APPLICATION NOTE
AN-201301141
01/14/13

Wire Selection

Thermostat Wire

Wire Selection

Thermostat wire should be 18 gauge – 20 gauge solid conductor, unshielded cable. Five conductor cable is recommended for standard thermostat installations. 8 conductor cable is recommended for heat pumps or multi-stage installations.

Wire Color

If the wire colors used for your system do not match the standard/recommended colors, it is recommended that new wire be pulled in order to reduce the possibility of incorrect wiring that may cause damage to the system.

Terminal ID	Description	Typical Colors	5 Wire	8 wire
C	Common	Blue, Black, Brown	Blue/Black	Black
R, Rh, Rc	Control Power (24 VAC)	Red	Red	Red
W, W1	Heat	White	White	White
Y, Y1	Cool	Yellow	Yellow	Yellow
G	Fan	Green	Green	Green
O/B	Reversing Valve	Orange/Dark Blue	-	Orange
W2	2nd Stage Heat	Brown	-	Brown
Y2	2nd Stage Cooling/Compressor	Blue, Pink	-	Blue

Sources for Typical Thermostat Cable

The cables listed below are typical examples. Equivalent cables may be used.

18 Ga, 5 conductor thermostat wire

- Red, white, green, blue, yellow
- Provides correct colors for standard thermostat installation.
- McMaster-Carr 70985K84 $0.26 / foot
- Grainger 5LWP8 $0.39 / foot

18 Ga, 8 conductor thermostat wire

Red, white, green, blue, yellow, brown, orange, black
Provides correct colors for advanced thermostat installations (heat pump or multi-stage)

McMaster-Carr	70985K86	$0.37 / foot
Grainger	5LWP4	$0.60 / foot

Network Cables

Any standard category 5, category 5e or category 6 network cables are acceptable for connecting the BAYweb Thermostat. Pre-terminated cables are available from a variety of sources. The Bay Web Store has pre-terminated cables ranging from 6 feet to 50 feet. Network patch cables can easily be found at most electronic equipment stores.

Bay Controls Web Store (https://store.baycontrols.com/)

Description	Length	Price
Cat 5e Ethernet Patch Cable	6	1.99
Cat 5e Ethernet Patch Cable	10	2.99
Cat 5e Ethernet Patch Cable	15	3.99
Cat 5e Ethernet Patch Cable	25	6.49
Cat 5e Ethernet Patch Cable	50	12.49

Input Wiring

Wire Selection

The wire selected for input connection can be critical to providing a reliable signal. The cable must be selected to provide appropriate protection from the environment (plenum, out door, direct sun light or direct burial). It should be a jacketed, two conductor twisted pair cable. Shielding is optional.

For short runs (<30 feet) in environments that are relatively free from electrical noise, any common wire will suffice. Two conductor thermostat cable can be used because it is inexpensive, commonly available and easy to use.

For longer runs that may be exposed to electrical noise, a shielded cable should be used. The shield must be properly terminated to ground at one end. Do not leave the shield ungrounded and do not ground the shield at both ends.

Runs longer than 100 feet are not recommended.

Wire Installation

The routing of the input cable is also important. The input cable should not be installed in the same conduit or path as high voltage wiring. It should not be routed near motors or other sources of electrical noise.

If the cable has a shield, the shield must be properly terminated to ground at ONE end. Do not leave the shield ungrounded and do not ground the shield at both ends.

Sources for Typical Cables

18 Ga, 2 conductor thermostat wire (no shield)

- Red, white
- Good for wiring supply temperature or door contact.
- McMaster-Carr 70985K81 $0.10 / foot
- Grainger 5LWP5 $0.15 / foot

18 Ga, 2 conductor, shielded cable

- Belden 8760 Many Sources $0.52 / foot
- Grainger 4DPN4 $153.00 / 1000 feet