LG TRAINING MANUAL

Spring 2011 Mini Split Air Conditioner

Mini-split- Why so different

- The refrigerant is metered in the condensing unit by the Electronic expansion valve (EEV)
- Both refrigerant lines are essentially the same pressure. High or low depending on the mode.
- Both lines of the line set need to be insulated.
- The access ports are both on the same side of the EEV and are the same pressure.
- The pressure reading on the other side of the EEV can be obtained by reading the pipe thermister.
- Units are thermister controlled. There are usually no thermostats.
- The hand held remote inputs to the board but does not control temperature.
- Compressor speed and EEV positioning are regulated by the inverter circuit. These two need to be synchronized!
- Compressor speed is frequency regulated.
- High voltage (220V) line between indoor and outdoor is polarity sensitive.

Mini-split- Why so different

With the expansion valve in the condensing unit, both lines the line set are the same pressure. There is a temperature difference between the two lines because of the temperature drop across the coil. Therefore both lines have to be insulated individually. They cannot be wrapped together. If you are in cooling mode both lines will be low pressure. If you are in heating mode both lines will be high pressure. There is no access port on the outdoor coil side of the electronic expansion valve. So attaching gauges will give you one side of your pressure split, but the other side will have to be obtained by reading the pipe thermistor and taking that reading to a pressure temperature chart. This will be covered in detail later in the manual.

One of the problems this brings up is at a service technician will approach the machine and put his gauges on the line set. He will see equal pressures. If he checks the compressor with an amp probe, he will see a very low amp draw. This usually leads to the conclusion of a bad compressor, but on a mini split these are normal operating conditions.

These units are thermistor controlled. There is no thermostat. The handheld remote only inputs information to the board. Once the information is given to the board, the handheld remote has no influence on the system operation. It can be removed from the room without affecting the machine operation.

The compressor speed is frequency controlled by the inverter circuit. This circuit also controls the electronic expansion valve. The movement of the valve and the speed of the compressor have to be perfectly coordinated. As the compressor speeds up the valve needs to open to allow more refrigerant to pass. As the compressors slows down the valve needs to close to maintain pressure.

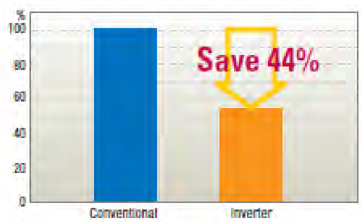
The inverter units have three wires and a ground between the indoor and outdoor units. One wire is marked as communication, and the other two wires are 230V.The units are communicating in two directions, outdoor to indoor, and indoor to outdoor. Because of this there is communication on the wire labeled for communication, and also on L2 of the power line. This is a new concept for an electrician is that there is communication on one leg of power. Therefore the power wires are polarized. L1 outside has to be connected to L1 inside. L2 outside has to be connected to L2 inside. So if you have a new installation and are showing a communication error, make sure the power lines are properly installed.

The inverter compressor will usually run between 25 and 50% of rated power. Therefore it is extremely economical to run these systems. Most will have a SEER rating between nineteen and twenty-six. This is why inverter technology and communicating machines are the coming technology in the air conditioning industry.

Mini-split- Why so different

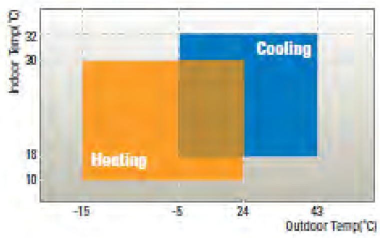
Energy Saving

Unlike ordinary Conventional air conditioners, inverter air conditioners can control the speed of compressors to adjust cooling and heating.
When indoor temperatures reach your desired levels, inverter air conditioners can operate their compressors at low speeds and maintain desired temperatures, thus saving you electricity cost by about 44% compared to conventional.



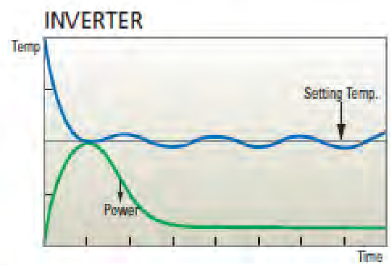
Powerful Heating Capacity

With a wide operating range in both heating and cooling modes, inverter air conditioners will cool or heat your room even in extreme outdoor temperature conditions.
Heating can be sustained even when the outdoor temperature is -15°C by Inverter technology.



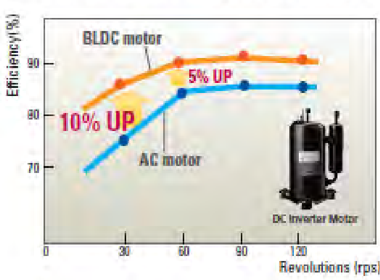
Pleasant Feeling

When the air conditioner is initially activated to either heat or cool, the compressor will operate at maximum speed to reach the desired temperature quickly. Once the desired temperature is achieved, unlike conventional air conditioners that turn the compressor on and off, LG inverter units adjust and constantly vary the compressor speed to maintain the desired temperature with minimal fluctuation to ensure that your comfort is not compromised.



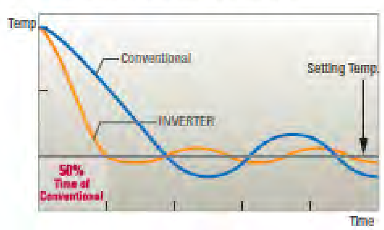
DC Inverter Compressor

The LG inverter air conditioner uses a DC Inverter compressor due to its optimized refrigeration effect, low noise and high efficiency.
DC compressor are much more efficient especially at low loads compared with conventional constant speed AC comps.



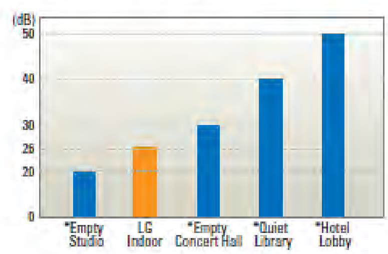
Quick Cooling & Heating

Inverter air conditioners can operate their compressors faster to give them more powerful performance.
This results in being able to attain the desired temperature much faster in both heating and cooling modes than conventional air conditioners.



Quiet Operation

Inverter air conditioners are optimally designed to operate with the minimal noise with the use of a DC compressor.

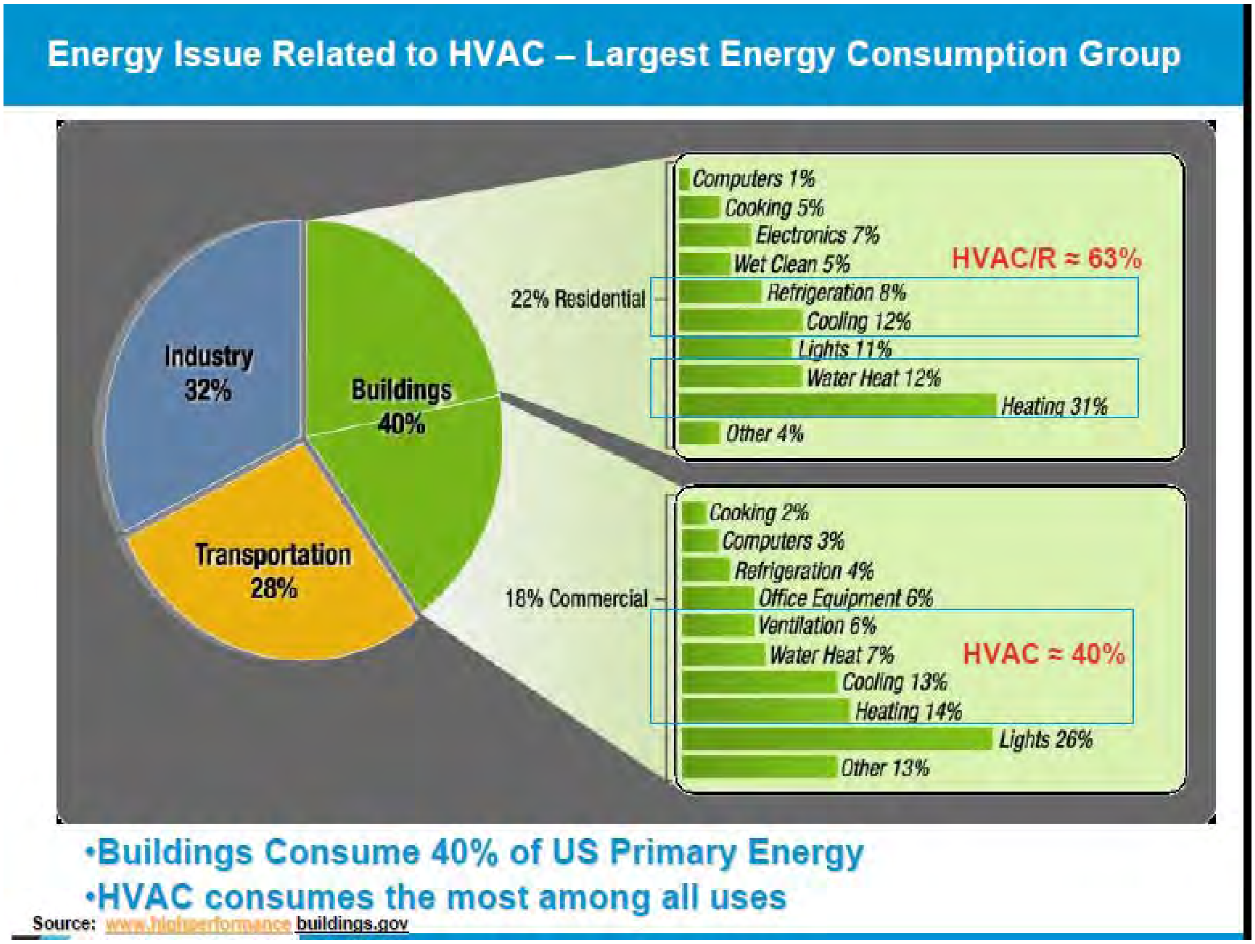


Economical 1
High energy efficiency ensures a much more economical system

Powerful 2
Ensures rapid cooling in summer and rapid heating in winter

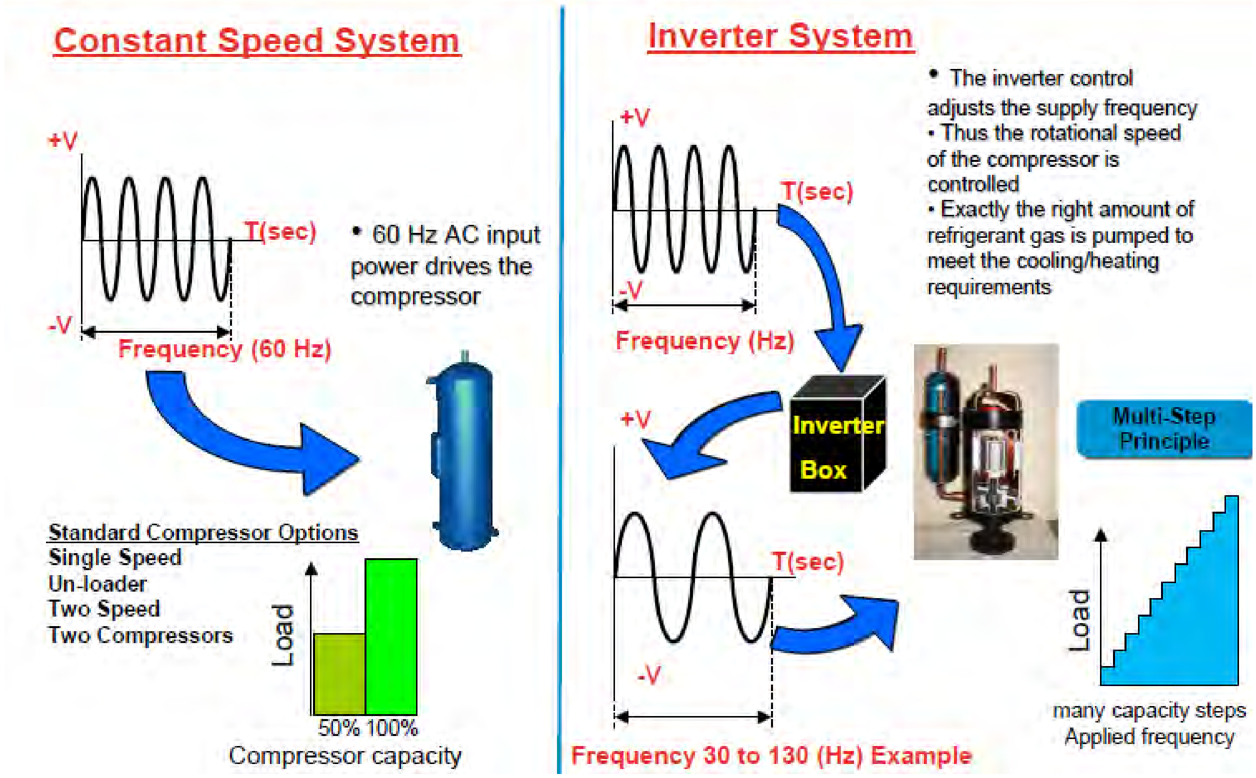
Comfortable 3
Attains and maintains set temperature fast with minimal noise

Mini-split- Why so different



This chart shows the amount of power, both residential and commercial, consumed by the HVACR industry. The large portion of power that we consume makes it essential to use the best technology we can find to reduce our consumption. The high efficiency rating and low amp draw, coupled with variable speed compressor, makes inverter technology one of the best answers to our energy consumption.

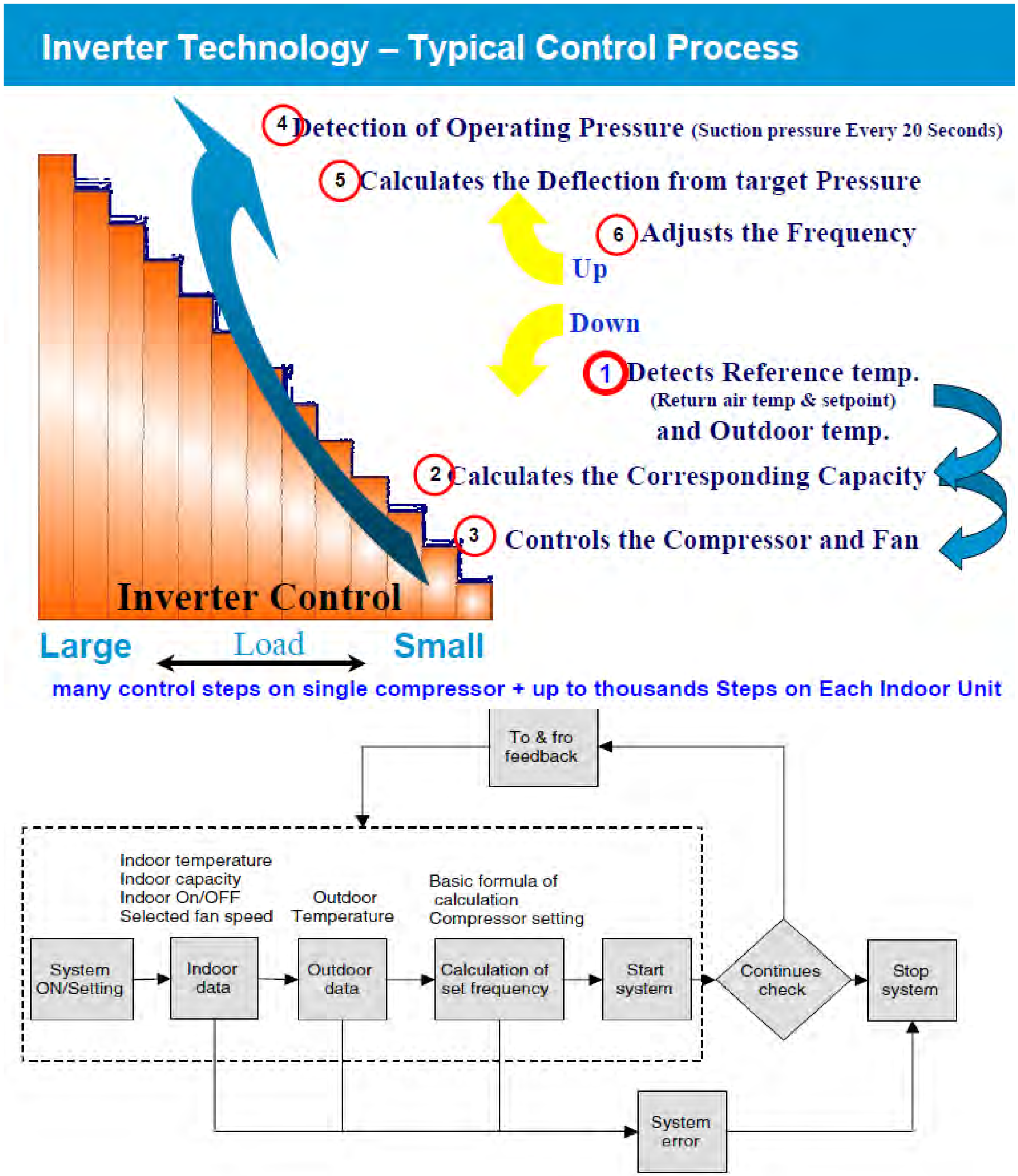
Mini-split- Why so different



The constant speed compressor that we are used to working with is either on at full power or off. The inverter compressor will slow down as it gets closer to the set point. This gives it a longer run time at much lower power consumption. The longer run time also gives better temperature control and humidity control.

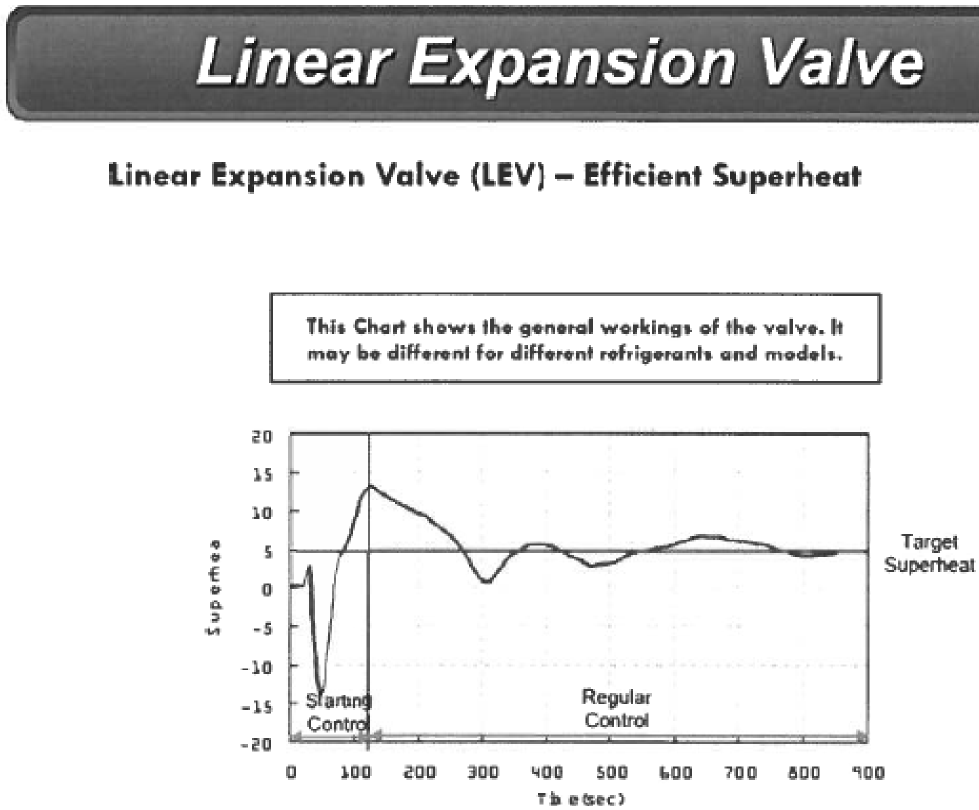
The thermistors in the indoor and outdoor unit sense the operating parameters. The board analyses this data and sets the fan and compressor speed along with the EEV setting to meet the demand. Therefore the machine is constantly sampling and adjusting to the most efficient speed needed at the time.

Mini-split- Why so different



This loop will continue until the thermostat is satisfied or the unit is turned off. If there is a problem the unit will give an error code.

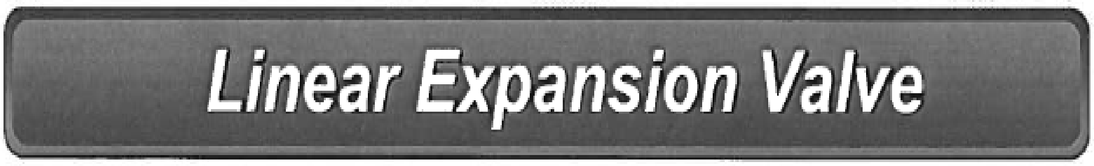
Mini-split- Why so different



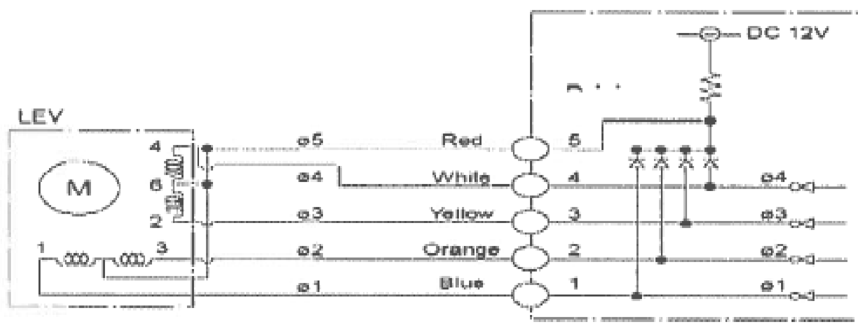
When the unit first starts, the board is receiving information from the thermistors. There is a short time that the expansion valve will appear to hunt. As the system settles the valve will become more stable. Then depending on model, it will only reposition every four or six minutes.

The electronic expansion valve is a four pole stepper motor. In the following diagram you can see how each pole is energized. The valve has about 1400 steps that it can be set to. It never fully closes that can be precisely set to monitor the refrigeration flow as needed.

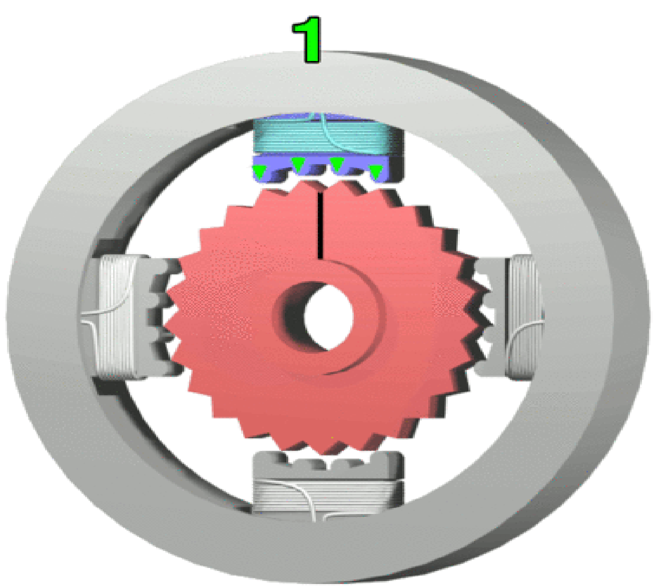
Mini-split- Why so different



Wiring connections: There are 5 wires of different colors to control the excitation of the motor. Depending on the phase active and the time of pulse it decides the angle of motor to rotate. Below is the graph showing the phase excitation.



By alternating before magnets you can regulate the EEV valve as close as one cog of the wheel.



Mini-split- Why so different

What is Inverter Technology?

Inverter and Converter

- **Converter:** Device to convert alternating current to direct current.
- **Inverter:** Device to convert direct current to alternating current

In general terms, we call an Inverter a device that converts normal alternating current from home/industrial-used power supply to voltage/frequency adaptable from alternating current.

Outline principle of inverter:

- Rectifying the alternating current and flattening the output to derive direct current power supply.
- Using the electrical equipment such as the semi-conductor to do switching and chopping and the derived direct current is used to make the alternating current at required frequency and voltage.

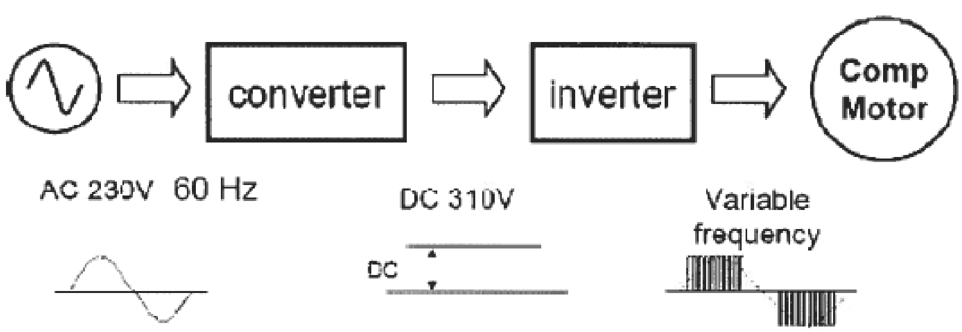
Advantages of the Inverter air-conditioner

- Energy saving- Comparing to the common ON - OFF controlled compressor, the inverter controlled compressor is able to run at the proper revolution to provide the best efficiency and reduce losses.
- When the maximum capacity is not required, the compressors revolution will decrease. This means that the input power is also decrease, resulting in the increased unit efficiency.

What is Inverter Technology?

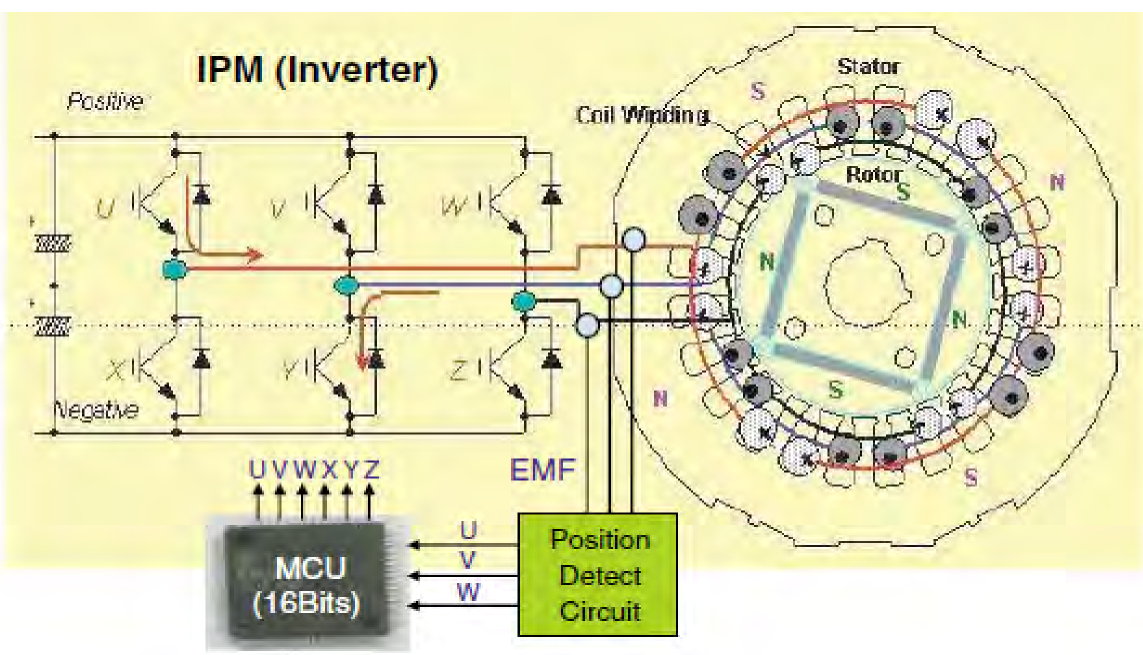
Inverter is a device which supplies variable frequency of power supply on equipments

Thanks to this function, motor revolution speed can be controlled and it leads to reduce energy consumption.



Mini-split- Why so different

How does inverter technology actually work? We take our line voltage AC and go through a circuit called a diode bridge. The output of the bridge is a DC power source. This is called the converter circuit. From here that DC is sent through another circuit that brings it back to a chopped or square wave AC. This circuit also makes it appear as three phase power. Each phase of this power fires the bank of transistors. Each bank of transistors is wired to one winding of the compressor. By firing two banks of transistors and powering two windings at one time and having one winding not energized a potential difference is created and the compressor rotates. The faster these transistors fire, the faster the compressor rotates, this is called frequency.



Mini-split- Why so different

This picture shows just the bank of transistors feeding the windings of the motor.

Basic principle is to control the rpm of the motor by changing the working frequency of the compressor.
Three phase voltage is supplied to the motor and the time for which the voltage will supplied is controlled by IPM (intelligent power module).
Switching speed of IPM defines the variable frequency input to the motor.

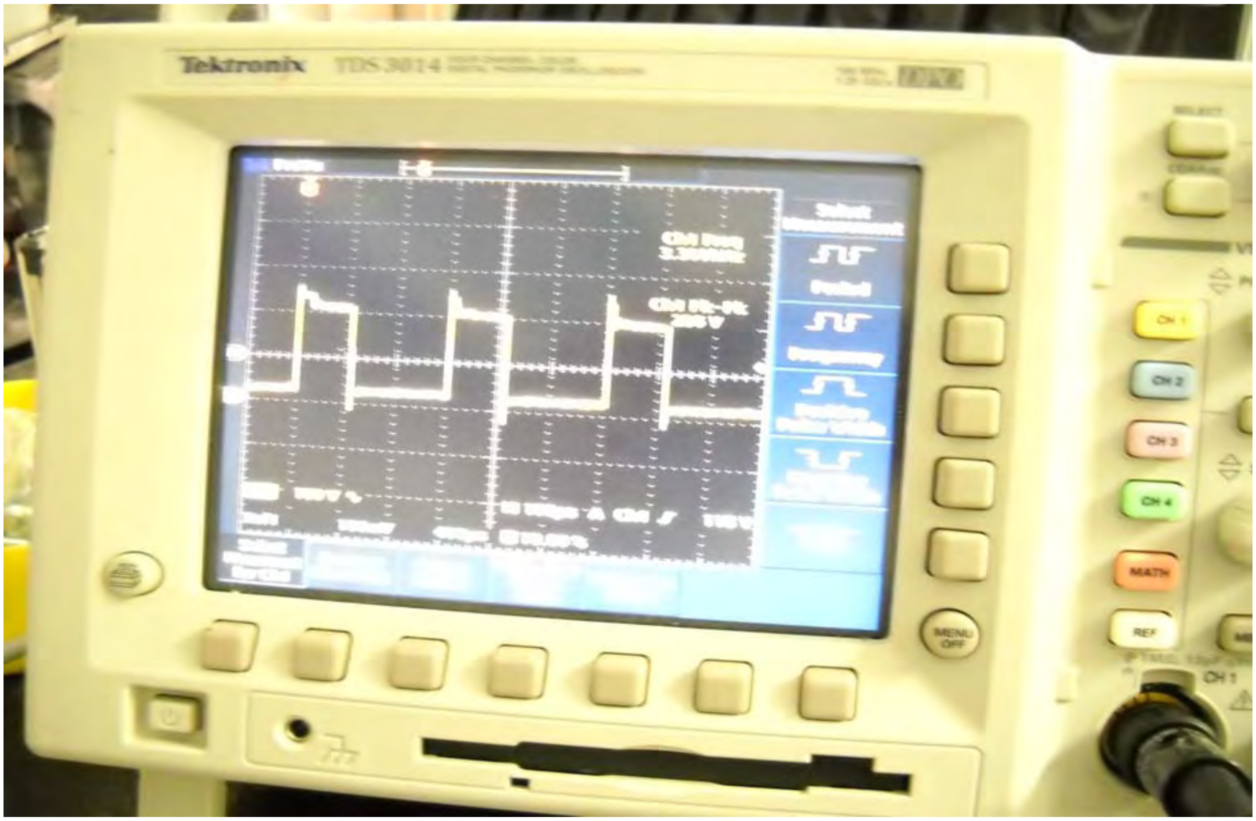
$$RPM = \frac{120\,f}{P}$$

RPM → Revolutions/Minute
F → Frequency
P → Number of poles

The actual speed of the compressor can be calculated as above

Although BLDC motors are practically identical to permanent magnet AC motors, the controller implementation is what makes them DC. While AC motors feed sinusoidal current simultaneously to each of the legs (with an equal phase distribution), DC controllers only approximate this by feeding full positive and negative current to two of the legs at a time. The major advantage of this is that both the logic controllers and battery power sources also operate on DC, such as in computers and electric cars. In addition, the approximated sine wave leaves one leg undriven at all times, allowing for back-EMF-based sensorless feedback.

Mini-split- Why so different

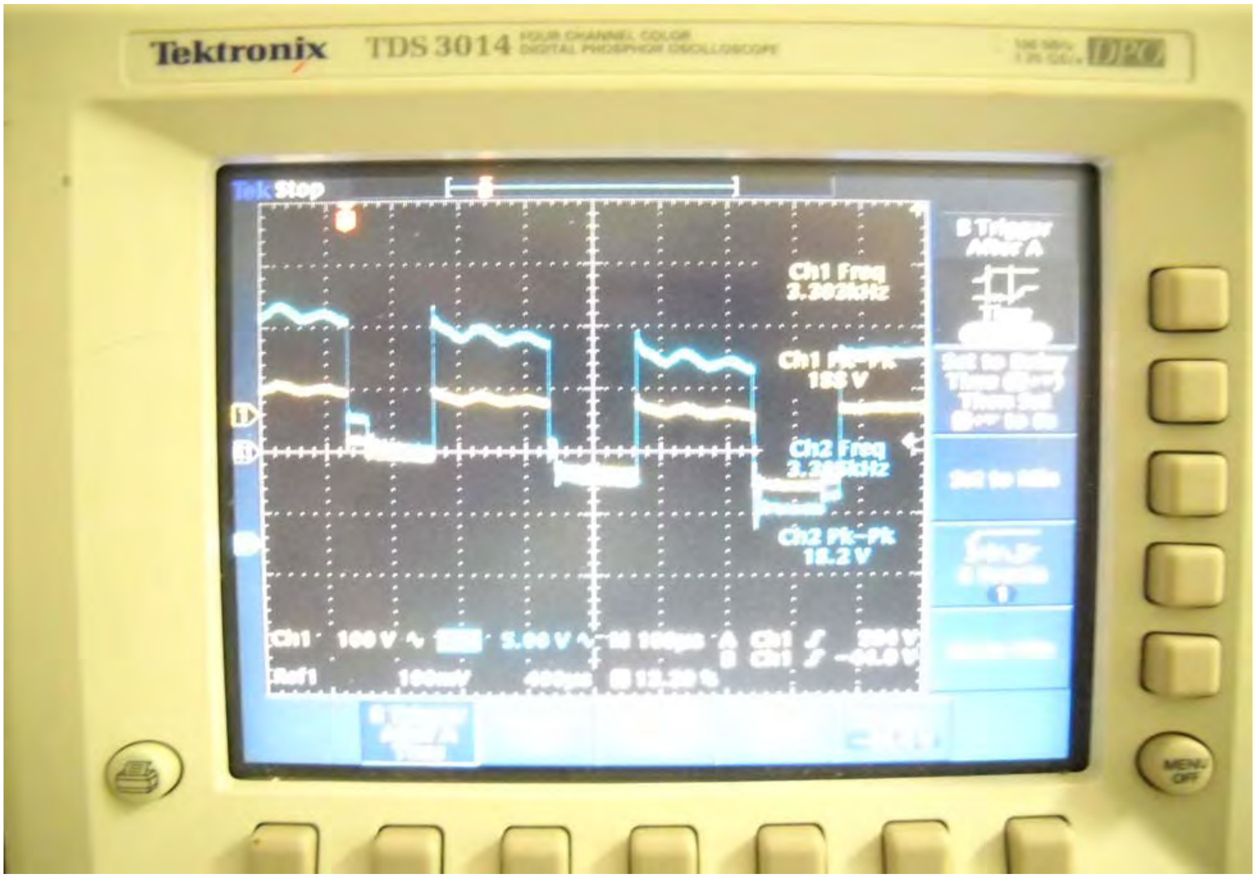


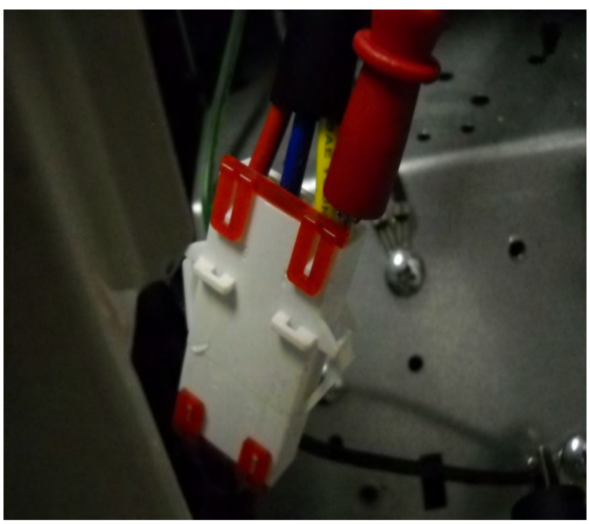
This is the wave out of the inverter circuit, going to the compressor. Notice it is a square wave. As it is a wave, it will have a frequency that can be controlled by the inverter.

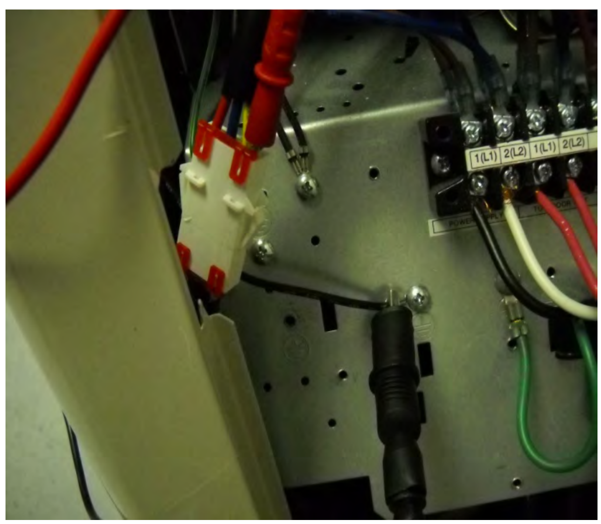
The following is the compressor wave form with the signal to the electronic expansion valve added. As was stated earlier the two signals have to be perfectly synchronized. The only difference you can see is a voltage difference.

Mini-split- Why so different

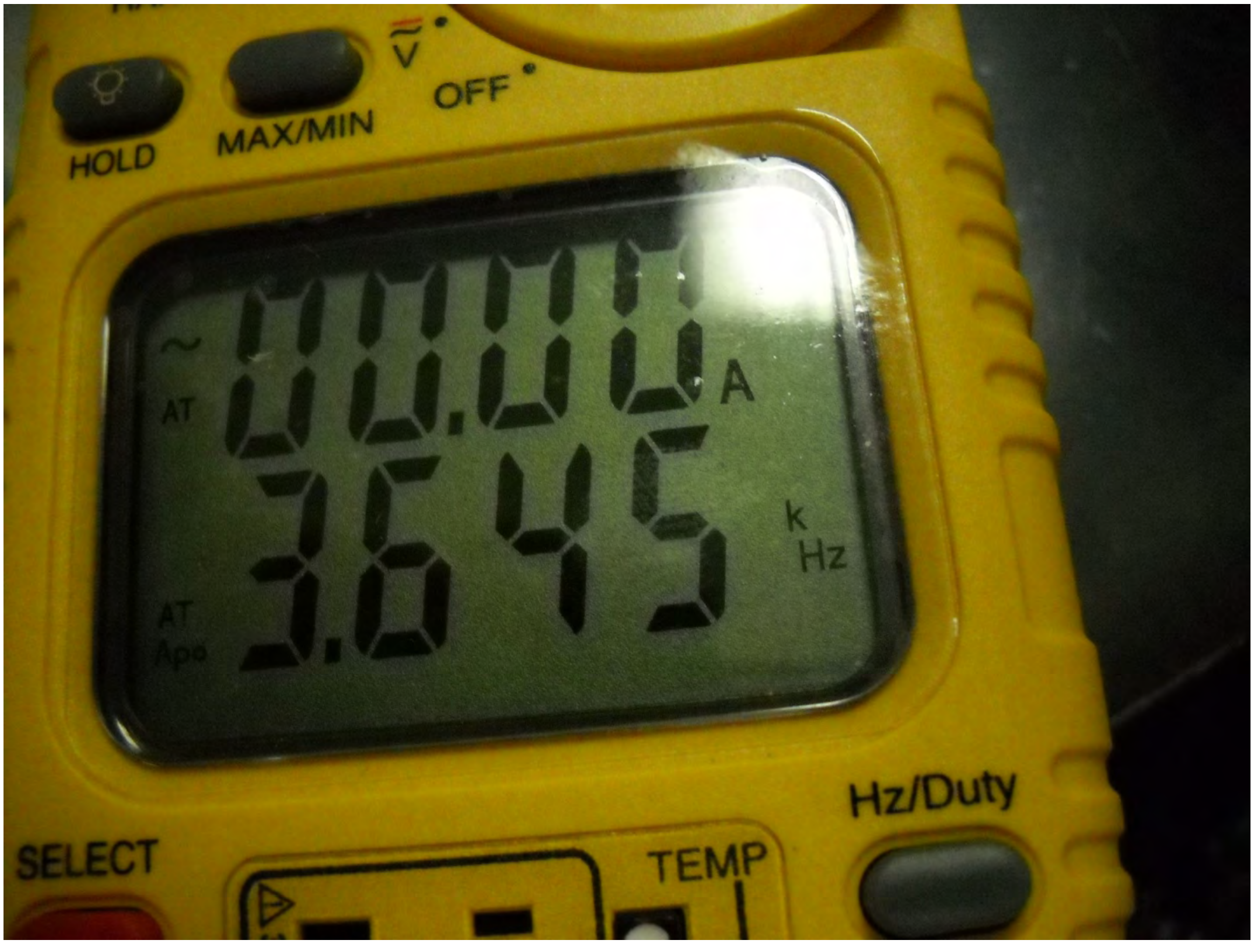
This is shown by the difference in the heights of the signals.







Mini-split- Why so different



Frequency can be read on a standard meter by going on any of the three compressor leads and reading to ground. Most of our meters have a frequency scale, we have not had the reason to use it previously.

The following startup sheet can be used to record initial information that will become the basis for your follow-up service. It is essential to know that the unit was properly installed. We will talk more about this Later in the manual.

Mini-split- Why so different

- CONDENSER UNIT VOLTAGE : RATED ______ APPLIED ______
- EVAPORATOR VOLTAGE A/C OR D/C RATED _______ APPLIED ______
- COMPRESSOR : ROTARY _____ INVERTER
- FLAIR NUTS TORQUED TO ________FT/LBS
- LEAK CHECK COMPLETED Y/N EVACUATED TO _______ MICRONS
- LINE SET SIZE LIQ. ____ SUCTION _____ LENGTH _____FT.
- REFRIGERANT ADJUSTMENT LENGTH -25 FT= ____X .22 OZ/FT= ____OZ. REF. ADDED
- REFRIGERANT ADJUSTMENT 25FT – LENGTH = _____X.22OZ/FT= ____OZ. REF. REMOVED
- INVERTER REFRIGERANT ADJUSTMENT SINGLE ZONE OVER 43FT X .22 OZ/FT-------- ADDED
- INVERTER DUAL ZONE ADJUSTMENT OVER 74 FT. ----------ADDED DIPSWITCH SET Y/N
- INVERTER TRI AND QUAD ZONE ADJUSTMENT OVER 123FT. --------ADDED. DIPSWITCH SET Y/N
- BOTH REFRIGERANT LINES INSULATED Y/N CONDENSATE INSULATED AS NEEDED Y/N
- EVAPORATOR SECURE ON WALL Y/N LEVEL Y/N
- CEILING MOUNT ALL BOLTS TIGHT Y/N LEVEL Y/N
- CONDENSATE DRAIN FLOW GOOD Y/N CONDENSATE PUMP INSTALLED Y/N ALL ELECTRICAL CONNECTIONS TIGHT Y/N IN CODE COMPLIANCE Y/N
- CONDENSER BOLTED DOWN AND VIBRATION PADS INSTALLED Y/N

Mini-split- Why so different

- SERVICE PORTS OPEN AND LEAK CHECKED Y/N
- FAN OPERATION : JET COOL Y/N CHAOS Y/N FAN ONLY Y/N
- COOLING MODE : COMPRESSOR TIME DELAY _____MIN.
- COMPRESSOR CYCLES ± 1 DEG.FROM ROOM TEMP. Y/N
- DOES FAN GO TO LOW SPEED WHEN THE STAT IS SATISFIED Y/N
- AFTER TEN MINUTE RUN TIME: PRESSURE HI_____ LO ____
- COOLING MODE : EVAP COIL AIR IN ____ AIR OUT ____ ΔT ____
- HEAT MODE : DOES THE DOMPESSOR CYCLE ± 3 DEG. FROM ROOM TEMP. Y/N
- DOES EVAP FAN DELAY UNTIL COIL INLET REACHES 82 DEG. Y/N
- DOES FAN GO TO SET SPEED AFTER 4 MIN. Y/N LOW WHEN STAT IS SATISFIED
- HEAT MODE EVAP AIR IN ____ AIR OUT ____ΔT
- CONDENSER : MODEL # ____________ SER#_____________

EVAPORATOR: MODEL # ____________ SER # __________ As a companion to the startup sheet we are supplying a service checklist. Either of these lists can be modified to fit your company needs.

SERVICE TRAINING

JOB#______CUSTOMER_________ DATE_______

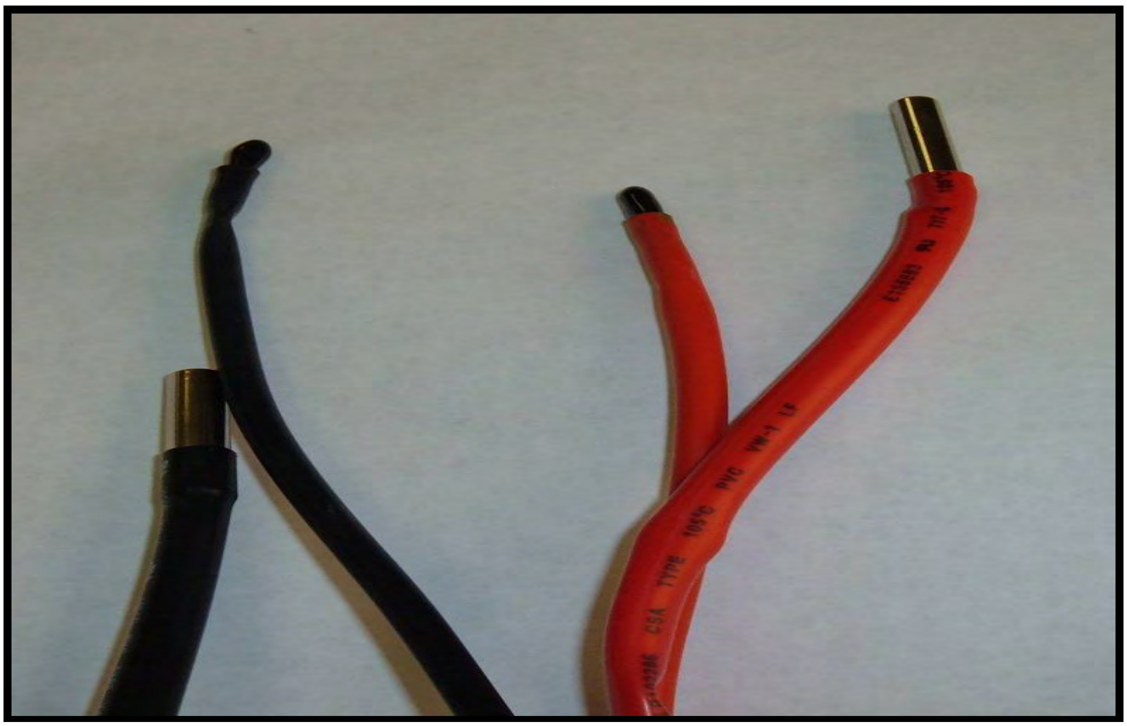
1) DISPATCHED COMPLAINT______________________________
2) CUSTOMER INPUT ___________________________________
3) CORRECT EVAPORATOR Y/N CONDENSER MODEL #_______________ SERIAL#___________
4) UNIT CONDITION __________VIBRATION PADS INSTALLED Y/N UNIT BOLTED DOWN Y/N FREE OF OBSTRUCTIONS Y/N
5) MINIMUM CLEARANCE FROM OBNSTRUCTIONS AS PER INSTALL MANUAL FOR THIS MODEL Y/N
6) VOLTAGE: RATED__________ APPLIED ________ ALL WIRING MEETS LOCAL CODES Y/N
7) SUPPLY POWER CONNECTED TO L1 AND L2 Y/N INDOOR POWER CONNECTED TO PROPER TERMINALS FOR CORRESPONDING EVAPORATORS Y/N
8) NUMBER OF ZONES AVAILABLE _____ ZONES IN USE _____ COMMUNICATION LINES CONNECTED TO CORRESPONDING ZONES Y/N
9) LINE SET(S) PROPERLY SIZED Y/N STRAPPED TO ELIMINATE VIBRATION Y/N WITH IN MAXIMUM LENGTH SPECIFIED IN INSTALL MANUAL Y/N LINES PROPERLY OIL TRAPPED AS PER MANUAL Y/N
10) CONDENSATE(S) EXIT WALL AT THE BOTTOM OF THE PIPING BUNDLE Y/N FREE OF KINKS, RESTRICTIONS, AND SHARP BENDS Y/N CLEAR OF OBSTRUCTIONS AT DISCHARGE Y/N
11) EVAPORATOR MODEL#(S)_________________SERIAL#(S)______________
12) VOLTAGE: RATED_________ APPLIED_____ COMMUNICATION CABLE ON PROPER TERMINAL(S) Y/N WIRING PROPERLY SIZED Y/N VOLTAGE AND COMMUNICATION ROUTED TO
13) EVAPORATOR(S) SECURELY FASTENED TO WALL AND AT THE RECOMMENDED HEIGHT Y/N SECURE IN CEILING Y/N LEVEL Y/N PIPING AND DRAIN EXITING PROPERLY Y/N KINKED Y/N PIPING HOLE SEALED Y/N

14) UNIT CONTROL: HAND HELD REMOTE CONTROL Y/N WIRED REMOTE CONTROL Y/N
15) EVAPORATOR FAN MOTOR: DOES THE AIR DISCHARGE COVER OPEN ON FAN START Y/N IS THE FAN OPERATING IN THE MODE SELECTED Y/N BLOWER WHEEL TURNING SMOOTHLY Y/N BROKEN TINES Y/N MOTOR AND END BEARINGS QUIET AND SMOOTH Y/N BEARINGS AND MOTOR COOL TO THE TOUCH Y/N
16) UNIT PROPERLY RESPONDING TO THERMOSTAT OR REMOTE CONTROL Y/N
17) COOLING MODE: UNIT CYCLES AT ± 1 DEG. Y/N INDOOR FAN GOES TO LOW SPEED WHEN THE THERMOSTAT IS SATISFIED Y/N 3 MIN TIME DELAY BETWEEN CYCLES Y/N ON INVERTER MODELS DOES THE CONDENSER FAN SPEED UP OR SLOW DOWN WITH TEMP ADJUSTMENTS Y/N
18) DOES THE COMPRESSOR AND OUTDOOR FAN SHUT OFF IF THE INDOOR PIPE THERMISTOR SENSES LESS THAN 32 DEG. AND RESTART ABOVE 45 DEG Y/N
19) HEATING MODE: UNIT CYCLES ± 3 DEG. Y/N DOES THE INDOOR FAN DELAY UNTIL INDOOR PIPE THERMISTOR REACHES 82 DEG.Y/N DOES THE FAN START ON LOW FOR 4 MIN. AFTER REACHING 82 DEG INDOOR PIPE TEMP Y/NDOES FAN GO TO SELECTED SPEED AFTER 4 MIN RUN TIME Y/N DOES THE INDOOR FAN STOP IF THE INDOOR PIPE TEMP DROPS BELOW 95DEG AND RESTART WHEN THE PIPE TEMP GOES ABOVE 100DEG Y/N
20) DEFROST: HAS UNIT BEEN IN HEAT MODE AT LEAST 40 MIN Y/N HAS THE COMPRESSOR BEEN OPERATING FOR 10 MIN. CONTINUOSLY Y/N AT THIS POINT THEINDOOR PIPE SENSOR

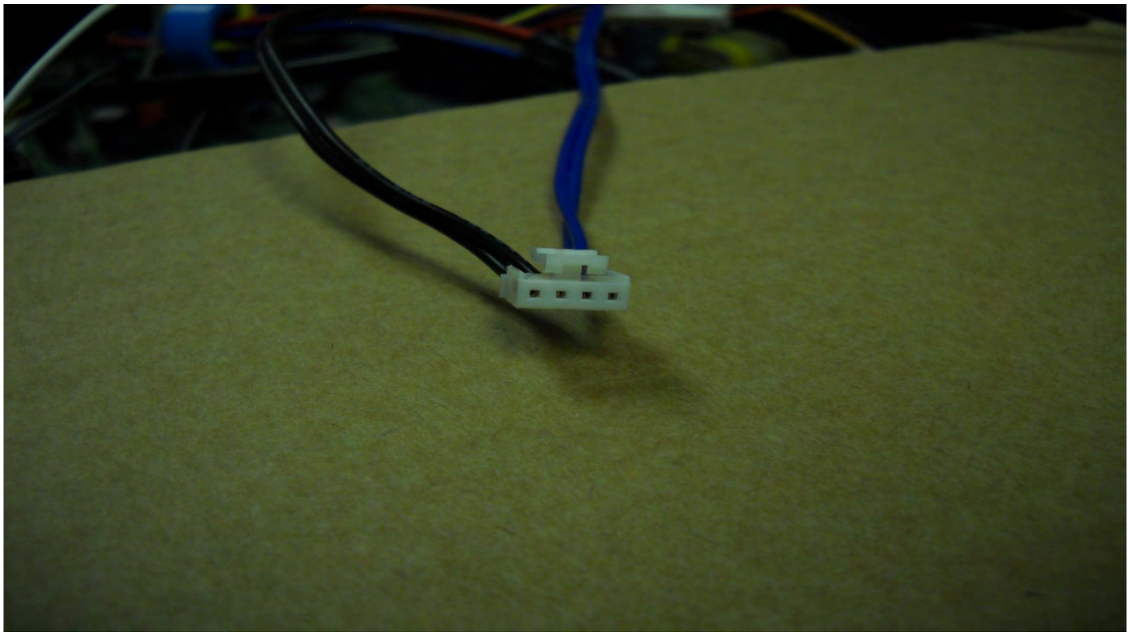
MEASURES TEMP AND IT IS STORED ON THE INDOOR BOARD AS A BASE. EVERY 4 MIN. OF ADDITIONAL CONTINUING RUN TIME A NEW READINDG IS RECORDED AND COMPARED WITH THE BASE READING. THE BOARD THEN DETERMINES IF DEFROST IS NEEDED AND IF SO HOW LONG THE DEFROST CYCLE WILL BE. MAXIMUM DEFROST IS 12MIN.

Mini-split- Why so different

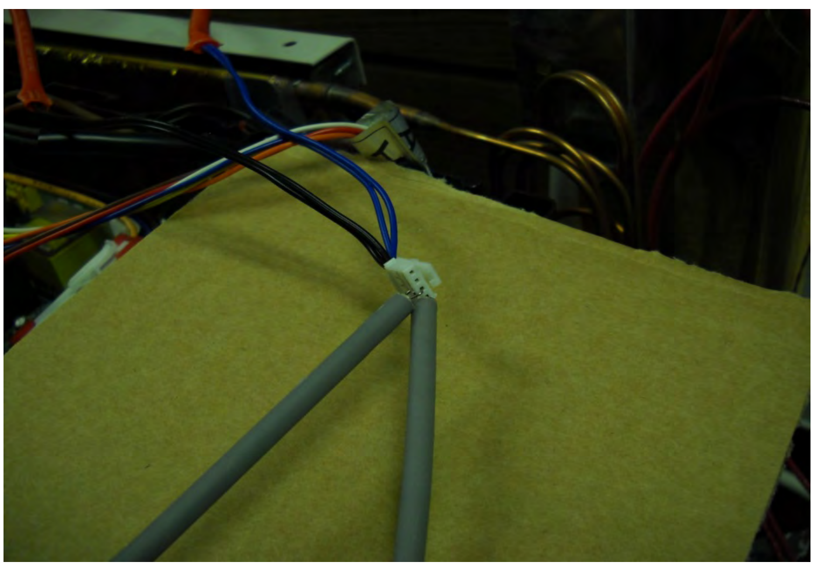
As was stated in the beginning of the manual these units are thermister controlled. The first two types of thermistors that we will discuss are air thermistors and pipe thermistors. Air thermistors have a plastic or neoprene looking sensing bulb. Pipe thermistors have a metallic sensing bulb.

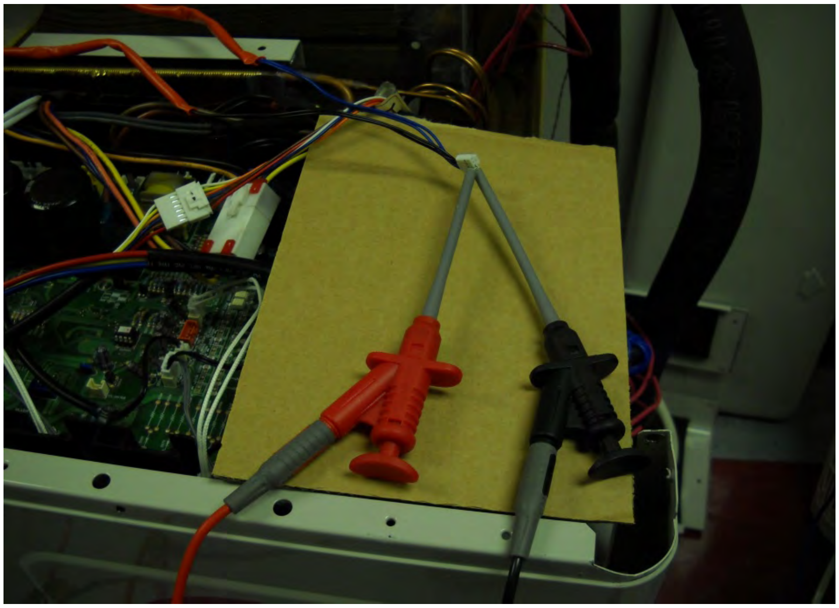


Mini-split- Why so different



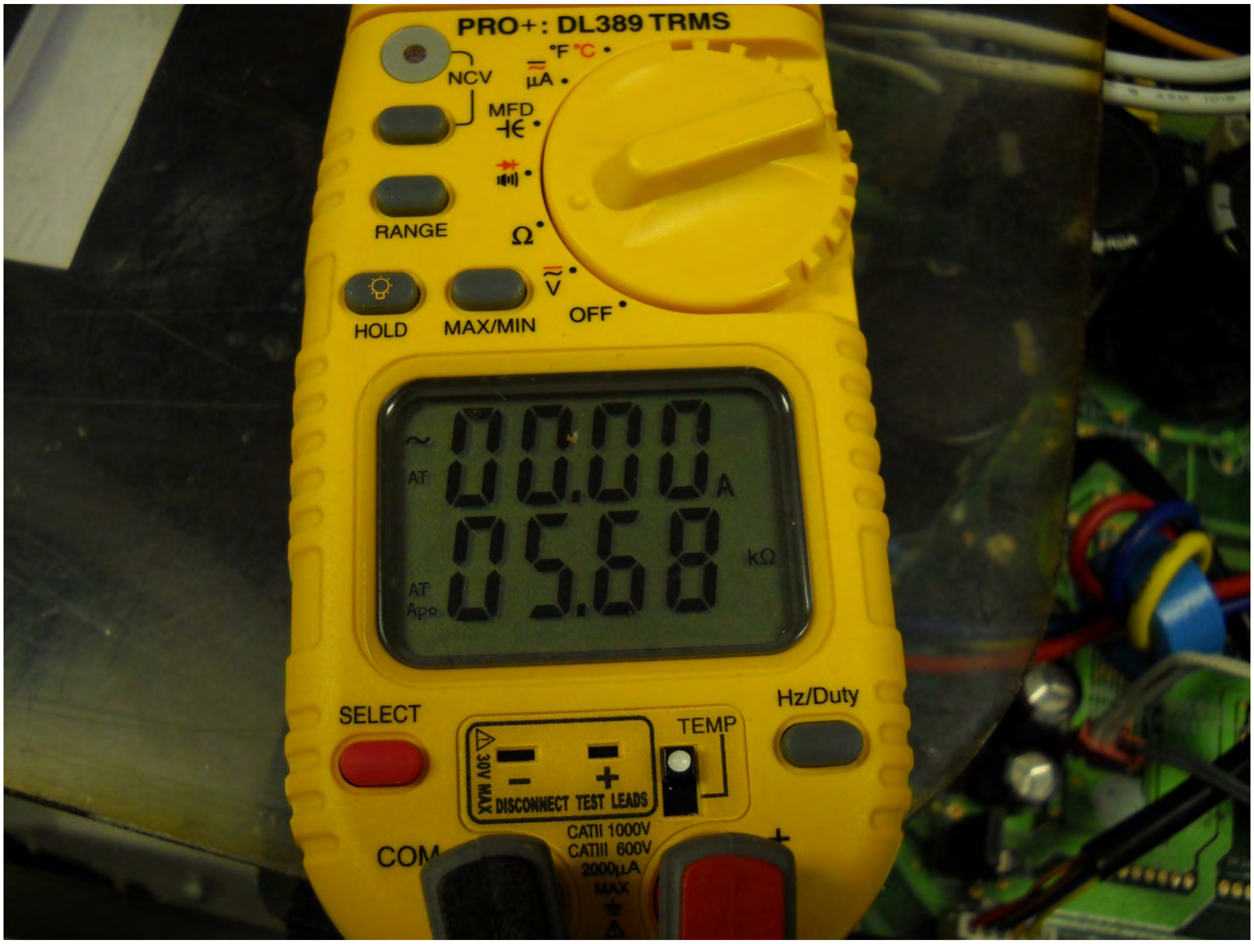
The thermister plugs have very small openings making it very difficult to take readings with normal meter leads.





These thin spring wire leads will fit into the plug opening and also make contact with the metal on the side of the plug. Being able to clamp them on, it leaves both hands free to adjust the meter.

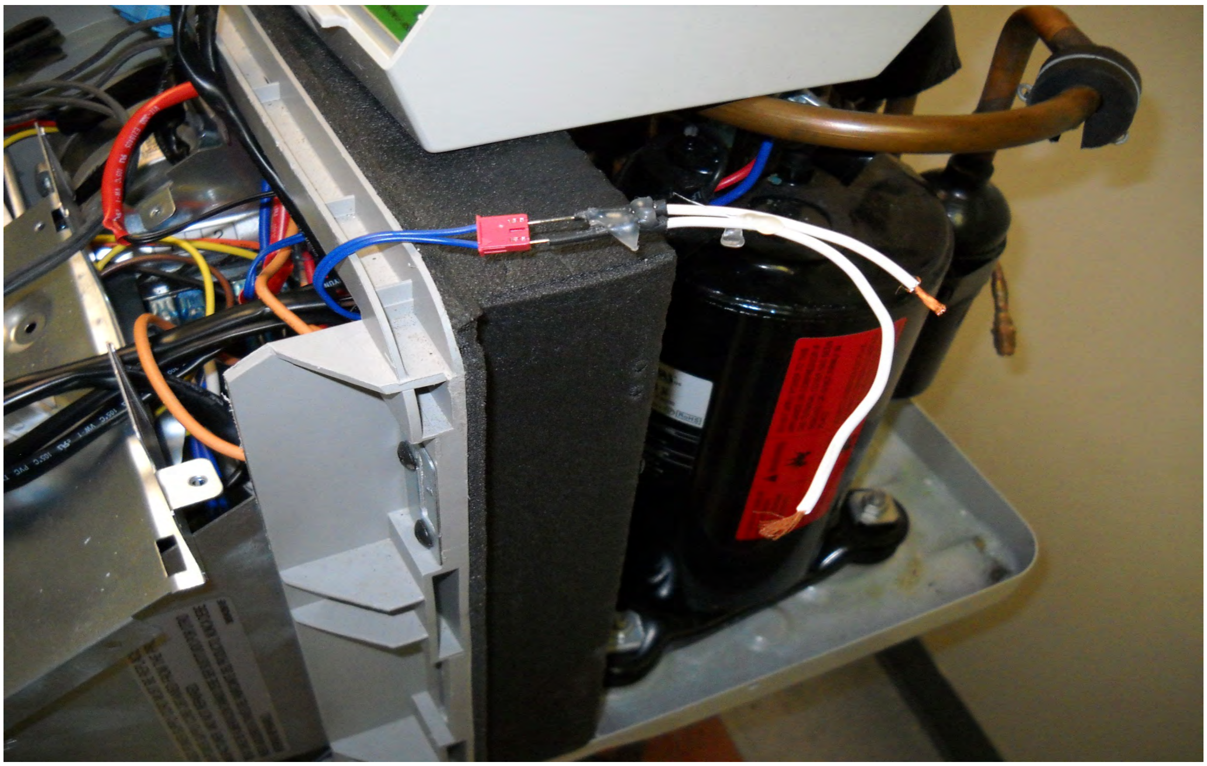
Mini-split- Why so different



Another method that can be used or meter leads with very fine points that can make contact with the small metal area on the back side of the plug.

Mini-split- Why so different

If you are meter does not have the clamping spring clips, or the fine pointed meter leads, one alternative would be to solder straight pins or sewing needles into the end of the wire at shown below. This will give you a wire end that you can use to obtain your readings.



Thermistors can be checked by reading ohms or DC volts. The most common method used to check ohms. Once you have obtained the ohm reading, you can go to the thermistor chart and determine the temperature at the sensor of the thermistor.

Mini-split- Why so different

AIR THERMISTOR READINGS			PIPE THERMISTOR READINGS					
TEMP	KΩ	VDC (OUT)	TEMP	KΩ	VDC (OUT)	TEMP	KΩ	VDC (OUT)
32	33.82	3.68	0	45.74	4.4	70	5.96	2.46
33	32.84	3.65	1	44.24	4.39	71	5.81	2.42
34	31.89	3.62	2	42.79	4.37	72	5.66	2.39
35	30.97	3.6	3	41.39	4.35	73	5.52	2.36
36	30.08	3.57	4	40.04	4.33	74	5.39	2.32
37	29.22	3.54	5	38.75	4.31	75	5.25	2.29
38	28.39	3.51	6	37.5	4.29	76	5.12	2.26
39	27.58	3.48	7	36.29	4.27	77	5	2.23
40	26.8	3.44	8	35.13	4.25	78	4.88	2.2
41	26.05	3.41	9	34.02	4.23	79	4.76	2.17
42	25.32	3.38	10	32.94	4.21	80	4.65	2.14
43	24.61	3.35	11	31.8	4.19	81	4.53	2.11
44	23.92	3.32	12	30.9	4.16	82	4.43	2.08
45	23.26	3.29	13	29.93	4.14	83	4.32	2.05
46	22.62	3.26	14	28.99	4.12	84	4.22	2.02
47	22	3.23	15	28.09	4.1	85	4.12	2
48	21.39	3.19	16	27.23	4.07	86	4.02	1.97
49	20.81	3.16	17	26.39	4.05	87	3.93	1.94
50	20.24	3.13	18	25.58	4.02	88	3.83	1.91
51	19.7	3.1	19	24.8	4	89	3.74	1.88
52	19.16	3.06	20	24.04	3.97	90	3.66	1.86
53	18.65	3.03	21	23.32	3.95	91	3.57	1.83
54	18.15	3	22	22.61	3.92	92	3.49	1.8
55	17.67	2.97	23	21.93	3.9	93	3.41	1.77
56	17.2	2.93	24	21.28	3.87	94	3.33	1.75
57	16.74	2.9	25	20.64	3.85	95	3.26	1.72
58	16.3	2.87	26	20.03	3.82	96	3.18	1.7
59	15.87	2.84	27	19.44	3.79	97	3.11	1.67
60	15.46	2.8	28	19.87	3.76	98	3.04	1.64
61	15.06	2.77	29	18.31	3.74	99	2.97	1.62
62	14.66	2.74	30	17.78	3.71	100	2.9	1.6
63	14.28	2.71	31	17.26	3.68	101	2.84	1.57
64	13.92	2.67	32	16.76	3.65	102	2.78	1.55
65	13.56	2.64	33	16.28	3.62	103	2.71	1.52
66	13.21	2.61	34	15.81	3.59	104	2.65	1.5

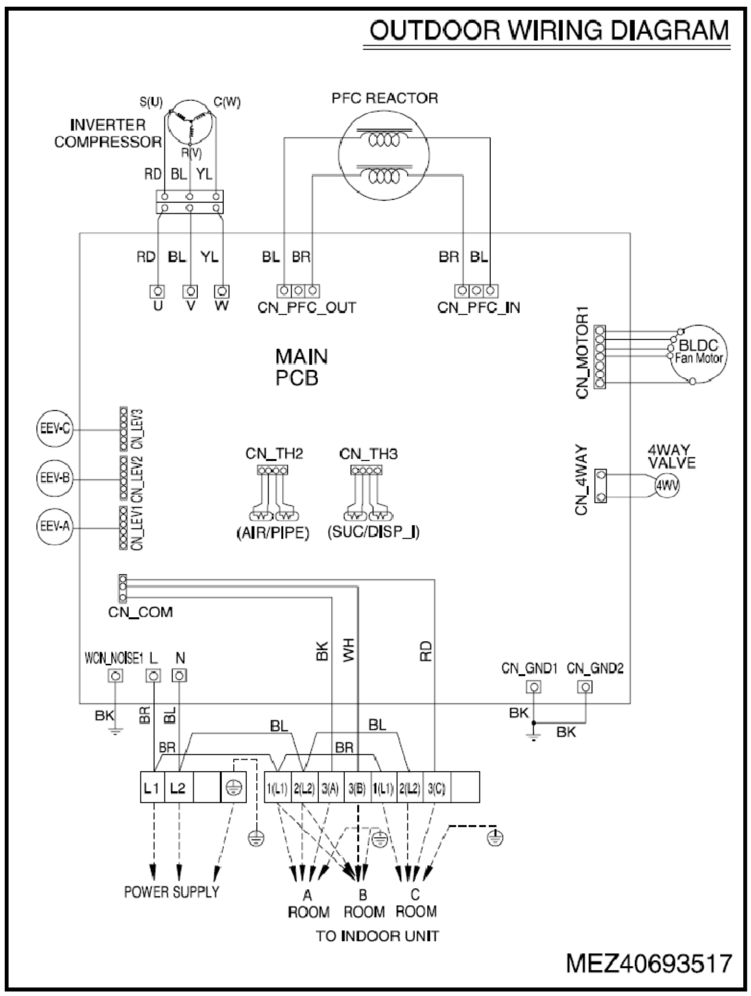
Mini-split- Why so different

As you can see by the chart there are differences in value between air and pipe thermistors. at 32° The air thermistor reads 33.82 Ω the pipe thermistor at 32° reads 16.76Ω. One of the easiest ways to check a thermistor used to put the sensing end in a glass of ice water. If you also put your temperature sensing lead from your meter in the glass of ice water you can check the calibration of your meter while you are checking the thermister. Two of the easy checks on thermistors are as follows. At 77° the air thermistor we'll read 10KΩ. The pipe thermistor will read 5KΩ.

By reading the pipe thermistor resistance and converting it to a temperature we now have the temperature of the refrigerant in that pipe. This value can be taken to a standard pressure/ temperature chart and you can read the pressure of the refrigerant in that line. Since these units are critical charge and have much less refrigerant in them than a standard unit it is essential to use this method to obtain refrigerant pressures. When we ohm out the thermistor and go to the temperature/ pressure chart to obtain our pressure readings there is absolutely no loss of refrigerant.

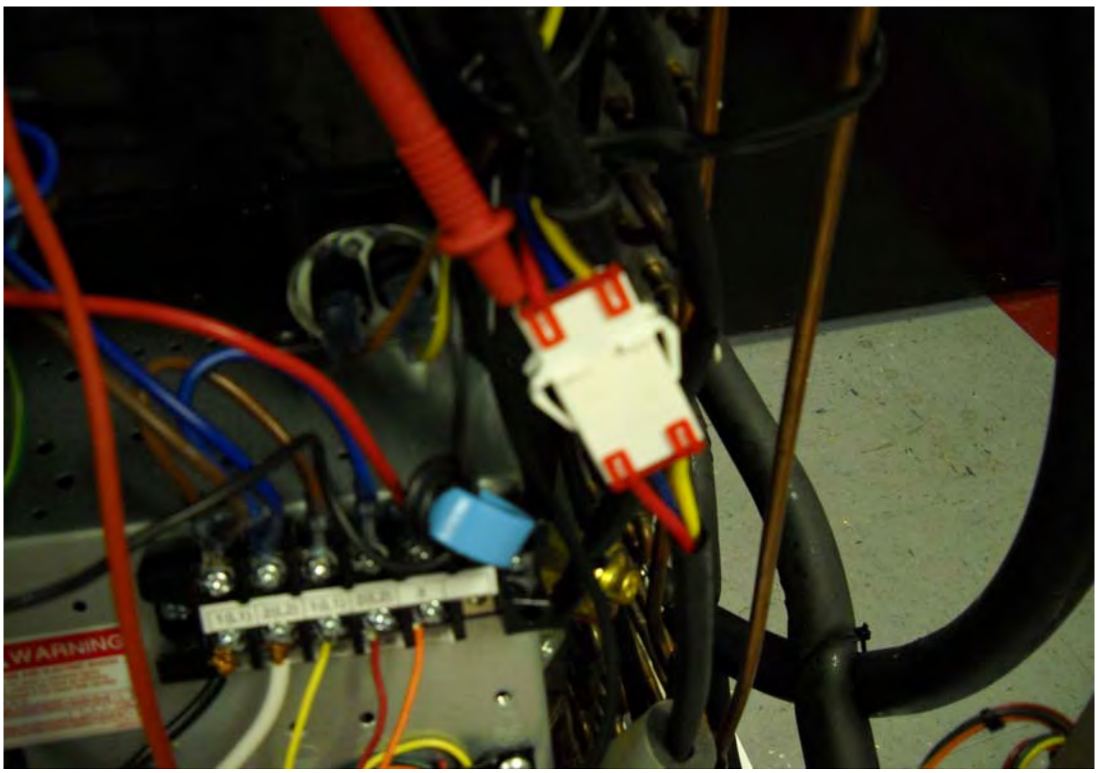
All manufacturers of mini-splits have the error codes for open or shorted thermistors. There are no error codes for out of tolerance thermistors. Since the Mini-split-or controlled through the board using the inputs from thermistors we cannot maintain proper temperature control if the thermistor is out of tolerance. Many times control boards have been changed simply because a thermistor was out of tolerance and no one thought to check it because there was no error code displayed.

4. Wiring Diagrams



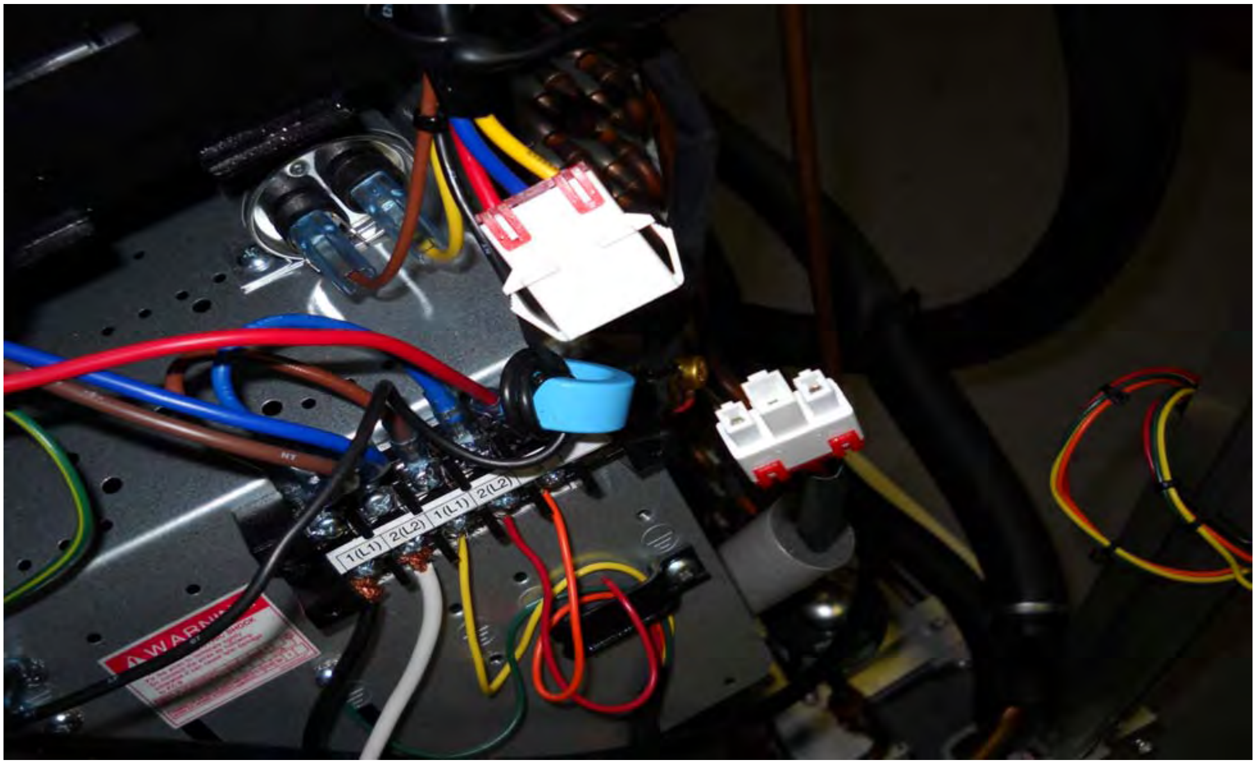
Mini-split- Why so different

Many of our wiring diagrams simply show where to plug each component into the main control board. Most of our troubleshooting will be at the control board. It will consist of removing a plug from the board and checking the component, and on the other side checking the output of the board. If the component does not plug directly into the board, we may go to the plug for that component and do our check there.



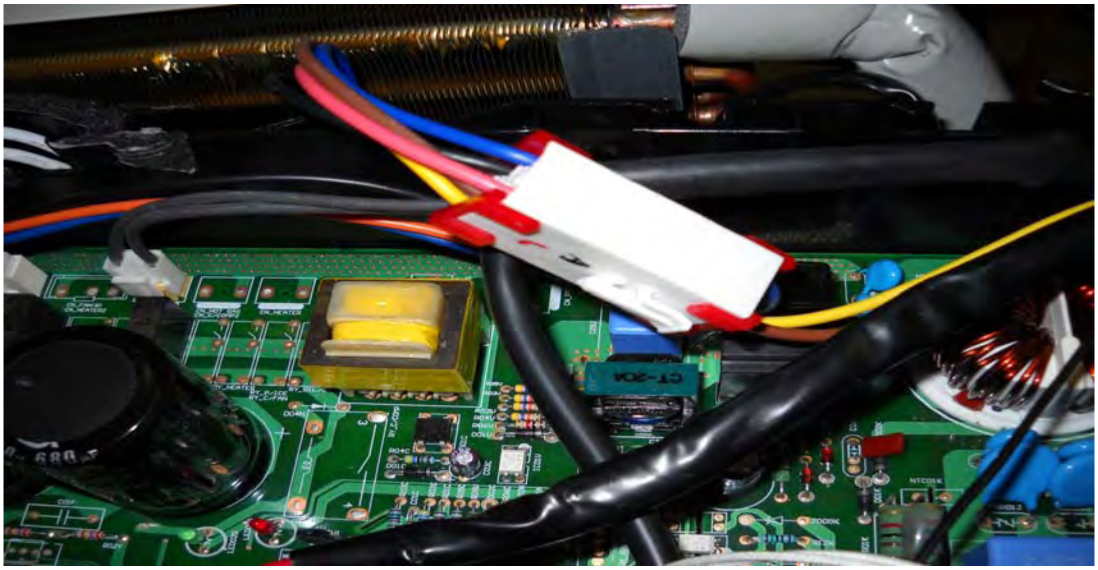
At the three wire compressor plug we can check voltage to each lead and the frequency going to the compressor.

Mini-split- Why so different



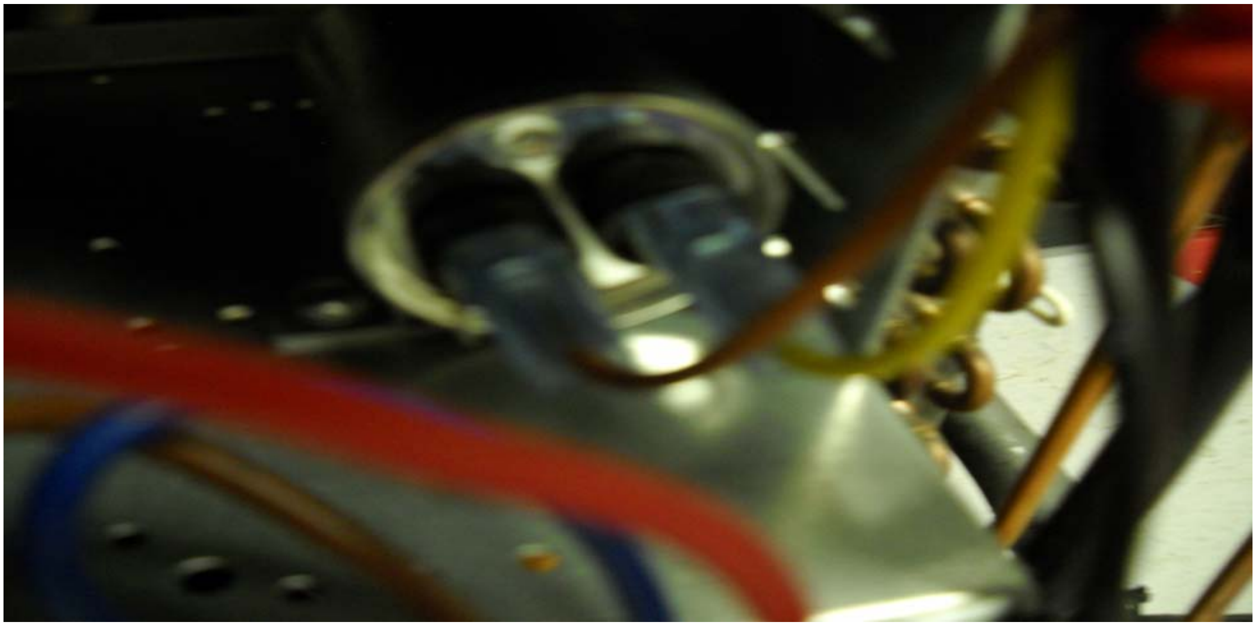
With a plug open on the plug side going to the compressor we can check the windings of the compressor. We can check winding to winding and winding to ground. Since this is a three phase compressor, there is no capacitor. If we were working on a standard compressor we would be able to shut off the power and read the capacitor at the receptacle side of this plug.

Mini-split- Why so different

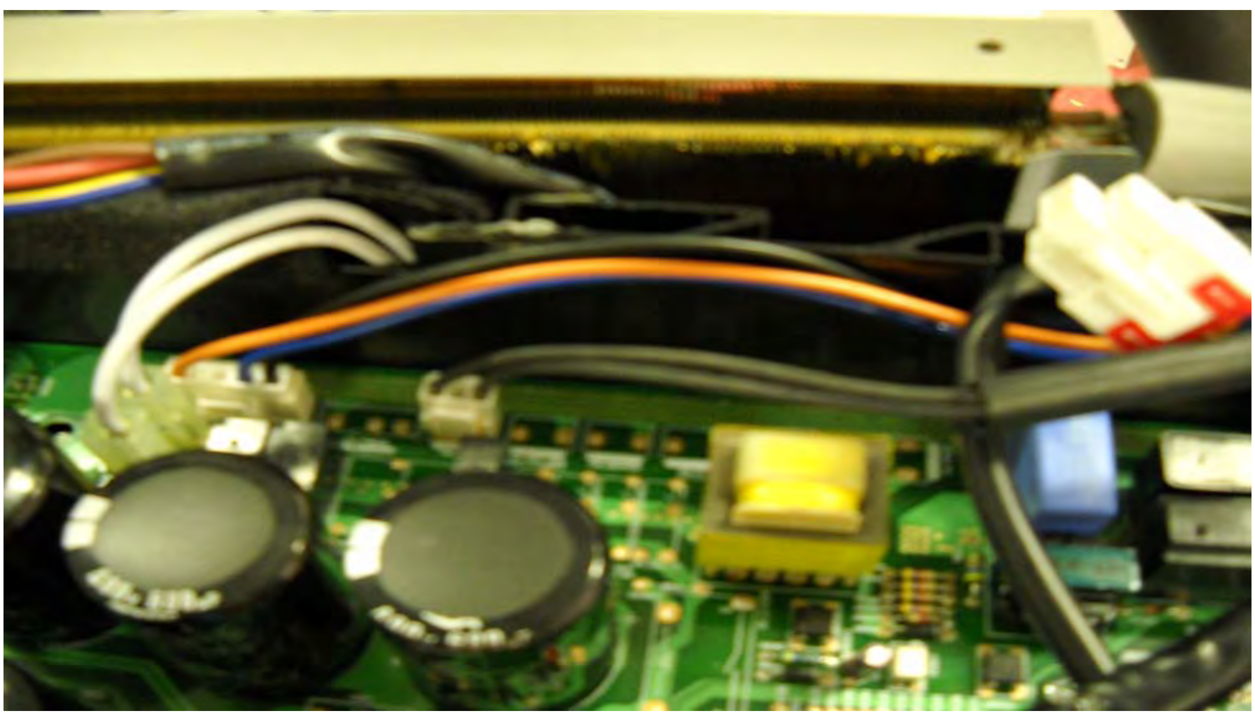


The outdoor fan motor uses a 6pin connector. If we open this connector, on the board side we can check for power. If we disconnect power we can check between the yellow and brown wire and read our capacitor. The windings of the motor can be checked on the receptacle side of the connector.

Mini-split- Why so different



The capacitor for the outdoor fan motor is located below the control board assembly. This is one of the reasons it is advantageous to check components out at the plug rather than having to dig down to where they're located.



Mini-split- Why so different

Each component that plugs into the board will either have a unique size of plug or a different color. It is difficult to miss wire these boards.

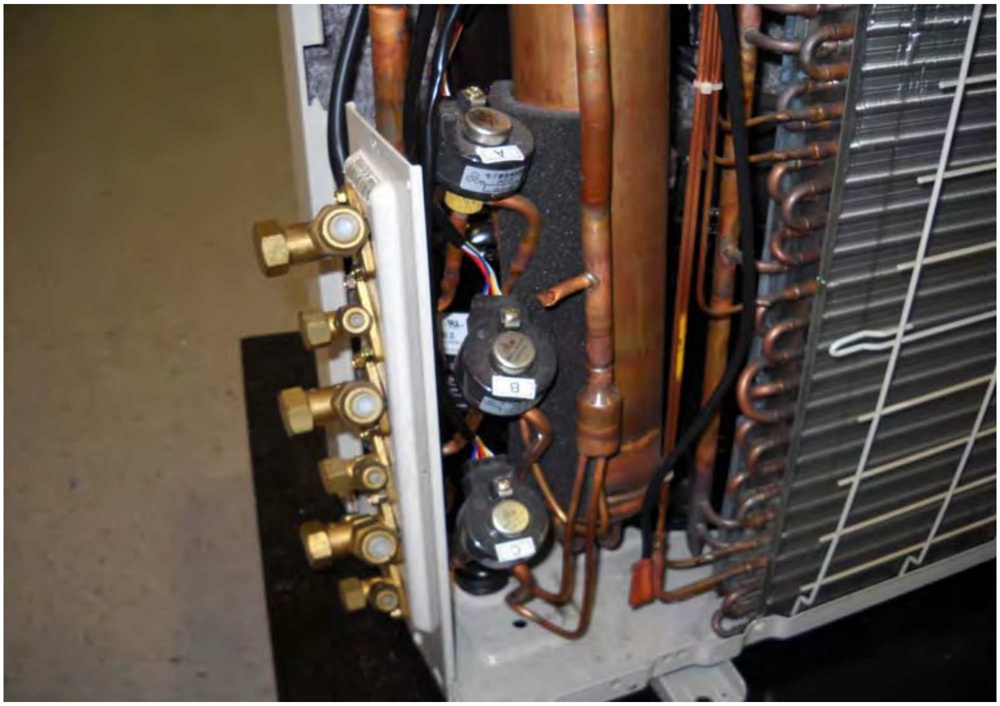
WARNING: WHEN DISCONNECTING POWER, THE CONTROL BOARD REMAINS HOT UNTIL THE LED LIGHTS GO DIM. THIS MAY TAKE AS LONG AS TWO MINUTES

Mini-split- Why so different

The machine pictured here is setup for up to three indoor units. This is shown by the three sets of brass fittings for the refrigerant lines on the side of the machine.

There's one reversing valve located below the control board assembly. The coil is replaceable, and can be checked out from the plug at the board.

Mini-split- Why so different



Mini-split- Why so different

67	12.88	2.58	35	15.36	3.56	105	2.6	1.48
68	12.55	2.55	36	14.92	3.53	106	2.54	1.45
69	12.23	2.51	37	14.5	3.5	107	2.48	1.43
70	11.92	2.48	38	14.09	3.47	108	2.43	1.41
71	11.62	2.45	39	13.69	3.44	109	2.38	1.39
72	11.33	2.42	40	13.3	3.41	110	2.33	1.36
73	11.05	2.39	41	12.93	3.38	111	2.27	1.34
74	10.78	2.36	42	12.57	3.35	112	2.23	1.32
75	10.51	2.32	43	12.22	3.32	113	2.18	1.3
76	10.25	2.29	44	11.89	3.29	114	2.13	1.28
77	10	2.26	45	11.56	3.25	115	2.09	1.26
78	9.76	2.23	46	11.24	3.22	116	2.04	1.24
79	9.52	2.2	47	10.94	3.19	117	2	1.22
80	9.29	2.17	48	10.64	3.16	118	1.96	1.2
81	9.06	2.14	49	10.35	3.13	119	1.92	1.18
82	8.84	2.11	50	10.07	3.09	120	1.88	1.16
83	8.63	2.08	51	9.8	3.06	121	1.84	1.14
84	8.42	2.05	52	9.54	3.03	122	1.8	1.12
85	8.22	2.02	53	9.28	3	123	1.76	1.11
86	8.03	1.99	54	9.04	2.97	124	1.72	1.09
87	7.84	1.97	55	8.8	2.93	125	1.69	1.07
88	7.65	1.94	56	8.56	2.9	126	1.65	1.05
89	7.47	1.91	57	8.34	2.87	127	1.62	1.04
90	7.3	1.88	58	8.12	2.84	128	1.59	1.02
91	7.13	1.85	59	7.91	2.8	129	1.56	1
92	6.96	1.83	60	7.7	2.77	130	1.52	0.99
93	6.8	1.8	61	7.51	2.74	131	1.49	0.97
94	6.64	1.77	62	7.31	2.71	132	1.46	0.95
95	6.49	1.75	63	7.12	2.67	133	1.43	0.94
96	6.34	1.72	64	6.94	2.64	134	1.41	0.92
97	6.2	1.69	65	6.76	2.61	135	1.38	0.91
98	6.06	1.67	66	6.59	2.58	136	1.35	0.89
99	5.92	1.64	67	6.43	2.54	137	1.32	0.88
100	5.79	1.62	68	6.26	2.51	138	1.3	0.87
			69	6.11	2.48	139	1.27	0.85
						140	1.25	0.84

Spring 2011 Mini Split AC