Split Air-Conditioning Units

Electrical Fact Sheet Split Air-Conditioning Units

Access Canberra Electrical Inspections team provide this guidance to electricians in the ACT on some emerging issues affecting the electrical industry.

Wiring Systems For Air-conditioning and Heat Pump Systems

This fact sheet provides guidance to clarify some of the possible effects of AS/NZS 3000:2018 clause 4.19 has in the requirements for isolating electrical supply to Air-conditioning Systems where the compressor and internal units are separate from each other. Often referred to as split systems.

This fact sheet also replaces the previous 2016 fact sheet on the same subject.

4.19 AIR-CONDITIONING AND HEAT PUMP SYSTEMS

Air-conditioning and heat pump systems incorporating a compressor shall be provided with an isolating switch (lockable) in accordance with Clause 2.3.2.2, installed adjacent to but not on the unit, which isolates all parts of the system, including ancillary equipment, such as head units, from the same location.

For split system air-conditioning units, where the manufacturer requires the air-conditioning system to be connected to the electricity supply by means of a plug and socket at the internal unit, the isolating switch installed at the external unit shall control the socket-outlet located at the internal unit.

For air-conditioning systems (including room heaters incorporating a compressor) where the internal unit (or units) are supplied from a circuit separate to that of the compressor, a warning sign shall be permanently fixed on or adjacent to the compressor isolator indicating that the isolator does not isolate the ancillary equipment. Where the internal unit (or units) are not connected by plug and socket, an independent isolating switch (lockable) in accordance with Clause 2.3.2.2 shall also be installed adjacent to each separately supplied internal unit (or units).

Exceptions:

1. *The isolating switch may be installed at the switchboard supplying the system if the switchboard is dedicated to the equipment (e.g. an air-conditioning plant room).*
2. *This Clause need not apply to unitary window or through-wall air-conditioners, nor to heat pump hot water services that are supplied by a plug and socket-outlet installed adjacent to the unit.*

The Objective of AS/NZS 3000:2018 Clause 4.19

The aim or objective of AS/NZS 3000:2018 clause 4.19 to ensure that there is isolation of electrical supply to Air-conditioning and Heat Pump Systems to allow electrical and/or Refrigeration and Air-conditioning workers to safely work on these systems.

Further, the clause provides requirements to;

- Ensure an external compressor can be safely isolated and worked on, without having to gain access to the internal units.
- To state that external isolators are required, and where they are placed.
- To provide external isolation of internally supplied plug and socket systems.

The requirement to have an isolator at the internal fan unit is found in AS/NZS 3000:2018 clause 4.19.

Typical Drawings

The typical drawings provided below in this electrical fact sheet explain the different isolation requirements of the clause. They are typical only and not meant to convey the only method for compliance.

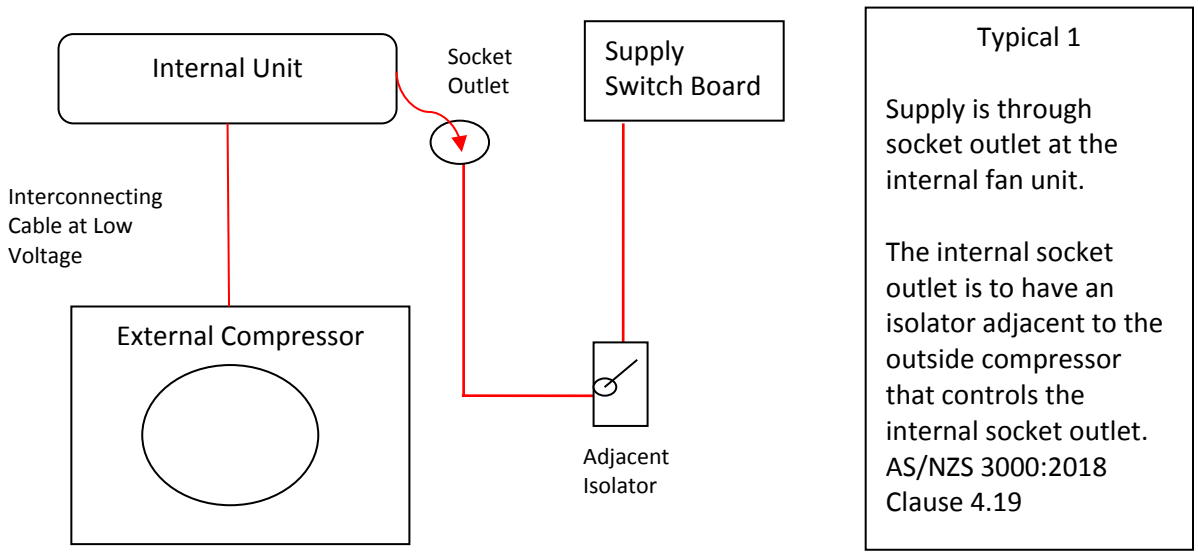
Please Note

ELV = Extra-Low Voltage. Not exceeding 50 V a.c. or 120 V ripple-free d.c.
LV = Low Voltage. Exceeding extra-low voltage, but not exceeding 1000 V a.c. or 1500 V d.c.

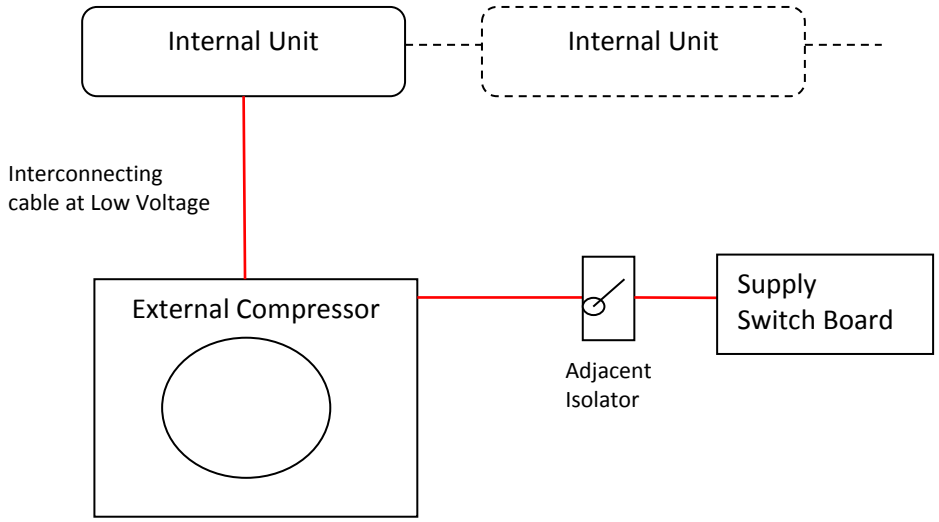
Please Note

Electrical wiring work on Low Voltage (LV) wiring systems requires an Unrestricted Electrical Licence. A Restricted Electrical Licence holder may disconnect and reconnect LV only, that licence class does not permit the installation of LV wiring systems.

Typical 1 – Socket Outlet



Typical 2 – Internal Unit Supply From Compressor

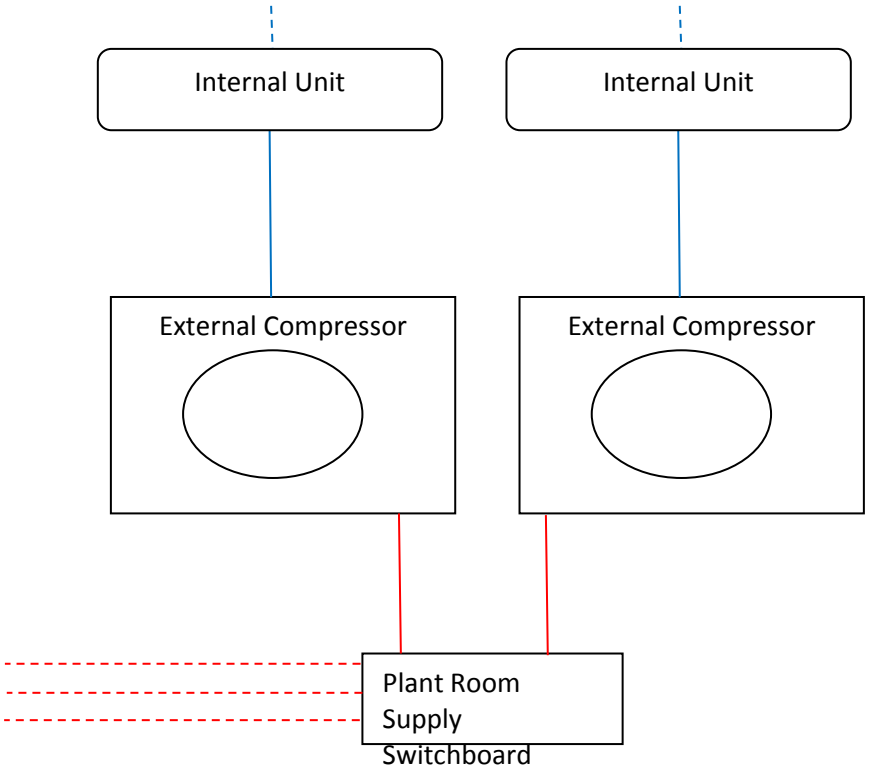


Typical 2

Supply is through an isolator adjacent to the outside compressor, then to internal fan units via the Interconnecting cable.

AS/NZS 3000:2018 Clause 4.19

Typical 3 - Plantrooms

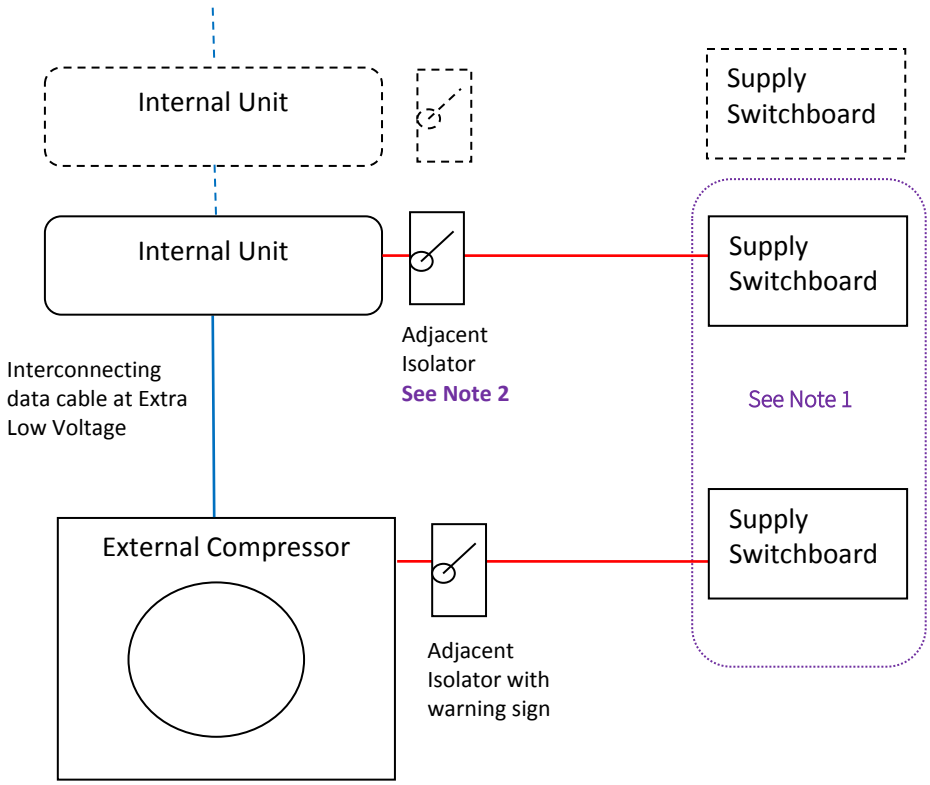


Typical 3

Supply is through a ***dedicated*** switchboard in the plant room, the individual compressor isolators can be omitted.

Supply board to meet the requirements of AS/NZS 3000:2018 clause 2.3.6 for isolation.

Typical 4 – Internal Unit Supply From Local Switch Board, With ELV Interconnect



Typical 4

Supply is through an isolator adjacent to the outside compressor, for the compressor only.

There is a separate supply to internal fan units. (Including reheat coils) with local isolator

Where the interconnecting cable is Low Voltage (LV) and isolated by the compressor isolator Warning - Dual Supply signs are required at the internal units.

A warning sign at external isolator, *indicating that the isolator does not isolate the ancillary equipment* is required

Note 1.

Supply can be from separate switchboards or the same switchboard with separate circuits.

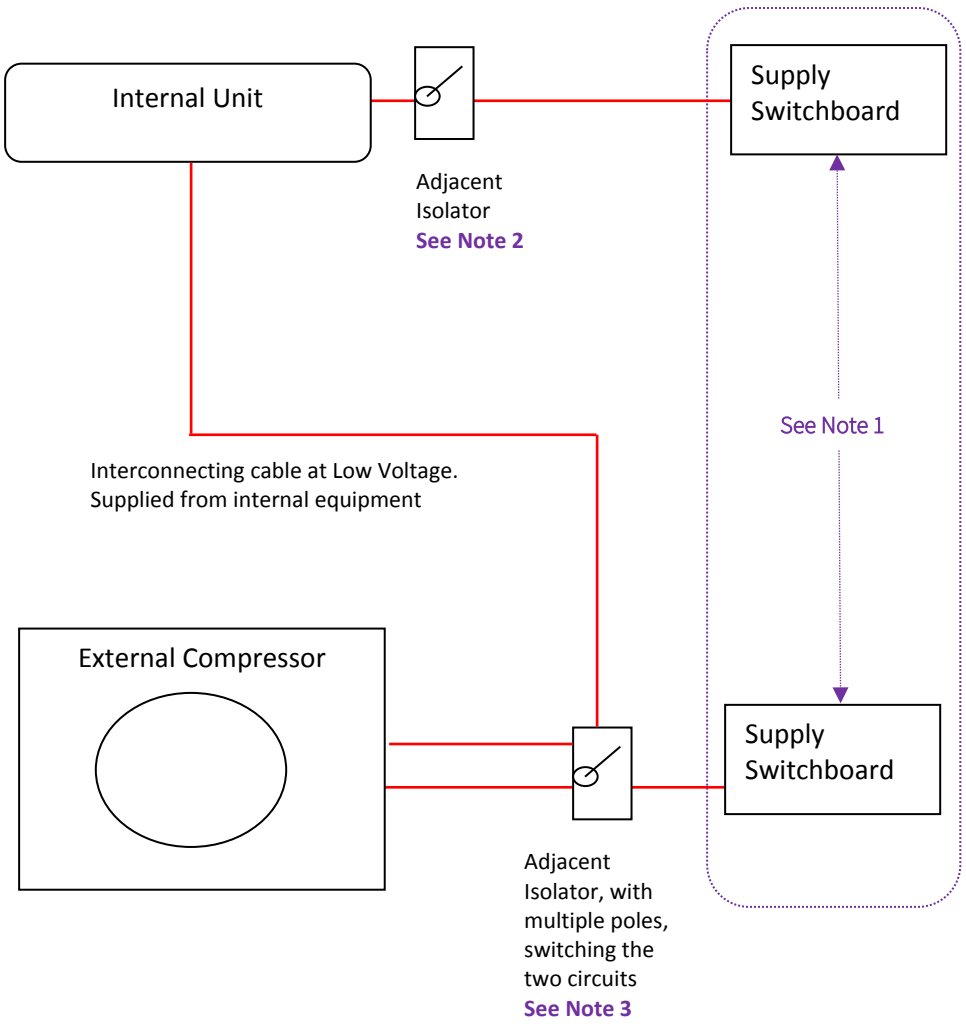
Note 2.

AS/NZS 3000:2018 clause 4.19 requires an isolator adjacent to the internal fan unit unless supplied from a switchboard (SWB) dedicated to the equipment. For the purposes of this clause, where the SWB is in the same room with a lockable circuit breaker, the electrical inspections team would also consider this exception is met.

Additionally, AS/NZS 3000:2018 clause 4.13.1.1 *Switching devices* – Exception 2 would provide further exemptions for an isolator where the fan motor was;

- connected by a plug and socket-outlet; or
- incorporated in an appliance having no exposed moving parts; or
- rated at not greater than 150 VA.

Typical 5 – Internal Unit Supply From Local Switch Board, With LV Interconnect



Typical 5

Supply to the compressor is through an isolator adjacent to the outside compressor.

There is a separate Low Voltage (LV) supply to internal fan units from a local switchboard.

The interconnecting cable is at Low Voltage (LV) supplied from the internal unit.

AS/NZS Clauses 4.19 requires the compressor to have an isolator that isolates it from all supplies.

Warning - Dual Supply signs are required at compressor and internal units.
A warning sign at external isolator, *indicating that the isolator does not isolate the ancillary equipment* is required

Note 1.
Supply can be from separate switchboards or the same switchboard with separate circuits.

Note 2.
AS/NZS 3000:2018 clause 4.19 requires an isolator adjacent to the internal fan unit unless supplied from a switchboard (SWB) dedicated to the equipment. For the purposes of this clause, where the SWB is in the same room with a lockable circuit breaker, the electrical inspections team would also consider this exception is met.

Additionally, AS/NZS 3000:2018 clause 4.13.1.1 *Switching devices* – Exception 2 would provide further exemptions for an isolator where the fan motor was;

- connected by a plug and socket-outlet; or
- incorporated in an appliance having no exposed moving parts; or
- rated at not greater than 150 VA.

Note 3.
The isolator adjacent to the external compressor needs to isolate **all** LV to the compressor.
Warning - Dual Supply signs are required at compressor and internal units

General Requirements

Identification

In all commercial applications or, multi-residential installations where the compressor is not in the residential unit it is supplied from, the isolator is to be legibly and permanently identified for its intended use and the circuit identification for isolation is to be included.

> ***AS/NZS 3000:2018 clause 2.3.6.4*** *Identification*
>
> *Devices for shutting down for mechanical maintenance shall be placed and marked so as to be readily identifiable and convenient for their intended use.*

Manufactures Instructions

The manufactures instructions will provide important information on the supply cable size, circuit breaker size, maximum demand and the type of Residual Current Device (RCD) that is required. At all times the additional requirements of the manufactures instructions are to be followed.

Current Rating

For the purposes of AS/NZS 3000:2018 Clause 3.4 Current-Carrying Capacity;

The wiring system for supply to the Air Conditioning system is to be as per the **Manufactures Instructions**. Where they are not available the wiring system is to be rated to meet the Maximum Current rating of the appliance as displayed on the appliance label.

Please Note

The circuit design should not exceed the maximum protection device rating specified in the manufactures instructions.

For the purposes of AS/NZS 3000:2018 Clause 2.2.2 Maximum Demand and Appendix C2 Maximum Demand

The Air Conditioning system maximum demand is to be as per the **Manufactures Instructions**. Where they are not available, for the maximum demand calculations the run current of the appliance may be used in the maximum demand calculations for the installation.

Residual Current Device (RCD)

The wiring system for supply to the Air Conditioning system is to be protected with a Residual Current Device (RCD) as per the **Manufactures Instructions**. Where they are not available, the final sub-circuit should be protected with a Type A, 30mA Residual Current Device (RCD).

Due to most compressors being supplied by an inverter supply, the manufacture may specify a particular type of RCD, see AS/NZS *3000:2018 clause **2.6.2.2** Types of RCD* and also this link.

Type A RCD

The *Type A* RCD work where pulsating DC is likely to be present. With the penetration of DC systems into the electrical installation a *Type A* RCD is required on certain circuits to ensure the RCD still works as intended when there is a likelihood of pulsating DC in the circuit. (See *AS/NZS 3000:2018 clause **2.6.2.2** Types of RCD*)

Type A RCD (marked with the  symbol), for which tripping is ensured:

- as for Type AC; and
- for residual pulsating direct currents.

Contact us

Access Canberra Electrical Inspections Team

Phone: 02 6207 7775 (8:30am to 4:30pm)
Email: Electrical.Inspections@act.gov.au.
Web: https://www.accesscanberra.act.gov.au

Previous electrical notices are available at this link:
https://www.accesscanberra.act.gov.au/app/answers/detail/a_id/2998/kw/electrician%20note#!tabs-5

Credits

- Clause 1.4.128 Voltage Systems; from Standards Australia publication AS/NZS3000:2018
- Clause 2.3.6.4 *Identification*; from Standards Australia publication AS/NZS3000:2018
- Clause 2.6.2.2 *Types of RCD*; from Standards Australia publication AS/NZS3000:2018
- Clause 4.13.1.1 *Switching devices*; from Standards Australia publication AS/NZS3000:2018
- Clause 4.19 *Air-Conditioning And Heat Pump Systems*; from Standards Australia publication AS/NZS3000:2018