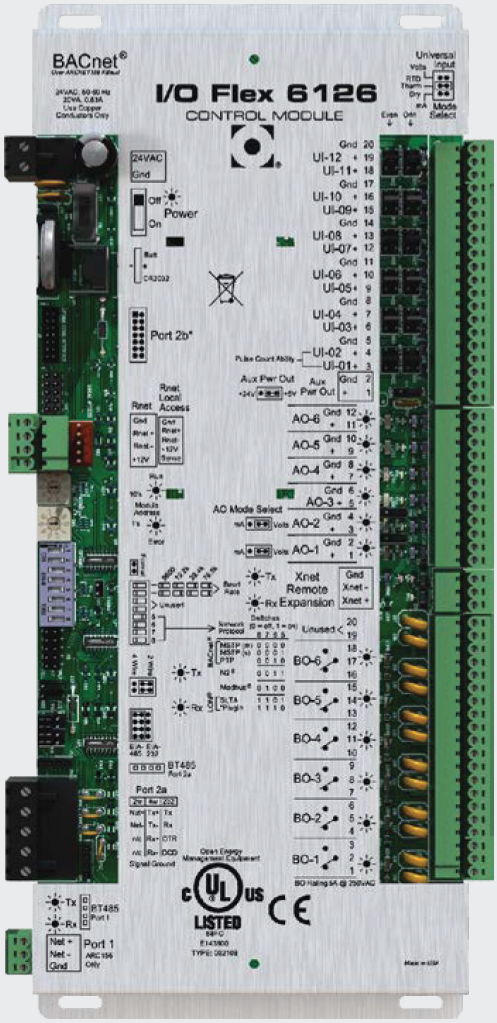
BOSCH

Installation & Operation Manual

For Commercial Water to Air DDC Applications

Control Air 6120



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1 Key to Symbols and Safety Instructions

1.1 Key to Symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following keywords are defined and can be used in this document:

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

Important information

The info symbol indicates important information where there is no risk to people or property.

1.2 Safety Warnings

WARNING

Electrical hazard!

Installation and servicing of this equipment can be hazardous due to the electrical components. Only trained and qualified personnel should install, repair, or service the equipment.

WARNING

Electrical hazard!

Before performing service or maintenance operations on the system, turn off main power to the unit. Electrical shock could cause personal injury or death.

WARNING

Fire, personal injury!

When working on equipment, always observe precautions described in the literature, tags, and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing, and place a fire extinguisher close to the work area.

WARNING

Electrical hazard!

To reduce the risk of fire or electric shock, do not interconnect the outputs of different class 2 circuits.

WARNING

Contains lead!

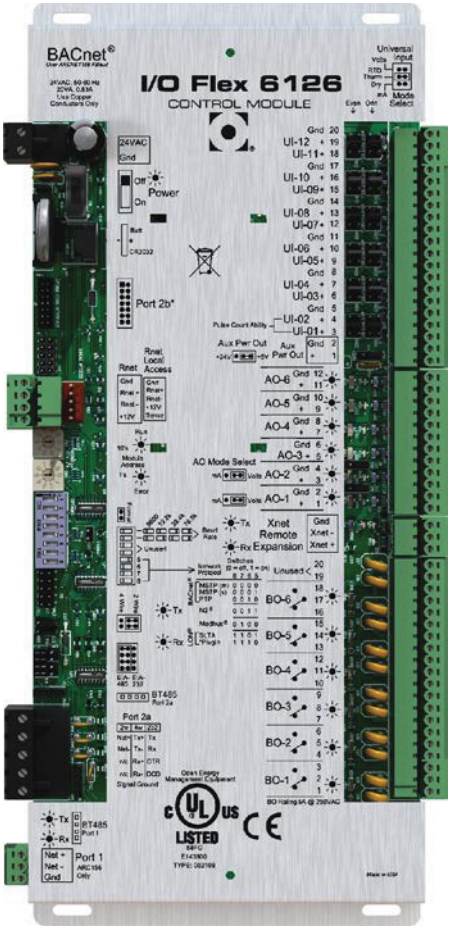
This product can expose you to chemicals including Lead and Lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

2 Introduction

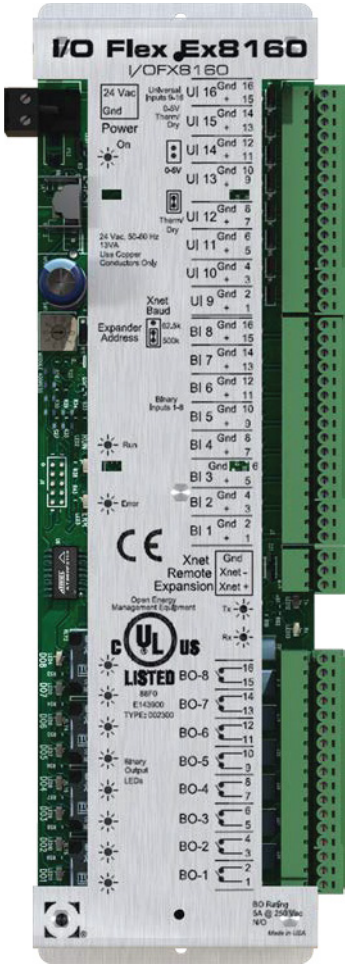
2.1 Control Air 6120 and Control Air 6120 Point Expander

The Control Air 6120 is a general purpose controller. It provides the communications circuitry, non-volatile memory, and removable screw terminals for I/O connections.

The Control Air 6120 can be connected to the Control Air 6120 Point Expander to increase the number of inputs and outputs, allowing your system to grow as the size of the job increases.



Control Air 6120



Control Air 6120 Point Expander

Figure 1

2.2 Components Overview

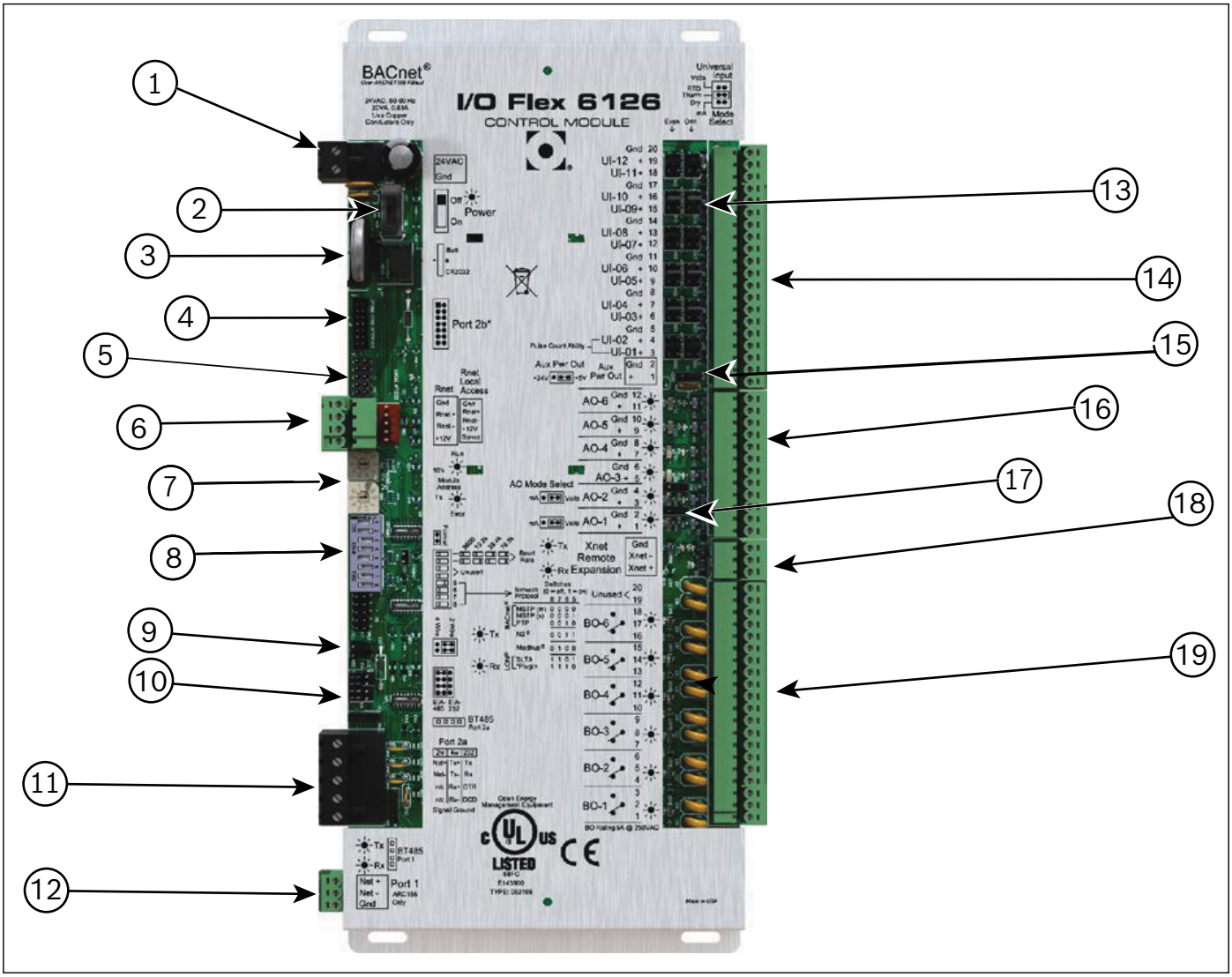


Figure 2

Components List

1. Power
2. Power Switch
3. Battery
4. Port 2b
5. Local Access
6. RNET port
7. Rotary Switches
8. Dipswitch Baud/Network Protocol
9. Full Half Duplex Jumper
10. EIA-485/EIA-232 Jumper
11. Port 2a
12. Port 1 ARC156 Only
13. Universal Input Select Mode Jumpers
14. Universal Input
15. Aux Power Out Jumper
16. Analog Output
17. AO Mode Select Jumpers
18. XNET Remote Expansion
19. Binary Output

3 Control Air 6120 Features

Power

24 Vac ± 10%, 50-60 Hz, 20 VA power consumption (26 VA with BACview attached), 26 Vdc (25 V min, 30 V max), Single Class 2 source only, 100 VA or less.

Power Switch

Turn on or off the power that is supplied to enable the CA6120 to operate

Battery

The 10-year Lithium CR2032 3V battery retains data (e.g. control programs, modified parameters, schedules, etc) for a maximum of 10,000 hours during power outages. If the Control Air 6120 experiences RAM loss (e.g. due to low voltage on the controller or high voltage on the network), it may be reset by recycling the battery power. This operation should be performed with the Control Air 6120 powered off (no 24Vac power) and resolves most of all "bad controller" issues. All previously saved parameters are retained upon power up.

Port 2b

Lon Interface (Not Supported).

Local Access

The local access port is available for system startup, servicing and troubleshooting using BACview.

Rnet Port

The Rnet port is a four-connector block reserved mainly for wiring the ZS combo sensors to the Control Air 6120. It consists of 2 points for power (12VDC and Gnd) and 2 points for communication (Rnet + and Rnet -). This port is also used for data when connecting a Control Air M to the controller (Rnet+ and Rnet- only).

Rotary Switches

The rotary dials are used to address the Control Air 6120 so it can be uniquely identified over a network. The top dial represents the Tens digit while the bottom one represents the Ones digit. Before setting or changing the address make sure the Control Air 6120 is powered off; the controller only reads the address when the module is turned on.

Dipswitch Baud/Network Protocol

The BAS Port Settings DIP switch bank is used to set the appropriate network configuration when the Control Air 6120 is integrated into a Building Automation System (BAS).

Duplex Jumper

Select Full (4-wire) or Half (2-wire) for Port 2a.
NOTE This jumper setting must match the correct protocol settings in WebCTRL, or the module will not be able to communicate on Port 2a.

EIA-485/EIA-232 Jumper

Select EIA-485 or EIA-232 for Port 2a.

Port 2a

For communication on EIA-232 or EIA-485 (2-wire or 4-wire). Network protocol selectable for: BACnet (MS/TP or PTP) , Modbus, N2.

Port 1 ARC156 Only

For communication with the ARC156 networks.

Universal Input Select Mode Jumpers

Select 0-10V, RTD Therm Dry, or 0-20mA to indicate what type of signal each input should expect.

Universal Input

12 inputs configurable for 0-10 V, RTD Therm Dry, or 0-20mA. Inputs 1 and 2 may be used for pulse counting.

Aux Power Out Jumper

Select +24V or +5V if you are using this as an additional power source when the current input mode is being used.

Analog Output

6 outputs. Outputs 1 and 2 are configurable for 0-10 V or 0-20mA, 3 - 6 are 0-10 V only.

AO Mode Select Jumpers

Select 20mA or 10V, depending on what type of signal this output will send.

XNET Remote Expansion

For communication with one CA6120 point expander.

Binary Output

6 outputs, relay contacts rated at 5A max @ 250 Vac. Configured normally open or normally closed.

4 Specifications

Description	Value
Driver	drv_ioflex
Maximum number of control programs*	20
Maximum number of BACnet objects*	1000
Power	• 24 Vac ±10%, 50–60 Hz • 20 VA power consumption (26 VA with BACview® device attached) • 26 Vdc (25 V min, 30 V max) • Single Class 2 source only, 100 VA or less
Comm Ports	• Port 1: For communication with the ARC156 networks. • Port 2a: For communication on EIA-232 or EIA-485 (2-wire or 4-wire). Network protocol selectable for: ◦ BACnet (MS/TP or PTP) ◦ Modbus ◦ N2
Rnet port	You can connect zone sensors or the BACview ® device to the Rnet port, as follows: • ZS sensors ◦ 1-5 ZS Sensors ◦ Up to 5 ZS sensors and 2 BACview ® devices CAUTION: Power requirements differ for the various ZS sensor models. See the ZS Sensor Installation Guide for details.
Local Access port	For local communication with a laptop computer running Virtual Backview or a BACview® 6 device.
Xnet port	For communication with one I/O Flex Ex8160 expander.
Universal inputs	12 inputs configurable for 0-10 V, RTD Therm Dry, or 0-20mA. Inputs 1 and 2 may be used for pulse counting.
Input pulse frequency	Maximum of 10 pulses per second. Minimum pulse width required for each pulse: • ON to OFF time (half cycle) is 50 msec • ON to OFF to ON time (full cycle) is 100 msec
Input resolution	12 bit A/D
Binary outputs	6 outputs, relay contacts rated at 5A max @ 250 Vac. Configured normally open or normally closed.
Analog outputs	6 outputs. Outputs 1 and 2 are configurable for 0-10 V or 020mA, 3 - 6 are 0-10 V only.
Output resolution	8 bit D/A
Memory	1 MB non-volatile battery-backed RAM, 4 MB Flash memory, 16bit memory bus
Real-time clock	Battery-backed real-time clock keeps track of time in event of power failure

Table 1

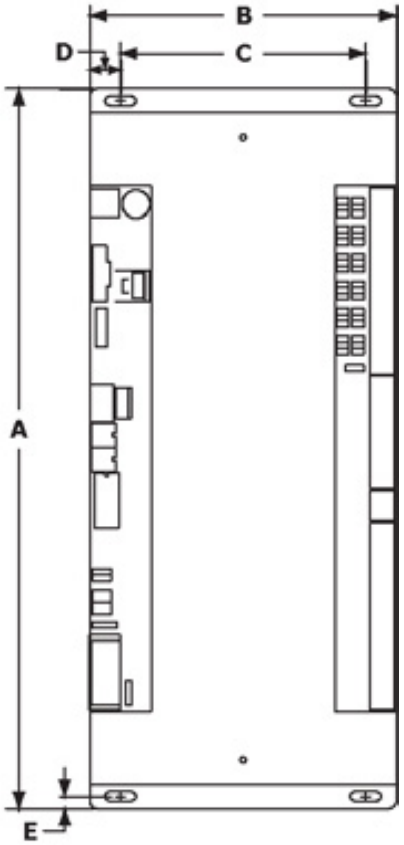
** Depends on available memory*

Specifications Continued

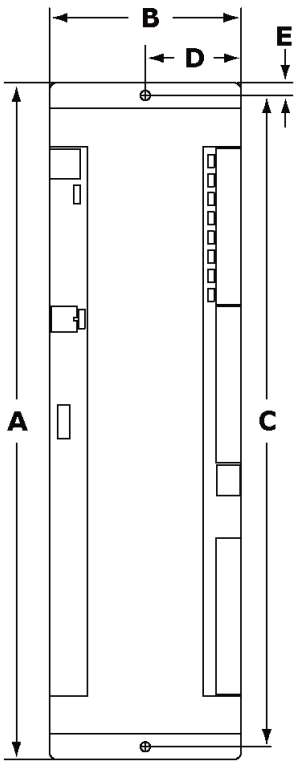
Description	Value
Battery	10-year Lithium CR2032 battery ensures the following data is retained for a maximum of 10,000 hours during power outages: • Time • Graphics • Control programs • Editable properties • Schedules • Trends A low battery is indicated by a low battery alarm in the WebCTRL® for OEMs application, BACview® terminal, and Field Assistant.
Data Archive	Control programs, graphics, or BACview® files, editable properties, and schedules are archived to non-volatile Flash memory after every download or manual archive. If memory is corrupt or a power outage occurs and the battery backup fails or is turned off, the data is automatically restored from this archive, or you can manually restore from archived memory.
Protection	• Incoming power and network connections - non-replaceable internal solid-state polyswitches reset themselves when fault clears. • Power, network, I/O connections - protected against voltage transient and surge events.
Status indicators	LED's indicate status of communications, running, errors, and power. LED indicators for transmit/receive for Port 1 and Port 2a and for each of the 12 outputs.
Electrostatic Discharge (ESD) Protection	Level: 2 Contact Discharge (kV): ±4 Air-Gap Discharge (kV): ±4
Environmental operating range	-20° to 140°F (-29° to 60°C), 10–95% relative humidity, noncondensing
Physical	Rugged aluminum housing, removable screw terminals
Weight	1.1 lb. (0.5 kg)
BACnet support	• Conforms to the BACnet Advanced Application Controller (B-AAC) • Standard Device Profile as defined in ANSI/ASHRAE Standard • 135-2012 (BACnet) Annex L, Protocol Revision 9
Listed by	UL916 (Canadian Std C22.2 No. 205-M1983, CE, FCC Part 15 - Subpart B - Class A

Table 2

5 Dimensions



Control Air 6120



Control Air 6120
Point Expander

Figure 3

Overall dimensions			Mounting dimensions		
A	B	Depth	C	D	E
11-13/16 in. (30 cm)	5 in. (12.7 cm)	1-9/16 in. (4 cm)	4 in. (10.2 cm)	1/2 in. (1.3 cm)	13/64 in. (.5 cm)

Table 3 Control Air 6120 Dimensions

Overall dimensions			Mounting dimensions		
A	B	Depth	C	D	E
10-5/8 in. (27 cm)	3 in. (7.6 cm)	1-9/16 in. (4 cm)	10-3/16 in. (25.9 cm)	1-1/2 in. (3.8 cm)	13/64 in. (.5 cm)

Table 4 Control Air 6120 Point Expander Dimensions

6 Mounting and Wiring

6.1 Mounting the Control Air 6120

1. Screw the Control Air 6120 into an enclosed panel using the mounting slots on the coverplate. Leave about 2 in. (5 cm) on each side of the controller for wiring.
2. See mounting hole dimensions in Dimensions (page 10).
3. If using an expander, see the following section before mounting the controller.

6.2 Connecting to an Expander

Wiring restrictions for connecting the expander to the controller are as follows:

- Maximum length: 100 feet (30 meters)
- 22 AWG, low-capacitance, twisted, stranded, shielded copper wire

The Control Air 6120 supports one Control Air 6120 Point Expander to increase input/output capacity.

The Control Air 6120 Point Expander may be mounted directly onto the Control Air 6120 using the screws provided with the Control Air 6120 Point Expander and the captive fasteners that are installed into the Control Air 6120.

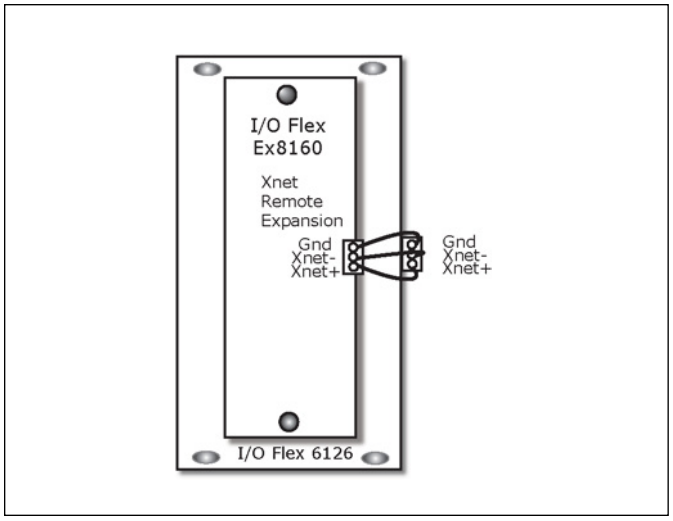


Figure 4

The expander may also be mounted separately within the mounting enclosure. Screw the Control Air 6120 Point Expander into an enclosed panel using the mounting holes provided on the coverplate. Be sure to leave about 2 inches (5 cm) on each side for wiring.

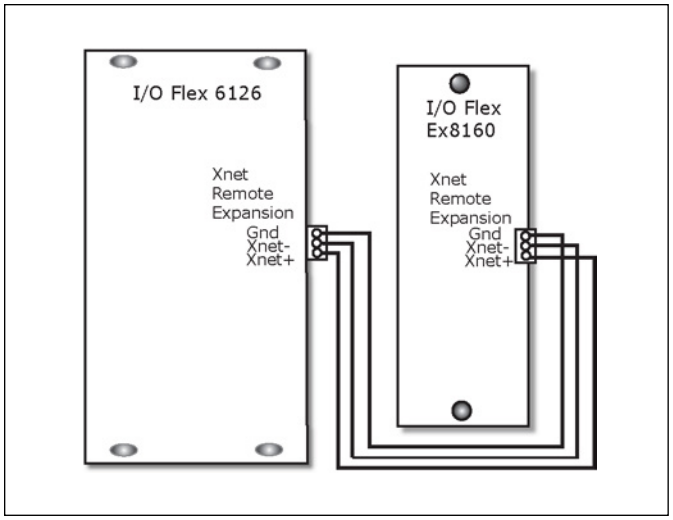


Figure 5

NOTICE

Product damage!

Connect the Control Air 6120 Point Expander to the Control Air 6120 before applying power to either one. Turn on the expander before you turn on the controller.

6.3 To Address the Control Air 6120

The Control Air 6120's two rotary switches determine the Control Air 6120's MAC address when it is placed on a BACnet/ARC156 or BACnet MS/TP network. The rotary switches define the MAC address portion of the device's BACnet address, which is composed of the network address and the MAC address. They also set the slave address on a Modbus or N2 network, when less than 100.

1. If the Control Air 6120 has been wired for power, pull the screw terminal connector from its power terminals labeled **Gnd** and **Hot**. The controller reads the address each time you apply power to it.
2. Using the rotary switches, set the controller's address. Set the **Tens (10's)** switch to the tens digit of the address, and set the **Ones (1's)** switch to the ones digit.

EXAMPLE: If the controller's address is 25, point the arrow on the **Tens (10's)** switch to 2 and the arrow on the **Ones (1's)** switch to 5.

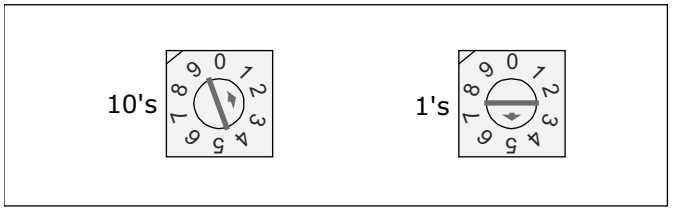


Figure 6

The Control Air 6120 recognizes its address only after power has been cycled.

6.4 To Wire for Power

CAUTION

Electrical hazard!

The Control Air 6120 is powered by a Class 2 power source. Take appropriate isolation measures when mounting it in a control panel where non-Class 2 circuits are present.

Do not power pilot relays from the same transformer that powers the Control Air 6120.

CAUTION

Electrical hazard, product damage!

Bosch controllers can share a power supply as long as you:

- Maintain the same polarity
- Use the power supply only for Bosch controllers

NOTICE

Improper operation!

The Control Air 6120 has an operating range of 21.6 Vac to 26.4 Vac. If voltage measured at the Control Air 6120's input terminals is outside this range, the Control Air 6120 may not work properly.

NOTICE

Improper operation!

Avoid running communication wires or sensor input wires next to AC power wires or the controller's relay output wires. The resulting noise can affect signal quality. Common sources of noise are:

- Spark igniters
- Radio transmitters
- Variable speed drives
- Electric motors (> 1hp)
- Generators
- Relays
- Transformers
- Induction heaters
- Large contactors (i.e., motor starters)
- Video display devices
- Lamp dimmers
- Fluorescent lights

For the controller to recognize an attached expander, you must turn on the expander before you turn on the controller.

1. Turn off the Control Air 6120's power to prevent it from powering up before you can verify the correct voltage.
2. Remove power from the 24 Vac transformer.
3. Pull the screw terminal connector from the controller's power terminals labeled Gnd and 24 Vac.
4. Connect the transformer wires to the screw terminal connector.
5. Apply power to the transformer.
6. Measure the voltage at the Control Air 6120's power input terminals to verify that the voltage is within the operating range of 21.6 - 26.4 Vac.
7. Insert the screw terminal connector into the Control Air 6120's power terminals.
8. Turn on the Control Air 6120's power.
9. Verify that the Power LED is on and the Run LED is blinking.

Baud Rate Setting		
Baud Rate	SW1	SW2
9.6KBPS	Off	Off
19.2KBPS	Off	On
38.4KBPS	On	Off
76.8KBPS	On	On

Table 5

Protocol				
	SW5	SW6	SW7	SW8
BACnet®MS/TP (M)	Off	Off	Off	Off
BACnet®MS/TP (S)	On	Off	Off	Off
BACnet®MS/TP PTP	Off	On	Off	Off
N2	On	On	Off	Off
Modbus	Off	Off	On	Off

Table 6

7 Wiring Inputs and Outputs

7.1 Input wiring specifications

Input	Maximum length	Minimum gauge	Shielding
0–5 Vdc 0–10 Vdc	1000 feet (305 meters)	26 AWG	Shielded
0–20 mA	3000 feet (914 meters)	26 AWG	Shielded or unshielded
Thermistor Dry Contact Pulse Counter TLO	1000 feet (305 meters)	22 AWG	Shielded
RTD	100 feet (30 meters)	22 AWG	Shielded
ZS Sensor*	500 feet (152 meters)	22 AWG (7x0096) bare copper if only ZS sensors 18 AWG (7x0152) bare copper if a BACview® device is connected	Shielded or unshielded If shielded, Aluminum/Mylar shield (100% coverage) with TC drain wire, terminated at controller.

Table 7

** For more details, see the ZS Sensors Installation Guide.*

7.2 Inputs

The Control Air 6120 has 12 inputs that accept the following signal types.

Signal Type	Description
Thermistor	Precon type 2 (10 kOhm at 77°F). Input voltages should be from 0.489 Vdc to 3.825 Vdc for thermistors.
Dry contact	A 5 Vdc wetting voltage detects contact position, resulting in a 1 mA maximum sense current when the contacts are closed.
0–5 Vdc 0–10 Vdc	The input impedance of the I/O Flex 6126 is approximately 20 kOhm.
0–20 mA	The input resistance on the positive (+) terminal is 250 Ohms. The **Aux Power Out** connector is capable of supplying 24 Vdc to multiple 4–20 mA transducers, but the total current demanded must not exceed 200 mA. If the voltage measured from the **Aux Power Out** connector to **Gnd** is less than 18 Vdc, you need to use an external power supply.
RTD	• Platinum - 1 kOhm at 32°F (0°C) • Nickel/Iron - 1 kOhm at 70°F (21°C) • Balco TS8000 - 1 kOhm at 70°F (21°C) • Input voltages should be from 0.6–1.2 V.
Pulse counter*	UI-1 and UI-2 only: • Maximum of 10 pulses per second. Minimum pulse width required for each pulse: ◦ ON to OFF time (half cycle) is 50 msec ◦ ON to OFF to ON time (full cycle) is 100 msec

Table 8

** The Control Air 6120 can perform pulse counting for dry contact or voltage inputs if you assign the input to a Pulse to Analog Input microblock.*

7.3 To Wire Inputs

1. Turn off the Control Air 6120's power.
2. Connect the input wiring to the screw terminals on the Control Air 6120.

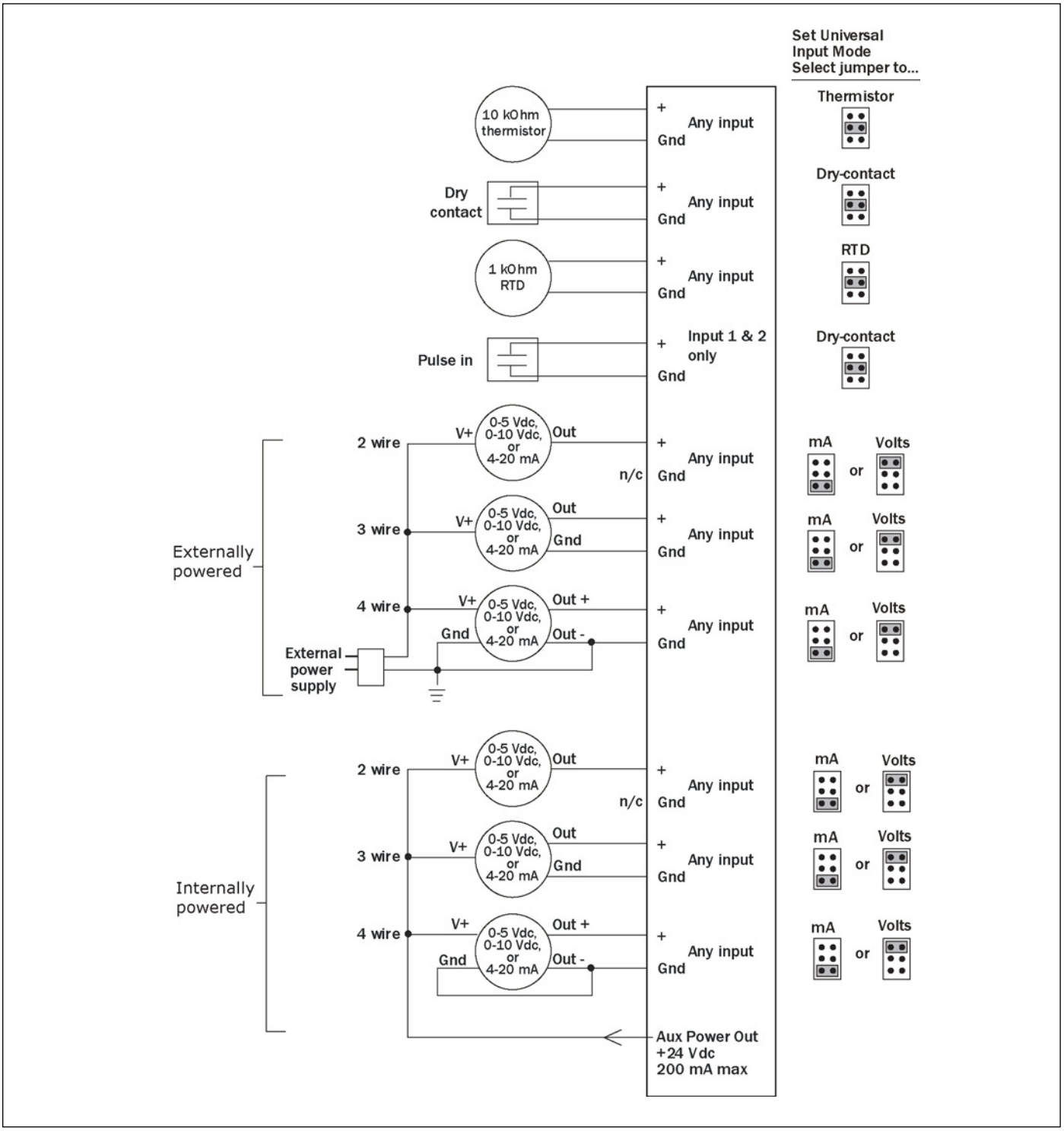


Figure 7

NOTES:

*- Connect the shield wire to the **GND** terminal with the ground wire.*
- Use only UI-1 or UI-2 for pulse counting or timed local override.
*- For a loop-powered 4-20 mA sensor, wire the sensor's positive terminal to the + terminal on the Control Air 6120's **Aux Power Out** connector. Wire the sensor's negative terminal to an input's + terminal.*

3. Set the appropriate jumpers on the Control Air 6120. Please see Table 8 and Figure 7 for more information on Jumper Positions and corresponding signal input types.

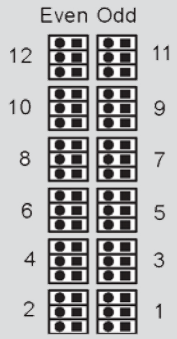
To use...	For...		
Any input	Thermistor Dry contract 0–5 Vdc 0-10 Vdc 0–20 mA RTD	Set each input's **Universal Input Mode Select** jumper to the type of signal the input will receive.	
Aux Power Out port	Loop-powered 4-20 mA	Set the **Select** jumper to **+5V** or **+24V** as required by the sensor.	

Table 9

4. Turn **ON** the Control Air 6120's power.

7.4 Output Wiring Specifications

To size output wiring, consider the following:

- Total loop distance from the power supply to the controller, and then to the controlled device
  NOTE: Include the total distance of actual wire. For 2-conductor wires, this is twice the cable length.
- Acceptable voltage drop in the wire from the controller to the controlled device
- Resistance (Ohms) of the chosen wire gauge
- Maximum current (Amps) the controlled device requires to operate

7.5 Binary Outputs

The Control Air 6120 has 6 binary outputs. You can connect each output to a maximum of 250 Vac.

7.6 Analog Outputs

The I/O Flex 6126 has 6 analog outputs that support voltage or current devices. The controlled device must share the same ground as the controller and have the following input impedance:

- 0–10 Vdc
- 0–20 mA
- min 500 Ohms
- max 800 Ohms

7.7 To Wire Outputs

1. Turn off the Control Air 6120's power.
2. Connect the binary output wiring to the screw terminals on the Control Air 6120 and to the controlled device.

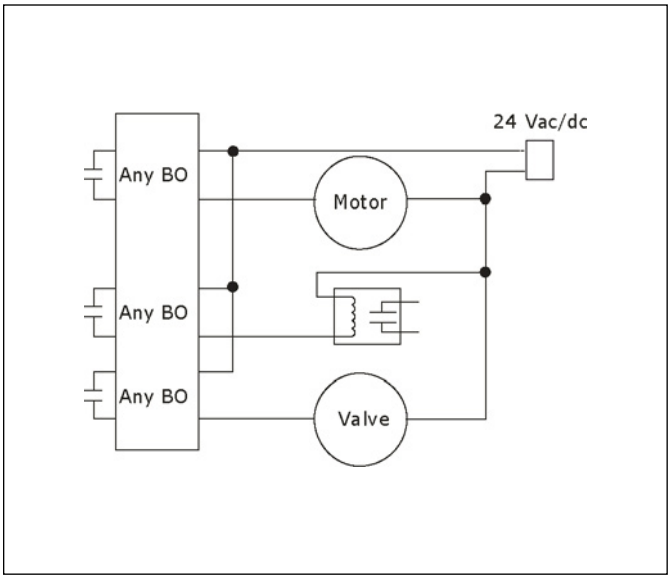


Figure 8

3. Connect the analog output wiring to the screw terminals on the Control Air 6120 and to the controlled device.

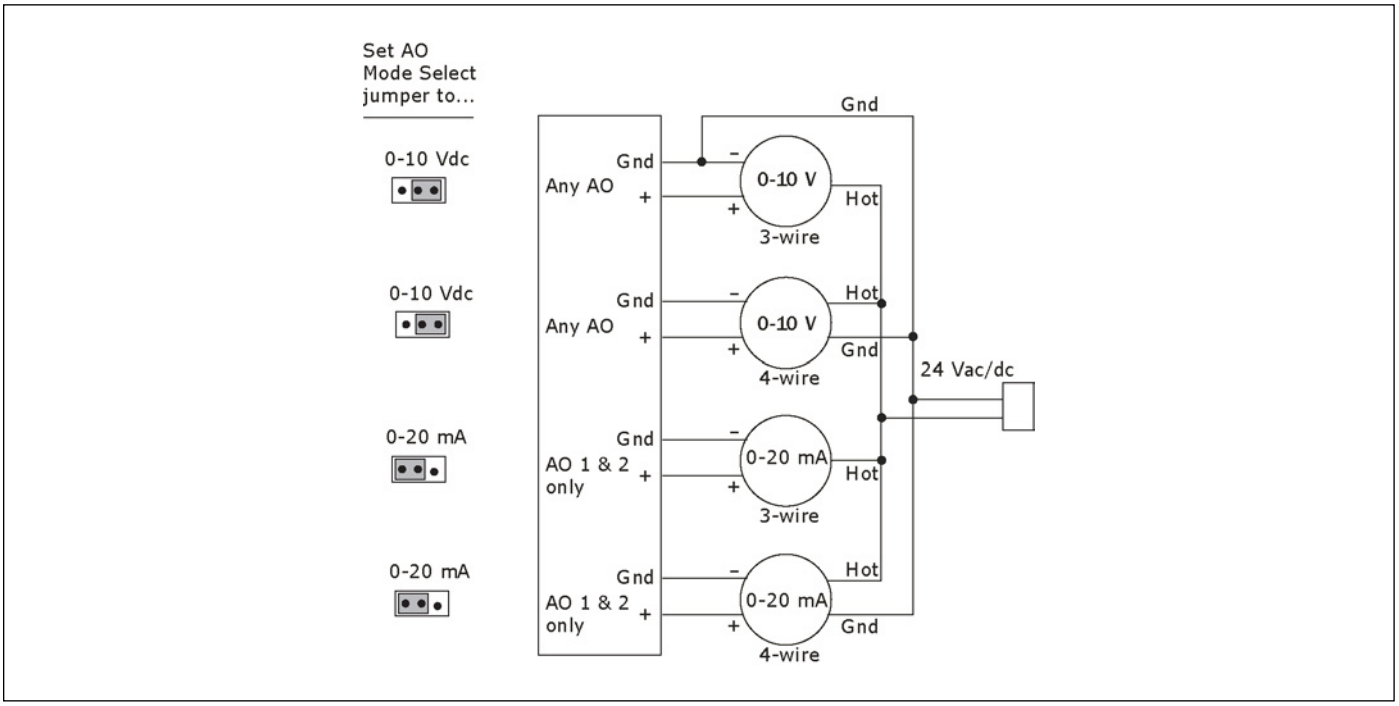


Figure 9

4. Set the **AO Mode Select** jumper to the type of device you are wiring the output to.
5. Turn **ON** the Control Air 6120's power.

8 Local Access

8.1 To Communicate Through the Local Access Port

Using a computer and a USB Link Kit, you can communicate locally with the Control Air 6120 to download or to troubleshoot.

PREREQUISITES

- Computer with a USB port
- USB Link Kit

NOTICE

Product damage!

If multiple controllers share power but polarity was not maintained when they were wired, the difference between the controller's ground and the computer's AC power ground could damage the USB Link Kit and the controller. If you are not sure of the wiring polarity, use a USB isolator between the computer and the USB Link Kit. Purchase a USB isolator online from a third-party manufacturer.

1. If your computer does not already have the USB Link Kit driver installed, install it before you connect the USB Link to your computer.

The Corresponding USB-L cable driver and instruction manual are all available for free download at the Bosch Home Comfort website.

2. Connect the USB Link Kit to the computer and to the controller's Local Access port.

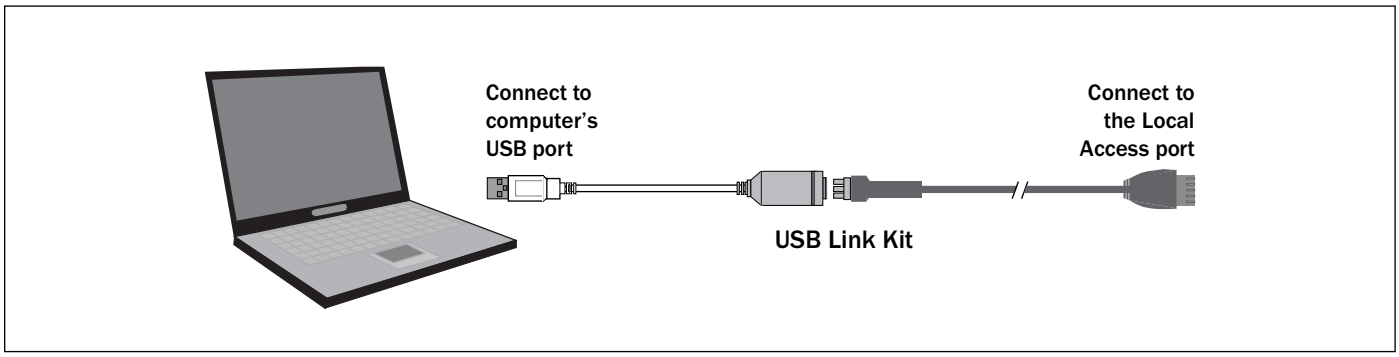


Figure 10

If using a USB isolator, plug the isolator into your computer's USB port, and then plug the USB Link Kit cable into the isolator.

8.2 Wiring Zone Sensors to the Control Air 6120

You can connect zone sensors, the BACview ® device as follows:

8.2.1 ZS Sensors

- 1-5 ZS Sensors
  NOTE: You cannot have more than 5 sensors per control program.
- Up to 5 ZS sensors and 2 BACview ® devices

NOTICE

Product damage!

Power requirements differ for the various ZS sensor models. See the *ZS Sensor Installation Guide* for details.

Specifications for ZS sensors		
Sensing element range and accuracy	Temperature only	Range: 32 to 122°F (0 to 50°C) Accuracy: ±0.35°F (0.2°C)
	Temperature if humidity is included	Range: 50 to 104°F (10 to 40°C) Accuracy: 0.5°F (0.3°C)
	Options:	
	Humidity	Range: 10 to 90% Accuracy: 2% typical
	CO_2	Range: 0 to 2000 PPM Accuracy: ±75 PPM typical
Power requirements	Temperature only	ZS Standard or ZS Plus: 12 Vdc @ 6 mA ZS Pro or Pro-F: 12 Vdc @ 7 mA
	Temperature with humidity	ZS Standard or ZS Plus: 12 Vdc @ 7 mA ZS Pro or Pro-F: 12 Vdc @ 8 mA
	Temperature with humidity and CO_2 - All models	12 Vdc @ 15 mA (idle) to 190 mA (CO_2 measurement cycle)
	Temperature and CO_2 - All models	12 Vdc @ 14 mA (idle) to 189 mA (CO_2 measurement cycle)
Power supply	The 4-conductor Rnet cable from a controller supplies +12 Vdc @ 210 mA. For additional power, use an external power supply. Use the above power requirements to calculate the size of the external power supply.	
Communication	115 kbps	
Local access port	For local access to start up and troubleshoot the system	
Environmental operating range	-4 to 122°F (-20 to 50°C), 10 to 90% relative humidity, non-condensing	
Mounting	Standard 4x2-in. electrical box using the 6-32 x 1/2" mounting screws provided	
Overall dimensions	Temperature sensor or temperature with humidity sensor	Width: 3 in. (7.62 cm)
		Height: 4-13/16 in. (12.22 cm)
		Depth: 13/16 in. (2.01 cm)
	Sensor with CO_2	Width: 2-7/8 in. (7.3 cm)
		Height: 4-13/16 in. (12.22 cm)
		Depth: 1-1/4 in. (3.18 cm)
Listed by	FCC Part 15-Subpart B-Class A, CE	

Table 10

8.2.2 To Wire and Mount a ZS Sensor

PREREQUISITE: The Rnet cable is wired to the controller. The shield wire and the ground wire should be inserted into the controller's GND terminal.

1. Turn off the controller's power.
2. Pull the backplate off the ZS Sensor. You may need to loosen the setscrew at the bottom of the sensor to remove it from the back plate.
3. Pull the Rnet communication cable through the wire guide in the backplate.

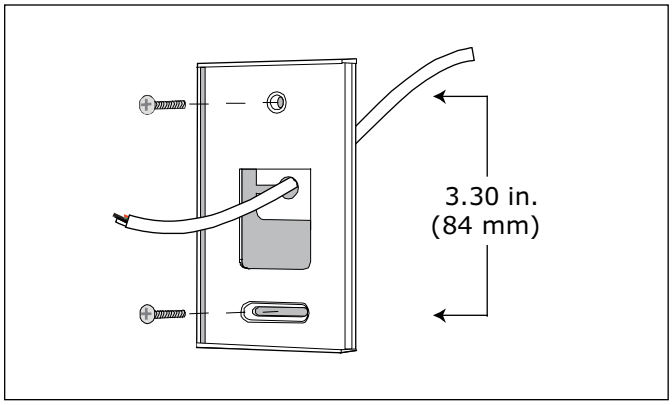


Figure 11

4. Use 2 screws to mount the backplate to the wall or outlet box.
5. Partially cut, then bend and pull off the outer jacket of the Rnet cable(s). Do not nick the inner insulation.

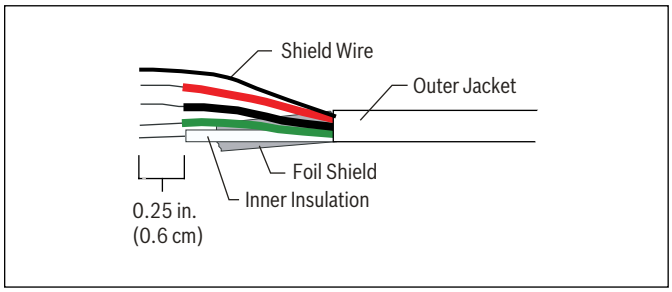


Figure 12

6. Strip about .25 inch (.6 cm) of the inner insulation from each wire.
7. If wiring 1 cable to the Control Air 6120, cut the shield wire off at the outer jacket, then wrap the cable with tape at the outer jacket to cover the end of the shield wire.

   For a daisy-chain configuration, Connect the Rnet terminals on the Flex 6126 to the first ZS sensor. From the first sensor, connect to the next one in the chain, and so on. Be sure to twist together the shield wires of the 2 cables before inserting into each terminal. Up to 5 ZS sensors can be daisy chained together. If wiring 2 cables in a daisy-chain configuration, twist together the shield wires, then wrap the shield wires with tape.

Insert the other 4 wires into the Control Air 6120's screw terminal connector.

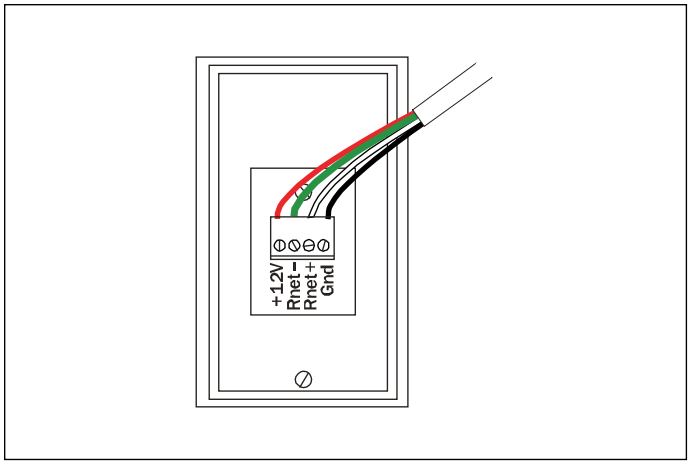


Figure 13

Bosch recommends that you use the following Rnet wiring scheme:

Connect this wire...	To this terminal...
Red	+12V
Green	Rnet-
White	Rnet+
Black	Gnd

Table 11

NOTICE

Improper operation!

Allow no more than 0.06 inch (1.5 mm) bare communication wire to protrude. If bare communication wire contacts the cable's foil shield, shield wire, or a metal surface other than the terminal block, the device may not communicate correctly.

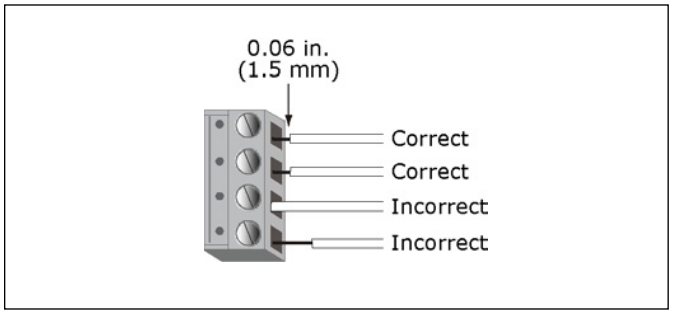


Figure 14

8. Attach the sensor's cover and circuit board to the mounted backplate, inserting the top first.
9. Tighten the setscrew so the cover cannot be removed.
10. Turn on the controller's power.

Use the same polarity throughout the Rnet.

See ZS Series Zone Sensor manual for additional information.

9 Water to Air Systems

9.1 DDC Options

9.1.1 Air Economizer (Free Cooling)

This option utilizes an outdoor air temperature and humidity combo sensor, and a field supplied fresh air damper to provide free cooling. When there's a call for cooling, the OAT/RH sensor connected to the Control Air 6120 will monitor the outside air temperature and humidity levels and determine if the compressor should be used for cooling or if the outdoor air is ideal to condition the space with just the fan. If the air temperature and humidity are within a user-configurable range, the damper solenoid will be energized to open by the Control Air 6120, the compressor will be indexed off, and the fan is used to cool the space. This option is only available in the cooling mode.

9.1.2 Auxiliary Electric Heat

Used to provide a single stage of electric heat by using a factory-installed electric heater option, or field-installed electric heater accessory. It may be used as a supplementary source of heating for units with mechanical heating/cooling capabilities where additional heating capacity is needed to meet/maintain space set point, or as the sole source of heat for straight cool units (mechanical cooling only). The configured controller output is energized to enable the heater based on unit configuration and parameter setup.

9.1.3 Boilerless Control

An option that allows a water source heat pump to be operated in heating safely when installed in a system that has no means of heating the water loop. A factory installed Entering Water Temperature (EWT) sensor (thermistor) is connected to the Control Air 6120 controller and used with this option. During a call for heating, if the EWT sensor detects a drop in water temperature below a pre-set limit (adjustable in the software), the Control Air 6120 will disengage the compressor output(s) and provide a 24VAC signal to divert unit operation from compressor heating to an alternate heat source (generally field-installed electric heat). The option is also used to proactively prevent coils from freezing.

9.1.4 MHGRH - Discharge Air Control

This option uses a factory installed modulating hot gas re-heat valve to maintain discharge air temperature at set point. An outside air temperature (OAT) source (factory provided and field installed outside, or BAS supplied) is used for staging. It is recommended that the factory mounted discharge air temperature sensor be replaced with a duct probe temperature sensor about 3ft downstream of the supply air duct inlet for best results. Only the cooling capacity is modulated during discharge air control operation. There is no provision for leaving air temperature (LAT) control in heating mode.

9.1.5 Demand Controlled Ventilation

This option maintains indoor CO_2 levels by way of a CO_2 sensor and a field provided/installed modulating damper. PID methods within the software are used to maintain a user configurable CO_2 set point. The CO_2 sensor value can come from a ZS sensor (recommended), BAS, or a third party CO_2 sensor with a 0-5 VDC output.

9.1.6 Fan Proving

This option uses a factory-installed current sensor to prove fan operation prior to unit operation. The status output of the current sensor is used to establish fan operation for the unit when a proven fan call is established. If configured, the Control Air 6120 disables unit compressor operation when the current in the monitored conductor drops below the rated threshold, indicating the fan is nonoperational.

9.1.7 Flow Proving (DPS)

This option employs the use of a self-resetting Differential Pressure Switch (DPS) to prove water flow across a unit's water-to-refrigerant heat exchanger. If configured the software enables unit compressor operation when a pressure drop of 1.5 psi or more is detected across the water-to-refrigerant heat exchanger, indicating adequate water flow. This option prevents nuisance cut-outs on high head pressure or freeze protection when there are interruptions in water flow.

9.1.8 Loop Water Valve Control

This option uses a factory-installed condenser water valve to control water flow through the condenser coil. The normally closed valve includes an auxiliary end switch that is wired to the controller to determine the status of the valve. When the Control Air 6120 is configured for this option, compressor operation is disabled until valve-open status from the valve end switch is verified.

9.1.9 Hot Gas Reheat

Hot gas reheat actively controls humidity by reheating cooled and dehumidified air back to a neutral temperature using waste heat from the compressor. Doing this allows the unit to continue to operate and remove moisture from the space even after the sensible cooling set point has been satisfied. Hot gas reheat is well suited for conditioning outside ventilation air and for maintaining ideal humidity levels in schools, commercial buildings and even homes. A binary output on the Control Air 6120 controller is used to provide the signal for activating the reheat valve when the necessary conditions are met. Relative humidity readings may be acquired from a wall-mounted ZS combo sensor, a third-party hard wired 0-5V humidity sensor, or from RH values pushed to the Control Air 6120 over a network.

9.1.10 Control Air 6120 Point Expander

The Point Expander is used when multiple options that require more inputs and outputs are desired for a single application with DDC. The Point Expander is connected to XNET Remote Expansion Port.

9.1.11 Outside Air Damper

Allows the capability for pre-filtered outside air to enter the unit while in operation via a motorized, field supplied damper, based on unit occupancy, fan operation, or CO_2 levels in the monitored space. A binary output on the Control Air 6120 controller is used to provide the signal for activating the damper solenoid when the necessary conditions are met. CO_2 readings may be acquired from a wall-mounted ZS combo sensor, a third-party hard wired 0-5V CO_2 sensor, or from CO_2 values pushed to the controller over a network. A damper end switch connected to the controller may be used to verify damper status and disable compressor operation when the damper fails.

9.1.12 SCR Controlled Electric Heat

This option uses a field supplied and installed heat kit to (in addition to mechanical heating) maintain heating set point. The unit controller will provide a 0-10VDC output at Analog Output 1.

9.1.13 Variable Frequency Drive

This option uses a factory installed VFD and static pressure sensor to modulate the fan speed and maintain a user configurable static pressure set point.

9.1.14 Water-Side Economizer

An optional package consisting of a water-to-air heat exchanger (economizer coil), a thermistor (EWT sensor), and a 3-way diverting valve. When there is a call for cooling, the EWT sensor connected to the Control Air 6120 will monitor the entering water temperature to the unit and determine if the compressor should be used for cooling or if the water temperature is low enough to cool the entering air with the economizer coil. If the entering water temperature is below a selected user-adjustable set point, the diverting valve will be indexed by the Control Air 6120 to divert the entering water through the economizer coil to cool the air stream.

Water-Side Economizer can only be use for cooling operations.

CA6120 Universal Inputs				
Connection Pin Numbers	Input	Signal Type	Jumper Position	Overview
UI-11 - 17 & 18	Duct Static Sensor (DSS)	0-5VDC	Top (IN-11)	This input is used for applications requiring static pressure readings.
UI-10 - 16 & 17	Dirty Filter Switch (DFS)	Dry Contact (N.O)	Middle (IN-10)	Selecting this option for this input provides an alternate means of alerting the end user of a dirty filter condition by way of a contact closure instead of fan runtime hours. An alarm is generated when Control Air 5600 senses a contact closure at the input.
UI-10 - 16 & 17	Outside Air Temperature Sensor (OATS)	10K Type II	Middle (IN-10)	This input is selected if outside air temperature readings are required.
UI-10 - 16 & 17	Differential Pressure Switch (DPS)	Dry Contact (N.O)	Middle (IN-10)	A Differential Pressure Switch may be connected to this input to prove water flow across a unit's water- to-refrigerant heat exchanger. Heat pump operation is disabled until the DPS is closed.
UI-10 - 16 & 17	Fan Status Switch (FSS)	Dry Contact (N.O)	Middle (IN-10)	The status output from a factory installed current sensor used to monitor fan operation may be connected to this input to provide fan status during unit operation. The unit is allowed to run only when the sensor contacts are verified as closed at the input after the fan has been indexed to run. If there's no contact closure after the fan has been commanded on, the unit is not allowed to run, and an alarm is generated after 45 seconds. If the fan fails during normal unit operation the compressors are shut down after 20 seconds and an alarm is generated.
UI-08 - 13 & 14	Zone Remote Temperature Sensor	10K Type II	Middle (IN-8)	This input is used if zone temperature readings for controlling the unit are not desired from a ZS Combo sensor or over a network. An example would be a third party wall or duct mounted sensor. Temperature sensor must be a Type II 10kohm @ 77°F(25°C) sensor.
UI-08 - 13 & 14	Supply Air Temperature Sensor (SAT)	10K Type II	Middle (IN-8)	This input is selected if Supply air temperature readings are required
UI-06 - 10 & 11	Discharge Air Temperature Sensor (DAT)	10K Type II	Middle (IN-6)	A factory-installed thermistor mounted on the heat pump unit's blower housing (air handler section) is connected to this input for all orders requiring the factory installed DDC option. It is highly recommended that for applications requiring a more accurate representation of the supply air temperature, a duct mounted temperature probe be used instead to relocate the source of the discharge air temperature just downstream of the supply air duct. If this recommendation is followed the factory-installed thermistor may be disconnected from this input, and replaced with the leads from the duct mounted sensor.
UI-05 - 8 & 9	Relative Humidity Sensor(RH)	0-5 VDC	Top (IN-5)	This input is used if RH readings are not desired from a ZS Combo sensor or over a network. An example would be a duct mounted humidity sensor or third party humidity sensor with 0- 5VDC output.
UI-04 - 7 & 8	Condensor Water Valve Feedback	0-10 VDC	Top (IN-4)	This input is used to provide current CWV operating conditions
UI-04 - 7 & 8	CO_2 Sensor (Required for demand control ventilation)*	0-5 VDC	Top (IN-4)	This input is used if CO_2 readings are not desired from a ZS Combo sensor or over a network. An example would be a third party CO_2 sensor with 0-5VDC output.
UI-03 - 5 & 6	Leaving Water Temperature Sensor (standard) (LWTS)	10K Type II	Middle (IN-3)	A thermistor is wired to this input from factory to monitor leaving water temperature at the heat exchanger leaving water pipe. If the water temperature rises above 135°F or drops below 40°F for more than 5 minutes while the unit is running, compressor operation is halted and an alarm is generated. These temperature trip values are user adjustable.
UI-02 - 2 & 4	A2L UPM Alarm Output (4STG units only)	Pulse	Middle (IN-2)	The Unit Protection Module (UPM) is standard on all Bosch heat pumps. The alarm contacts of the UPM board are wired to the controller at this input from factory to transmit error pulse codes to the Control Air 6120. Faults include: High Pressure, Low Pressure, High Condensate, Freeze Stat, Brown out , A2L conditions, etc.
UI-01 - 2 & 3	A2L UPM Alarm Output	Pulse	Middle (IN-1)	The Unit Protection Module (UPM) is standard on all Bosch heat pumps. The alarm contacts of the UPM board are wired to the controller at this input from factory to transmit error pulse codes to the Control Air 6120. Faults include: High Pressure, Low Pressure, High Condensate, Freeze Stat, Brown out, A2L conditions, etc.
UI-01 - 2 & 3	Occupancy Override	Dry Contact (N.O)	Middle (IN-1)	This input is selected when a dry contact (e.g. room occupancy sensor) is required to enable the unit, and Digital Input has been selected for Occupancy Command. Unit is placed in occupied mode upon a contact closure at the input, and placed in unoccupied mode 10 minutes after the contacts reopen.

Table 12

CA 6120 Analog Ouputs				
Connection Pin Numbers	Output	Signal Type	Jumper Position	Overview
AO-6 - 11 & 12	Open	NA	NA	NA
AO-5 - 9 & 10	Condensor Water Valve Signal (CWVS)	0-10Vdc, 5mA (max)	NA	This output modulate CWV valve to regulate condensing flow based on CWV Feedback and CWV status
AO-4 - 7 & 8	open	NA	NA	NA
AO-3 - 5 & 6	open	NA	NA	NA
AO-2 - 3 & 4	Modulating Hot Gas Re-heat (MHGRH)	0-10Vdc, 5mA (max)	10V	This output modulates (0-10VDC) MHGRH valve to regulate flow to the reheat coil
AO-1 - 1 & 2	Aux Heat SCR	0-10Vdc, 5mA (max)	10V	Analog output 1 is wired to the analog input terminal of the field-installed SCR auxiliary heater unit. When the software is configured for this option and provided there is a heating demand greater of 90% (default and user configurable) this output will provide a corresponding 0-10VDC signal to enable and regulate the heater unit.
AO-1 - 1 & 2	VFD Control	0-10Vdc, 5mA (max)	10V	Analog output 1 is wired to the AI1 of the VFD signal terminal block (ABB Automation ACH-500-UH series). VFD must be selected in the software.

Table 13

CA6120 Binary Outputs				
Connection Pin Numbers	Output	Signal Type	Terminal	Overview
BO-6 - 16-18	Compressor Stage 4 (Y4)	24VAC	Y4	Binary Output 6 is factory defaulted for the compressor stage 4 command (Y4) and is connected to the "Y" terminal using the 4th Stage A2L UPM board, via the unit terminal block in the electrical box.
BO-5 - 13-15	Compressor Stage 3 (Y3)	24VAC	Y3	Binary Output 5 is factory reserved for the compressor stage 3 command (Y3) and is connected "Y" using the 3rd Stage A2L UPM board via the unit terminal block in the electrical box.
BO-4 - 10-12	Compressor Stage 2 (Y2)	24VAC	Y2	Binary Output 4 is factory defaulted for the compressor stage 2 command (Y2) and is connected to the "Y" terminal using the 2nd Stage A2L UPM board, via the unit terminal block in the electrical box.
BO-3 - 7-9	Compressor Stage 1 (Y1)	24VAC	Y1	Binary Output 3 is factory defaulted for the compressor stage 1 command (Y1) and is connected "Y" using the A2L UPM board via the unit terminal block in the electrical box.
BO-2 - 4-6	Reversing Valve	24VAC	O	Binary Output 2 is factory reserved for the reversing valve command (O) and is wired to the valve via the unit terminal block in the electrical box. For heat pump units, the output is energized during a call for cooling, and remains de-energized for heating. For straight cool units (cooling only) where no reversing valve is installed, the output is disabled and not used.
BO-1 - 1-3	FAN	24VAC	G	Binary Output 1 is factory reserved for the fan command (G) and is wired to the unit terminal block in the electrical box. The fan mode may be software configured either for "continuous" mode (fan is energized continuously during occupied and night set back modes), or configured to run in "auto" mode (fan is energized only during a call for heating or cooling). Continuous mode is the factory default.

Table 14

CA6120 Point Expander Inputs				
Connection Pin Numbers	INPUT	Signal Type	Jumper Position	Overview
IN-16 - 15 & 16	Open	NA	NA	NA
IN-15 - 13 & 14	Open	NA	NA	NA
IN-14 - 11 & 12	Open	NA	NA	NA
IN-13 - 9 & 10	Open	NA	NA	NA
IN-16 - 15 & 16	Open	NA	NA	NA
IN-7 - 13 & 14	Open	NA	NA	NA
IN-10 - 3 & 4	Open	NA	NA	NA
IN-9 - 1 & 2	Entering Water Temperature Sensor	10K Type II	Therm/Dry	This input should be selected for applications where the entering water temperature needs to be monitored, or used to control options such as Economizer or Boilerless Electric Heat.
IN-8 - 15 & 16	Open	BI (Dry contact)	NA	NA
IN-7 - 13 & 14	Condenser Water Valve Status Switch	BI (Dry contact)	NA	This input provides feedback on valve position
IN-6 - 11 & 12	Open	BI (Dry contact)	NA	NA
IN-5 - 9 & 10	Open	BI (Dry contact)	NA	NA
IN-4 - 7 & 8	Open	BI (Dry contact)	NA	NA
IN-3 - 5 & 6	Open	BI (Dry contact)	NA	NA
IN-2 - 3 & 4	Open	BI (Dry contact)	NA	NA
IN-1 - 1 & 2	Smoke Detector	BI (Dry contact)	NA	This input provides feedback on Smoke Detector Input

Table 15

CA6120 Point Expander Binary Outputs				
Connection Pin Numbers	Output	Signal Type	Jumper Position	Overview
BO-8 - 15 & 16	Electric Heat Stage 4	BO (Dry contact)	NA	Binary output 8 is wired to Supplemental Electric Heating Stage 4. This output will energize when there is a heating demand greater of 90% and Electric Heating Stage 3 has been running for 3 minutes
BO-8 - 15 & 16	Economizer Control	BO (Dry contact)	NA	Binary output 8 may instead be configured for Economizer Control
BO-8 - 15 & 16	Boilerless Control	BO (Dry contact)	NA	Binary output 8 may instead be configured for Boilerless Control
BO-7 - 13 & 14	Electric Heat Stage 3	BO (Dry contact)	NA	Binary output 7 is wired to Supplemental Electric Heating Stage 3. This output will energize when there is a heating demand greater of 80% and Electric Heating Stage 2 has been running for 2 minutes
BO-6 - 11 & 12	Electric Heat Stage 2	BO (Dry contact)	NA	Binary output 6 is wired to Supplemental Electric Heating Stage 2. This output will energize when there is a heating demand greater of 70% and Electric Heating Stage 1 has been running for 2 minutes
BO-5 - 9 & 10	Electric Heat Stage 1	BO (Dry contact)	NA	Binary output 5 is wired to Supplemental Electric Heating Stage 1. This output will energize when there is a heating demand greater of 60%
BO-4 - 7 & 8	Open	BO (Dry contact)	NA	
BO-3 - 5 & 6	Damper	BO (Dry contact)	NA	This input energizes or de-energizes the damper based on comparing the Zone CO_2 to the CO_2 set point
BO-2 - 3 & 4	Heat Gas ReHeat (HGRH)	BO (Dry contact)	NA	This input energizes or de-energizes the HGRH valve open or close
BO-1 - 1 & 2	Condenser water valve	BO (Dry contact)	NA	This input energizes or de-energizes the CW valve open or close

Table 16

10 Water to Air Operation

10.1 Inputs

- ZS Room temperature sensor (Rnet)
- ZS Room temperature sensor Set point adjust (Rnet)
- ZS Room temperature sensor Occupancy override (Rnet)
- Discharge air temperature sensor
- Leaving water temperature sensor
- Unit Protection module (UPM) Alarm codes
- Unit Filter status
- Entering water temperature sensor
- Duct static pressure sensor
- Condenser water valve
- Outside air temperature sensor
- Supply air temperature sensor
- CO_2 sensor
- Relative Humidity sensor
- Unit Enable manual control (optional DI Enable)

10.2 Outputs

- Unit blower control
- Reversing Valve
- Cooling Stage 1
- Cooling Stage 2
- Cooling Stage 3
- Cooling Stage 4

10.3 Control & Status Parameters and Alarms

10.3.1 Control

- BACview occupancy schedule
- System control: Schedule, Manual ON, BAS command or DI Enable
- Room temperature occupied cooling/heating set point
- Room temperature unoccupied cooling/heating set point
- Unit blower control
- Reversing valve control
- Compressor 1 control
- Compressor 2 control
- Compressor 3 control
- Compressor 4 control
- Unit Enable manual control (optional)
- Humidity Control (hot gas re-heat optional)
- Auxiliary/Emergency Electric heat output control (optional)

10.3.2 Status

- Cooling/Heating control status
- Cooling/Heating percentage (0-100%)
- Room temperature
- Discharge air temperature
- Leaving water temperature
- Unit filter status (optional)
- Fan-Hours runtime counter (filter replacement indicator)
- Fan starts counter
- Comp 1 starts counter
- Comp 2 starts counter
- Comp 3 starts counter
- Comp 4 starts counter

10.3.3 Alarms

- Output Overridden via Keypad
- Sensor Failure
- Leaving Water Temp Alarm
- Zone Temp Alarm
- Discharge Air Temperature
- Filter Alarm/Compressor Runtime
- Zone Humidity Alarm
- High CO_2 Level Alarm
- Differential Pressure Switch/Fan Switch
- HP1: High Pressure 1st Stage Alarm
- LP1: Low Pressure 1st Stage Alarm
- HP2: High Pressure 2nd Stage Alarm
- LP2: Low Pressure 2nd Stage Alarm
- HP3: Hi Pressure 3rd Stage Alarm
- LP3: Low Pressure 3rd Stage Alarm
- HP4: High Pressure 4th Stage Alarm
- LP4: Low Pressure 4th Stage Alarm
- FRE: Freeze Alarm
- FRE2: Freeze 2 Alarm
- FZE: Freeze Air Coil Alarm
- FZE2: Freeze Air Coil 2 Alarm
- CON: Condensate Alarm
- CON2: Condensate 2 Alarm
- BRN: Brownout Alarm
- BRN2: Brownout 2 Alarm
- A2L: A2L Refrigerant Alarm
- A2L: A2L 2 Refrigerant Alarm
- COMM: Communication Alarm

10.4 Sequence of Operation

- Supported Controllers: Control Air 6120.
- Depending on the options selected, an Expander Module (Control Air 6120 Point Expander) may be required to support additional inputs and outputs.
- A detailed points list should be consulted for specific points and values.

10.4.1 Control Source (Run Conditions)

The heat pump unit may have external or internal control sources to initiate heating or cooling operation.

External Control Source
The heat pump may be controlled from the following external sources::

- Digital Input
- BAS – Building Automation System
- Manual On
- Push Button Temporary Override

Digital Input:
Provides a method of running the unit by providing a contact closure (On/Off) to IN-1. Digital input provides a simple interface for enabling unit operation. Once enabled, the unit will run until the occupied set-point has been satisfied.

BAS:
A network point is used to command the unit into occupied or unoccupied mode

Manual On:
Places the Heat Pump in manual run mode; the unit will operate until the setpoint is satisfied.

Temporary Override:
For systems with the ZS walls sensor, unit operation can be temporarily overridden via the push button located on the wall sensor. The unit will run until the occupied set-point is satisfied or the temporary run time has expired.

10.4.2 Internal Control Source (Keypad Schedule)

All Bosch controllers are provided with a battery backed up real time clock. When configured for Keypad Schedule, the internal scheduler uses the local time and user schedule to initiate heat pump operation.

- Occupied Schedule
  - 74°F Cooling Set-point (Adjustable)
  - 70°F Heating Set-point (Adjustable)
- Unoccupied Schedule
  - 90°F Cooling Set-point (Adjustable)
  - 55°F Heating Set-point (Adjustable)

10.5 Unit Mode

The Unit Mode is used to configure the heat pump per its specific design configuration and application. A unit mode may be selected from the following:

- Cooling Only
- Auxiliary Heating (Cooling Only + Aux Heat)
- Heat Pump
- Heat Pump with Aux Heat
- Heat Pump with Hot Gas Re-Heat
- Cooling Only with Hot Gas Re-Heat
- Heat Pump with Hot Gas Re-Heat and Aux Heat

10.5.1 Cooling Only

The unit is configured for mechanical cooling only and the reversing valve and piping are not installed. Please consult with a factory engineer for specific application. Cooling only units are typically applied in warm climates or for applications that involve 100% outside air.

10.5.2 Auxiliary Heating

The unit is configured for mechanical cooling with up to 4 stages of auxiliary electric heat. Electric heat is field-installed; Binary Outputs 5, 6, 7, and 8 (BO-5, BO-6, BO-7, BO-8) on the Control Air 6120 Point Expander are available for this option. It is therefore important to note that any application involving Auxiliary Heating MUST include the Control Air 6120 Point Expander.

10.5.3 Heat Pump

The unit is configured for mechanical heating and cooling.

10.5.4 Heat Pump With Aux Heat

The unit is configured for mechanical heating and cooling with auxiliary electric heat.

10.5.5 Heat Pump With Hot Gas Re-Heat

The unit is configured for mechanical heating and cooling with active humidity control. Humidity control consists of either On/Off Hot Gas Re-Heat or Modulating Hot Gas Re-Heat. Hot Gas Re- Heat must be ordered when the unit is being manufactured. Hot Gas Re-Heat cannot be installed in the field.

10.5.6 Cooling Only With Hot Gas Re-Heat

The unit is configured for cooling only with active humidity control. Please see Heat Pump with Hot Gas Re-Heat for additional details.

10.5.7 Heat Pump With Hot Gas Re-Heat and Aux Heat

The unit is configured for mechanical heating and cooling with active humidity control and auxiliary electric heat.

10.6 Temperature Sensor Selection

A temperature measurement is required by the DDC control software for proper unit operation and control of space temperature.

For zone temperature applications, the temperature measurement source is user selectable.

The following applies to the Sensors:

- Only one temperature source value will be used by the control software. A ZS sensor may be installed to provide temperature feedback to the occupant even if a BAS or remote sensor is installed.
- Option configuration must be specified and adapted as required by the application. The appropriate sensor must be selected for the corresponding input to engender the desired response from the software.
- The wall or remote sensor is field installed by the equipment integrator.
- A remote temperature sensor is hardwired to IN-8 port of the Control Air 6120
- For application involving mixed air or discharge air control, the probe sensor will be used unless a BAS sensor values is provided.
- If required, an outside air temperature sensor must be hardwired to IN-10 of the Control Air 6120
- Leaving Water Temperature (LWT) sensors and Discharge Air Temperature (DAT) sensors are wired as standard in IN-3 and IN-6 respectively on the FLEX.
- The return air temperature can be adjusted with a user offset.

The ZS Sensor (Wall Sensor) is a communicating sensor. The ZS sensor is field installed and it is connected via the Rnet port of the Control Air 6120. A maximum of 5 ZS sensors (with at least one of these sensors being an ZS-PLUS or ZS-PRO) can be daisy-chained and used for temperature averaging applications.

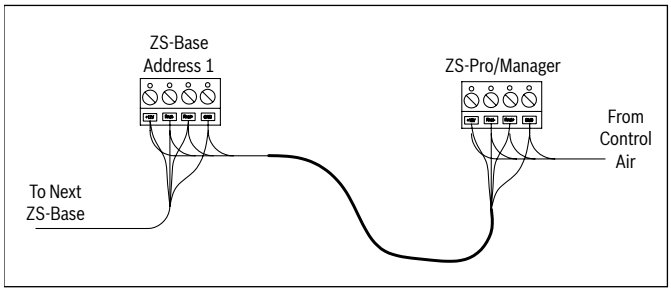


Figure 15 Daisy chain detail

10.7 Zone Control

All zone temperatures values are in Fahrenheit. Please consult with a factory application engineer regarding software with international units.

Once the sensor source has been selected for the zone control application, (see previous selection), the operating set-point for heating and cooling operation may be set for occupied and unoccupied through the BACview terminal.

		Low Limit	Set-point	High Limit
Heating	Occupied	60.0°F	70.0°F	75.0°F
	Unoccupied	50.0°F	55.0°F	70.0°F
Cooling	Occupied	65.0°F	74.0°F	85.0°F
	Unoccupied	80.0°F	90.0°F	95.0°F

Table 17 Factory Defaults for Heating / Cooling Set-points and Limits

10.7.1 Set-Points Management

All set-points are adjustable via the network or with the BACview terminal. Adjustment Limits is used to limit the allowed set-point changes via the wall sensor. For a given set-point the adjustment amount is limited to ±3 °F; this limits the upper and lower set-point adjustment allowed by the user.

Zone Control Status Information is available via the BAS:

- Run Status – indicates the current commanded status of the unit, (on/off).
- Effective Zone Temperature – the measured space temperature with offset applied.
- Override Time – the amount of time the user has overridden the current set-point.
- Current Set-point – current set-point with limits applied.
- Effective Heating Set-point – current heating set-point with offset applied.
- Effective Cooling Set-point – current cooling set-point with offset applied.
- Night Setback Status – status indicating that the zone is:
  - ON – zone is occupied
  - OFF – zone is unoccupied
- Current Cooling Percent – the zone PID value for cooling operation, 0% - 100%.
- Current Heating Percent – the zone PID value for heating operation, 0% - 100%.

10.7.2 Zone Temperature Limits

When the ZS-Sensor is selected as the primary zone sensor, a zone temperature range alarm is asserted when the measured space temperature is above or below the following trip conditions:

- +10 degrees above cooling set-point
- +10 degrees below heating set-point

The high and low zone temperature alarm trip points may be customized via the Alarm Configuration Screen utilizing the BACview terminal. The ZS Sensor hardware is validated if appropriately configured via the BACview terminal.

10.7.3 Remote Temperature Limits

When the RTS is used as the zone temperature sensor, a zone temperature range alarm is asserted when the measured space temperature is above or below the following trip conditions:

- +10 degrees above cooling set-point
- +10 degrees below heating set-point

The high and low zone temperature alarm trip points may be customized via the Alarm Configuration Screen utilizing the BACview terminal. The remote zone sensor hardware is validated if appropriately configured/installed.

10.8 Fan Mode

The Fan Mode option is used to select the type of fan hardware being used with the unit. Fan hardware is application specific and it will determine the behavior for the specific application for which it is being applied.

The Fan option may be configured with one of the following options:

- Start/Stop (also known as On/Off signaling)
- Variable Frequency Drive (or Variable Fan)

10.8.1 Start / Stop Fan

The fan control signal is provided on BO-1 of the Control Air 6120. Fan operation is interlocked with heating and cooling operations. The fan will be engaged during heating and cooling operations. The fan will always run (interlocked) when heating or cooling.

10.8.2 Variable Frequency Drive (VFD) Fan

The VFD uses an analog signal (0-10V) to control the speed of the blower. This signal is output from Analog Output 1 (AO-1) of the Control Air 6120. Blower speed is modulated by a PID loop to maintain a constant static pressure, The scaling in the software for the static pressure sensor readings is from 0 to 3 (0=0V and 3 = 5V). The fan speed will not be allowed to drop below the minimum (default: 20%) speed during VFD operation. VFD can be configured to not use the a static pressure sensor and work on/off when the start stop switch closes. Horizontal units do not allow for mounting of the VFD inside the equipment and require the VFD equipment to be mounted close to the unit. An inside-wall close to the unit is typically used for mounting an external VFD.

10.8.3 Fan Operation

When the unit control is set for occupied operation the fan will run continuously as the default behavior. The fan mode may be modified to cycle only during heating and cooling operation. During unoccupied operation the fan will only cycle during a call to maintain a heat or cool setpoint.

The Fan will operate when the cooling or heating PID value is greater than 10% for zone control applications, if it is set to cycle with the compressors. For Discharge Air Control (DAC) applications, the fan input percent is acquired from the PID static pressure control logic. DAC fan operation will run only during occupancy and for the unit being configured for discharge air control.

The fan may be configured for continuous operation during occupancy or for operation during compressor operation.

10.8.4 Fan Override

The fan will operate when the override mode is initiated.

10.8.5 VFD Control

The following applies for VFD Control:

- Variable Frequency Drive fan control requires a static pressure measurement.
- The static pressure sensor uses inches of water column as the unit of measure.
- The static pressure sensor is configured for IN-11 port of the FLEX 6126.
- The static pressure set-point is user configurable and it is used by the static pressure PID control.
- The minimum VFD fan speed is user configurable and is set during the test and balance phase of commissioning phase.
- A static pressure measurement may be compensated with a user configurable value.
- A high static pressure alarm will be generated for a static pressure exceeding the maximum static pressure trip point for a minimum of 10 minutes.
- The static pressure sensor will be range-validated and a sensor failure alarm will be generated for a missing sensor.
- The VFD output may be switched to a constant value for a smoke event if enabled.

10.8.6 Fan Operation During Smoke Event

Under most circumstances during a smoke event the fan will be commanded off. However, there are conditions where fan operation may be required to prevent smoke infiltration by providing pressurization of the space. The speed of the fan during a smoke event is user configurable for VFD enabled units (defaults to 100%).

10.8.7 Fan History Statistics

The controller will collect fan history statistics and sum the total number of fan start events that occurred in the proceeding 1 hour period. The fan history may be reset by the user. Fan history reset may be performed locally at the unit with a BACview terminal.

10.9 Digital Inputs for Monitoring

The controller software may be configured to provide digital inputs for monitoring unit faults and alarms. The equipment integrator must configure the input for the appropriate installed option and desired function. The functional options may be configured via a local terminal or building automation system.

10.9.1 Filter Status (DFS)

The Control Air 6120 has the option of providing a filter alarm for indicating that the filter needs servicing. The filter-status service option may be implemented with hardware or with fan run time. The filter switch hardware is connected directly to IN-10 with a contact closure indicating a service event and the equipment integrator must configure the dedicated filter switch option; it shares an input with the Differential Pressure Switch and Outside Air Temperature, and therefore precludes any options involving them if chosen. Option selection will determine the location for connecting the filter switch input.
The following applies to the Filter Status:

- The filter status (replacement) may be configured for accumulated running time.
- The total fan run time prior to filter service is user configurable, 2000 hrs.
- The filter timer may be reset upon the filter being serviced.

10.9.2 Differential Pressure Switch (DPS)

The differential pressure switch is applied to a unit for which the flow of water through the heat exchange must be confirmed prior to the unit operating. The differential pressure switch hardware is connected directly to IN-10 and the equipment integrator must configure the option; it shares an input with the Dirty Filter Switch and Outside Air Temperature, and therefore precludes any options involving them if chosen.

In addition, the following applies to the DPS option:

- An alarm notification is set if the DPS is asserted TRUE.
- A DPS alarm will terminate compressor operation.
- Three DPS events will hard lockout the unit.
- The DPS hard lockout condition is cleared by a reset.
- A sum of all DPS events will be logged.
- A sum of DPS events will be logged for a 1 hour period.

10.9.3 Smoke Detector Status (SDS)

The unit may be setup to receive a smoke event via a contact closure. The smoke detector status input is located on the Control Air 6120 Point Expander.

The response to a smoke event must be determined by safety regulations and jurisdiction of the local governing body. The smoke detector response must be enabled and setup by the system integrator and safety personnel. The default behavior for a smoke event will terminate the operation of the unit (fan and compressor). The unit may be configured for operation during a smoke event for specific safety applications, and the safety integrator must determine the appropriate behavior during a smoke event. Variable Frequency Drive configured units can be configured for a specific air flow during a smoke event. A Smoke Detector contact closure will produce a Smoke Alert.

10.10 Heating & Cooling Operation

The controller will measure the zone temperature and stage the compressor(s) to maintain its set-point. To prevent short-cycling, there will be a 5 minute delay (Zone Control) or a 10 minute delay (Discharge Air Control) between compressor stages (if equipped with 2 or more compressors). Additionally, there will be a 1 minute delay when transitioning between heat and cool modes, and there's also a 3-minute delay to prove water flow prior to Compressor 1 operation when the unit is first powered on. The compressor will run subject to internal safeties and controls provided by UPM board.

Furthermore, for zone control and discharge air control applications the following minimum on-times and off-times are applicable:

	Compressor 1		Compressor 2		Compressor 3		Compressor 4	
	Min On Time	Min Off Time	Min On Time	Min Off Time	Min On Time	Min Off Time	Min On Time	Min Off Time
Zone Control	10 mins	10 secs	5 mins	10 secs	5 mins	10 secs	5 mins	10 secs
Discharge Air Control	10 mins	5 mins	10 mins	5 mins	5 mins	5 mins	5 mins	5 mins

Table 18

Heating

Heating will be enabled whenever:

- The fan output is on
- The loop valve is open
- The reversing valve is de-energized in heat mode.

Cooling

Cooling will be enabled whenever:

- The fan output is on.
- The loop valve is open
- AND the reversing valve is energized in cool mode.

10.10.1 Cooling Mode

When commanded into cooling mode, the unit will energize the reversing valve, the condenser water valve and wait for its valve end switch to be made prior to energizing the compressors. Once the valve has been proved open the unit will command the compressor to stage according to the cooling percentage required. This value is provided via reverse acting PID loop which compares the supply air temperature (SAT) value and the SAT cooling set point (AV:93).

The unit monitors return air temperature to assure air entering the unit is greater than 62°F (adj.) prior to running in the cooling with modulating hot gas reheat. If at any time the cooling set point is greater than the mixed air temperature the unit will enter into economizer assist mode as it would be able to use the MAT as cooling mean, and all compressors will be disabled after the minimum runtime has expired.

Compressors will be staged as follows:

- **Compressor one (1) will run:**
  - When the fan is running
  - AND the reversing valve is proved in cooling mode.
  - AND the cooling demand is greater than 25%
- **Compressor two (2) will run:**
  - When compressor one has run for 10 min
  - AND the cooling demand is greater than 50%
- **Compressor three (3) will run:**
  - When compressor two has run for 10 min
  - AND the cooling demand is greater than 75%
- **Compressor four (4) will run:**
  - When compressor two has run for 10 min
  - AND the cooling demand is greater than 90%

When the unit runs in cooling mode the hot gas re-heat valve will be enabled and modulated to maintain supply air temperature set point, factory default is 55 °F (AV:93, adj.) +/- 2°F.

10.10.2 HGRH Start/Stop (On/Off)

Once the set-point has been satisfied and the humidity is above set-point, the unit will run until there is another cooling call, or the humidity set-point has been satisfied. Active humidity removal will operate the equipment until satisfied.

10.10.3 Dedicated Outside Air (Modulating Hot Gas Re-Heat)

When in cooling mode, if the unit is equipped with modulating hot gas re-heat valve, it will be enabled and modulated to maintain supply air temperature set point, factory default is 55 °F (adj.) +/- 2°F.

The cooling stages are reset with outside air temperature (OAT) as it changes as follows:

Mode	Outside Air Temperature (OAT)
Mechanical Heating	40 °F <OAT < 49°F
Free Cooling	50 °F <OAT < 59°F
Mechanical Cooling (Comp 1)	60 °F <OAT < 69 °F (adj.)
Mechanical Cooling (Comp 2)	70 °F <OAT < 77 °F (adj.)
Mechanical Cooling (Comp 3)	78 °F <OAT < 83 °F (adj.)
Mechanical Cooling (Comp 4)	OAT > 83 °F (adj.)

Table 19

All values have a hysteresis of 2.5 °F.

Any of the following alarms will immediately shut all compressors stages down:

- Leaving water high
- Leaving water low
- Fan alarms
- Status Switch
- High Static
- Smoke
- A2L Alarm

10.10.4 Discharge Air Control (Without Modulating Hot Gas Re-Heat)

When in cooling mode, if the unit is not equipped with modulating hot gas re-heat valve, the compressors will be staged on and off to maintain discharge air temperature (DAT) set point. The factory default set point is 55 °F (adj.). This set point cannot be lower than 55°F or higher than 80°F. A demand level set point of 0.72°F (adj.) is added to the DAT set point (DATSP) when calculating the effective DATSP. This value cannot be modified via BACview, but can be adjusted through BACnet network point AV:64 over a network.

The cooling stages are reset with discharge air temperature (DAT) as it changes as follows:

Cooling Stage	Discharge Air Temperature (DAT)
Free Cooling (Fan Only)	50 °F < DAT<DATSP
Mechanical Cooling (Comp 1)	DAT>DATSP
Mechanical Cooling (Comp 2)	DAT>DATSP + 2°F
Mechanical Cooling (Comp 3)	DAT>DATSP + 4°F
Mechanical Cooling (Comp 4)	DAT>DATSP + 6°F

Table 20

Any of the following alarms will immediately shut all compressors stages down:

- Leaving water high
- Leaving water low
- Fan alarms
- Status Switch
- High Static
- Smoke
- A2L Alarm

10.10.5 Reversing Valve Operation

A reversing valve is used to change the direction of the refrigerant installed on units that are configured as heat pump equipment (heating and cooling). The reversing valve is energized on a call for cooling and will remain energized until a call for heating. Upon a call for heating, the reversing valve is de-energized and remains de-energized until a call for cooling. The compressor will be disabled and remain off for 10sec after the reversing valve has changed position. The reversing valve logic can be reversed.

10.10.6 Discharge Air Temperature (DAT) Sensor

The DAT sensor is typically factory installed at the inlet of the blower housing and connected to IN-6 of the Control Air 6120. For parallel coil applications it is best to locate a duct mounted sensor in the supply air stream since supply air stratification can occur during 1st stage operation. Supply duct sensor placement provides a better measurement of the discharge air temperature due to the mixing process. Duct mounted DAT sensors are field installed by the controls integrator and must be purchased as a separate item. Please consult with a factory application engineer for specific duct sensor hardware. If supplemental heating is installed then the DAT sensor will be mounted downstream of the discharge side of the heating coil.

10.10.7 High Discharge Air Temperature Condition (Cooling)

DAT measurements are tested for a high limit trip above 70 °F. An alarm is asserted for high discharge air temperature under the following conditions:

- DAT is above the high limit for 5 minute
- Fan Operation Asserted
- Cooling Mode
- Valid DAT sensor measurement

10.10.8 Low Discharge Air Temperature Condition (Heating)

DAT measurements are tested for a low limit trip below 75 °F. An alarm is asserted for low discharge air temperature under the following conditions:

- DAT is above the low level limit for 5 minute
- Fan Operation Asserted
- Heating Mode
- Valid DAT sensor measurement

10.10.9 High Static Lock

The controller will monitor and count the high static shutdown alarms and will apply a three (3) strike rule prior to locking the unit down; this is done to protect the cycling of major unit components.

If the lock state is reached the alarm code 100 will be set and broadcast over the BACnet network via the Systems Status point (AV:16). Since the controller interprets this as an issue that needs technical assistance the unit can only be reset from the BACview terminal.

10.10.10 Economizer Mode

When commanded into the economizer mode, the unit will disable both mechanical heating and cooling operations. The fan will continue to modulate to meet the static pressure set point.

10.10.11 Leaving Water Temperature

The controller will monitor the leaving water temperature.

Alarms will be provided as follows:

High Leaving Water Temp:
If compressor(s) is running and the leaving water temperature is greater than 135°F (adj.).

Low Leaving Water Temp:
If compressor(s) is running and the leaving water temperature is less than 21°F (adj.).

Leaving Water Sensor Failure:
If leaving water sensor is outside of normal operating limits.
Should a High or Low Leaving Water Temperature Alarm occur, the call for heat or cool will be removed.

10.10.12 Supply Air Temperature

The controller will monitor the discharge air temperature. For proper operation sensor must be located 6 feet from unit discharge outlet in the duct.

Alarms will be provided as follows:

High Supply Air Temp:
If unit running in cooling mode and the discharge air temperature is greater than 120°F (adj.).

Low Supply Air Temp:
If unit running in heating mode and the discharge air temperature is less than 50°F (adj.).

Supply Air Sensor Failure:
If discharge air sensor is outside of normal operating limits.

10.10.13 UPM Fault Monitor

The controller will monitor both alarm inputs from the Unit Protection Modules (UPMs). Upon a hard lock out alarm, compressors are disabled by the UPM board.

Alarms will be provided through BACnet point current_alarm (AV:17) as follows:

- HP1: High Pressure 1st Stage Alarm
- LP1: Low Pressure 1st Stage Alarm
- HP2: High Pressure 2nd Stage Alarm
- LP2: Low Pressure 2nd Stage Alarm
- HP3: Hi Pressure 3rd Stage Alarm
- LP3: Low Pressure 3rd Stage Alarm
- HP4: High Pressure 4th Stage Alarm
- LP4: Low Pressure 4th Stage Alarm
- FRE: Freeze Alarm
- FRE2: Freeze 2 Alarm
- FZE: Freeze Air Coil Alarm
- FZE2: Freeze Air Coil 2 Alarm
- CON: Condensate Alarm
- CON2: Condensate 2 Alarm
- BRN: Brownout Alarm
- BRN2: Brownout 2 Alarm
- A2L: A2L Refrigerant Alarm
- A2L: A2L 2 Refrigerant Alarm
- COMM: Communication Alarm

11 Virtual BACview® Application

The Virtual BACview® application simulates the BACview®6 Handheld keypad/ display device. Run the Virtual BACview® application on a laptop that is connected to the controller. See Section 8 Local Access for establishing connection between Laptop and Control Air 6120.

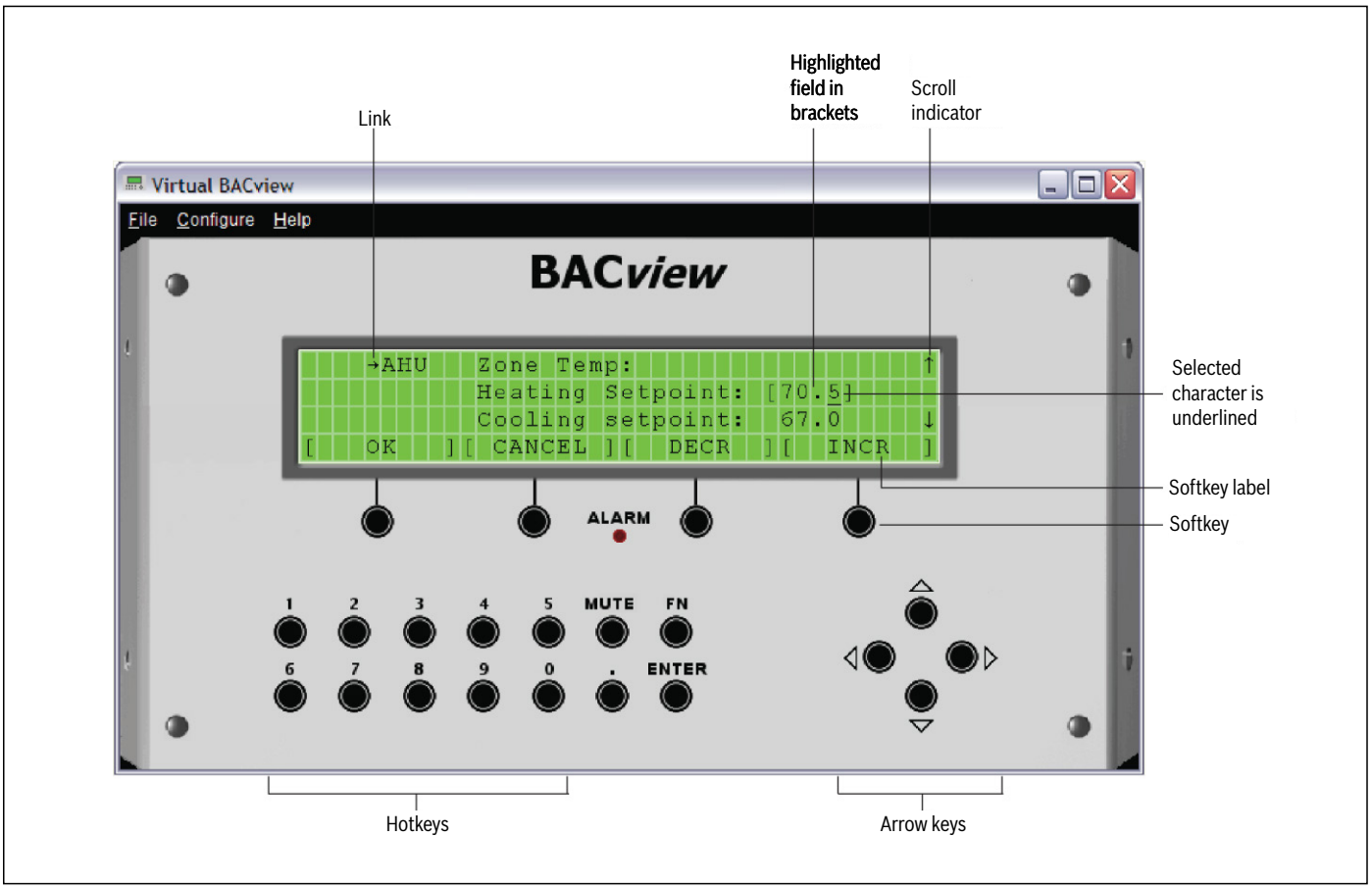


Figure 16

11.1 To Download the Virtual BACview® Application

To put the application on your laptop:

1. Go to the website https://www.bosch-homecomfort.com/us/en/residential/technical-documentation/software/
2. Scroll down to Virtual BACview Software.
3. Select Download.

12 BACview®6 Device

The Physical BACview has been discontinued. Please use Virtual BACview if a physical BACview device is not readily available for use.

The BACview®6 device is a keypad/display unit that you connect to the Control Air 6120 to let you view or edit certain property values and the controller's real time clock.

You connect the BACview®6 device to the Control Air 6120's 4-pin Rnet port. The Control Air 6120 can share the Rnet with zone sensors. Wire the devices in a daisy-chain or hybrid configuration.

For instructions on using/programming the BACview®6 device, refer to BACview®6 technical documentation.

When using a permanent Equipment Touch or BACview®6 device, they must be externally powered.

12.1 Specifications for Mounting the BACview®6 Device

You can mount the BACview®6 device:

- In the panel above the controller
- On the panel door
- On a wall up to 500 feet from the controller

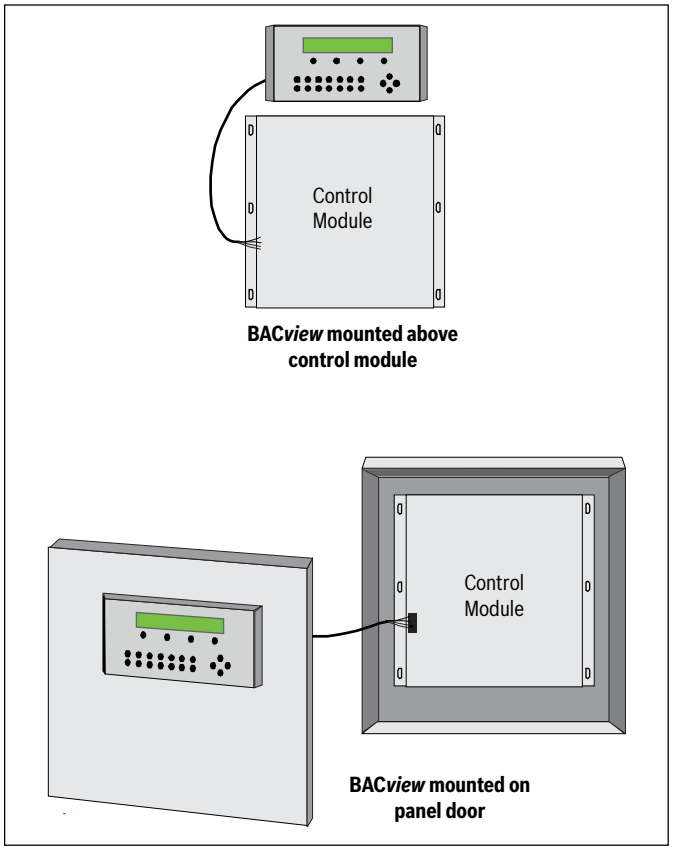


Figure 17

12.2 To Mount the BACview®6 Device

WARNING

Electrical hazard, product damage!

The BACview®6 device is powered by a Class 2 power source. Properly isolate the BACview®6 device from non- Class 2 circuits in the same control panel.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

1. Remove the 4 screws on the sides of the BACview®6 device to remove the rear mounting plate.

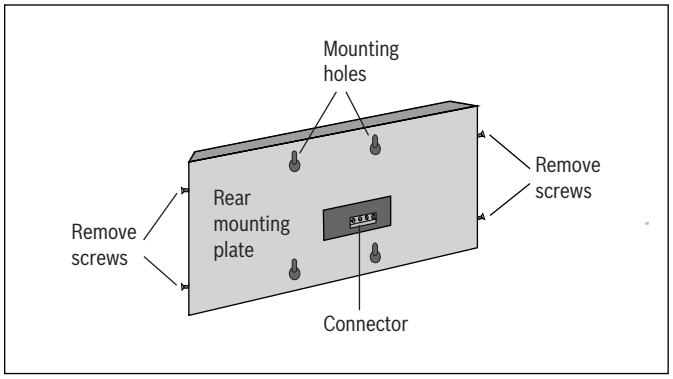


Figure 18

2. Using the rear mounting plate as a template, drill 4 holes in the surface that you are mounting the BACview®6 device to, then insert 4 screws in the holes.
3. If mounting on a panel door, use the cutout in the rear mounting plate as a template to cut a hole in the panel door for the cable to pass through.
4. Reattach the BACview®6 device's rear mounting plate.
5. Wire the BACview®6 device to the Control Air 6120.
6. Hang the BACview®6 device on the 4 mounting screws.

If mounting above the Control Air 6120 or on a wall, pull the cable out to the side of the BACview®6 device without bending or pinching the cable beneath the BACview®6 device.

12.3 To Wire the BACview®6 Device

Use 18 gauge wire for the BACview®6 device to be up to 500 feet from the controller.

NOTICE

Improper operation, product damage!

Maintain the same polarity throughout the Rnet.

Wiring the 12V power incorrectly can damage the components.

1. Pull the screw terminal connector from the controller's power terminals labeled **Gnd** and **Hot**.
2. Pull the screw terminal connector from the BACview®6 device.
3. Partially cut, then bend and pull off the outer jacket of the Rnet cable(s). Do not nick the inner insulation.

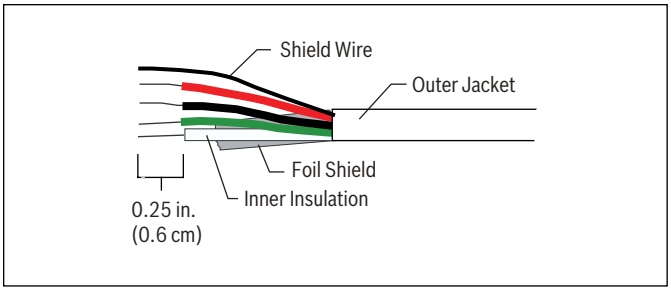


Figure 19

4. Strip about .25 inch (.6 cm) of the inner insulation from each wire.
5. Insert the wires into both of the screw terminal connectors.

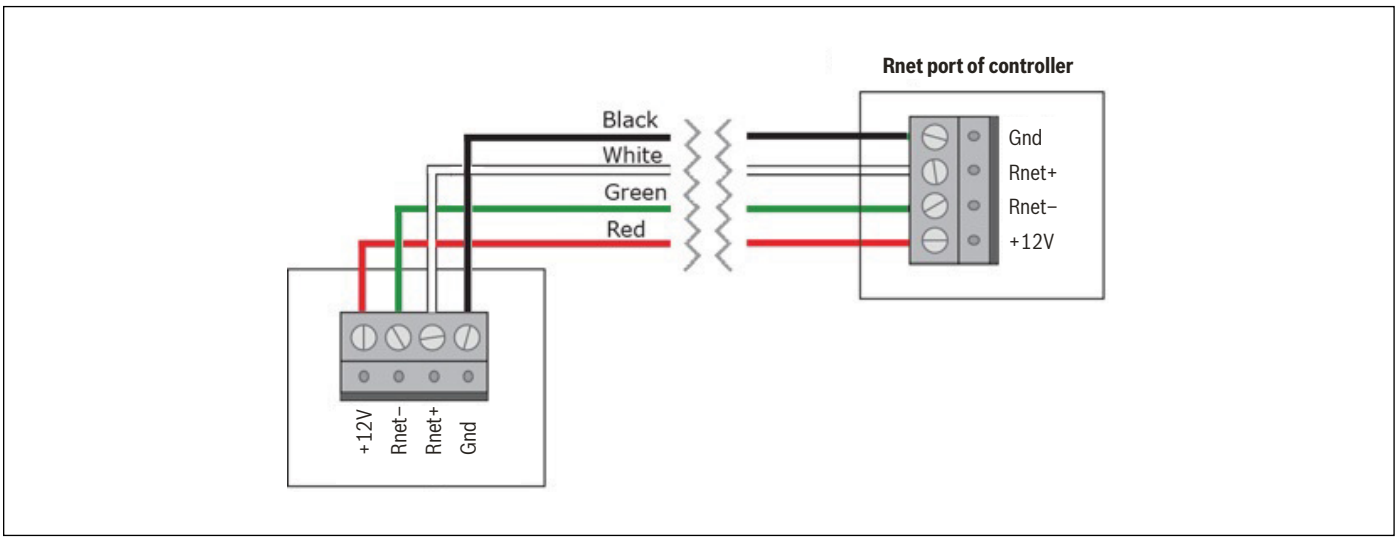


Figure 20

6. If connecting more than one BACview®6 device, the first one on an Rnet is powered by the controller. You must provide an external power supply for a second BACview®6 device. When wiring two BACview®6 devices together on the same Rnet, set the J1 jumper to the down position on the first BACview®6 device.

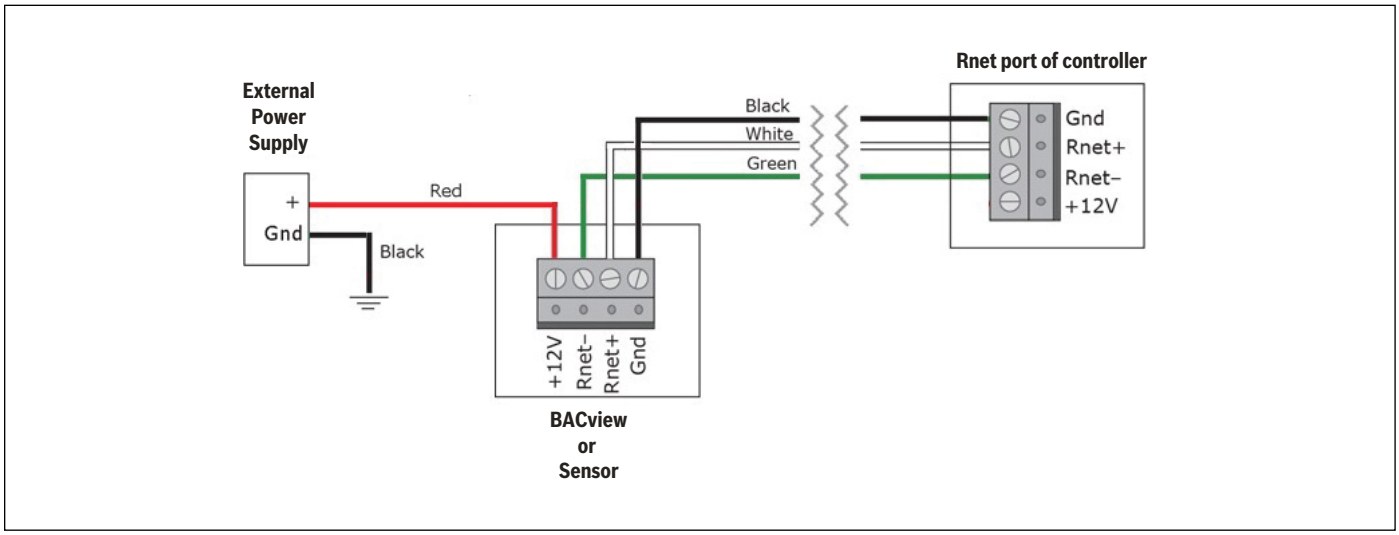


Figure 21

7. Insert the screw terminal connector into the BACview®6 device with the screw heads facing out.
8. Insert the screw terminal connector into the Control Air 6120's power terminals.

13 Electrical Schematics - Water to Air

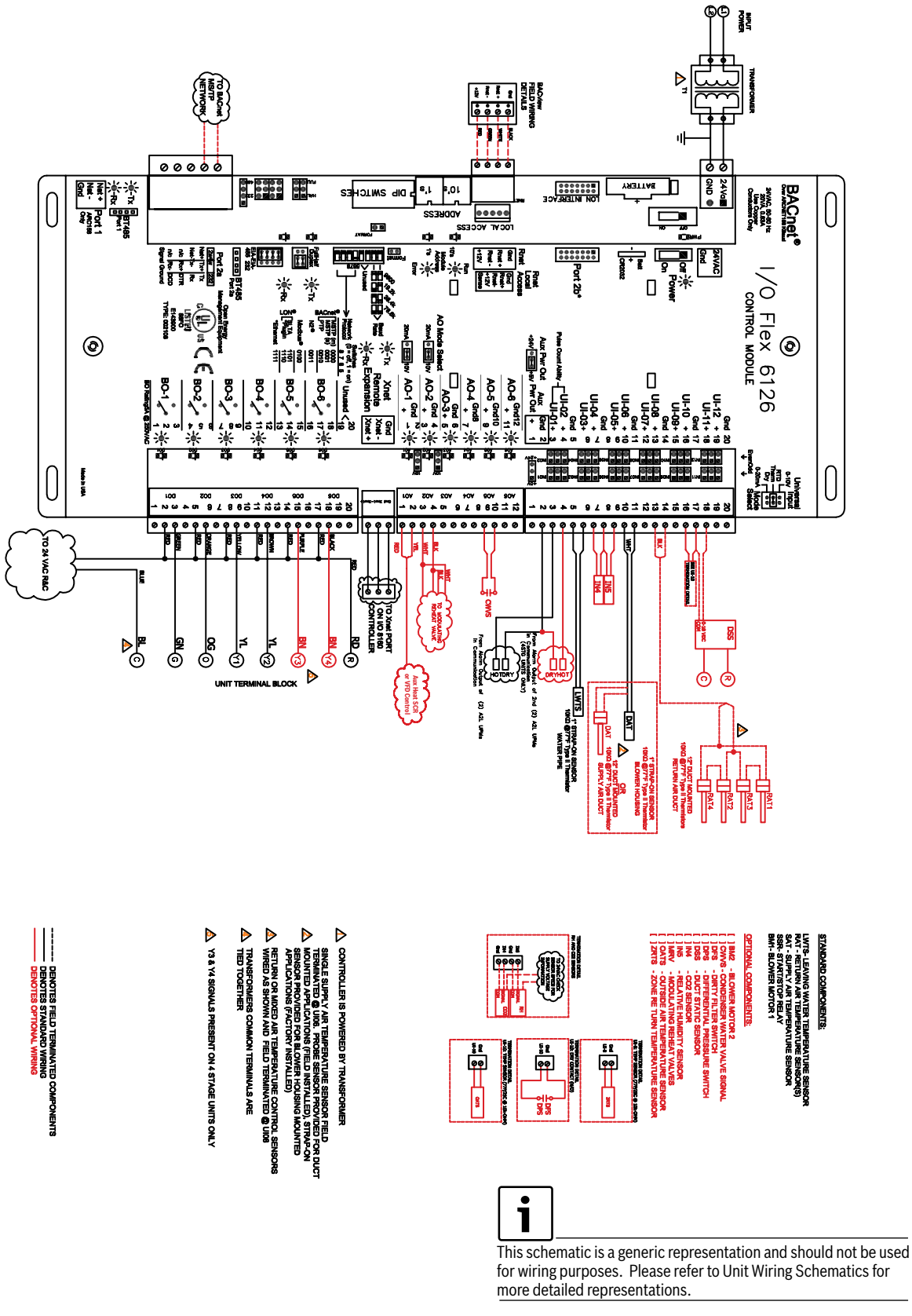


Figure 22

13.1 Control Air 6120 Point Expander

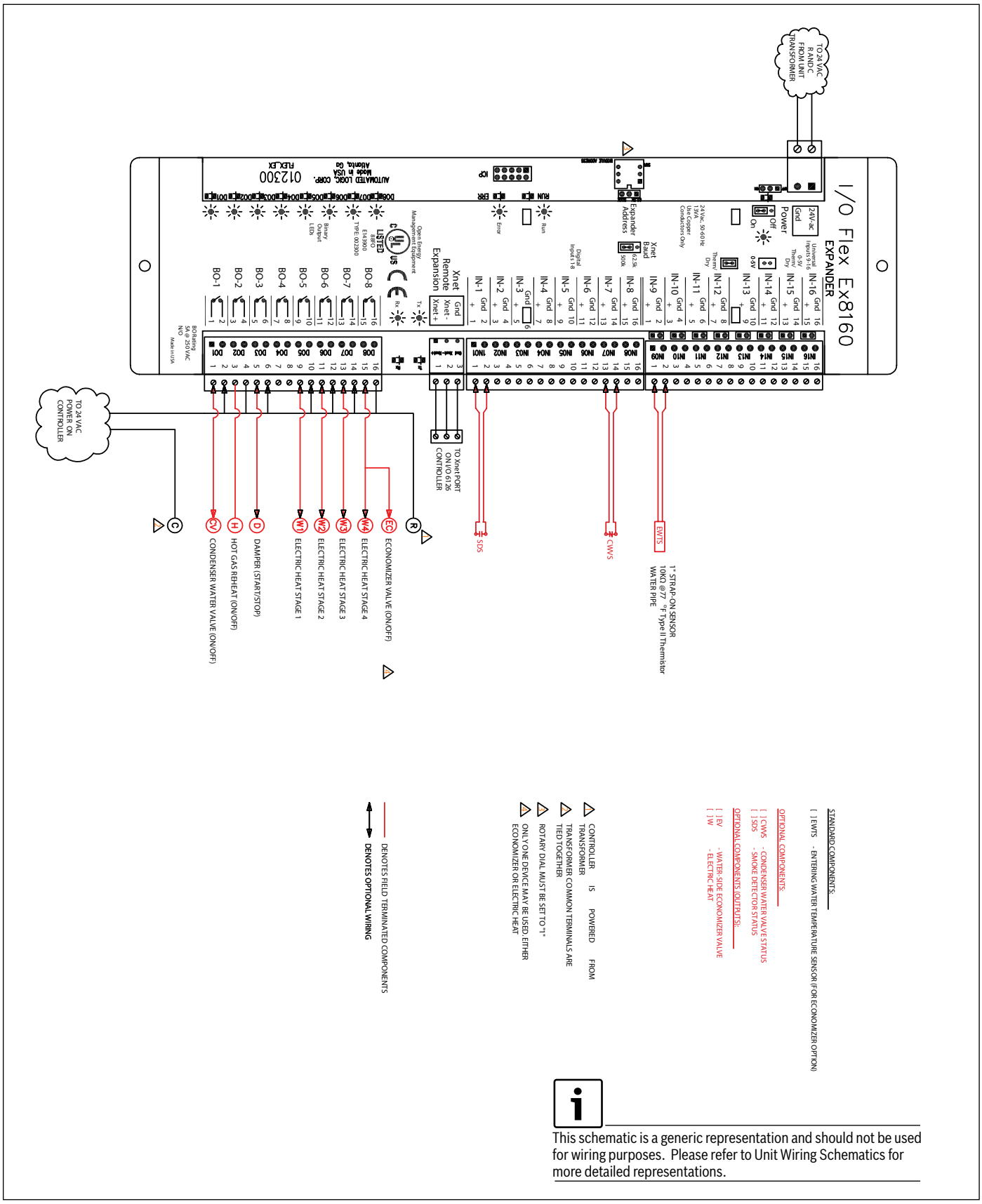


Figure 23

14 Troubleshooting

If you have problems mounting, wiring, or addressing the Control Air 6120, contact Bosch Technical Support 1-800-283-3787.

14.1 Communication LED's

The LED's indicate if the controller is speaking to the devices on the network. The LED's should reflect communication traffic based on the baud rate set. The higher the baud rate the more solid the LED's become.

LEDs	Status
Power	Lights when power is being supplied to the controller. **NOTE:** The Control Air 6120 is protected by internal solid state Polyswitches on the incoming power and network connections. These Polyswitches are not replaceable and will reset themselves if the condition that caused the fault returns to normal.
Rx	Lights when the controller receives data from the network segment; there is an Rx LED for Ports 1 and 2.
Tx	Lights when the controller transmits data to the network segment; there is an Rx LED for Ports 1 and 2.
Run	Lights based on controller health. See table below.
Error	Lights based on controller health. See table below.

The **Run** and **Error** LED's indicate controller and network status.

If Run LED shows...	And Error LED shows...	Status is...
1 flash per second	1 flash per second, alternating with the **Run** LED	The controller files are archiving. Archive is complete when **Error** LED stops flashing.
2 flashes per second	Off	Normal
2 flashes per second	2 flashes, alternating with **Run** LED	Five minute auto-restart delay after system error
2 flashes per second	3 flashes, then off	The controller has just been formatted
2 flashes per second	4 flashes, then pause	Two or more devices on this network have the same MS/TP network address
2 flashes per second	1 flash per second	The controller is alone on the network
2 flashes per second	On	Exec halted after frequent system errors, due to: • Controller halted • Program memory corrupted • One or more programs stopped
5 flashes per second	On	Exec start-up aborted, Boot is running
5 flashes per second	Off	Firmware transfer in progress, Boot is running
7 flashes per second	7 flashes per second, alternating with Run LED	Ten second recovery period after brownout
14 flashes per second	14 flashes per second, alternating with Run LED	Brownout
On	On	Failure. Try the following solutions: • Turn the I/O Flex 6126 off, then on. • Download memory to the I/O Flex 6126. • Replace the I/O Flex 6126.

Table 21

14.2 Recovering From a Power Outage

The Control Air 6120 has a 10-year Lithium CR2032 battery that ensures the following data is retained for a maximum of 10,000 hours during power outages:

- Time
- Graphics
- Control programs
- Editable properties
- Trends
- Schedules

If the above data is lost after power returns, replace the battery and then restore memory from archive. See instructions below.

14.2.1 Archive Function

Factories - After a memory download, the firmware stores the touchscreen, BACview® files, graphics, control programs, and database settings to flash memory. This archiving can take up to a minute, depending on the size of the files.

Site-specific - You can archive site-specific configurations to the Control Air 6120 by using the BACview® device, the control program, the WebCTRL® for OEMs application, or Field Assistant. We strongly recommend you archive whenever you change factory settings, such as schedules, devices instances, network addresses, etc.

14.2.2 Restore Memory From Archive

The Control Air 6120 checks the memory configuration during power up and, if it is identified as corrupt, it reconstructs memory from the last archive. In addition, if the battery fails to power the device during a power outage, memory could be lost, but will be reconstructed from the last archive. The device supports factory and site-specific archives, which can be manually restored in the field.

To restore the factory archive

1. Turn off the Control Air 6120.
2. Address the rotary address switches to 0, 0 (zero, zero).
3. Put the **Format** jumper on the pins.
4. Turn on the Control Air 6120.
5. **Run** and **Error** LED's cycle 3 times opposite of each other, then return to normal operation once the process is complete.

The **Run** LED flashes once per second during normal operation.

To restore the site-specific archive

1. Turn off the Control Air 6120.
2. Address the rotary address switches to any numbers greater than 0, 0 (zero, zero). Example (0, 1).
3. Put the Format jumper on the pins. For device with a format button, hold it down.
4. Turn on the Control Air 6120.
5. Run and Error LEDs cycle 3 times opposite of each other, then return to normal operation once the process is complete.

The **Run** LED flashes once per second during normal operation.

After restoring from archive

1. Run a module status and check the information message history to confirm the archive.
2. Set the time and date for schedules to operate properly.

The restore uses June 12, 2002 @ 10:00 AM as a place holder because the battery failure inhibits the real time clock. Use the Equipment Touch, BACview® local display, the WebCTRL® for OEMs application, or Field Assistant to set the correct time and date. If the device is integrated with a BACnet-speaking BAS, the time and date are set via the communication network.

14.3 Replacing the Control Air 6120's Battery

To determine when to replace the battery, remove power and measure the voltage. If the voltage is below 2.9 volts, you need to replace the battery.

Power must be ON to the Control Air 6120 when replacing the battery, or your date, time, and trend data will be lost.

1. Remove the battery from the controller, making note of the battery's polarity.
2. Insert the new battery, matching the battery's polarity with the polarity indicated on the Control Air 6120.

14.4 Serial Number

If you need the Control Air 6120's serial number when troubleshooting, the number is on:

- a sticker on the back of the main controller board
- a Module Status report (modstat) from the WebCTRL® for OEMs application

Online Help Resources

Alternatively, please visit our Service & Support webpage to find FAQs, videos, service bulletins, and more; www.bosch-homecomfort.us/service or use your cellphone to scan the code below.

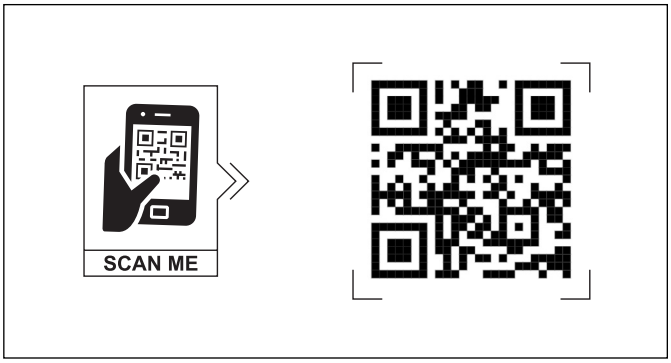


Figure 24

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