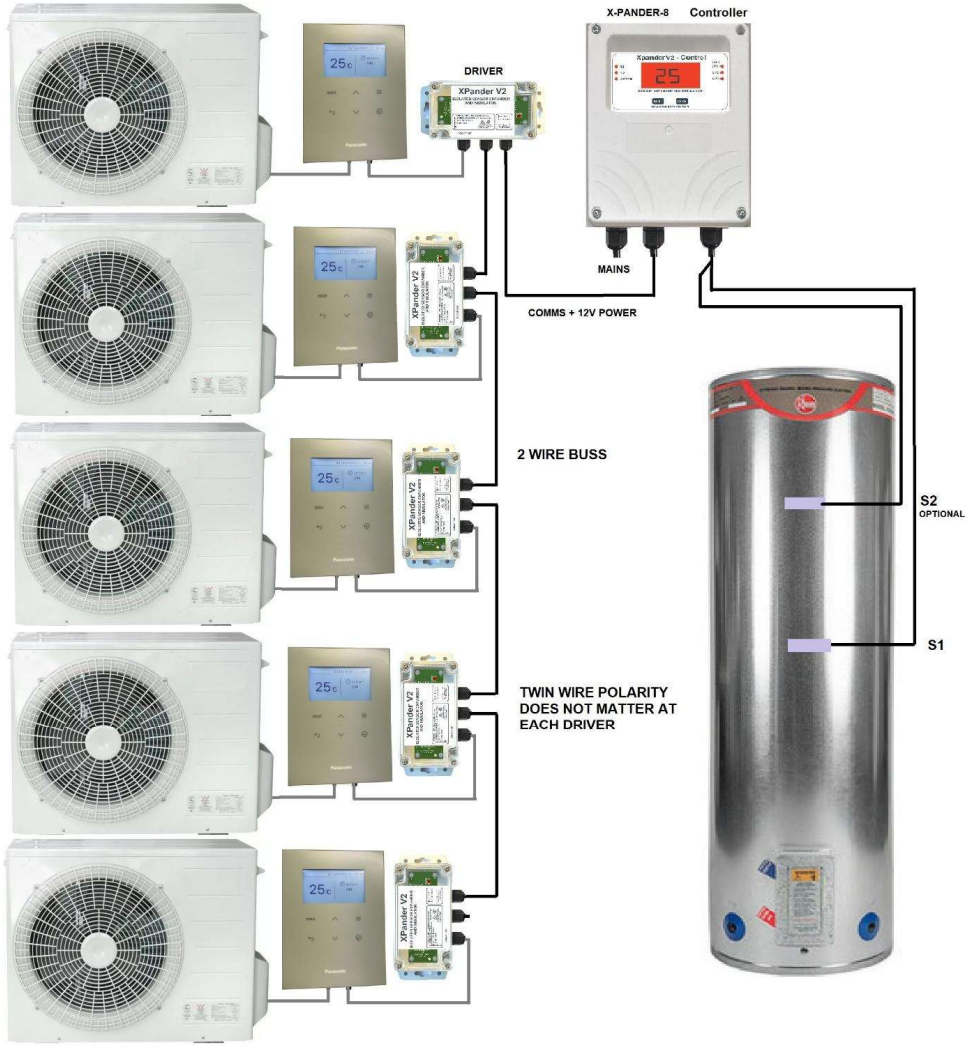
Heat-Pump Controller Sensor Xpander System



Principle of Operation

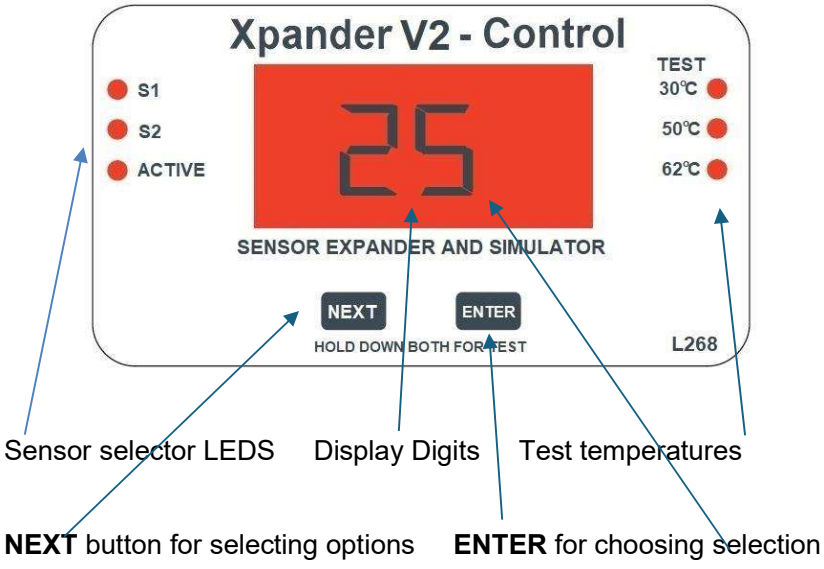
The Xpander V2 system is a sensor reader and simulator. The system consists of one controller and multiple drivers (up to 10). The controller reads the sensor/s on the tank then displays the current active temperature value on the 2-digit display along with status LEDs.

This selected temperature value is then sent to the drivers over 2 wires. The drivers turn this data into resistance at their outputs. This resistance is a simulation of the tank active tank sensor, repeated on each driver. The local Compressor controller reads this resistance and displays the temperature, then controls the compressor based on its internal settings, just like it was the only controller, and its temperature sensor was on the tank.

For added flexibility, the Xpander Controller can have 2 sensors. Either of these 2 sensors can be selected as the active sensor (the value sent to the drivers). Only 1 sensor is ever active, the other can be for reference.

Pressing NEXT will cycle through the 3 LEDs on the left of the display. There are also 3 fixed temperatures that can be selected for easy onsite testing of the compressors. Press NEXT and ENTER together at the same time to access these test settings. These selected values will remain active until the NEXT button is pressed and returned to the displayed temperature sensor again on the left side.

Controller Interface



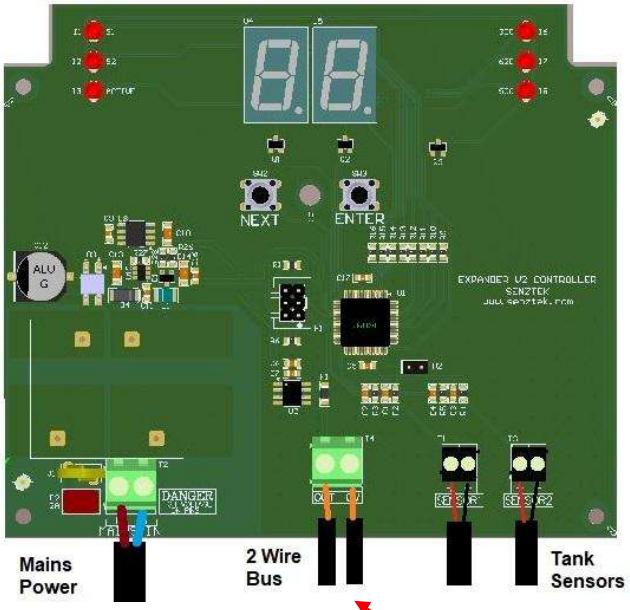
Change Active Sensor

Press both **NEXT** and **ENTER** together to advance to test values which display on the LEDs on the right side of the display

Decimal Point flashes to show that data is being sent

Controller Wiring

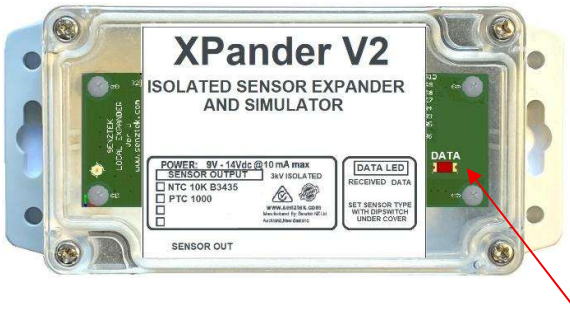
To change active sensor, press **NEXT** to select the ACTIVE LED (3rd down on the left of the display). This will display either 1 or 2, pressing **ENTER** will change and store the new selection. The controller will remember this selection even if the power is removed and reapplied.



Only Cable to add is normally the 2 wire Bus to the Drivers

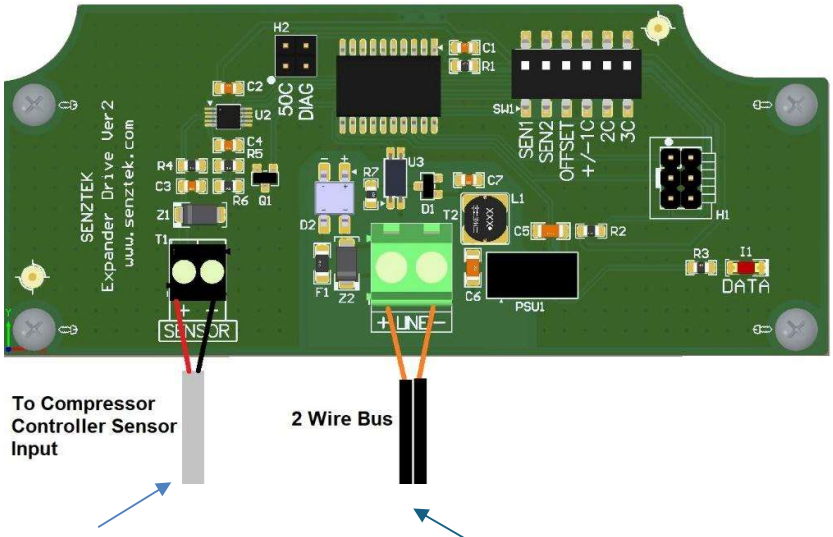
Drivers

The Drivers all wire in parallel with 2 wires from the Controller. The polarity of the wires doesn't matter at each Driver.



Data LED flashes to confirm valid data is received from the Xpander Controller. If no periodic flashing, then a possible wiring error exists.

Driver Wiring



The (new) sensor wire replaces the existing sensor on the Compressor Controller. Either use the supplied sensor replacement cable or cut the sensor cable and

The 2-wire bus should not be too thin as all the current for the drivers is shared over these wires. Typically, 2 wire mains cable or similar.

All Drivers wire in parallel over the same 2 wires, back to the Xpander V2 Controller

The bus wires are not polarity sensitive, neither are the sensor wires to the Compressor Sensor input.

Note: The Drivers do not reply to the Xpander V2 Controller. The DATA LED visible with the clear lid on, is the best way to tell if the Driver is connected properly. The **Compresso**r Controller should be reading the same temperature as displayed on the Xpander V2 Controller- if the temperature is close but not quite right see “Sensor Reading Offset” below to correct this.

Error Conditions

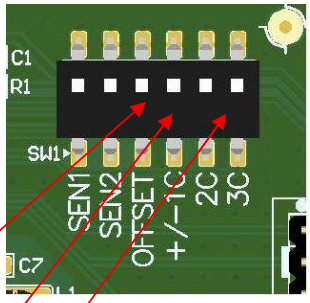
If a sensor break is read by the Xpander V2 Controller, the Expander will create a simulated sensor break at each Driver (open circuit) and a short circuit error will simulate as 0ºC

Sensor Reading Offset

Sometimes the Xpander Controller temperature readings can disagree by 1 or 2 degrees with the Heat Pump controller interface. This is usually because of various tolerances in either (or both) the Driver and the Sensor excitation on the Compressor Sensor input. These 'offsets' can be compensated for in each Driver.

Remove the cover.

Comparing the Xpander V2 Controller reading and Compressor Sensor Input reading then



slide across the OFFSET switch on the 6 way switch under the Driver cover. This will initially create a +1ºC. If the offset should be minus and not plus, slide the +/- 1C switch to create a negative offset. If 2ºC or 3ºC offsets are needed, slide the other labelled switches.

Installation

Mount the controller with the cables facing down and out of direct sunlight and weather. Mount the sensor/s on the tank into sensor wells, making sure to use heat transfer paste and sealing the well to avoid rain ingress.
Connect the Xpander V2 Drivers to the Xpander V2 Controller with UV resistant 2 core cables with an outside diameter between 3mm and 6.5mm. All Drivers are wired in parallel.
Unscrew and remove the Driver covers, pass the cables through the 12mm glands, using one gland for the cable in and one for the cable out. Cut and strip the cables to suit and screw into the terminals. Tighten the glands to secure the cables and waterproof the cable entry points. Replace the cover and the Drivers are installed.

Compressor Sensor connection

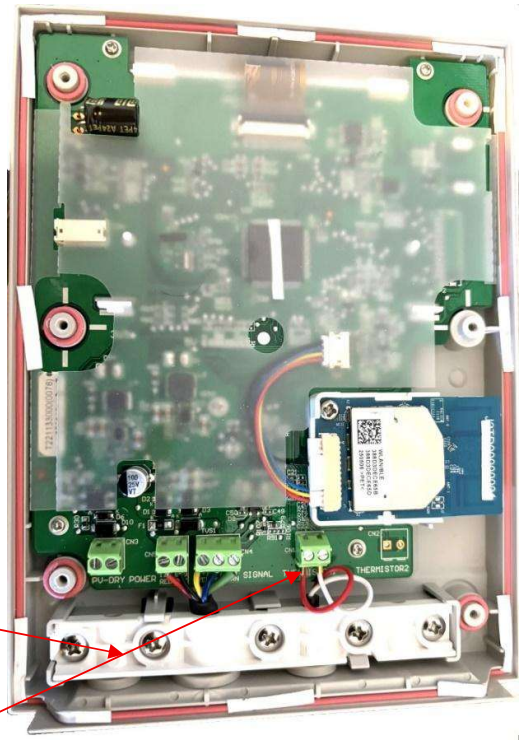
The output of the Xpander V2 Driver replaces the temperature sensor on the Compressor controller.
Example:
Panasonic V2 WiFi controller
The Drivers come with a 1 metre lead connected to the sensor input
<u>There are two options on how to install this.</u>

1. Remove the sensor from Panasonic Controller and connect the 1 metre lead supplied with the Driver
    a. Unscrew the back off the Panasonic Controller

b. Loosen the cable clamp bar
c. Unscrew and remove the Panasonic Sensor
d. Thread through the Driver sensor cable and screw into the terminal where the sensor was.
e. Retighten the clamp bar and replace the back cover

2. Cut the sensor supplied by Panasonic, strip the wires and run them into the Driver. This might affect the warrantee

Panasonic V2 Controller with back cover removed



Note: Senztek Temperature Sensors and Panasonic Temperature Sensors used on this controller have identical characteristics (10K NTC B 3435K) and can be substituted for replacement sensors

Xpander V2 Controller Specifications:

Power Supply:

Supply Voltage	230 Vac +/- 10% 50 to 60 Hz
Quiescent power usage	2VA typical

Interface:

Input:	1 or 2 temperature sensors. NTC 10K B 3435K
Displayed Range	0 – 99°C
Output:	12 Volts DC at 100mA max and serial data

EMC and Safety Compliances:

Emissions	AS/NZS 61000.6.3:2012
Safety Compliance	AS/NZS 62368.1:2022

General Specifications:

Operating Temperature	-20~60°C
Operating Humidity	5 ~ 85% RH. Non-Condensing
Enclosure Construction	Polycarbonate - Impact Resistant UL94 V-2 Non Burning, UV A & B Stabilized Water resistant to IP55
Dimensions (excluding glands and cables)	L = 167mm W = 142mm H = 40mm
Weight (Standard model + cable + packaging)	1200grams

Xpander Driver Specifications:

Power Supply:

Supply Voltage	11 to 13 Volts DC
Power usage	10mA typical

Driver:

Input:	12 volt and serial data (interrupted supply = data)
Output:	0 to 50KΩ isolated resistance
Error simulation:	Sensor break at Controller = open circuit Sensor short = 0°C
Output Isolation:	3000 Vdc

EMC:

Emissions:	AS/NZS 61000.6.3:2012

General Specifications:

Operating Temperature	0~60°C
Operating Humidity	5 ~ 85% RH. Non-Condensing
Enclosure Construction	Polycarbonate - Impact Resistant UL94-HB Flame Retardant, UV A & B Stabilized Water resistant to IP55
Dimensions (excluding glands and cables)	L = 140mm (flange included) W = 65mm H = 40mm
Weight (Standard model + cable + packaging)	150grams

Note: Do not exceed these specification limits. Exceeding these limits can result in damage to the unit and voiding of the warrantee.

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