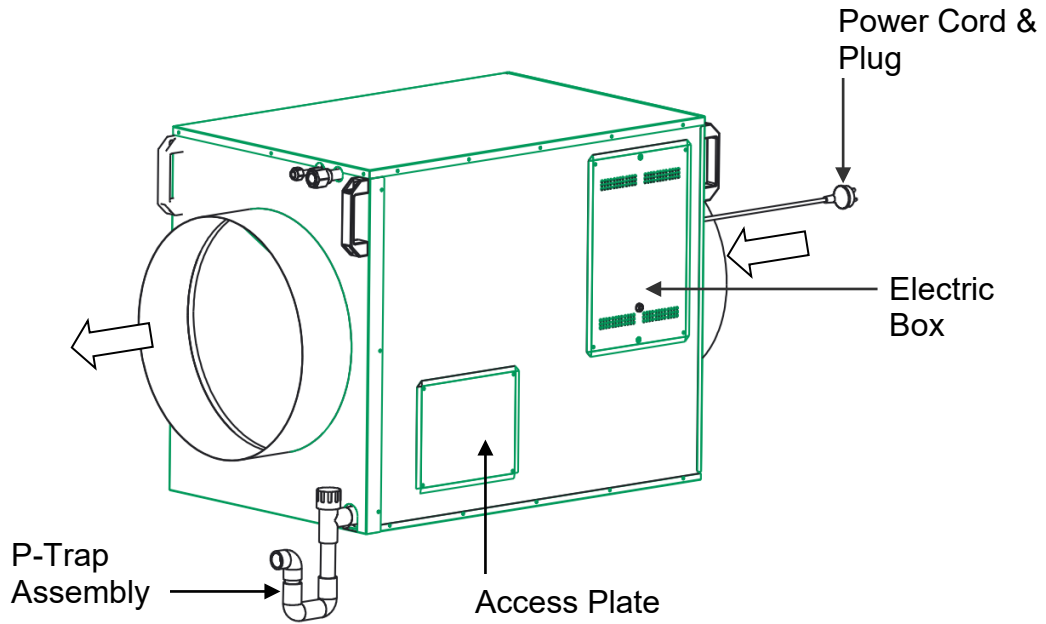
Remove packaging from unit and any protective foam packing from coils and pipes. Indoor units are shipped with a holding charge of dry nitrogen. Check to confirm the holding charge. For lifting details refer to the General Arrangement drawings.

- Brivis Inverter ICE indoor units shall be installed only downstream of a heater
- Brivis Inverter ICE is not designed for installation on a marine craft, houseboat, or any similar environment.

**Fig. 1a – DINXU Indoor Cooling Coil**



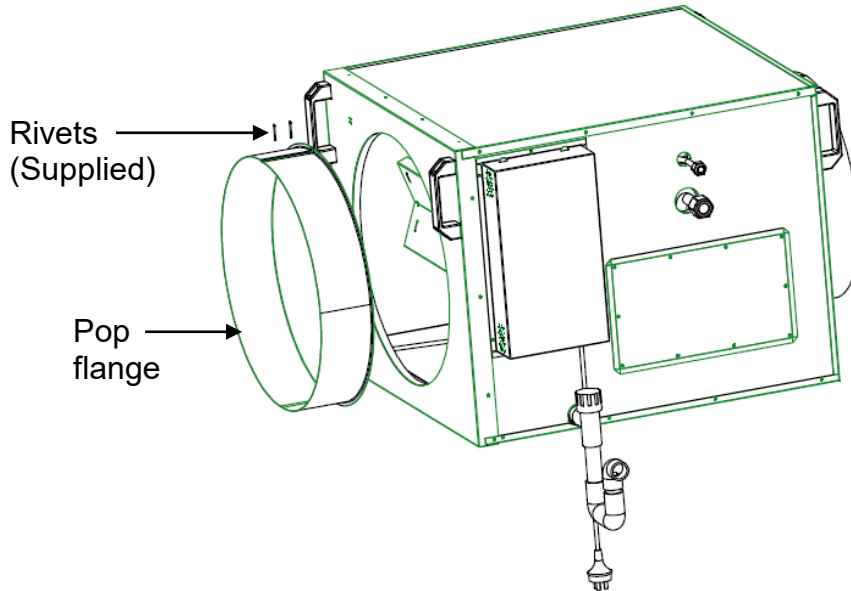
**Fig. 1b – DINLU Indoor Cooling Coil**



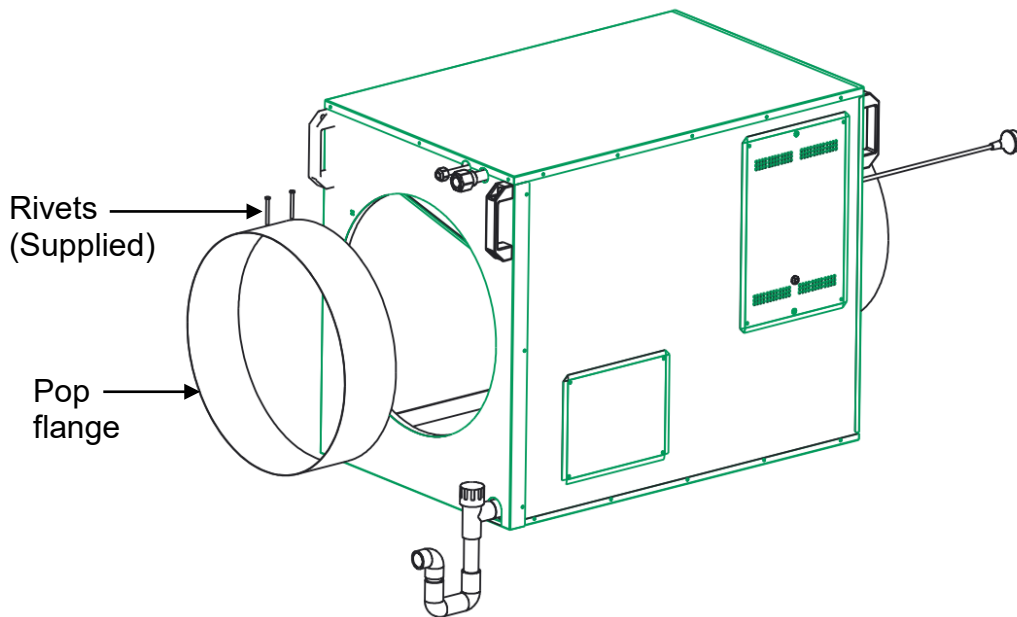
## 2.2 Starting Collars

Insert starting collar (pop) into the hole in pop plate, ensuring pop flange is placed over the inner supply air wall of the cabinet. Spread the pop flange to fit tight in the cabinet's hole with the notch side of the collar overlapping the other. Secure the pops with the rivets supplied.

**Fig. 2a – DINXU Indoor Unit Starting Collar Assembly**



**Fig. 2b – DINLU Indoor Unit Starting Collar Assembly**



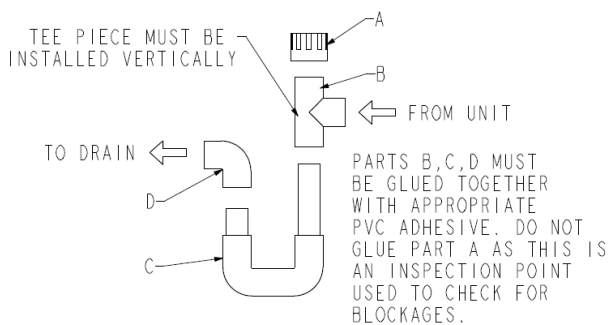
### 2.3 P-Trap

The Indoor Unit incorporates an evaporator drip tray and is supplied with a 20mm Female Pressure Pipe drain spigot, which is to be connected to the "P" trap.

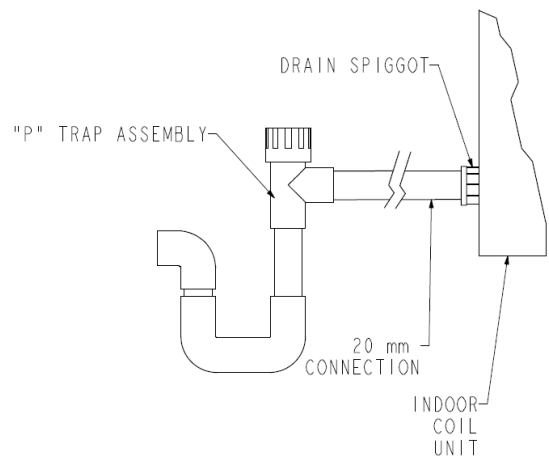
- Always install the "P" trap as close to the unit as possible
- Fill the "P" trap with water during installation before starting unit, to prevent air movement through the drainpipe
- Ensure trap contains water at all times
- Adjust the level of the unit to ensure that the condensate drains from the evaporator drip tray (approx. 10 - 15mm incline from back to front)

#### Important Note

- **Before installing and commissioning the P-Trap, check to ensure that all joints are sound, including the preformed U-Bend.**



**Fig. 3 - "P" TRAP ASSEMBLY**



**Fig. 4 - "P" TRAP INSTALLATION**

2.4 Outdoor Unit

Fig. 5 - Outdoor Units



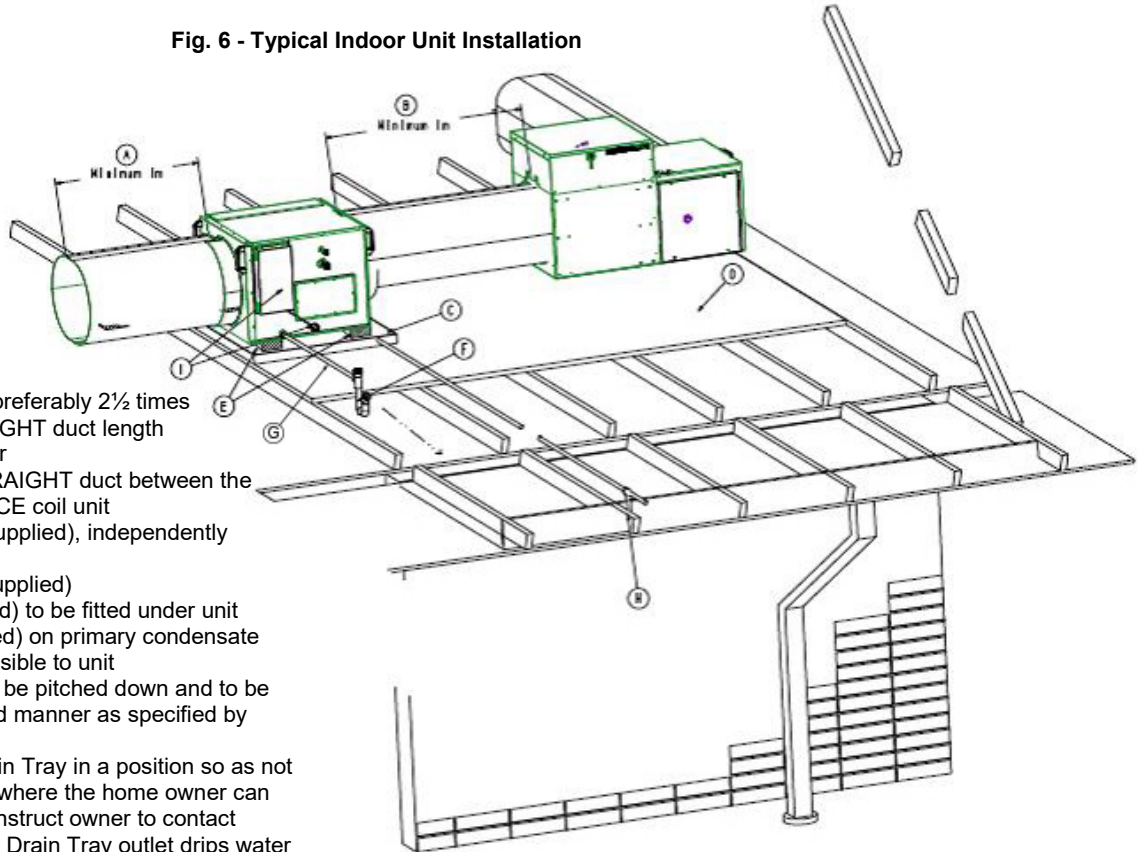
DONSC10Z71



DONSC13Z71, 15Z71 & 17Z71

### 3.0 TYPICAL INSTALLATION

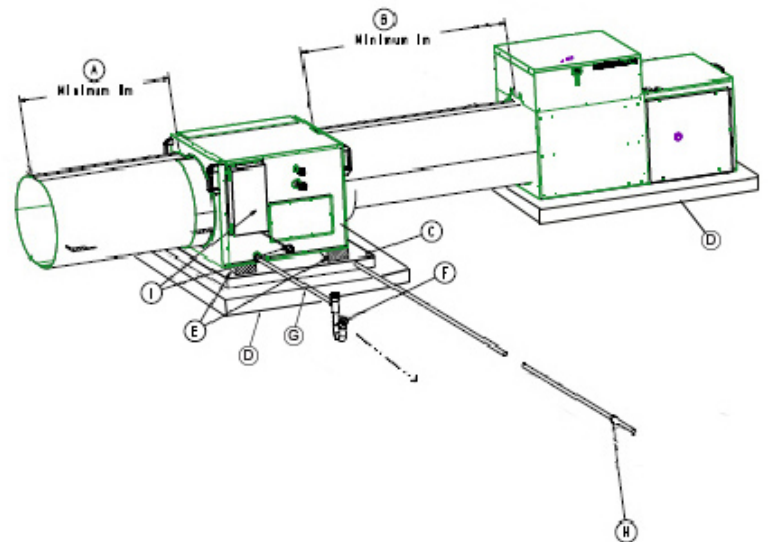
Fig. 6 - Typical Indoor Unit Installation



- A. Ensure 1m minimum, or preferably 2½ times the duct diameter, STRAIGHT duct length before any take-offs occur
- B. Ensure 1m minimum STRAIGHT duct between the Gas Ducted Heater and ICE coil unit
- C. Safety Drain Tray (field supplied), independently drained
- D. Working Platform (field supplied)
- E. Unit Mounts (field supplied) to be fitted under unit
- F. P Trap Assembly (supplied) on primary condensate drain – fit as close as possible to unit
- G. Condensate drain pipe to be pitched down and to be terminated in an approved manner as specified by local codes
- H. Terminate the Safety Drain Tray in a position so as not to cause a nuisance, but where the home owner can see if water is dripping. Instruct owner to contact Installer or Brivis if Safety Drain Tray outlet drips water
- I. Electric box with standard 10 A power plug
  - Run 2 core **shielded** communication cable from indoor coil electric box (Terminals Q, P) to the outdoor unit (S1,S2).
  - Run 24VAC from the heater into the indoor coil electric box (Terminals A1, A2)

Fig. 7 - Typical Under Floor Installation

- A. Ensure 1m minimum, or preferably 2½ times the duct diameter, STRAIGHT duct length before any take-offs occur
- B. Ensure 1m minimum STRAIGHT duct between the Gas Ducted Heater and ICE coil unit
- C. Safety Drain Tray (field supplied), independently drained
- D. Working Platform (concrete slab)
- E. Unit Mounts (field supplied) to be fitted under unit
- F. P Trap Assembly (supplied) on primary condensate drain – fit as close as possible to unit
- G. Condensate drain pipe to be pitched down and to be terminated in an approved manner as specified by local codes
- H. Terminate the Safety Drain Tray in a position so as not to cause a nuisance, but where the home owner can see if water is dripping. Instruct owner to contact Installer or Brivis if Safety Drain Tray outlet drips water
- I. Electric box with standard 10 A power plug
  - Run 2 core **shielded** communication cable from indoor coil electric box (Terminals Q, P) to the outdoor unit (S1,S2).
  - Run 24VAC from the heater into the indoor coil electric box (Terminals A1, A2)



#### IMPORTANT NOTE

1. Ensure unit is sitting on something that is 'weather/waterproof'
2. Make sure there is adequate ventilation to help prevent condensation
3. Ensure the P-Trap and drain are working effectively
4. Always mount the coil on (field supplied) supports to create an air gap to prevent moisture/condensation
5. Always mount coil over safety tray



## 4.0 INDOOR UNIT INSTALLATION

- Indoor coils are supplied with a nitrogen holding charge ranging from 400kPa to 700kPa
- Connect a suitable pressure gauge to the indoor coil valve to ensure the internal pressure is at least 400kPa
- If the measured pressure is less than 400kPa, check and if necessary repair any leaks found before proceeding
- Remove the nitrogen holding charge by connecting a charging line with valve depressor
- For SWEAT connection: Sweat off the liquid & suction pipe blanking plates and proceed to pipe up in line with section 6.0 (Refrigeration Charge & Pipe-work)
- For FLARE connection: Un-screw the flare connection, remove the plastic seal and proceed with section 6.0 (Refrigeration Charge & Pipe-work)
- Some heaters may require a transition to modify its starting collar (pop) size to suit the inlet pop size of the ICE indoor coil. DO NOT REDUCE POP SIZES ON INDOOR COIL or HEATER
- Ensure minimum specified air quantity requirement passes through the ICE cooling coil at all times
- Ductwork and fittings must be sized to handle the total cooling airflow through the system on either whole home or zoned basis
- 24 volt control wiring shall be installed from the indoor coil electric box (Terminals A1, A2) to the Heater (StarPro series) or to Brivis Thermostat as required
- The electric box has standard 10 A power cord and plug , please do not cut or modify the cord
- 2 core shielded communication cable shall be installed from the indoor unit (Terminals Q, P) to the outdoor unit (S1,S2). One end of the shield has to be earthed.
- If the Brivis Heater requires a remote thermistor installed in the supply air ductwork, position it in the supply air starting collar (discharge pop) of the cooling coil (see Section 4.6)

## 4.1 Location

- Choose a location that is suitable for refrigeration piping and condensate drainage
- Allow adequate provision is made for service access
- Indoor Coil Unit is not weatherproof and should be installed so that there is no chance of direct sunlight, water or moisture coming into contact with the outer casing
- Where the unit is installed in the roof or ceiling space ensure the building structure is capable of supporting the unit's weight – do not suspend unit from support handles
- Brivis Inverter ICE indoor units shall be installed only downstream and at least 1m distance from heater's main supply air outlet and always before the first duct branch-take-off fitting
- Never put the Indoor Coil Unit in the Return Air part of the duct system, this may result in condensation forming in the Heater, causing corrosion and damage to vital components
- Ensure a minimum of 1m, or preferably 2½ times the duct diameter of straight ductwork, is installed immediately downstream of the Indoor Coil Unit before any fitting, divergence or branch-take-offs occur. **Failure to do so may compromise airflow, system performance and reliability**

## 4.2 Condensate Drain / Safety Tray

- A non-flexible drainpipe shall be installed for the primary condensate run-off with a continuous downward grade away from the unit of not less than 1:50
- When the indoor unit is installed in a roof or ceiling space, an additional field-supplied Safety Drain Tray shall be installed under the Indoor Unit
- Safety Tray must also be separately drained, arranged to terminate in a position where the home owner can see if water is dripping from the outlet. Please instruct the end user to call their Installer or Brivis Service should they notice water dripping from the Safety Tray drain outlet

## 4.3 Minimum Service Access

For servicing, a minimum clearance of 600mm must be provided in front of the access panel side of the unit for its entire length.

- Where installed on a platform in the roof space, the platform should also extend 600mm out in front of the access panel side of the unit for its entire length
- A 600mm wide platform is required to connect between the indoor unit and the access opening or the ducted heating unit for the purpose of access
- Adequate lighting should be installed, such as permanent artificial lighting with switch located at roof access opening
- Duct work should not be installed across the platform preventing safe access

Fig. 8a – DINXU Indoor Service Clearances

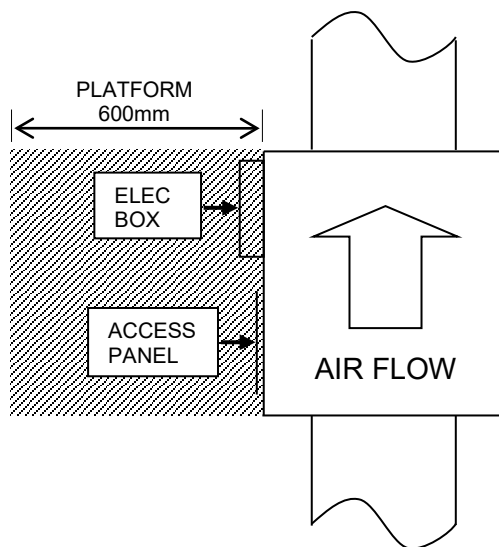
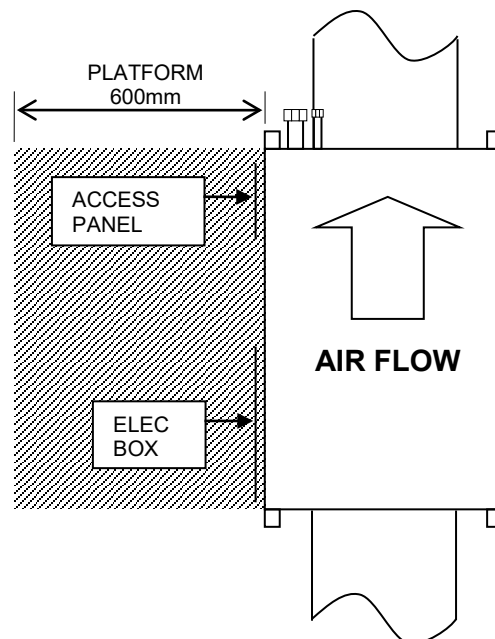


Fig. 8b – DINLU Indoor Service Clearances



## 4.4 Electrical Connection

- The electric box has standard 3 m, 10 A power cord and plug; do not cut or modify the cord
- 24 Volt control wiring shall be installed from the indoor coil electric box (Terminals A1, A2) to the Heater (StarPro series) or to Brivis Thermostat as required
- 2 core **shielded** communication cable shall be installed from the indoor unit to the outdoor unit. One end of the cable has to be earthed. See Fig. 14.

The unit is pre-wired with a 3-pin plug and lead, and should be plugged into a standard 10 Amp 220 to 240 Volt fixed switched socket outlet adjacent to the unit, in a convenient location so it can be turned OFF quickly and easily.

**Note:** A qualified electrician must install the 220 to 240 Volt wiring according to local regulations.

The electricity supply must be 220 to 240 Volts at 50 Hz, and from an authorised power supplier. Generators should never be used, as their output may be incompatible with, or prone to damage the unit's electronic components.

## 4.5 System and Ductwork Design

Good duct design and sizing are essential to every Brivis ICE cooling system. Use the Brivis "SuperSizeGuide", Brivis size, or HB276 for guidance. In general:

- The ductwork system shall be designed to ensure the minimum recommended cooling airflow as specified in the technical data, is capable of being supplied at all times.
- Ductwork should be airtight and have a minimum insulation rating as specified by local codes; under no circumstances should it be less than a rating of R1.0
- It should also be properly sized, and curves and bends should be smooth enough to ensure that the air flows through efficiently, quietly and with minimal resistance
- The registers and diffusers should be large enough and of good design. They should minimise noise, while providing the correct distribution pattern
- The positive return air system should be fitted with a grille large enough to accept the full air capacity of the system at low noise levels
- Adequate air filtration must be provided
- If the system uses high level outlets (e.g. ceiling diffusers), then the return air inlet should be at a low level

**Note:** It is important that all ductwork and fittings be insulated. It is mandatory under some building codes to also install fire rated duct. Check with your local authority.

## 4.6 Brivis Heater Thermistor position (if applicable)

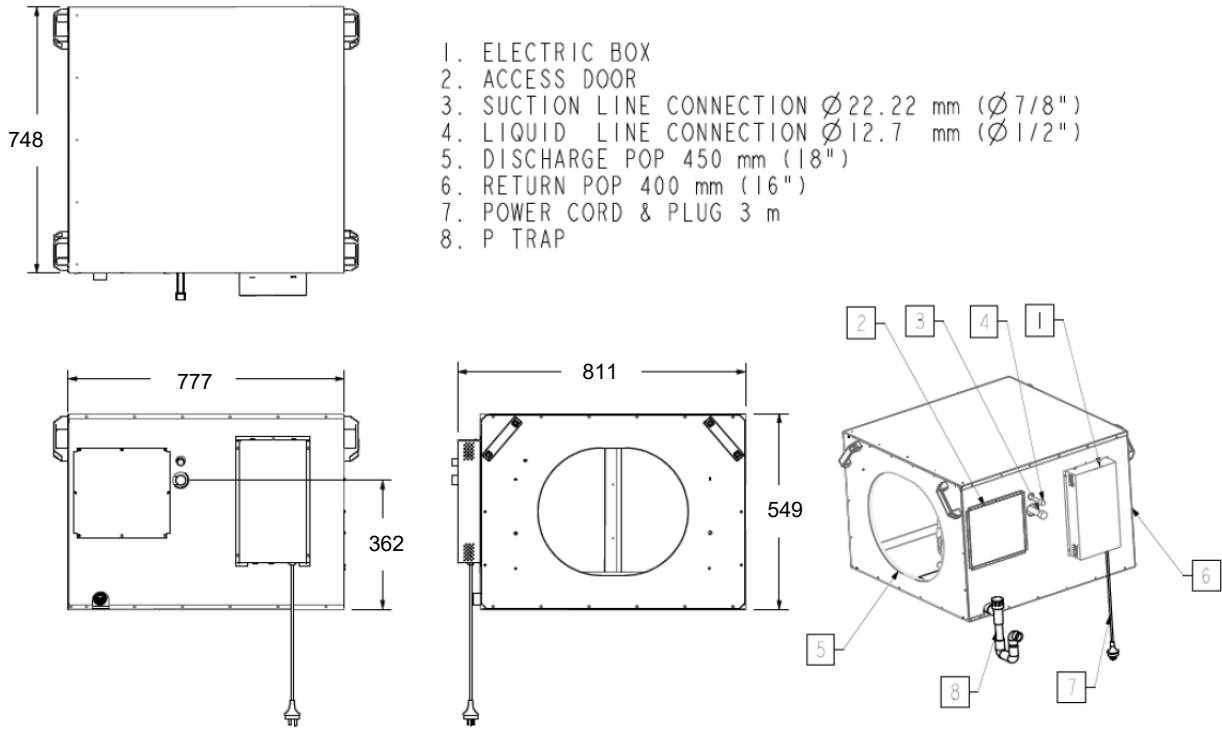
- Mount heater thermistor in the **discharge (outlet) pop** of the cooling coil
- Drill a 3/4" (20mm) diameter hole through the top of the evaporator coil's outlet pop
- Carefully insert the thermistor assembly (probe end first) into this hole and secure using the two screws provided
- Ensure that the thermistor plug is facing upwards and is accessible for servicing
- Connect the thermistor extension lead from the heater to the thermistor assembly and ensure that the plug is connected securely
- Ensure that the thermistor extension lead is secured to timbers or duct outer casing to prevent damage

## 4.7 Filtration

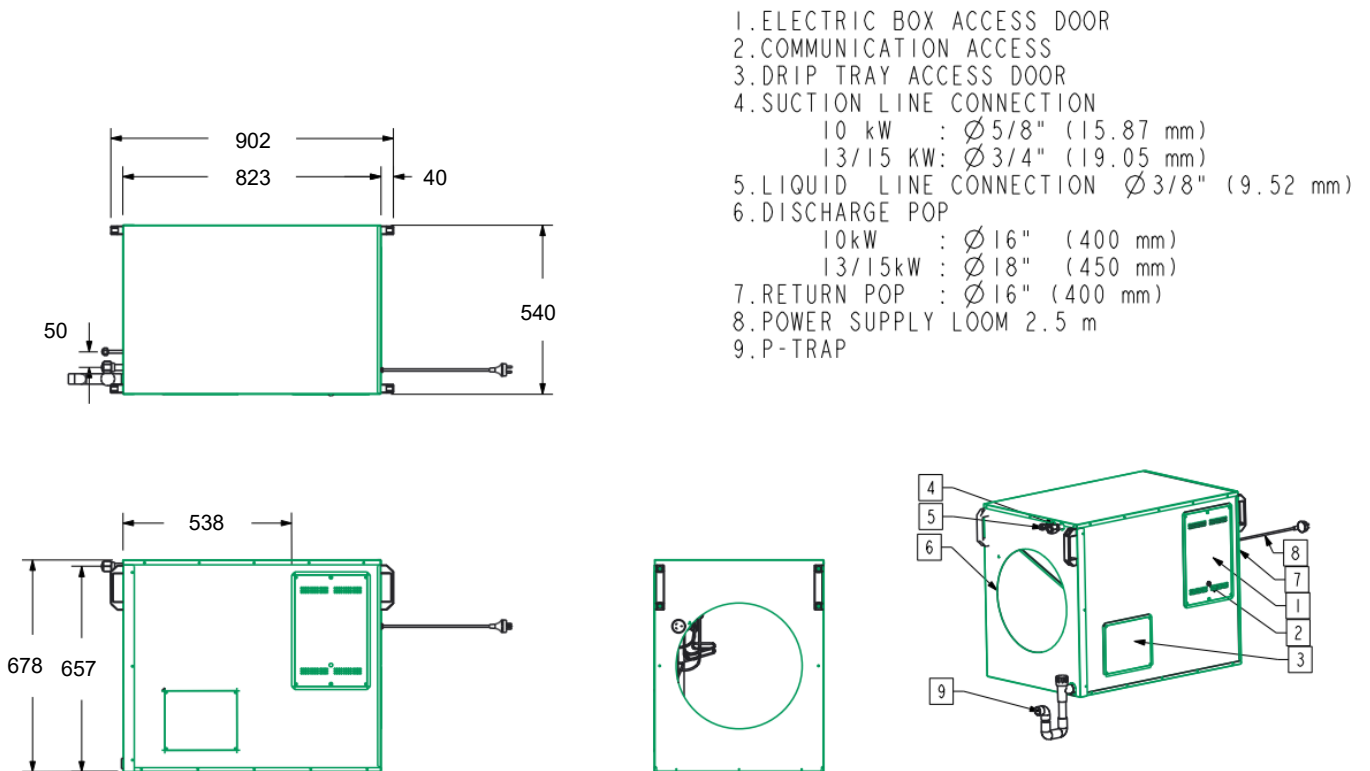
A filter must be fitted into the system, and should be easily accessible for regular cleaning. Please refer to the guidelines for return air filter grilles accompanying the Gas Ducted Heater.

## 4.8 General Arrangement Drawings

**Fig. 9 - Indoor Unit Dimensions – Model DINXU17Z7**



**Fig. 10 - Indoor Unit Dimensions Models - DINLU10Z7, DINLU13Z7 & DINLU15Z7**



## 5.0 OUTDOOR UNIT INSTALLATION

### 5.1 Location

- The unit must be installed in accordance with relevant authority requirements.
- The unit should not be accessible to general public
- Do not install the unit where there is a possibility it will present a noise problem for either the home owner or neighbours, or exceed the noise guidelines as set down by local or state legislation or regulatory bodies.
- Avoid positioning unit in direct sunlight
- The unit must be installed in an area that is well ventilated - avoid positions where condenser air may be recirculated
- The location shall easily support the outdoor unit's weight
- Locate the outdoor unit as close as possible to the indoor unit
- Allow for drainage of rainwater
- Ensure minimum clearances, as outlined in the Outdoor Unit Clearances drawing, Fig. 16 (Section 5.5), are maintained

#### Mounting at ground level:

- The unit shall be mounted and fastened on to a solid, level foundation
- Apply rubber "waffle pad" or similar between the unit feet and the foundation if required

#### Mounting on the roof:

- Ensure that the weight of the unit is not excessive for the design of the roof structure
- Unit shall be mounted onto either a suitably designed metal frame or timber blocks, ensuring that there is an insulating membrane such as rubber "waffle pad" between the roof structure and the frame for vibration elimination
- Metal frame or timber supports must be of sufficient size and length to prevent the unit tipping over in high winds.

### 5.2 Electrical Connection

All electrical work shall be carried out by a qualified and licensed electrician. The installation shall comply with current relevant standards, wiring rules and local authority requirements. Means for disconnection (i.e. isolating switch and circuit breaker) shall be incorporated according to wiring rules. Wiring sizing is the responsibility of the installer as it depends on the conditions and regulations applicable to each installation site. Refer to the electrical drawings and specifications for electrical data.

The electrical installation requirements are generally as follows:

- The outdoor unit shall be supplied directly from a distribution board.
- An external isolating switch shall be installed adjacent to the Outdoor Unit.
- Short circuit protection for the unit shall be supplied at the main switchboard Wire fuses shall not be used - check SAA Wiring Rules for "Protection" sizing and cable sizes. Refer to specification sheet for circuit breaker sizing.
- Do not drill into the cabinet as critical internal components may be damaged during this process.
- Avoid running the control/communication cables near sources of electromagnetic interference such as electrical motors, transformers, high current cables etc. Use **shielded** cable and earth it on one end.
- Ensure that power supply is adequate.
- 2 core shielded communication cable, earthed at one end (see Fig. 14) shall be run between the indoor coil electric box and the outdoor unit.

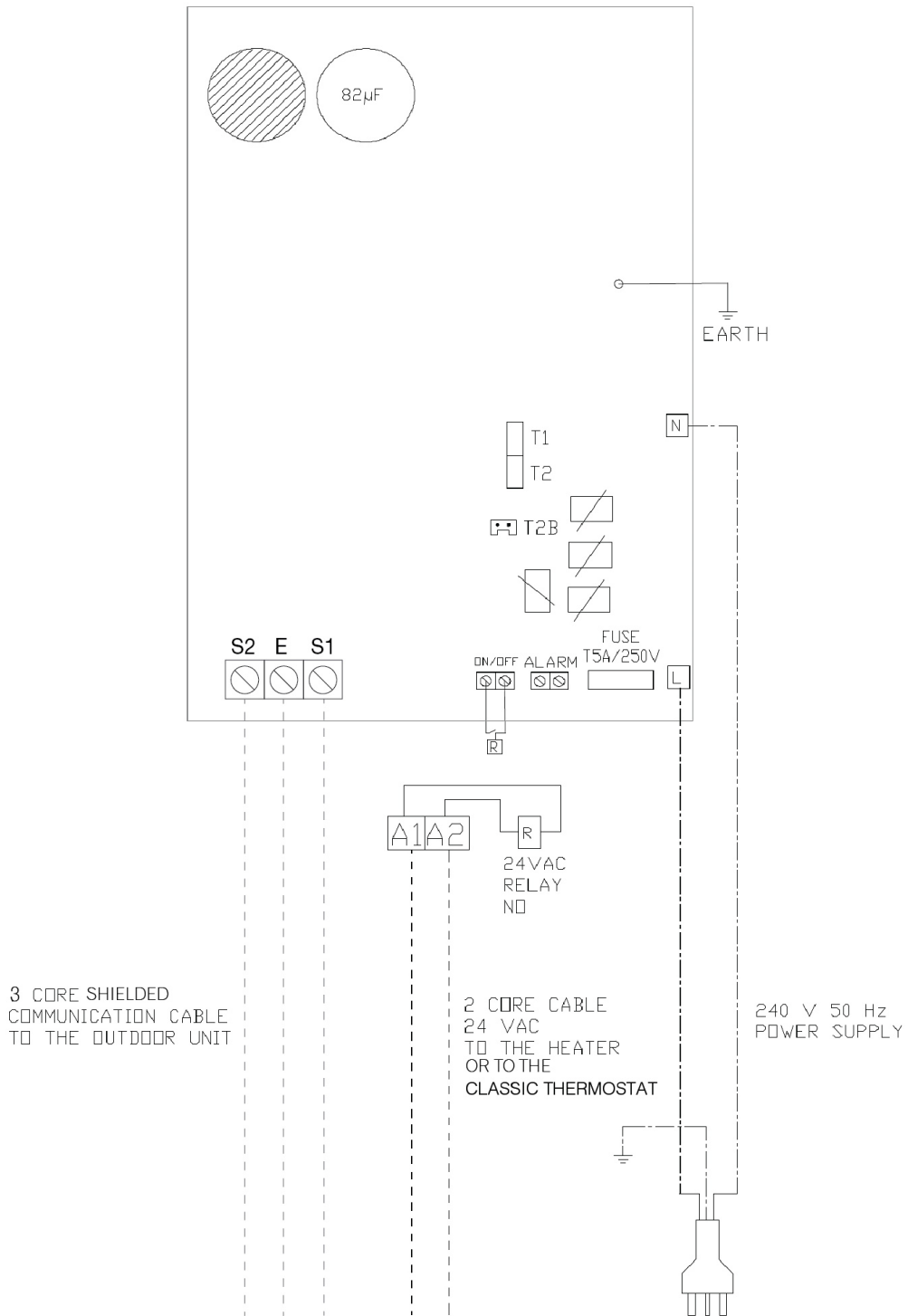
### 5.3 Thermostat Control Wiring

- All control wiring is 24 Volt, and is required to be installed between the indoor coil electric box (Terminals A1, A2) and the Gas Ducted Heater or programmable Controller in accordance with the wiring instructions supplied with the Brivis Gas Ducted Heater.
- For any other make of heater (Non- Brivis) contact the heater's manufacturer.
- Minimum control circuit wire size is 1.0mm<sup>2</sup> with a maximum of 1.5mm<sup>2</sup>

**Note:** There is time delay built into the Outdoor Condensing Unit to prevent compressor short cycling on rapid calls from the thermostat for cooling. Time delays providing this protection are built into the recommended Brivis Controllers.

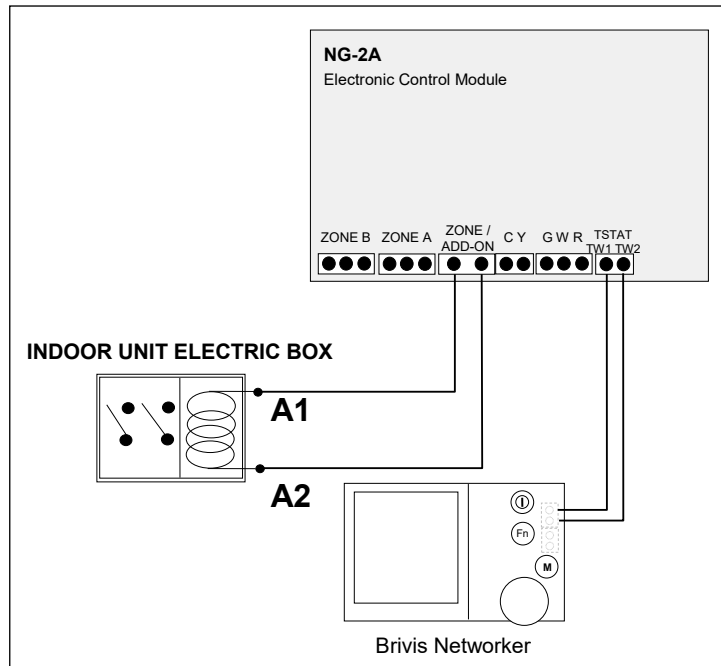
## 5.4 Wiring Diagrams

**Fig. 11 – Typical Indoor Unit Wiring Diagram (DINXU & DINLU SERIES)**



LEGEND	
A1/A2	RELAY COIL TERMINALS
L	LOAD (ACTIVE)
N	NEUTRAL
NO	NORMALLY OPEN
S1 / S2	COMMUNICATION TERMINALS
R	RELAY
T1	RETURN AIR TEMPERATURE
T2	COIL TEMPERATURE
T2B	SUCTION TEMPERATURE
----	FIELD WIRING
—	CONTROL WIRING
---	240 WIRING

**Fig. 12 – Wiring Circuit for Bravis StarPro Series Heaters with Bravis ICE Add-On Using Bravis Networker**

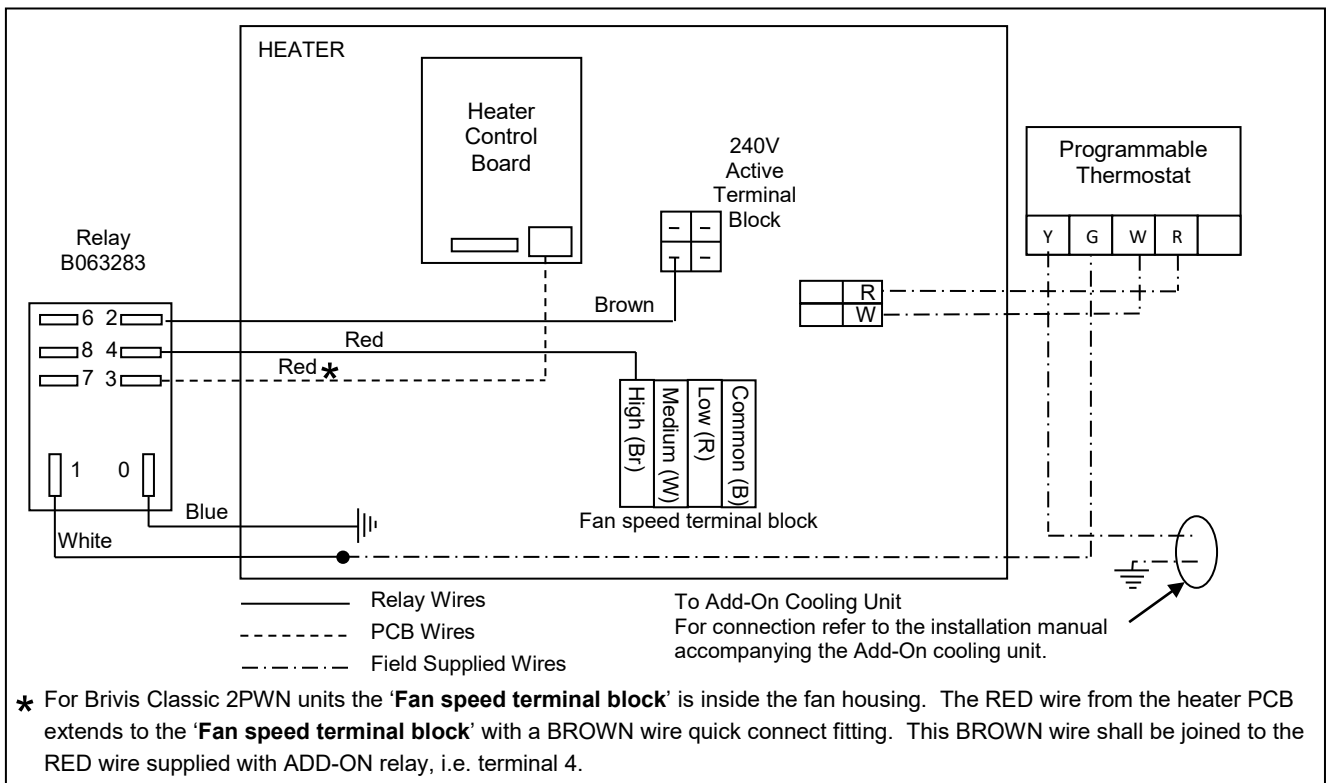


StarPro model heaters can be configured for zoning and/or Add-On Refrigerative Air Conditioning. For more information regarding connection to a StarPro unit please refer to the associated heater installer's manual.

Your zoning requirements may require a 'Bravis Network 516 module' (Bravis Part No. B023178), please refer to the associated heater installer's manual.

**Note:** For Bravis ICE Add-On connection to a Bravis BX5 StarPro heater, a 'Bravis Network 516 module' (Bravis Part No. B023178) must be fitted.

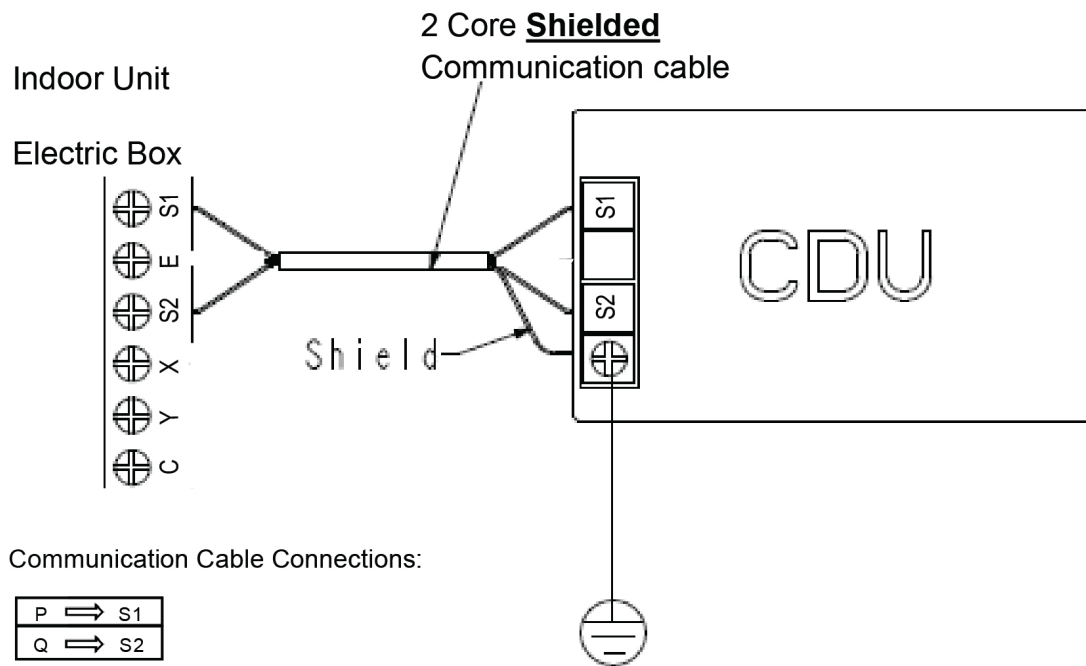
**Fig. 13 – Wiring Circuit for Bravis Classic Series Heaters with Bravis ICE Add-On Using Bravis Programmable Thermostat**



**Note:** For Bravis ICE Add-On connection to a Bravis Classic heater (CC3, 2PWN, or BX3) an additional relay 'ACC LOOM ADD-ON RELAY CLASSIC' (Bravis Part No. B063283) must be fitted.

Contact Bravis Technical Support for information on superseded Bravis Heaters.

Fig. 14 – Shielded Communication Cable Between Indoor and Outdoor Units





## 5.5 Dimensional Drawings & Clearance Requirements Outdoor Unit

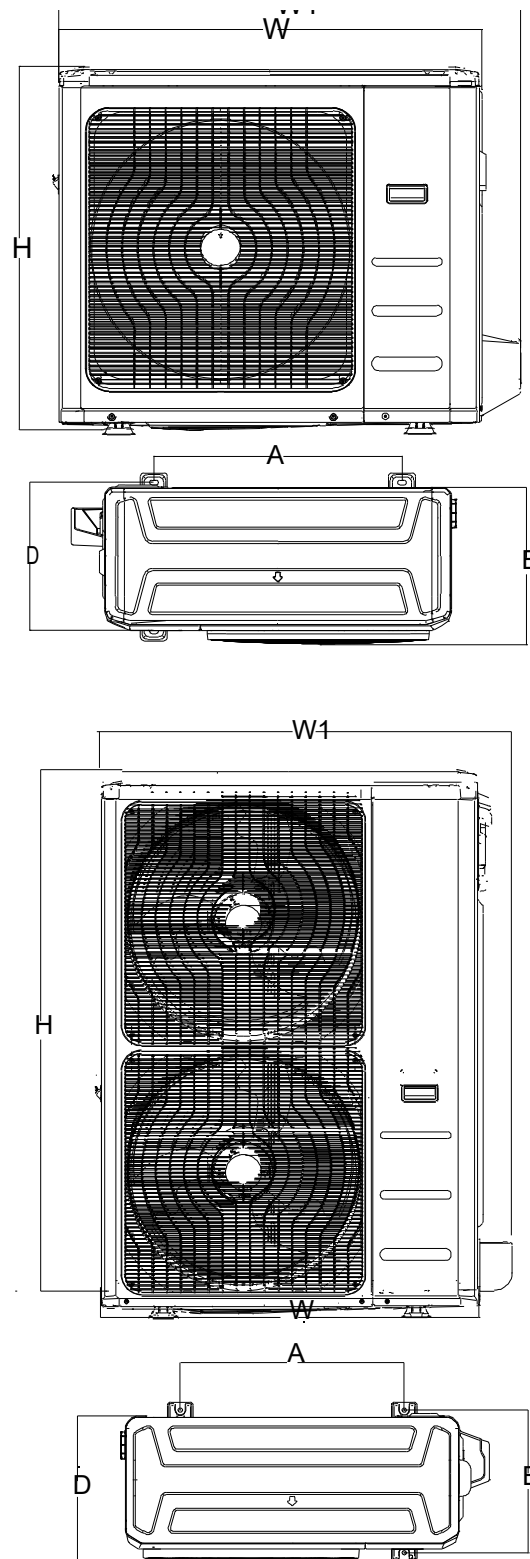


Fig. 15 – Outdoor Unit Dimensions

MODEL	Size	W	D	H	W1	A	B
DONSC10Z71	10	946	410	810	1030	673	403
DONSC13Z71	13 / 15 / 17	952	415	1333	1045	634	404
DONSC15Z71							
DONSC17Z71							

Table 2 – Brivis ICE Inverter Outdoor Unit Dimensions

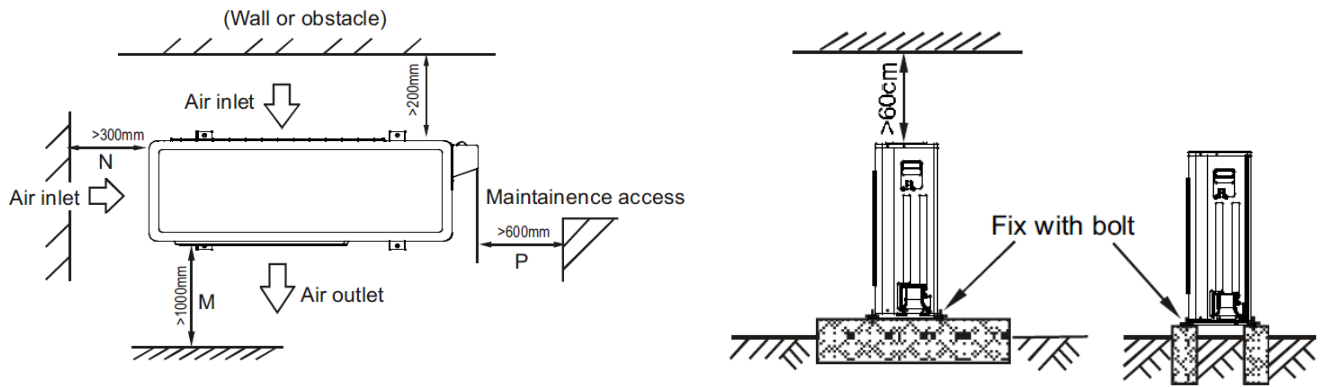


Fig. 16 – Outdoor Unit Clearances

## 6.0 REFRIGERATION CHARGE & PIPE-WORK

### **WARNING:**

- Both indoor and outdoor units come delivered under positive pressure
- The Outdoor Unit is charged with sufficient R410a refrigerant for an interconnecting pipe run of 15m actual length
- The indoor unit is pressurised with 400kPa to 700kPa dry nitrogen
- Pipe end blanking plates must not be removed until the installer is sure the plates are not under positive pressure
- A suction accumulator and oil separator has been fitted in the outdoor units
- Read all instructions and notes below before starting installation
- For flare connections please refer to section 6.2.

### **CAUTION:**

- Use new, clean and sealed refrigeration grade pipe suitable for R410a
- Keep pipe ends sealed, both before and during installation, to avoid entry of moisture
- Suspend pipes with hangers or straps and seal openings around pipe penetrations with flexible material
- Consider pipe expansion and leave space between pipes and adjacent structures
- Use brazing shields where required
- When brazing in the vicinity of valves likely to be affected by heat, they shall be lagged with a wet cloth
- All brazing operations must be completed with a small steady stream of nitrogen passing through the pipe-work to limit scale build up and moisture contamination
- Never use the unit compressor as a vacuum pump

## 6.1 Piping Design

- Pipe-work shall be installed in a manner which prevents drainage of liquid into the compressor and ensures adequate oil return
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- The burning performance of the insulation material should be over 120°C.
- The insulation materials should be also chosen according to the local law.
- The thickness of insulation layer shall be above 10mm. If in hot or wet environment place, the layer of insulation should be thicker accordingly
- **Both the liquid and vapour line shall be separately insulated**
- Be sure not to bind the insulation material over tight, it may extrude out the air in the material to cause bad insulation and cause early aging of the material.
- Pipes should be run as directly as possible between indoor and outdoor units
- **If the indoor coil is located above the condensing unit the suction line shall have a loop at the evaporator outlet to prevent refrigerant drainage into the compressor during off cycle (see Fig. 17)**
- If the evaporator is located below the condensing unit, then the suction riser shall be U-Trapped at 3m above ground level (see Fig 17)
- Avoid burying pipes below ground. If necessary, they shall be insulated and encased in a PVC pipe, sealed at both ends where the pipe exits above ground. The buried distance shall not exceed 5 metres and a liquid line solenoid valve, interlocked with the compressor, shall be located adjacent to the indoor unit.
- Care should be taken if running pipe-work within wall cavities as this may lead to transmission of refrigerant noise into the occupied space. The use of mufflers or oil separator can help reduce potential pulsation in the discharge line

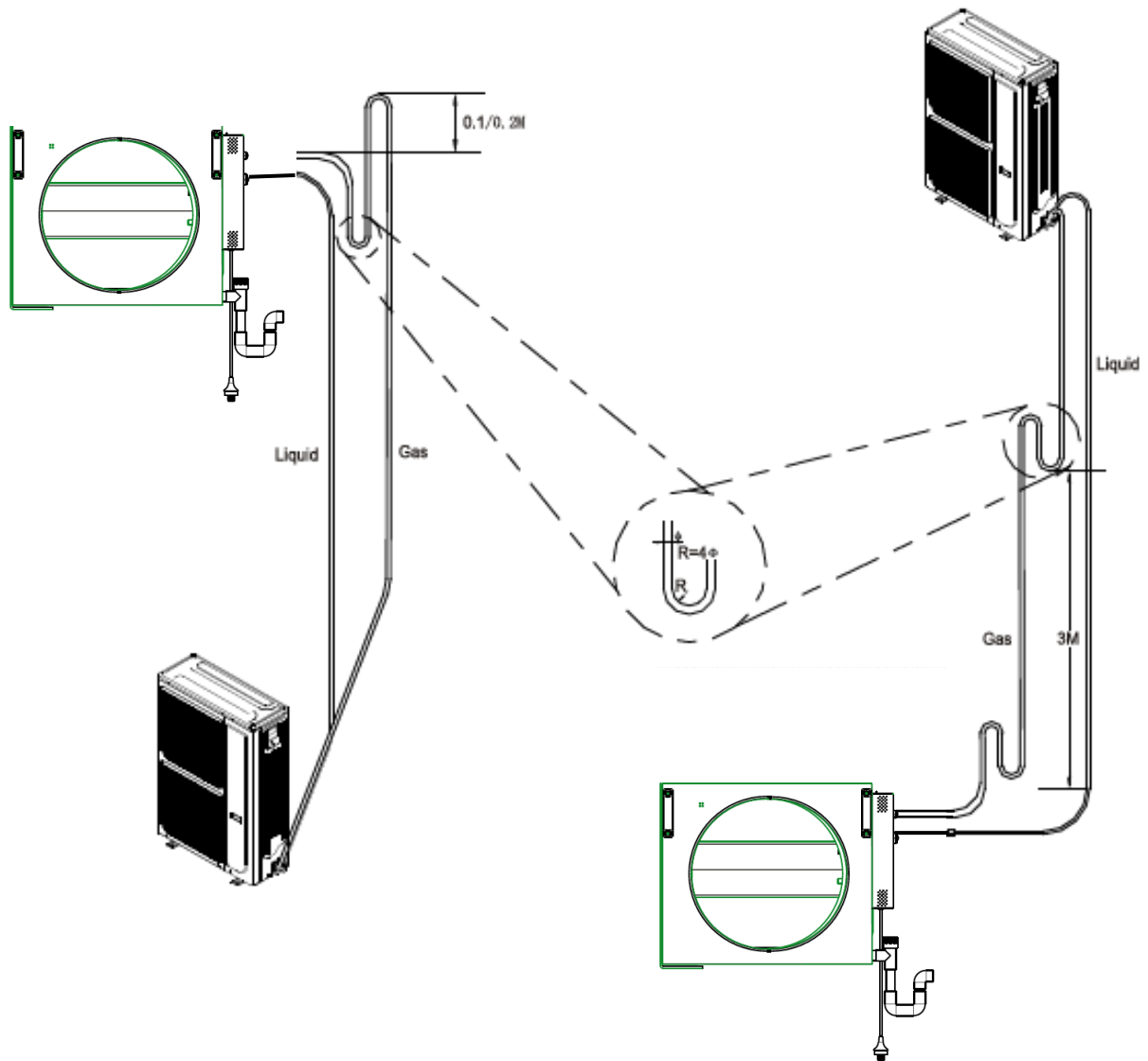


Fig. 17 – Piping Diagram

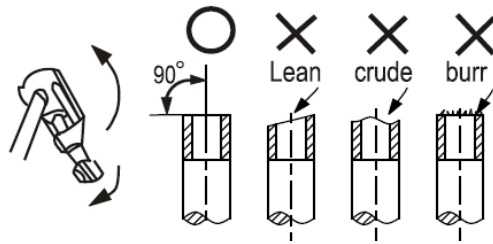
## 6.2 Pipe-work connection

### Sweat connection:

- Locate the suction & liquid pipe service valves in the compressor compartment by removing the service access panel
- Check that the service valves are tightly closed (Service Ball valves have been provided for suction and liquid lines)
- Wrap each valve in turn with a wet cloth prior to sweating off its associated blanking plate (Flare nut connection is fitted on some of the indoor units to avoid brazing)
- Braze the interconnecting liquid and suction pipes from the indoor unit
- Pressurise the indoor unit & pipe-work again with dry nitrogen and check for any brazed joint leaks. Repair as necessary but ensure the system is not under pressure prior to brazing
- With the indoor unit pressure again released, evacuate to a vacuum pressure of 100 microns minimum
- Disconnect the vacuum pump whilst retaining the system vacuum
- Open the liquid line valve fully first, and then the suction line valve

### Flare connection:

- Cut the pipe with pipe cutter

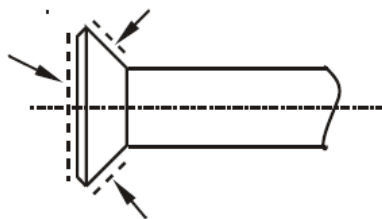


- Insert the flare nut into the pipe and flare the end
- Refer to the following table for the dimension of flare nut spaces:

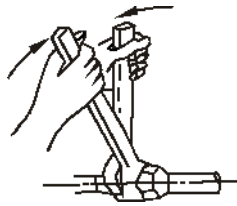
Pipe Gauge	Tightening Torque	Flare Dimensions 'A'	
		Minimum (mm)	Maximum (mm)
Ø 6.4	14.2 ~ 17.2 N.m (144 ~ 176 kgf.cm)	8.3	8.7
Ø 9.5	32.7 ~ 39.9 N.cm (333 ~ 407 kgf.cm)	12.0	12.4
Ø 12.7	49.5 ~ 60.3 N.m (504 ~ 616 kgf.cm)	15.4	15.8
Ø 15.9	61.8 ~ 75.4 N.m (630 ~ 770 kgf.cm)	18.6	19.0
Ø 19.0	97.2 ~ 118.6 N.m (990 ~ 1210 kgf.cm)	22.9	23.3

Table 3 – Flare Dimensions and Flare Tightening Torque

- Connect the indoor unit first and then the outdoor unit.
- Bend the refrigerant pipe in the correct way to prevent damage.
- The bending angle should not exceed 90°.
- The preference is to place any bends in the middle of the pipe. The larger the bending radius the better, as it reduces internal pressure drop.
- Do not bend pipe more than is necessary.
- When connecting the flare nut, coat the flare both inside and outside with approved oil and initially tighten by hand 3 or 4 turns before tightening firmly.



- Be sure to use both a spanner and torque wrench together when connecting/disconnecting pipe to/from the unit.



**NOTE:** Too large torque will harm the bell-mouthing and too small will cause leakage. Please determine the torque according to the table below. Leak test the unit after finishing the connection.

Tightening Torque N•M (Turn clockwise to close)				
Stop Valve size	Shaft (valve body)		Cap (valve lid)	Maintenance Nut
Ø 6.4	5.4 ~ 6.6	Hexagonal wrench 4 mm	13.5 ~ 16.5	11.5 ~ 13.9
Ø 9.5			18 ~ 22	
Ø 12.7	8.1 ~ 9.9	Hexagonal wrench 6 mm	23 ~ 27	
Ø 15.9	13.5 ~ 16.5	Hexagonal wrench 10 mm	36 ~ 44	
Ø 22.2	27 ~ 33	Hexagonal wrench 10 mm	36 ~ 44	
Ø 25.4				

**Table 4 – Service Valve Tightening Torque**

## 6.3 Expelling the air with the vacuum pump

### Stop Valve opening / Closing

**Opening:** Remove the cap and turn the valve counter-clock wise (with the hexagon wrench) until the shaft stops. Do not apply excessive force to stop the valve. Doing so may damage the valve as the valve is not a backseat type. Always use the correct tools. Make sure to tighten the cap securely.

**Closing:** Remove the cap and turn the valve clockwise with the hexagon wrench. Securely tighten the valve until the shaft contacts the main body seal. Please make sure to tighten the cap securely and refer to Table 4 for the tightening torque.

### Using the vacuum pump

- Loosen and remove the service port nuts of stop valves A and B, and connect the charging hose of the manifold valve to the service port of isolation valve A. Ensure that the isolation valves A and B are both closed.
- Connect the charging hose with the vacuum pump.
- Open the Low-side valve of the manifold completely.
- Turn on the vacuum pump. At the beginning of pumping, loosen the service valve nut of isolation valve B a little to check for air entering (the sound of the pump will change, and the manifold gauge reads below zero). Then close the service valve.
- When evacuation is complete, close the Lo-side valve of the manifold gauge completely and turn off the vacuum pump. Let the system hold for 15 minutes or more and check that the pressure does not rise, suggesting a system leak.
- Loosen and remove the cap of isolation valves A and B to open stop valve A and B completely, then fasten the cap.
- Disassemble the charge hose from the service port of the isolation valve A, and fasten the nut.

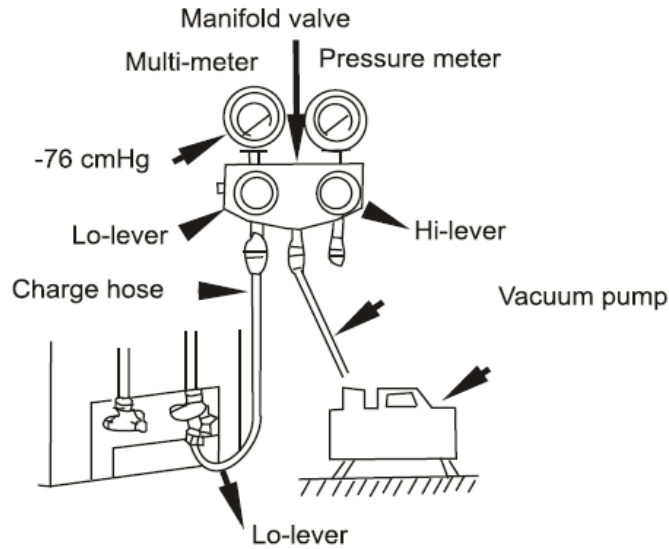
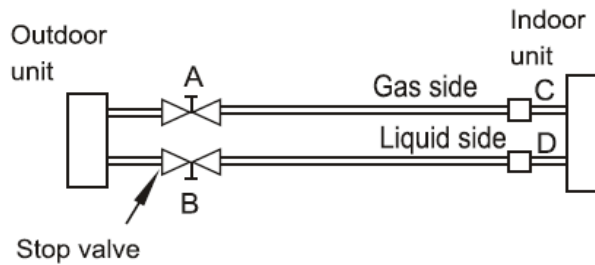


Fig. 18 – Vacuum Pump Application

## 6.4 Charging the system

Once all electrical connections are correctly made, the unit is ready to be commissioned. Refrigerant may only be added after performing a leak test and system evacuation.

Start the system in cool mode and allow it to stabilise before checking liquid line sub-cooling and compressor suction superheat. Refer to Start Up and Commissioning procedures (Section 7).

- The system is pre-charged with R410a refrigerant for 15m actual pipe length
- For lengths greater than 15m, additional charge is required. This is done by starting the unit and using it to draw refrigerant (liquid only) through the compressor suction pipe Schrader valve, located in the compressor compartment. Refer to Section 6.2.
- Refrigerant containers should be opened slowly to avoid injury.
- Always use protective gloves and protect your eyes when charging refrigerant.

### Refrigerant Charge Adjustment

The outdoor unit is pre-charged with refrigerant for a 15 m pipe run.

Please calculate the refrigerant adjustment required according to the diameter and length of the liquid line pipe of the indoor/outdoor connection.

System Refrigerant Adjustment		
Less than 15m	REMOVE Refrigerant	30g/m for Ø9.52 liquid line OR 60g/m for Ø12.7 liquid line
More than 15m	ADD Refrigerant	

**The correct measurement and assessment of superheat and sub-cooling values should be the only measures used to confirm correct system charge.**

- Superheat should be between 4 and 9K
- Sub-cooling should be between 2 and 8K
- Discharge gas temperature should not exceed 130°C in any circumstances
- Do not overcharge.

## 7.0 Start-Up and Commissioning

- Ensure that a Return Air Filter is fitted prior to fan start up
- Measure and record the system details as noted under PRELIMINARY SYSTEM INFORMATION and check all items as noted under PRE START-UP on the Commissioning Sheet provided
- Switch the unit on in cooling mode with the thermostat set to minimum temperature set point
- Measure and record all items as noted under OPERATION CHARACTERISTICS on the Commissioning Sheet provided
- Check suction and liquid pressures
- Care must be taken to charge the system correctly. Undercharge will result in lack of capacity and the unit may lock out on its LP (Low Pressure) safety switch. Overcharge will result in high head pressures whilst unit is operating
- Measure the compressor suction pressure and convert to a compressor saturated suction temperature (CSST) using R410a refrigerant pressure/temperature table
- Measure the suction line temperature (SLT) approximately 100mm before the compressor
- Calculate the superheat (SH) = SLT – CSST
- Measure the compressor discharge pressure and convert to a condensing temperature (CT) using R410a refrigerant pressure / temperature table
- Measure the liquid line temperature (LLT) between the outdoor coil and indoor unit throttling device in cooling mode
- Calculate the sub-cooling (SC) = CT – LLT
- Measure the outdoor ambient air temperature
- Measure the indoor return and supply air dry bulb temperatures, both before and after the indoor coil
- Measure the indoor air quantity ensuring it falls within the Indoor Coil's limits
- Adjust the fan speed to suit the static pressure and air quantity requirements
- Allow system pressure to stabilise for a minimum of 20 minutes
- Instruct the customer on system capability and correct operation
- Please ask the customer to fill in the CUSTOMER DETAILS section and to register their product warranty with Brivis

R410a Pressure-Temperature chart					
Saturated Temperature °C	Gauge Pressure kPa	Saturated Temperature °C	Gauge Pressure kPa	Saturated Temperature °C	Gauge Pressure kPa
-40	79	-4	602	32	1866
-38	95	-2	648	34	1968
-36	113	0	697	36	2073
-34	132	2	749	38	2183
-32	152	4	803	40	2297
-30	174	6	859	42	2415
-28	196	8	918	44	2537
-26	221	10	980	46	2664
-24	246	12	1045	48	2796
-22	274	14	1113	50	2932
-20	303	16	1183	52	3073
-18	334	18	1257	54	3219
-16	366	20	1334	56	3371
-14	400	22	1414	58	3527
-12	436	24	1497	60	3689
-10	475	26	1584	62	3857
-8	515	28	1674	64	4031
-6	557	30	1768	66	4210

**Table 5– Saturated Pressure-Temperature R410a**

**FAILURE TO COMPLETE PROPER START UP AND COMMISSIONING MAY VOID BRIVIS PRODUCT WARRANTY**

## 7.1 Sequence of Operation

Check correct sequence of operation, then proceed to instruct customer on correct thermostat operation for refrigerated cooling. Refer to the thermostat operating instructions.

### **Ventilation**

Set the thermostat to the fan only mode. The fan only will start and operate continuously.

### **Cooling**

On a call for cooling the compressor and outdoor fan/s will start and cycle in response to the thermostat to maintain the desired room temperature. The heater's fan will operate continuously or will cycle with compressor depending on the selected fan mode.



7.2 Cooling Capacity

**DONSC10Z71 / DINLU10Z7 (678 L/s)**

Air Temperature Entering Outdoor Unit °C		Return Air Temperature							
		Dry Bulb°C		Wet Bulb°C		Dry Bulb°C		Wet Bulb°C	
		21	15	27	19	32	23		
21	TC KW	10.34		10.84		11.04			
	SC KW	7.83		8.21		9.60			
28	TC KW	9.84		10.34		10.64			
	SC KW	9.34		8.14		9.47			
35	TC KW	9.34		10.01		10.44			
	SC KW	7.64		8.26		9.40			
43	TC KW	8.94		9.34		9.64			
	SC KW	7.67		7.83		9.16			
50	TC KW	8.43		8.94		9.24			
	SC KW	7.50		7.77		9.07			

**DONSC13Z71 / DINLU13Z7 (697 L/s)**

Air Temperature Entering Outdoor Unit °C		Return Air Temperature							
		Dry Bulb°C		Wet Bulb°C		Dry Bulb°C		Wet Bulb°C	
		21	15	27	19	32	23		
21	TC KW	13.51		14.16		14.42			
	SC KW	10.16		10.65		12.45			
28	TC KW	12.85		13.51		13.90			
	SC KW	12.12		10.57		12.29			
35	TC KW	12.20		13.07		13.63			
	SC KW	9.91		10.72		12.20			
43	TC KW	11.67		12.20		12.58			
	SC KW	9.96		10.16		11.89			
50	TC KW	11.01		11.67		12.06			
	SC KW	9.74		10.08		11.77			

**DONSC15Z71 / DINLU15Z7 (830 L/s)**

Air Temperature Entering Outdoor Unit °C		Return Air Temperature							
		Dry Bulb°C		Wet Bulb°C		Dry Bulb°C		Wet Bulb°C	
		21	15	27	19	32	23		
21	TC KW	15.06		15.78		16.07			
	SC KW	10.91		11.45		13.38			
28	TC KW	14.32		15.06		15.49			
	SC KW	13.03		11.36		13.20			
35	TC KW	13.60		14.57		15.20			
	SC KW	10.65		11.52		13.11			
43	TC KW	13.01		13.60		14.03			
	SC KW	10.70		10.92		12.78			
50	TC KW	12.28		13.01		13.44			
	SC KW	10.46		10.83		12.65			

**DONSC17Z71 / DINXU17Z7 (956 L/s)**

Air Temperature Entering Outdoor Unit °C		Return Air Temperature							
		Dry Bulb°C		Wet Bulb°C		Dry Bulb°C		Wet Bulb°C	
		21	15	27	19	32	23		
21	TC KW	16.78		17.59		17.92			
	SC KW	12.81		13.43		15.71			
28	TC KW	15.96		16.78		17.27			
	SC KW	15.29		13.33		15.50			
35	TC KW	15.15		16.24		16.94			
	SC KW	12.50		13.52		15.38			
43	TC KW	14.50		15.15		15.64			
	SC KW	12.56		12.82		15.00			
50	TC KW	13.68		14.50		14.99			
	SC KW	12.28		12.71		14.84			

**Table 6 - Expanded Ratings:**  
Based on Rated Airflow

TC = Total Cooling Capacity  
SC = Sensible Cooling

## 7.3 Specifications

### Brivis ICE Inverter - Technical Specifications

System Overview			10	13	15	17
Nominal Capacity	kW		10	13	15	17
Power Supply	V-Ph-Hz	220~240-1-50				
Cooling	Rated Capacity	kW	10.01	13.07	14.57	16.24
	Capacity Range		4.8 ~ 11.0	6.3 ~ 14.0	7.5 ~ 16.0	8.3 ~ 16.6
	Rated Input Power	W	3.20	4.08	4.67	5.18
	Rated Input Current	A	15.70	19.70	23.30	25.50
	AEER	W/W	3.12	3.20	3.12	3.13
<b>Outdoor Unit</b>			<b>DONSC10Z71</b>	<b>DONSC13Z71</b>	<b>DONSC15Z71</b>	<b>DONSC17Z71</b>
Power Supply	V-ph-Hz	220~240-1-50				
Maximum Input Power	W	3500	5100	5400	5500	
Maximum Input Current	A	18.0	23.0	25.0	27.0	
Recommended Circuit Breaker Size		25	32	32	32	
Compressor	Type	Twin Rotary				
Outdoor Air Flow	L/s	1528	1944	2000	2083	
Sound Pressure Level @ 1m	dB(A)	61	62	62	62	
Sound Power Level		70	71	71	71	
Dimensions	Net (L x W x H)	mm	946 x 410 x 810	952 x 415 x 1333	952 x 415 x 1333	952 x 415 x 1333
	Packing (L x W x H)		1090 x 500 x 865	1095 x 495 x 1480	1095 x 495 x 1480	1095 x 495 x 1480
	Net / Gross Weight		kg	68.5 / 74	100/114	116/130
Refrigerant Piping	Type	R410A				
	Charged Volume	kg	3.8	4.5	4.9	5.8
	Design Pressure	MPa	4.2 / 1.5	4.2 / 1.5	4.2 / 1.5	4.2 / 1.5
	Pre-Charged Length	m	15	15	15	15
	Charge Adjustment (Add or Remove)	g/m	30	30	30	60
Refrigerant Piping	Liquid / Gas	mm	Φ9.5 / Φ15.9	Φ9.5 / Φ19.0	Φ9.5 / Φ19.0	Φ12.7 / Φ22.22
	Maximum Pipe	m	65	65	65	55
	Maximum Vertical Separation		30	30	30	30
Ambient Temperature Limits	°C	-15 ~ 50				
<b>Indoor Unit</b>			<b>DINLU10Z7</b>	<b>DINLU13Z7</b>	<b>DINLU15Z7</b>	<b>DINXU17Z7</b>
Power Supply	V-Ph-Hz	220~240-1-50				
Power Connection	Type	3m Power Cord & Plug				
Maximum Input Current	A	< 0.1	< 0.1	< 0.1	< 0.1	
Rated Input Power	W	10	10	10	10	
Airflow	Rated	L/s	678	697	830	956
	Minimum		500	550	620	850
Coil Static Pressure Drop	@ Rated Airflow (Dry / Wet)	Pa	48 / 58	50 / 60	65 / 80	92 / 122
	@ Minimum Airflow (Dry / Wet)		33 / 38	35 / 40	48 / 60	73 / 98
Dimensions	Net (L x W x H)	mm	823 x 540 x 678	823 x 540 x 678	823 x 540 x 678	777 x 811 x 549
	Packing (L x W x H)		900 x 600 x 680	900 x 600 x 680	900 x 600 x 680	790 x 910 x 684
	Net / Gross Weight		kg	31 / 32	31 / 32	40 / 41
Moisture Removal	L/h	2.4	3.2	3.5	4.3	
Duct Connection (Outlet)	mm	Φ400	Φ450	Φ450	Φ450	
Duct Connection (Inlet)		Φ400	Φ400	Φ400	Φ400	
Condensate Drain Pipe Diameter		IDΦ25	IDΦ25	IDΦ25	IDΦ25	
Refrigerant Piping		Liquid / Gas	Φ9.5 / Φ15.9	Φ9.5 / Φ19.0	Φ9.5 / Φ19.0	Φ12.7 / Φ22.22
Operating Temperature Limits		°C	19 ~ 32			
© Brivis Climate Systems. All specifications are subject to change without notification. Equipment rated in accordance with AS 3823.3 - 2009 with 5m charge						

Table 7 – Brivis ICE INVERTER - Technical Specifications

## 7.4 Commissioning Sheet

Installer; please complete all sections of this form.

### SYSTEM INFORMATION

ICE MODEL (Outdoor Unit)		SERIAL No. (Outdoor Unit)	
ICE MODEL (Indoor Unit)		SERIAL No. (Indoor Unit)	
HEATER MODEL		HEATER SERIAL No.	
INSTALLED BY/ DATE			

**PRE START-UP** (Please tick boxes below as each item is completed).

<input type="checkbox"/>	<b>VERIFY THAT ALL PACKAGING MATERIALS HAVE BEEN REMOVED FROM UNIT.</b>
<input type="checkbox"/>	<b>REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS, AS PER INSTALLATION INSTRUCTIONS.</b>
<input type="checkbox"/>	<b>CHECK THAT CONDENSATE CONNECTION IS INSTALLED, AS PER INSTALLATION INSTRUCTIONS.</b>
<input type="checkbox"/>	<b>CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS.</b>
<input type="checkbox"/>	<b>CHECK THAT INDOOR RETURN AIR FILTER IS CLEAN AND IN PLACE.</b>
<input type="checkbox"/>	<b>VERIFY THAT UNIT INSTALLATION IS LEVEL.</b>
<input type="checkbox"/>	<b>CHECK FANS FOR ALIGNMENT AND NOISE.</b>

### OPERATION CHARACTERISTICS

(Please record the following data after at least 20 minutes running time).

<b>Suction Pressure</b>		<b>kPa</b>
<b>Suction Line Temperature</b>		<b>°C</b>
<b>Discharge Pressure</b>		<b>kPa</b>
<b>Liquid Line Temperature</b>		<b>°C</b>
<b>Superheat</b>		<b>K</b>
<b>Sub-cooling</b>		<b>K</b>
<b>Compressor Amps (L1)</b>		<b>A</b>
<b>Indoor coil Air On (Return) Temperature</b>		<b>°C DB</b>
<b>Indoor coil Air Off (Supply) Temperature</b>		<b>°C DB</b>
<b>Outdoor air Temperature (Ambient)</b>		<b>°C DB</b>
<b>Length of liquid line</b>		<b>m</b>
<b>Length of suction line</b>		<b>m</b>
<b>Liquid line Diameter</b>		<b>mm</b>
<b>Suction line Diameter</b>		<b>mm</b>
<b>Extra refrigerant quantity charged (if any)</b>		<b>kg</b>
<b>Supply voltage</b>		<b>V</b>
<b>Actual voltage</b>		<b>V</b>

# Rinnai

# brivis

by **Rinnai**

## **Rinnai Australia Pty. Ltd.**

ABN 74 005 138 769

100 Atlantic Drive  
Keysborough, Victoria 3173

P.O. Box 460  
Braeside, Victoria 3195

AU45204

Rinnai has a Service and Spare Parts network with personnel who are fully trained and equipped to give the best service on your Rinnai appliance. If your appliance requires service, please call our National Help Line. Rinnai recommends that this appliance be serviced at least every 2 years.

With our policy of continuous improvement, we reserve the right to change, or discontinue at any time, specifications or designs without notice.

## **Product Sales & Service National Help Line**

Tel: **1300 555 545\*** Fax: **1300 555 655**

\*Monday to Friday, 8.00am to 5.30pm EST

For further information visit **[www.rinnai.com.au](http://www.rinnai.com.au)**  
or email **[enquiry@rinnai.com.au](mailto:enquiry@rinnai.com.au)**