



GREYSTONE
ENERGY SYSTEMS INC

CR3 Series Cleanroom Monitor

Field Calibration Manual



CR3 Field Calibration Guide

Purpose

Document describes procedure for field calibration of the CR3 sensor family. Sensor calibration is not possible in field, product offers offset for both temperature and humidity to adjust reading when verified against calibrated reference. For differential pressure reading the product provides an auto zero option for the CR3A or CR3B models only.

Procedure

Temperature Offset

Temperature offset can be adjusted in two ways. For CR3XXXBAC and CR3XXXMOD models that have communication feature the temperature offset can be set using the protocol documentation. For the CR3XXXANA models the temperature offset can be adjusted via the INSTALLER menu. To perform the offset use a calibrated reference near CR3 sensor, adjust offset on CR3 sensor to match reading on the calibrated reference.

CR3XXXBAC Models

Temperature offset is adjusted using Analog Input Object Identifier AV1, Object Name is TEMP Offset. The temperature reading can be offset by -5.0 to 5.0 $\Delta^{\circ}\text{C}$ or -10 to 10 $\Delta^{\circ}\text{F}$. Default for the AV1 object is 0 $\Delta^{\circ}\text{C}/^{\circ}\text{F}$.

Analog Value Object (Present Value defaults to 0 for no offset. Can be set from -10 to +10 $\Delta^{\circ}\text{F}$ or -5.0 to +5.0 $\Delta^{\circ}\text{C}$)

Temperature Offset (Units depend on the device units, either $^{\circ}\text{C}$ or $^{\circ}\text{F}$), ($^{\circ}\text{C}$ resolution = 0.5, $^{\circ}\text{F}$ resolution = 1)

Property	Default Value	Property Data Type	Access
Object Identifier	AV1 (Analog Value 1)	BACnetObjectIdentifier	Read
Object Name	Temperature Offset	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read / Write
Description	Temperature Offset	CharacterString (32)	Read
Status Flags	{false, false, false, false} (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	delta-degrees-Fahrenheit (120) or $\Delta^{\circ}\text{C}$ (121)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

CR3XXXMOD Models

Temperature offset is adjusted using ModBus address 40018, see below for reference.

Modbus Address	Typical Offset	Units	Data Type	Access	Notes
40018	+17	°C °F	Word	Read Write	16-bit integer, Temperature Offset -5 to 5 °C, -10 to 10 °F

CR3XXXANA Models

To adjust the temperature offset on these models, use a calibrated reference near CR3 sensor, adjust offset on CR3 sensor to match reading on the calibrated reference. Record the difference between the CR3 sensor and calibrated source, calculate the offset required on the CR3 sensor temperature reading to match the calibrated source.

CR3XXXANA models the temperature offset can be adjusted via the INSTALLER menu. The Installer Menu is accessed by pressing and holding the <UP> and <DOWN> buttons on front of CR3 sensor during normal operation at the same time for 5 seconds. To access the Temperature Offset option you must step through some other settings first.

Press and release the <MENU> button to step through the Installer Menu. Continue to do this until you observe the three displays on the CR3 sensor showing:

Te

Off

0.0 (Note: This line may have different number depending on previous calibrations)

Using the <UP> and <DOWN> buttons on the front face of the CR3 sensor adjust the offset to the value recorded when comparing the calibrated reference to the CR3 sensor reading. The offset resolution is 0.5 °C or 1°F. Once the offset value is at desired value press <MENU> button to save the offset.

Note: If doing RH calibration at the same time skip the step below and continue to humidity calibration section of this document to calibrate RH offset at this point.

Continue to press and release the <MENU> button until the unit returns to normal operation, or cycle power to CR3 sensor to reset and begin normal operation.

Relative Humidity Offset

Humidity offset can be adjusted in two ways. For CR3XXXBAC and CR3XXXMOD models that have communication feature the humidity offset can be set using the protocol documentation. For the CR3XXXANA models the humidity offset can be adjusted via the INSTALLER menu. To perform the offset, use a calibrated reference near CR3 sensor, adjust offset on CR3 sensor to match reading on the calibrated reference.

CR3XXXBAC Models

Humidity offset is adjusted using Analog Input Object Identifier AV2, Object Name is RH Offset. The humidity reading can be offset by -10 to 10 %RH. Default for the AV2 object is 0 %RH.

Analog Value Object (Present Value defaults to 0 for no offset. Can be set from -10 to +10 %RH, resolution = 1%)

RH Offset

Property	Default Value	Property Data Type	Access
Object Identifier	AV2 (Analog Value 2)	BACnetObjectIdentifier	Read
Object Name	RH Offset	CharacterString (32)	Read
Object Type	ANALOG_VALUE (2)	BACnetObjectType	Read
Present Value	0	Real	Read / Write
Description	RH Offset	CharacterString (32)	Read
Status Flags	{ false, false, false, false } (0000)	BACnetStatusFlags	Read
Event State	NORMAL (0)	BACnetEventState	Read
Out of Service	FALSE (0)	Boolean	Read
Units	percent-relative-humidity (29)	BACnetEngineeringUnits	Read
Property List		BACnetArray	Read

CR3XXXMOD Models

Temperature offset is adjusted using ModBus address 40019, see below for reference.

Modbus Address	Typical Offset	Units	Data Type	Access	Notes
40019	+18	%RH	Word	Read Write	16-bit integer, RH Offset -10 to 10 for -10 to 10 %RH

CR3XXXANA Models

To adjust the humidity offset on these models, use a calibrated reference near CR3 sensor, adjust offset on CR3 sensor to match reading on the calibrated reference. Record the difference between the CR3 sensor and calibrated source, calculate the offset required on the CR3 sensor humidity reading to match the calibrated source.

CR3XXXANA models the humidity offset can be adjusted via the INSTALLER menu. The Installer Menu is accessed by pressing and holding the <UP> and <DOWN> buttons on front of CR3 sensor during normal operation at the same time for 5 seconds. To access the Humidity Offset option you must step through some other settings first.

Press and release the <MENU> button to step through the Installer Menu. Continue to do this until you observe the three displays on the CR3 sensor showing:

rh

Off

0 Note: This line may have different number depending on previous calibrations)

Using the <UP> and <DOWN> buttons on the front face of the CR3 sensor adjust the offset to the value recorded when comparing the calibrated reference to the CR3 sensor reading. Once the offset value is at desired value press <MENU> button to save the offset.

Note: If doing Pressure Auto Zero calibration at the same time skip the step below and continue to Pressure calibration section of this document to Auto Zero the CR3 sensor at this point.

Continue to press and release the <MENU> button until the unit returns to normal operation, or cycle power to CR3 sensor to reset and begin normal operation.

Differential Pressure Auto Zero

Pressure Auto Zero can be adjusted in two ways. For CR3XXXBAC and CR3XXXMOD models that have communication feature the auto zero can be performed using the protocol documentation. For the CR3XXXANA models the auto zero can be set via the INSTALLER menu. To perform the auto zero, the differential pressure between the two zones should ideally be zero. For the autozero feature to work the difference must be within 10% of full scale.

CR3XXXBAC Models

Auto Zero is run using Analog Input Object Identifier BV3, Object Name is DP Auto Zero.

Binary Value Object (Present Value defaults to 0 (INACTIVE) for Normal Operation. Set to 1 (ACTIVE)

DP Auto Zero to initiate an auto zero of the pressure sensor)

Property	Default Value	Property Data Type	Access
Object Identifier	BV3 (Binary Value 3)	BACnetObjectIdentifier	Read
Object Name	DP Auto Zero	CharacterString (32)	Read
Object Type	BINARY_VALUE (5)	BACnetObjectType	Read
Present Value	INACTIVE (0)	BACnetBinaryPV	Read / Write
Description	Normal (0) or Do Auto Zero (1)	CharacterString (32)	Read
Status Flags	{ false, false, false, false } (0000) or (1100) if no sensor	BACnetStatusFlags	Read
Event State	NORMAL (0) or FAULT (1) if no sensor	BACnetEventState	Read
Reliability	NO_FAULT_DETECTED (0) or NO_SENSOR (1)	BACnetReliability	Read
Out of Service	FALSE (0)	Boolean	Read
Property List		BACnetArray	Read

This object is disabled for Type C model with remote transmitters

Rules are enforced: Only perform auto zero function if DP is within $\pm 0 - 10\%$ of range

CR3XXMOD Models

DP Auto Zero is run using ModBus address 40051, see below for reference.

Modbus Address	Typical Offset	Units	Data Type	Access	Notes
40051	+50	%RH	Word	Read Write	16-bit integer, DP Auto Zero 0 = Normal Operation, 1 = Perform Auto Zero

Installer Menu Auto Zero Calibration

For all models the DP Auto Zero can be performed via the INSTALLER menu. The Installer Menu is accessed by pressing and holding the <UP> and <DOWN> buttons on front of CR3 sensor during normal operation at the same time for 5 seconds. To access the Auto Zero option you must step through some other settings first.

Press and release the <MENU> button to step through the Installer Menu. Continue to do this until you observe the three displays on the CR3 sensor showing:

dp
0
CAL

When ready to perform the Auto Zero press and release <MENU> button to perform Auto Zero. The display will report results of Auto Zero by displaying one of three results:

PAS – Passed Auto Zero

LO - No Auto Zero performed, pressure differential too large or sensor not reading properly.

HI - No Auto Zero performed, pressure differential too large

Continue to press and release the <MENU> button until the unit returns to normal operation, or cycle power to CR3 sensor to reset and begin normal operation.