LG Therma V R32 Gen4 Typical Installation with Third Party controls

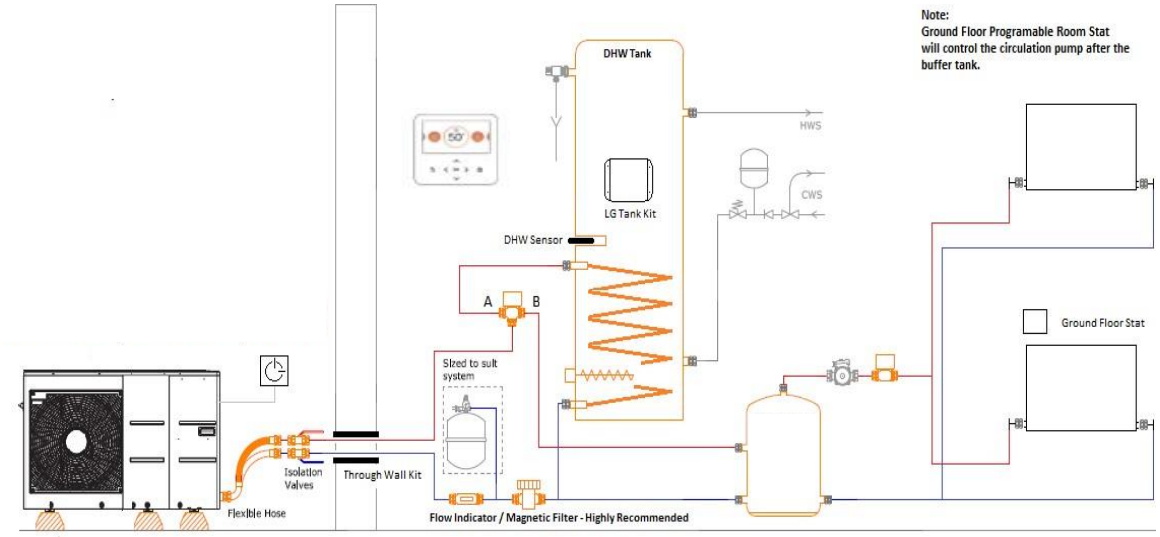
Installation and Setup

Monobloc system

Rev 1.1 May 24th 2022

This manual is designed to be a quick guide to the most common type of installation for a LG Therma V R32 Monobloc system.

This assumes heating via Buffer Tank, domestic hot water via a cylinder with sensor pocket and immersion heater, 3 port valve controlled Via the LG controller and Heating Control Via Third Party.



In the above system the monobloc units' functions are controlled by the unit's own controller and this is only used by the technician not the end user.

The end user controls the heating demand using a third party wired controller and can use this to set the room temperature at different times of the day.

The heat pump controls the domestic hot water temperature itself (including for an optional sterilization cycle) and is assisted by the immersion heater. 2 port valves MUST not to be used upstream of the buffer.

The hot water control is managed through the LG controller. Hot water takes priority over heating.

There is no electric heater inside the monobloc unit, however there is an additional booster heater available.

There is a flow sensor located within the unit.

A pump is installed within the Monobloc, however a second pump will be required on downstream of the buffer to feed the heating circuits

A strainer must be installed in the return pipework to the mono block. It is strongly recommended by LG in addition to this a Magnetic filter and Flow setter should also be installed.

Warranty

Please check the following before commencing startup as they are important conditions of the LG warranty.

- A strainer with a minimum 400 microns must be installed, in addition a Magnetic filter and flow setter are strongly recommended.
- A buffer tank should be used to ensure a minimum primary water volume of 25lt is obtained for the single fan units and 50lt for the double fan units.
- The pipe diameter used must be no smaller than 28mm copper (larger if plastic). Contact Secon for advice if the pipe length exceeds 10 meters or you are using plastic pipe.
- The external unit should be placed on a level, strong base suitable of withstanding its weight.
- The unit should be sited to allow good air flow around the unit and should not be located less than 300mm from any structure behind, with at least 700mm in front (we would recommend no less than 2m)
- Allowance for the condensate to soakaway, via a soakaway of to drain, not to allow ice formation around the unit.
- Anti freeze is recommended to protect again frost damage this should be premixed and added to the system, we will go into further detail later.
- The water quality should be tested against LG Requirements.
- The Mains power must be turned on 6 Hours before starting the product.

Part of the startup process involves checking the water flow rate. In order for the unit to operate at all then an absolute minimum flow rates must be met, but for correct operation as designed then a water flow rates below must be observed below.

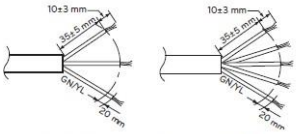
Capacity	Rated flow rate LPM	Rated flow rate M^3h	Minimum Primary Pipework size mm
5kw	14.37 Lpm	0.9 m^3h	22mm
7kw	20.12 Lpm	1.2 m^3h	28mm
9kw	25.87 Lpm	1.5 m^3h	28mm
12kw	34.5 Lpm	2.1 m^3h	28mm
14kw	40.25 Lpm	2.4 m^3h	35mm
16kw	46 Lpm	2.8 m^3h	35mm

*Taken from the Manufactures Recommendations, all pipe sizes should be calculated and checked, and remain responsibility of the installer to provide adequate flow through the unit.

Power Supply

MonoBloc units require one power supply

Power supplies sizes are-



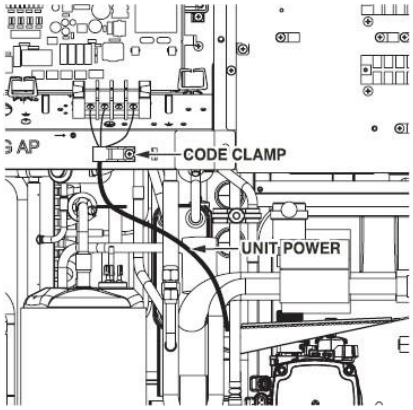
For the 1-Phase For the 3-Phase

Model Name		Area(mm²)	Cable Type
Phase	Capacity		
1Ø	5kW	4	H07RN-F
	7kW		
	9kW		
	12kW	6	
	14kW		
	16kW		
3Ø	12kW	4	
	14kW		
	16kW		

Model Name		Maximum Running Current
Phase	Capacity	
1Ø	5kW	23 A
	7kW	
	9kW	
	12kW	35 A
	14kW	
	16kW	
3Ø	12kW	15 A
	14kW	
	16kW	

The Following Points must be followed

- RCD - Type C.
- Rotary Enclosed Isolation switch - IP65.
- Mandatory electricity meter fitted within an enclosed box.
- Ensure power cable does not touch refrigerant pipework.



*All Electrical cable sizes should be checked on site by a NICEIC qualified electrician

Control Wiring

This shows a basic wiring schematic for a Heating and Domestic hot water system as for the hydraulic drawing on the first page.
Connections are made to the directly to the Monoblock via the 1st wiring centre as shown below:

*Wiring Differs to GEN 3 Models please use for GEN 4 models ONLY

Terminal Block 1

1	2	3	4	5	6	7	8	9
L	L1	N	L	L1	N	L	L1	N
MIXING VALVE			2WAY VALVE (A)			3WAY VALVE (A)		

Power supply for 2nd heating kit

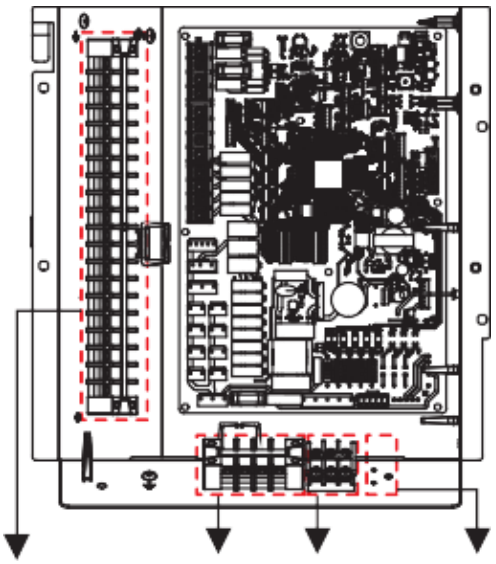
Water flow switching between using solar thermal heating and skipping solar thermal heating

Energizing water pump for solar thermal system

10	11	12	13	14	15	16	17	18	19	20
L	L1	N	L	N	L	N	L	N	L	N
3WAY VALVE (B)			WATER TANK HEATER		WATER PUMP(B)		MIX PUMP		WATER PUMP(C)	

Water flow switching between under floor heating and DHW tank heating

Power supply for 2nd heating kit



Terminal Block 1 | Terminal Block 2 | Terminal Block 3 | Terminal Block 4

Terminal Block 2 Terminal Block 3

21	22	23	24	25	26	27
L	N	L1	L2	L3	A	B
THERMOSTAT (Default : 230 V AC)					3rd PARTY CONTROLLER (5V DC)	

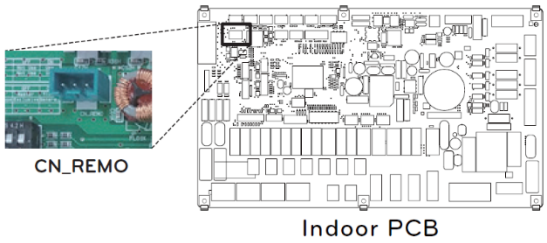
Connection for thermostat (230 V AC) Supporting type : Heating only or Heating/Cooling

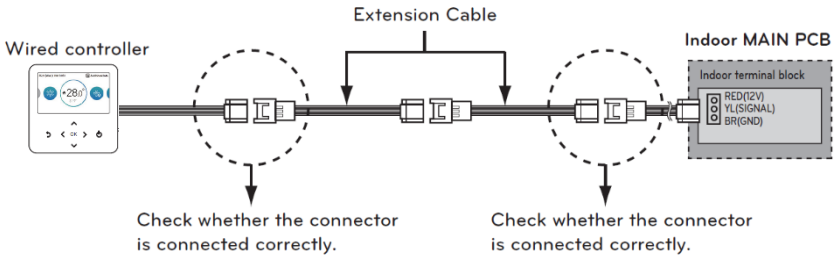
Connection for 3rd PARTY CONTROLLER

Terminal Block 4

28	29
L1	L2
E/HEATER OUT SENSOR (5 V DC)	

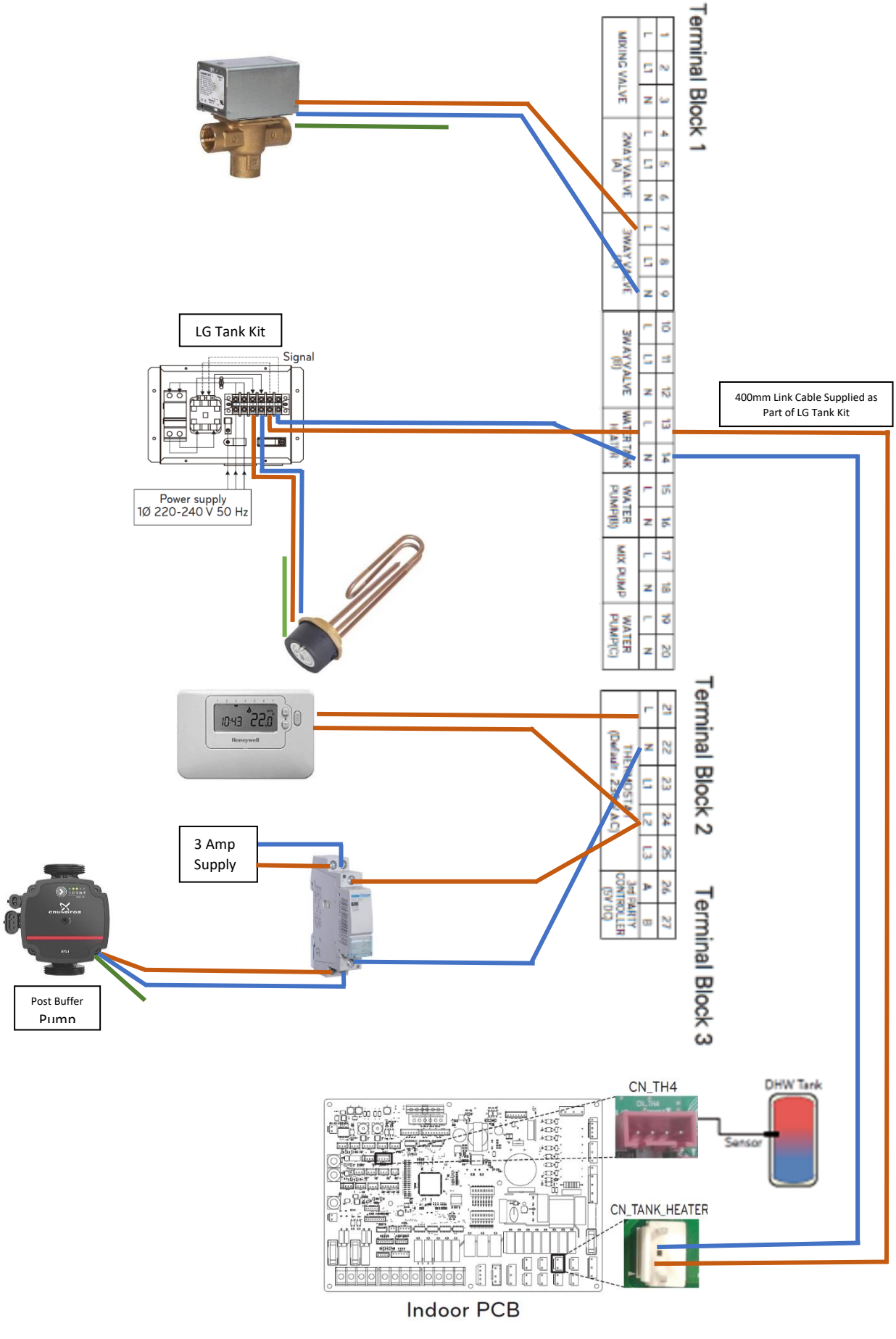
Connection for E/HEATER OUT SENSOR





The wired controller is Connected via plug CN_REM via the flying lead. If the Cable length is over 10m this can be extended using the 10m extension cable PZCWRC1.
Up to a MAXIMUM of 50m

Please Check wiring on site, as it may change without warning



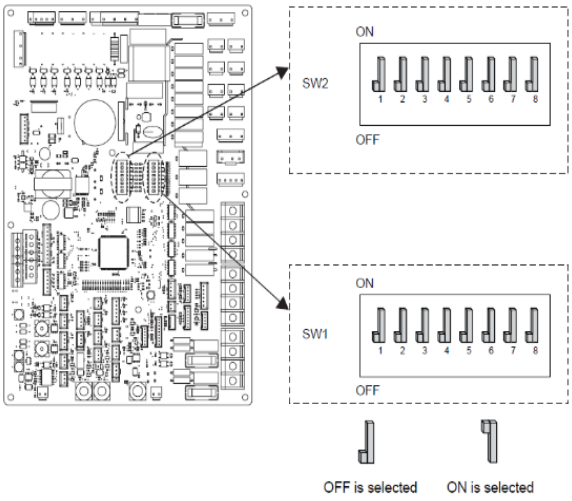
Please Note

- We recommend all communication cable and Power cables are separated to stop the protentional for interference, All communication cables should be screened.
- We recommend that all power supplies to heating pumps and immersion heaters Should go through local points of isolation via Switched fuse spurs.
- The tank sensor is not a generic item and LG approved sensors should only be used.
- Any Immersion heater stats should be set to maximum.
- All details should be confirmed with the LG manual.
- All Electrical work should be completed by NICEIC approved Electrician.

DIP Switch Settings

The unit contains a number of DIP switches these must be set prior to powering up the unit in order to allow the unit to operate correctly and to allow some features to function.

The Dip Switches are laid out as the diagram below:



SW2

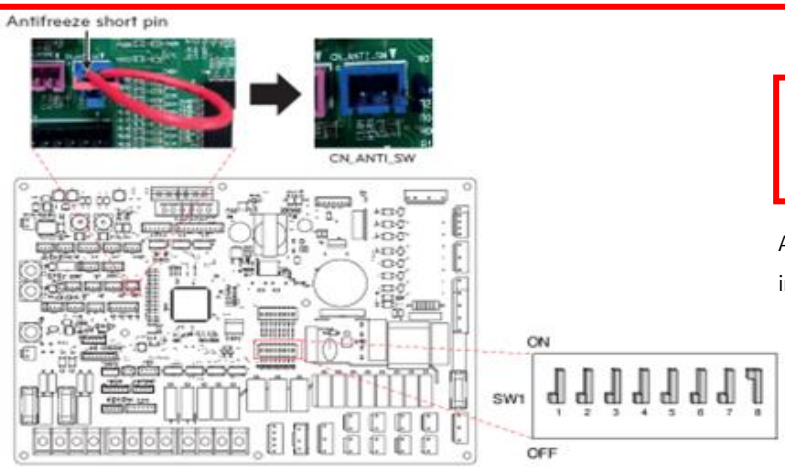
1 - Off (Master)
2 - Off
3 – ON (unit, Outdoor Unit DHW tank Installed)
4 – Off (Heating Only)
5 – Off
6 – Off
7 – Off
8 – ON (third party thermostat used)

SW1

8 – ON if Glycol used and CN_ANTI_SW link removed

NOTE

To use this function, the antifreeze short pin(CN_ANTI_SW) must be open and switch No.8 in Option SW 1 must be on.



*Please Refer to the table below when setting Anti-Freeze levels

Anti-freezing temperature setting is available in installer mode. Change the value from -5 to -10 *

- It is the responsibility of the installer to ensure the correct amount of antifreeze additiveis applied to the water system to protect the product against water temperatures below 0℃. The correct volume of water contained in the system should be calculated, with six additional liters added for the AWHP product, as per the installation instructions.

Guidance from this instruction is provided below :-

Antifreeze type	Antifreeze mixing ratio					
	0 ℃	-5 ℃	-10 ℃	-15 ℃	-20 ℃	-25 ℃
Ethylene glycol	0 %	12 %	20 %	30 %	-	-
Propylene glycol	0 %	17 %	25 %	33 %	-	-
Methanol	0 %	6 %	12 %	16 %	24 %	30 %

- If Antifreeze is added to the hydraulic system water, then the antifreeze solution temp can be adjusted in the installer settings. (The setting is not visible normally, method is described later)

- Possible settings are displayed as below.
  - Temperature : -5 / -10 / -15 / -20 / -25℃(Default : -5℃)

- The values shown are not actual temperature setting but an offset that can be applied to the default value of 0℃, as shown in the previous slide. When the function is activated the default value is -5℃.
- Example if setting -10 is used;
  - entering water temp for judgment is reduced from 15℃to 5℃for protection starting
  - entering water for condition release is reduced from 18℃(15℃+ 3℃) to 8℃(5℃+ 3℃)

Pre-Start Check

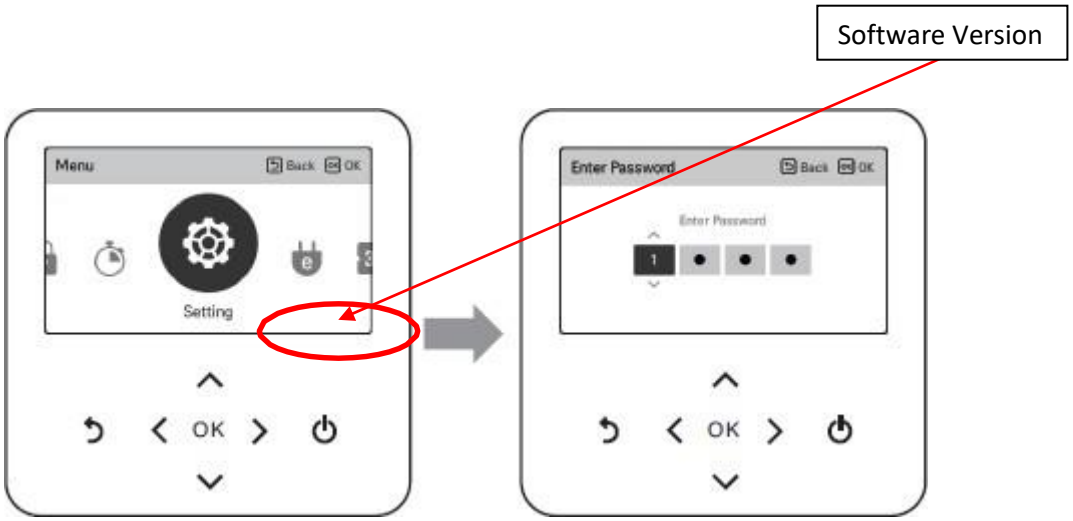
Please check the following prior to starting the unit :

- The power supply to the mono-bloc must have been on 6hr prior to starting.
- Check all electrical and wiring connections are as per LG spec
- Make sure that all hydraulic connection is as per LG spec
- Make sure the system is full and vented.
- Check the Anti-freeze level is adequate
- Check that the system has been adequately flushed.
- Check there is an adequately sized expansion vessel fitted to the system and safety relief valve. Inside the monobloc there is a 8lt vessel with a 1 bar precharge, this is adequate for system volumes up to 230lt dependent on system head.

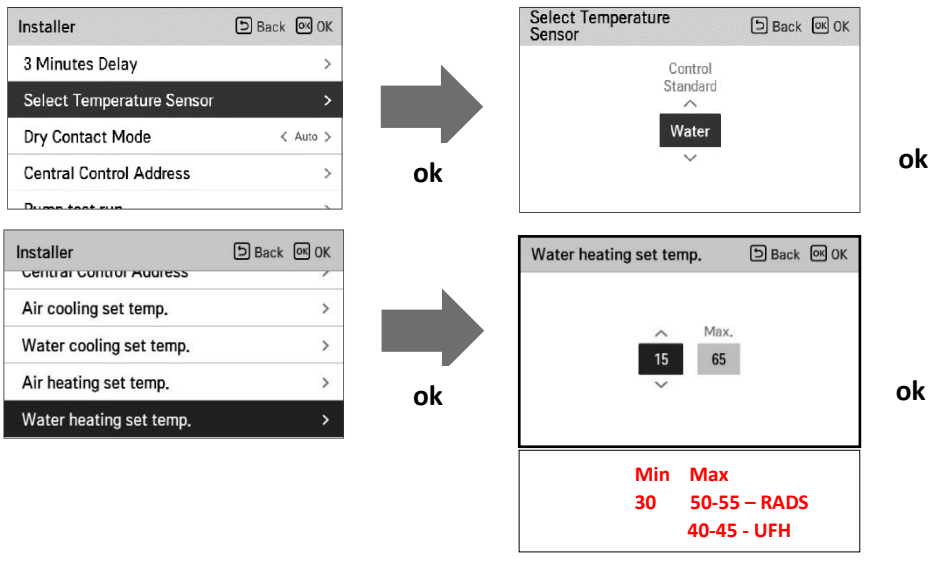
Starting the unit for First Time

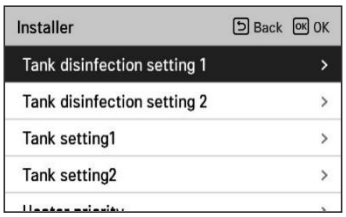
Power up the unit.

1. Press the Right hand button and Select Menu, Confirm with OK
2. Use the Right hand button Select Setting, Press and Hold the up Button for 3 Seconds
3. 4 square boxes are shown enter the Password (this is the software version in the right hand bottom corner of the screen).



You are now in the Installer Configuration menu. The following setting need to be set for Basic operation.



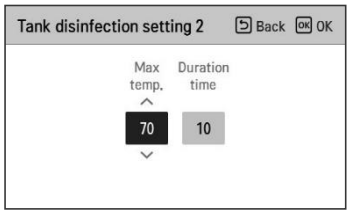


ok

ok

Use Sun 1:00am

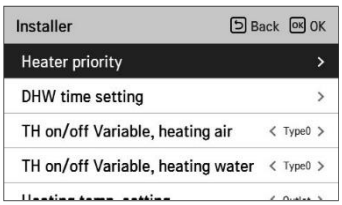
ok



ok

60 10

Force end (time) 1



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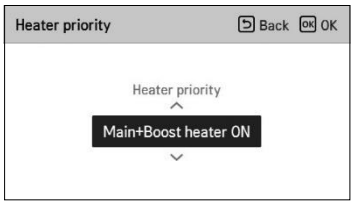

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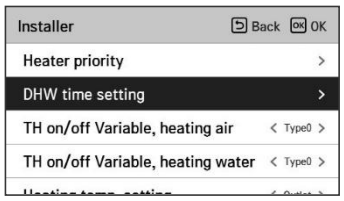
Booster Heater ON



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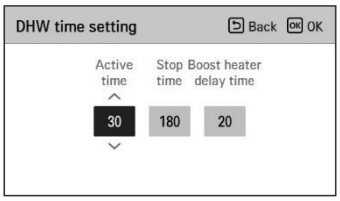

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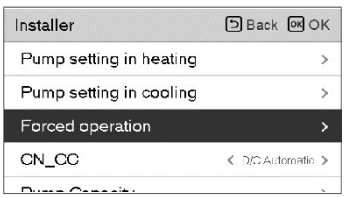
90 30 90



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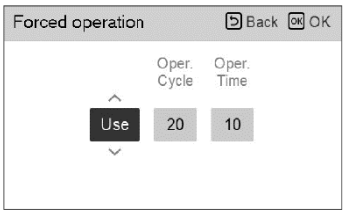


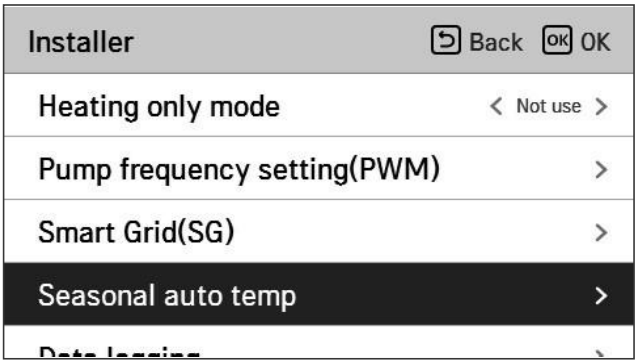
ok

AS ABOVE

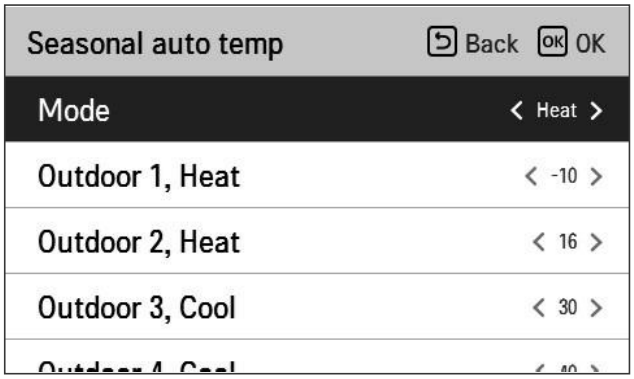
Here We Talk about setting the Weather Compensated Curve in Installer settings.

(*These Setting will be site Dependant)

In the example below the external design temp is -2.8℃ with a Design Flow temp of 50℃ for Radiators



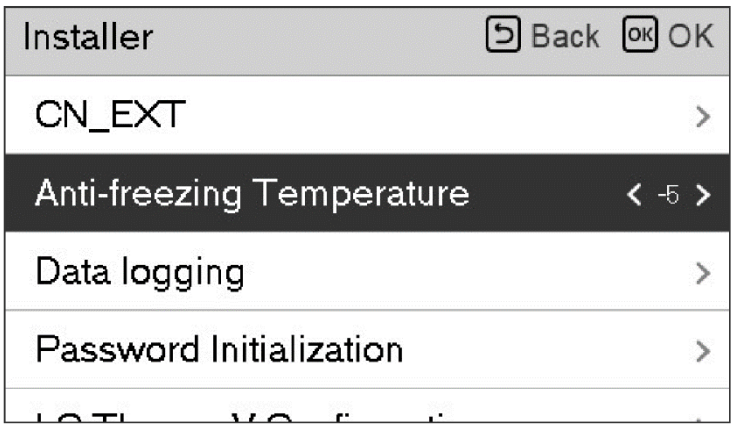
OK



MODE- Select HEAT

Function	Description	Range	Default	Set
Outdoor 1, Heat (OUT 1)	Heating Lower ambient Temp	-25 - 35℃	-10℃	- 2.8℃ *
Outdoor 2, Heat (OUT 2)	Heating Higher ambient Temp		16℃	19℃ *
Water1, Heat (LW1)	Heating higher Water Temp	Dependant on Field Settings	35℃	50℃ *
Water2, Heat (LW2)	Heating Lower Water Temp		28℃	30℃ *

Controler Video: LG Therma V R32 Monobloc Installer Setting Guide - Bing video



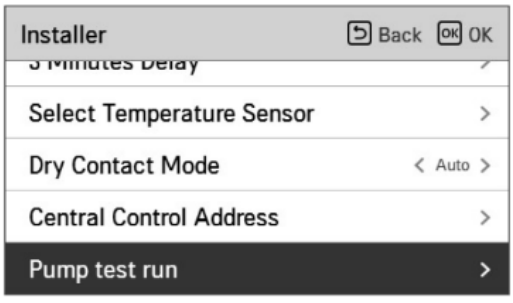
Please See Earlier Section Regards Antifreeze Levels

NOTE

To use this function, the antifreeze short pin must be open and switch No.2 in Option SW 3must be on.

Test Run of Heating Pump

Within the Installer menu Select Pump test run



OK

Through out this process the Flowrate should be observed to check it meet MI.

The system should be vent of air and check that it is full of water.

The System can now be put into normal Operation

This is done by highlighting the mode and ie CH or DHW on the main screen and pressing the ON/OFF button until the symbol is Orange.

Trouble Shooting

	Problem	Reason	Solution
1	Heating or Cooling is not satisfactory.	• Setting target temperatureis not proper.	• Set target temperature correctly. • Check if temperature is water-based or air-based . See "Remote sensor active' and 'Temp. sensor selection' inChapter6.
		• Charged water is not enough.	• Check pressure gage and charge more water until pressuregage is indication 2~2.5 Bar
		• Water flow rate is low.	• Check if strainer gathers too much partices. If so, strainer should be cleaned. • Check if pressure gage indicates above 4 Bar • Check if water pipe is getting closed due to stacked paticlesor lime.
2	Although electric power supply is OK (remote controller displays information), the unit does not start working.	• Water inlet temperature is too high.	• If water inlet temperature is above 57 °C, the unit does not operated for the sake of system protection
		• Water inlet temperature is too low.	• If water inlet temperature is below 5 °C in cooling operation, the unit does not operated for the sake of system protection. Wait while unit warms up the water inlet temperature. • If water inlet temperature is below 15 °C in heating operation,the unit does not operated for the sake of system protection. Wait while unit warms up to 18 °C the water inlet temperature. • If you are not using the back up heater accessory (HA**1M E1), increase the water temperature with theexternal heat source (heater, boiler). If the problem persists, contact your dealer. • If you want to use the screed drying function, be sure to purchase and install back up hater accessories (HA** 1M E1).
3	Water pump noise.	• Air purging is not completely finished.	• Open the cap of air purge and charge more water until pressure gage is indicating 2~2.5 Bar • If water does not splash out when the tip(at the top of the hole) is pressed, then air purging is not completed yet. If wellpurged, the water will splash out like fountain.
		• Water pressure is low.	• Check if pressure gage indicates above 0.3 Bar. • Check if the expanstion tank and pressure gage operates well.
4	Water is flood out through drain hose.	• Too much water is charged.	• Flood out water by opening the switch of the safety valve until pressure gage is indicating 2~2.5 Bar.
		• Expantion tank is damaged.	• Replace the expantion tank
5	DHW is not hot.	• Thermal protector of water tank heater is actived.	• Open the side panel of the DHW tank and push the reset button of the thermal protector. (for more detail information,please refer to intallation manual of DHW tank.
		• DHW Heating is disabled.	• Select DHW Heating Operation and identify if icon is displayedon the remote conrtoller.

Error Codes

Code No.	Description	Cause	Normal Condition
1	Problem in remote room air sensor	• Incorrect connection between sensor and PCB(Heater). • PCB(Heater) fault • Sensor fault	• Resistance: 10 kO at 25 centigrade (unplugged) -+ for Remote room air sensor • Resistance: 5 kO at 25 centigrade (unplugged)-+ for all sensors EXCEPT remote room air sensor • Voltage: 2.5 V DC at 25 centigrade (plugged) (for all sensors) • Refer resistance-temperature tableto check in different temperature
2	Problem in refrigerant (inlet side) sensor		
6	Problem in refrigerant (outlet side) sensor		
8	Problem in water tank sensor		
13	Problem in solar pipe sensor		
16	Problems in sensors		
17	Problem in water-inlet sensor		
18	Problem in water-outlet sensor		
19	Problem in electric heater outlet sensor		
10	BLOC Water pump Lock	Restriction of BLOC Water pump	• BLOC Water pump defect/ assembly condition abnormal • Fan lock by foreign material
3	Bad communication between remote controller and unit.	• Incorrect connection between sensor and PCB(Heater) • PCB(Heater) fault • Sensor fault	• Wire connection between remote controller and Main PCB assembly(Heater) should be tight • Output voltage of PCB should be12 V DC
5 53	Bad communication between Main PCB assembly(Heater) and Main PCB assembly(Inverter) of the unit.	• The connector for transmission is disconnected • The connecting wires are misconnected • The communication line is broken • Main PCB assembly(Inverter) is abnormal • Main PCB assembly(Heater) is abnormal	• Wire connection between remote control panel and Main PCB assembly(Heater) should be tight.
9	PCB program (EEPROM) fault	• Electrical or mechanical damage a the EEPROM	• This error can not be permitted
14	Problem in flow switch	• Flow switch is open while internal water pump is working • Flow switch is closed while internal water pump is not working • Flow switch is open while DIP switch No. 5 of Main PCB assembly(Heater) is set as on	• Flow switch should be closed while internal water pump is working or DIP switch No. 5 of Main PCB assembly(Heater) is setas on • Flow switch should be open while internal water pump is not working
15	Water pipe overheated	• Abnormal operation of electric heater • Leaving water temperature is above 72 °C.	• If there is no problem in electric heater control, possible maximum leaving water temperature is 72 °C

20	Thermal fuse is damaged	• Thermal fuse is cut off by abnormal overheating of internalelectric heater • Mechanical fault at thermal fuse • Wire is damaged	• This error will not be happened if temperature of electric heater tankis below 80 °C

Display code	Title	Cause of error	Check point & Normal condition
21	DC PEAK (1PM Fault)	• Instant over current • Over Rated current • Poor insulation of 1PM	• An instant over current in the U,V,W phase - Comp lock - The abnormal connection of U,V,W • Over load condition - Overcharging of refrigerant Pipe length.Outdoor Fan is stop • Poor insulation of compressor
22	Max. *C(T*	Input Over Current	1. Malfunction of Compressor 2. Blocking of Pipe 3. Low Voltage Input 4. Refrigerant, Pipe length, Blocked...
23	DC Link High/ LowVolt	• DC Link Voltage is above 420 V DC • DC Link Voltage is below 140 V DC	• Check CN_(L), CN_(N) Connection • Check Input Voltage • Check PCB DC Link voltage sensor parts
24	Low/High PressureSwitch Perception Error	• Low pressure is below 0.2 kgf/cm^2. • High pressure is above 42~44kgf /cm^2. • Pressure switch is self-defective.	• Check the low/high pressure • Check the connection of harness
26	DC CompressorPosition	• Compressor Starting fail error	• Check the connection of comp wire "U,V,W" • Malfunction of compressor • Check the component of "IPM", detection parts.
27	AC Input Instant overCurrent Error	PCB(Inverter) input current is over100 A(peak) for 2 us	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage (Insulation damage/Motor damage) 3. Input voltage abnormal (L,N) 4. Power line assemble condition abnormal 5. PCB assembly 1 Damage (input current sensing part)
29	Inverter compressorover current	(HM**1M U*3) Inverter Compressor input current is 35 Apk. (HM**3M U*3) Inverter Compressor input current is 35 Apk.	1. Overload operation (Pipe clogging/Covering/EEV defect/Ref. overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. ODU PCB assembly 1 damage

32	High temperature inDischarge pipe of the inverter compressor	• Overload operation (Outdoor fan constraint, screened, blocked) • Refrigerant leakage (insufficient) • Poor INV Comp Discharge sensor • LEV connector displaced/ poor LEV assembly	• Check outdoor fan constraint/ screened/ flow structure • Check refrigerant leakage • Check if the sensor is normal • Check the status of EEV assembly
35	Low pressure Error	Excessive decrease of low pressure	• Defective low pressure sensor • Defective unit fan • Refrigerant shortage/leakage • Deformation because of damage of refrigerant pipe • Defective unit EEV • Covering/ clogging (unit covering during the cooling mode/ unit filter clogging during heating mode) • SVC valve clogging • Defective unit PCB(Inverter) • Defective unit pipe sensor

Display code	Title	Cause of error	Check point & Normal condition
41	Problem in D-pipe temperature sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
43	Problem in highpressure sensor	Abnormal value of sensor (Open/Short)	• Bad connection of connector PCB(Inverter) • Bad connection high pressure connector • Defect of high pressure connector (Open/Short) • Defect of connector PCB(Inverter) (Open/Short) • Defect of PCB(Inverter)
44	Problem in outdoorair temperature sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
45	Problem in Cond. middle pipe temperature sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
46	Problem in suctionpipe temperature sensor	• Open / Short • Soldered poorly • Internal circuit error	1. Bad connection of thermistor connector 2. Defect of thermistor connector (Open/Short) 3. Defect of outdoor PCB(Inverter)
52	PCB CommunicationError	Checking the communication state between Main PCB and Inverter PCB	• Generation of noise source interfering with communication

54	Open and ReversePhase Error	Prevention of phase unbalance and prevention of reverse rotation of constant-rate compressor	Main power wiring fault
60	PCB(Inverter) & MainEEPROM check sum error	EEPROM Access error and CheckSUM error	1. EEPROM contact defect/wrong insertion 2. Different EEPROM Version 3. ODU Inverter & Main PCB assembly 1 damage
61	High temperaturein Cond. Pipe	• Overload operation (Outdoor fan constraint, screened, blocked) • Unit heat exchanger contaminated • EEV connector displaced/ poorEEV assembly • Poor Cond. Pipe sensor assembly/ burned	• Check outdoor fan constraint/ screened / flow structure • Check if refrigerant overcharged • Check the status of EEV assembly • Check the status of sensor assembly/ burn
62	Heat sink Temp,High error	Heatsink temperature is greater than110 °C.	1. Part no. : EBR37798101~09 - Check the heatsink sensor: 10 kO / at25 °C(Unplugged) - Check the outdoor fan is driving rightly2. Part no.: EBR37798112~21 - Check the soldered condition in the 22,23 pin of 1PM,PFCM - Check the screw torque of 1PM, PFCM - Check the spreadable condition of thermal grease on1PM, PFCM - Check the outdoor fan is driving rightly
65	Problem in HeatsinkTemperature sensor	Abnormal value of sensor (Open/Short)	• Check if there is defect of thermistor connector (Open/Short) • Check defect of outdoor PCB(Inverter)

Display code	Title	Cause of error	Check point & Normal condition
67	Fan lock error	Fan RPM is less than 10 for 5 seconds from start-up operation. Fan RPM is less than 40 in operationexcept for start-up operation	1 . Fan motor damage 2 Assembly condition abnormal 3 Jammed fan by surroundings
114	Problem in Vapor injection inlet temperature sensor	• Open (Below -48.7 °C)/ Short(Over 96.2 °C) • Soldered poorly • Internal circuit error	1 . Bad connection of thermistor connector 2 Defect of thermistor connector (Open/Short) 3 Defect of outdoor PCB(Outdoor)
115	Problem in Vapor injection outlet temperature sensor	• Open (Below -48.7 °C)/ Short(Over 96.2 °C) • Soldered poorly • Internal circuit error	1 . Bad connection of thermistor connector 2 Defect of thermistor connector (Open/Short) 3 Defect of outdoor PCB(Outdoor)

First two weeks: Blocked filters and/or air pockets

Flow rate alarms are likely to occur during the first two weeks after commissioning; this is due to the formation of air-pockets which may occur and temporarily affect the flow-rate. In most cases, the air will migrate to the auto-airvents (AAV) and release without any requirement for intervention.

Equally, if any sediments are in the hydronic pipework, they will be caught by the internal strainer. Blockages in thestrainer can cause CH14 alarms. In this case, the strainers will need to be cleaned

Recommendation: once the unit has been installed, advise the customers that it is quite likely and normal for a CH14 alarmto occur in the first two weeks. This will give the customer reassurance if and when the fault does arise!

If the cause was air, then a simple power reset could allow the system to continue working as normal, once the pocket of airhas made its way to the AAV

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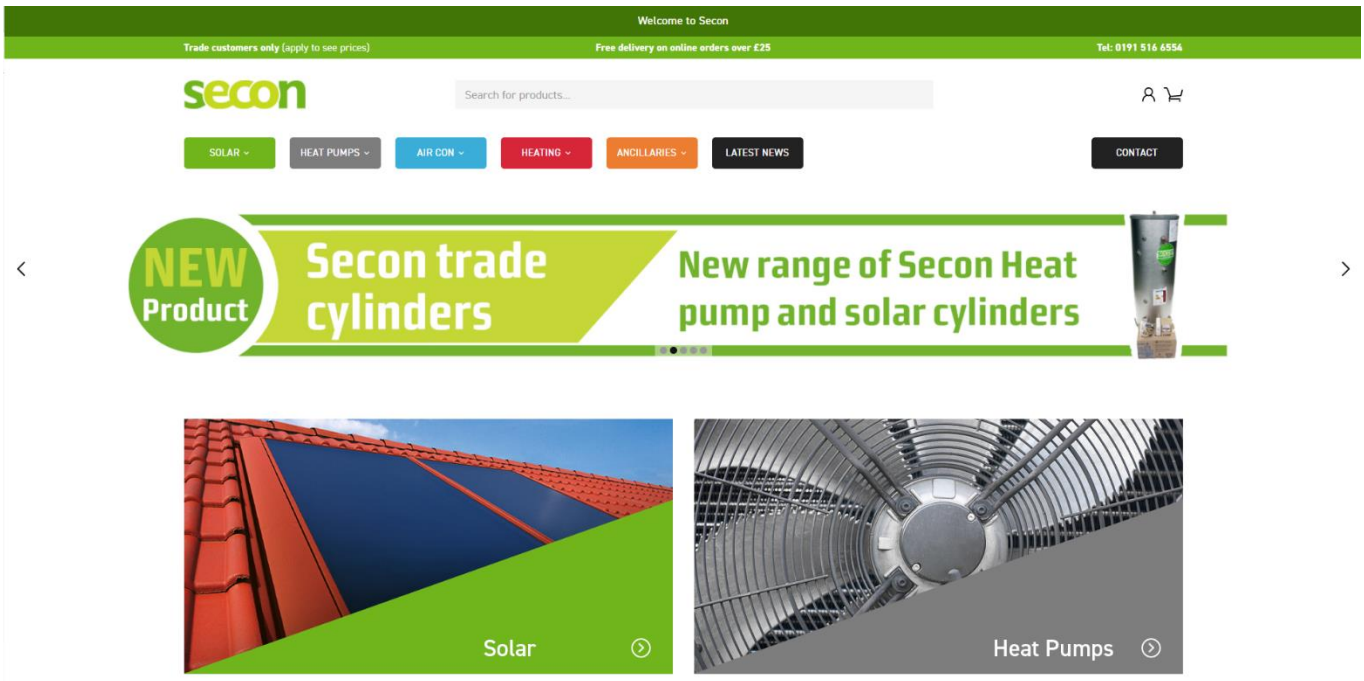

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