

BAScontrol20

20-point BACnet/IP Sedona Field Controller 3.1

INSTALLATION GUIDE

INTRODUCTION

The BAScontrol20 (BASC20) is a 20-point field controller with a direct connection to an IP/Ethernet network. Ideally suited for structured wiring systems, the BASC20 is BACnet/IP compliant with a B-ASC device profile. Having a resident Sedona Virtual Machine (SVM), the unit is freely programmable using tools such as Niagara Workbench or a third-party Sedona Tool. For remote Ethernet I/O applications, the unit can be configured with minimal effort using a standard web browser.

The BASC20 provides a convenient mix of universal inputs, binary inputs and outputs as well as analog outputs. Models exist for both triac and relay binary outputs. The unit is ideal for unitary control or for expanding I/O points in the field via an Ethernet connection:

Versatile Control Device — field controller or remote Ethernet I/O

- Direct connection to an IP/Ethernet network
- Compliant with BACnet/IP and B-ASC device profile
- Built on the Sedona Framework™ Controller
- Configurable with a standard web browser
- Real-Time clock with super-cap backup

Flexible Input/Output — 20 points of I/O

- Eight configurable universal inputs
- Thermistor, resistance, analog voltage, binary input, pulse inputs (4 channels)
- Four binary inputs
- Four analog voltage outputs
- Four relay or triac output models

The BASC20 provides the ultimate in flexibility. It can be used for expansion I/O at remote locations where an Ethernet connection exists. It can operate as a function block programmable controller with its resident Sedona Framework Virtual Machine. The BASC20 can operate as remote I/O for BACnet/IP and as a Sedona Framework controller at the same time. A 10/100 Mbps Ethernet port allows connection to IP networks and popular building automation protocols such as BACnet/IP, and Sedona SOX. Twenty points can be configured through resident web pages. The unit provides eight universal I/O points and four binary outputs — plus an additional four binary inputs and four analog outputs.

SPECIFICATIONS

Universal Inputs (Points UI1 – UI8) (web page configurable)

- Analog inputs: 0–10 VDC or 0–20 mA (with external resistor)
(Input impedance 1 M Ω on voltage)
- Temperature input: Type II 10 k Ω thermistors: –10° to +190 °F (–23.3° to +87.8°C)
Type III 10 k Ω thermistors: –15° to +200 °F (–26.1° to +93.3°C)
20 k Ω thermistors: 15° to 215° F (–9° to +101° C)
- Binary input: Excitation current 0.5 mA. Open circuit voltage 12 VDC.
Sensing threshold 3 VDC (low) and 7 VDC (high).
- Pulse input: (Points UI1–UI4) Adjustable high and low thresholds.
0–10 VDC for active output devices.
0–12 VDC for passive devices (configured for internal pull-up resistor)
40 Hz maximum input frequency with 50% duty cycle.
- Resistance: 1 k Ω -100 k Ω range

Binary Inputs (Points BI1 – BI4)

- Binary input: Excitation current 1.2 mA. Open circuit voltage 12 VDC.
Sensing threshold 3 VDC (low) and 7 VDC (high).
Response time 20 ms.

Analog Outputs (Points AO1 – AO4)

- Analog output: 0–10 VDC. 12-bit resolution. 4 mA maximum.

Binary Outputs (Points BO1 – BO4) (Class 2 circuits only)

- Model BASC-20R: Normally open relay contacts. 30 VAC/VDC 2 A.
Model BASC-20T: Isolated triac. 30 VAC 0.5 A.

Regulatory Compliance

CE Mark, CFR 47, Part 15 Class A, RoHS
UL 508, C22.2 No. 142-M1987



Functional

Ethernet

- Compliance: IEEE 802.3
- Protocols supported: BACnet/IP, SOX
- Data rate: 10 Mbps, 100 Mbps
- Physical layer: 10BASE-T, 100BASE-TX
- Cable length: 100 m (max)
- Port connector: Shielded RJ-45
- LED: Green = Link established
Flash = Link activity

TD100700-0IB

Electrical ($\pm 10\%$) (*Intended for use with Class 2 circuits.*)

Input (DC or AC)	DC	AC
Voltage (V, $\pm 10\%$):	24 V	24 V
Power:	4 W	6 VA
Frequency:	N/A	47–63 Hz

Environmental/Mechanical

Operating temperature:	0°C to +60°C
Storage temperature:	-40°C to +85°C
Relative humidity:	10% to 95%, non-condensing
Mounting:	Panel-mount
Protection:	IP30
Weight:	0.6 lbs. (.27 kg)

LEDs Ethernet: Green
 I/O Points: Green

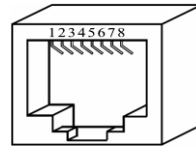


Figure 1 — RJ-45 Jack

RJ-45 Pin Assignments (MDI)

1 TD+ 3 RD+
 2 TD- 6 RD-
 (All other pins are unconnected.)

Dimensions (All dimensions are in mm.)

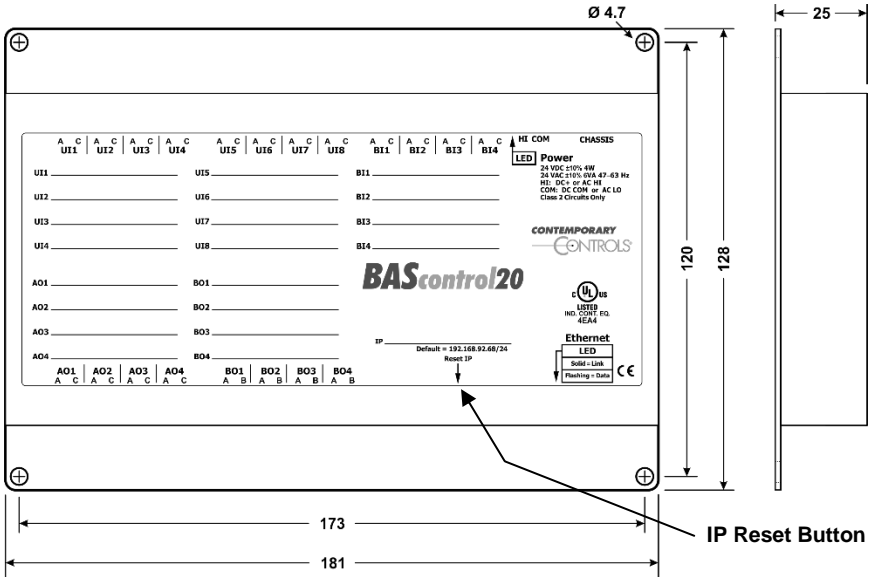


Figure 2 — BASC20 Dimensional Drawing

INSTALLATION

The BASC20 is intended to be panel-mounted in an industrial enclosure or wiring closet with screws (not provided). See Figure 2 for mechanical details.

Cabling Considerations

When attaching cables to the BASC20, Table 1 should be considered.

Function	Signalling & Data Rate	Minimum Required Cable	Maximum Segment Distance
Ethernet	10BASE-T 10 Mbps	Category 3 UTP	100 m (328 ft)
Ethernet	100BASE-TX 100 Mbps	Category 5 UTP	100 m (328 ft)
I/O	Unspecified	18 AWG	Unspecified

Table 1 — Cabling Considerations

NOTE: If using shielded cable, connect to chassis at only one point. Wire size may be dictated by electrical codes for the area where the equipment is being installed. Consult local regulations.

Observe in Table 1 that 10BASE-T segments can successfully use Category 3, 4 or 5 cable — however, 100BASE-TX segments *must* use no less than Category 5 cable. Category 5e cable is recommended as the minimum for new installations.

The Ethernet port employs Auto-MDIX technology so that either crossover or straight-through cables can be used to connect to the network.

Real-Time Clock

The BASC20 contains a real-time clock (RTC) which can be configured via a standard web browser or it can be configured to get its time from a Network Time Protocol (NTP) server. The RTC is backed up via a super-cap which can provide up to one week of backup for the RTC during a power loss. The RTC is also used to provide non-volatile storage for the unit's pulse counts and some of its virtual Sedona components.

Powering

The unit requires a source of 24 VDC or VAC via a two-pin removable keyed connector.

NOTE: This device is intended for use with Class 2 circuits.

The recommended size for power conductors is 16–18 AWG (solid or stranded). Ground is directly connected to zero volts. Input connections are reverse-polarity protected.

Limited Power Sources

The BASC20 should be powered by a limited power source complying with the requirements of the National Electric Code (NEC) article 725 or other international codes meeting the same intent of limiting the amount of power delivered by the source. Under NEC article 725, a Class 2 circuit is that portion of the wiring system between the load side of a Class 2 power source and the connected equipment. For AC or DC voltages up to 30 volts, the power rating of a Class 2 power source is limited to 100 VA. The transformer or power supply complying with the Class 2 rating must carry a corresponding listing from a regulatory agency such as Underwriters Laboratories (UL).

Indicator Lights

Power: If applied power is adequate, this LED glows solid green.

Ethernet: This LED glows if a valid link exists to an operating Ethernet device. It flashes to indicate activity.

I/O: Each of these LEDs glows green when the associated I/O point is in an active condition.

Field Connections

When attaching devices, observe proper cabling using Figure 3 as a guide.

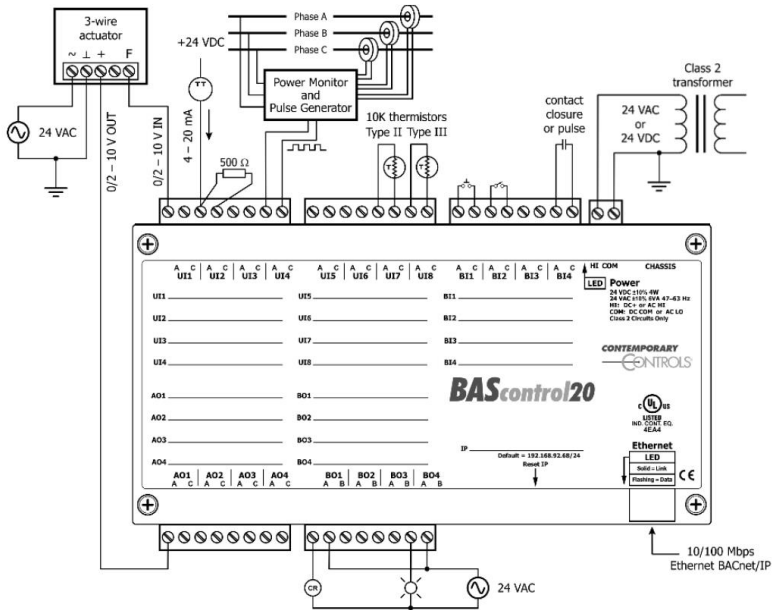


Figure 3 — Sample Wiring Diagram

Attach devices to the BASC20 so that the more positive wire goes to the A terminal. Considerations in making field connections for various types of input and output devices are discussed in the following pages.

Universal Inputs U11–U18

Universal inputs are configured via a web browser. Consult the BASC20 User Manual for details. It can be downloaded from the BAScontrol20 support page at:

www.ccontrols.com/support/bascontrol20.htm

Universal Input — Configured for Analog Input

A Universal Input can measure voltage in the range of 0–10 VDC or current in the range of 0–20 mA with the use of an external resistor. Transmitters that produce an elevated “zero” such as 2–10 VDC or 4–20 mA can be measured as well. With a web browser, access the Main Screen, click the *title link* of any channel UI1–UI8. Then set the **Channel Type** to *Analog Input* and the **Units** to the units desired. The input impedance is 1 M Ω .

To measure voltage, connect the more positive wire to point **A**. The output of a three-wire device (such as the actuator in Figure 4) references its power supply common — which must match the BASC20 common. In this situation, you only need to attach the device output to input point **A** on the BASC20 — otherwise, tie the negative wire to point **C**.

When measuring current (UI2 in Figure 4), provide a 500 Ω resistor between points **A** and **C** to measure a 0–20 mA signal with full resolution.

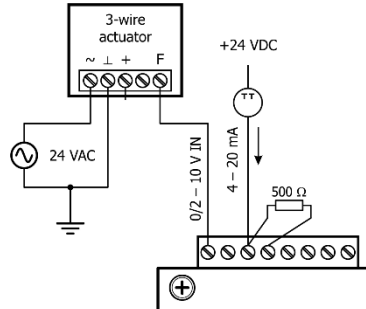


Figure 4 — Analog Input Connections

Universal Input — Configured for Temperature or Resistance Input

Built-in calibration curves are provided for 10 k Ω Type II, 10 k Ω Type III and 20 k Ω thermistors. For resistance, the scale is from 1 k Ω to 100 k Ω . With a web browser, access the Main Screen, click the *title link* of any channel UI1–UI8. Then set the **Channel Type** to either *Therm 10kT2*, *Therm 10kT3*, *Therm 20 k* or *Resistance* and the **Units** to either *DEGREES_CELSIUS*, *DEGREES_FAHRENHEIT* or *OHMS*. As shown in Figure 5, connect the thermistor to points **A** and **C**. Polarity is not an issue. For temperature averaging, connect multiple devices of the same in a series-parallel combination so that the nominal resistance remains at 10 k Ω for 10 k Ω applications. The effective range of temperature measurement for Type II 10 k Ω thermistors is from –10° to +190 °F (–23.3° to +87.8°C), for 20 k Ω it is 15° to 215 ° F (–9° to 101°C). For Type III 10 k Ω thermistors it is from –15° to +200 °F (–26.1° to +93.3°C). The channel LED will glow when a thermistor is properly connected.

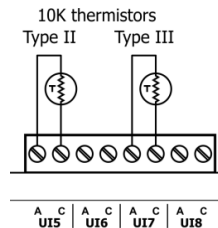


Figure 5 — Thermistor Connections

Universal Input — Configured for Binary Input

To sense the action of a push-button or relay, the contacts must have no applied energy, and be rated for low-voltage, low-current switching. The BASC20 provides the energy to be sensed. With a web browser, access the Main Screen, click the *title link* of any channel UI1–UI8. Set the **Channel Type** to *Binary Input* and the

Units to *NO_UNITS*. As shown in Figure 6, connect the contacts between points *A* and *C*. For common mechanical contacts, polarity is not an issue. The open-circuit voltage is 12 VDC and the short-circuit current is 0.5 mA.

For solid-state switch sensing, we recommend that an attached solid-state device have an opto-isolated open-collector NPN transistor output stage with a collector-emitter output voltage (V_{ce}) of at least 30 V. Output sinking current should be greater than 5 mA. The collector-emitter saturation voltage should be less than 0.2 V when sinking 2 mA. The emitter must be connected to point *C* and the collector to point *A* (the more positive point). The BASC20 sets the low-threshold to 3 V and the high-threshold to 7 V. When a contact is made or the solid-state switch is on (resulting in a saturated output), the voltage at point *A* is close to zero volts. The corresponding LED for that channel will be on. If the contact is opened or the solid-state switch is turned off, the voltage at point *C* quickly rises towards 12 V. Once the voltage passes the 7 V high-threshold, the “off” state is sensed. To return to the “on” state, this voltage must fall below 3 V. The four-volt difference is called *hysteresis*. There is no need to add an external pull-up resistor when using a contact closure input.

Contact closure inputs are sampled every 10 ms and for a change of state to be recognized, the input state must be stable for two consecutive samples. Therefore, contact closure response is 20 ms.

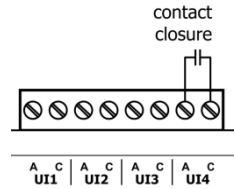


Figure 6 — Contact Closure Connection

Universal Input — Configured for Pulse Input (UI1 – UI4)

Assuming a 50% duty cycle, a pulse rate up to 40 Hz can be measured on channels UI1–UI4. With a web browser, access the Main Screen, click the *title link* of the selected channel. Set the **Channel Type** to *Pulse Input* and the desired accumulated **Units** to *NO_UNITS* or the proper units for the accumulated counts. The device can have an active output or passive output. Data is an *accumulated pulse count*.

When using a passive output pulse device, enable **Pull Up Resistor** in the web page configuration for the channel. When using pulse outputs with an active output, disable **Pull Up Resistor**.

The Pulse Input voltage low-threshold and high-threshold are adjustable. The difference in the two thresholds is the hysteresis. *Sinusoidal* signals can be detected if within the threshold limits. Any substantial swing within this range can be detected. The input impedance using Pulse Input is 1 M Ω if the pull-up is not enabled. Connect the output of the pulse device to point *A* and the common to BASC20 common as shown in Figure 7.

The pulse output could be sinusoidal with no DC offset so the BASC20 could experience both positive and negative excursions of the signal. The BASC20 can only detect positive voltages so the negative excursions will be ignored. It is still possible to detect the input signal by only sensing the positive excursions.

When interfacing to a pulse device that has an opto-isolated open-collector output, the internal pull-up resistor must be enabled on the device by selecting this option in the web page. In Figure 7, a three-phase wattmeter has three opto-isolated open-collector outputs, each requiring the internal pull-up resistor to be enabled.

The accumulator can be reset to zero using the UI Sedona component.

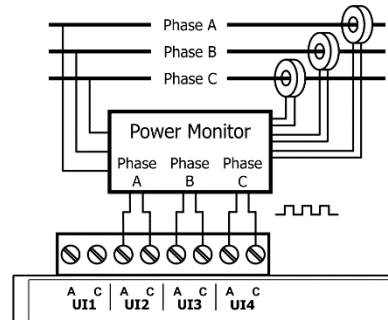


Figure 7 — Pulse Input Connection

Analog Outputs AO1–AO4

Voltage in the range of 0–10 VDC (with up to 4 mA of current) can be outputted. No configuration is necessary except to input the BACnet properties. Configure the BACnet properties using a web page. The output voltage is applied to point A with respect to common.

Figure 8 illustrates connections to a three-wire damper actuator. The damper requires a 0–10 V command signal which can easily be accomplished by the BASC20.

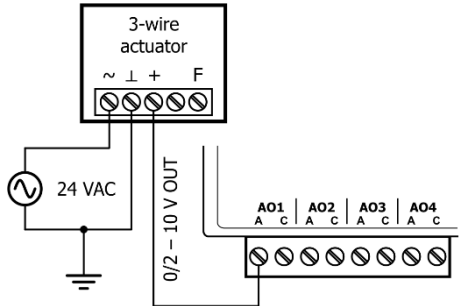


Figure 8 — Analog Output Connections

Binary Outputs BO1–BO4

The BASC20 can provide four relay (BASC-20R) or four triac outputs (BASC-20T). Only configuration of BACnet properties is required. The maximum voltage for relay units is 30 VAC/VDC and the maximum current through the relay contacts circuit is 2A. For triac models, the maximum voltage is 30 VAC and the maximum current is 0.5 A. Violating these limits could damage the BASC20 and void the warranty.

Relay outputs can be used as contact closures for other low-voltage AC or DC devices, but triac outputs can only be used for low-voltage AC devices. It is common for the BASC20 binary outputs to enable the coil of interposing relays which can carry larger currents and support switching higher voltages.

Figure 9 illustrates typical connections for binary outputs. Notice that an external power supply is necessary to power loads.

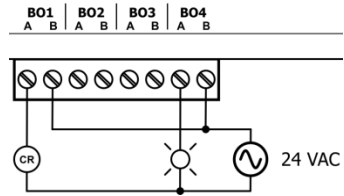


Figure 9 — Binary Output Connections

Binary Inputs B11–B14

To sense the action of a push-button or relay, the contacts must have no applied energy, and be rated for low-voltage, low-current switching. The BASC20 provides the energy to be sensed. Configuration is only required to set the BACnet properties. As shown in Figure 10, connect the contacts between points *A* and *C*. For common mechanical contacts, polarity is not an issue. The open-circuit voltage is 12 VDC and the short-circuit current is 1.2 mA.

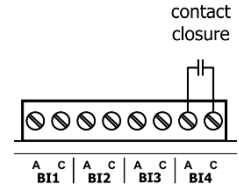


Figure 10 — Binary Input Connection

For solid-state switch sensing, we recommend that an attached solid-state device have an opto-isolated open-collector NPN transistor output stage with a collector-emitter output voltage (V_{ce}) of at least 30 V. Output sinking current should be greater than 5 mA. The collector-emitter saturation voltage should be less than 0.2 V when sinking 2 mA. The emitter must be connected to point *C* and the collector to point *A* (the more positive point). The BASC20 sets the low-threshold to 3 V and the high-threshold to 7 V. When a contact is made or the solid-state switch is on (resulting in a saturated output), the voltage at point *A* is close to zero volts. The corresponding LED for that channel will be on. If the contact is opened or the solid-state switch is turned off, the voltage at point *C* quickly rises towards 12 V. Once the voltage passes the 7 V high-threshold, the “off” state is sensed. To return to the “on” state, this voltage must fall below 3 V. The four-volt difference is called *hysteresis*. There is no need to add an external pull-up resistor when using a contact closure input.

Contact closure inputs are sampled every 10 ms and for a change of state to be recognized, the input state must be stable for two consecutive samples. Therefore, contact closure response is 20 ms.

Webpage Configuration

The BASC20 contains a web server — browser accessible from a PC on the local network. Often the BASC20 default IP address (192.168.92.68) and subnet mask (255.255.255.0) *must be changed* for use in the local facility.

Figure 11 shows the setup for doing this. Attach the unit to a PC with an Ethernet connection and a standard web browser. Initially, the PC should have its IP address *temporarily* modified as shown in Figure 12 using a Windows® 7 example. The PC has an IP address of 192.168.92.69, but the final quad of the address could be any value from 3 to 254 — except for 68 used by the BASC20. After the IP address of your PC has been set to the same subnet as the BASC20, a browser in your PC can access the BASC20 at its default IP address.

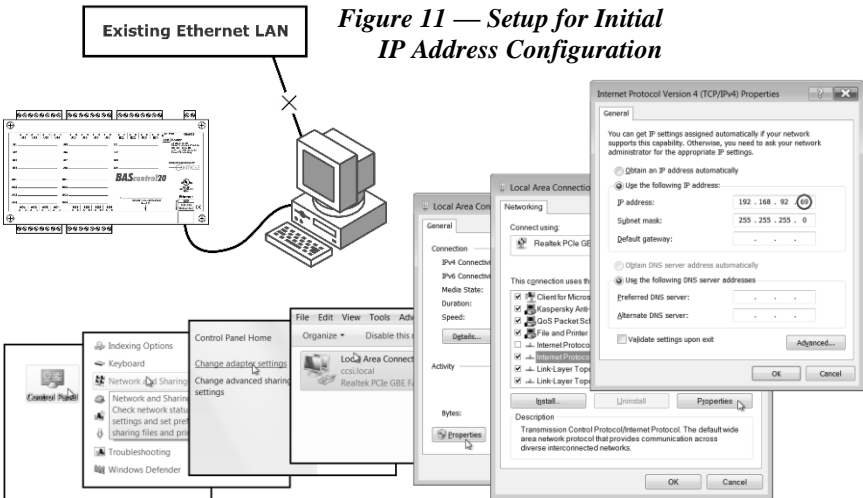


Figure 12 — Steps for Changing the IP Address of the PC Used for Setup

Secure Login and Reset (Recovery Mode)

To reset the unit to its default IP values and login credentials, press the reset switch (see Figure 2 for switch location) for over 4 seconds. This forces the recovery mode confirmed by alternate flashing of UI1-UI4 and AO1-AO4 channel LEDs. This action restores the default settings for the user ID (admin), password (admin), IP address (192.168.92.68) and subnet mask (255.255.255.0). Access the main web page, make any changes to the IP configuration and login credentials, and then click Restart Controller to exit recovery mode.

NEED MORE HELP INSTALLING THIS PRODUCT?

Additional information can be found in the technical documentation available on our web site at www.ccontrols.com/support/BAScontrol20.htm . There you will find more information regarding Sedona and Sedona Tools. Also, when contacting one of our offices, just ask for Technical Support.

WARRANTY

Contemporary Controls (CC) warrants its new product to the original purchaser for two years from the product shipping date. Product returned to CC for repair is warranted for one year from the date that the repaired product is shipped back to the purchaser or for the remainder of the original warranty period, whichever is longer.

If a CC product fails to operate in compliance with its specification during the warranty period, CC will, at its option, repair or replace the product at no charge. The customer is, however, responsible for shipping the product; CC assumes no responsibility for the product until it is received.

CC's limited warranty covers products only as delivered and does not cover repair of products that have been damaged by abuse, accident, disaster, misuse, or incorrect installation. User modification may void the warranty if the product is damaged by the modification, in which case this warranty does not cover repair or replacement.

This warranty in no way warrants suitability of the product for any specific application. **IN NO EVENT WILL CC BE LIABLE FOR ANY DAMAGES INCLUDING LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT EVEN IF CC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY PARTY OTHER THAN THE PURCHASER.**

THE ABOVE WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR USE, TITLE AND NONINFRINGEMENT.

RETURNING PRODUCTS FOR REPAIR

Return the product to the location where it was purchased by following the instructions at the URL below:

www.ccontrols.com/rma.htm

DECLARATION OF CONFORMITY

Information about regulatory compliance can be found at the URL below:

www.ccontrols.com/compliance.htm

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