



Installation Handbook

TAC Xenta® 102-AX

0-004-7838-1

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Contents

FCC Warning	vii
Overview	1
Modes of Operation	1
About This Manual	1
Hardware Description	3
Controller	3
Power	3
Communications	4
FTT-10A LON Ground	5
Thermostat	5
I/STAT	5
Three-Digit Display	5
Push-Buttons	6
LEDs	8
S/STAT	9
Timed Override Push-Button	9
Slide Potentiometer	9
Maintenance Port	9
TTS100WJ	10
Maintenance Port	10
Thermistor	10
External Inputs	11
Air Velocity Sensor	11
External Outputs	11
Indicator Lamps	12
Communications LEDs	12
Service Request LED	12
Installation Procedures	14
Mounting the Controller	14

Connecting the Air Velocity Sensor	15
Connecting the Thermostat	16
I/STAT and TTS100WJ	16
S/STAT	17
Thermistor	17
Connecting the Communications Cable	18
Connecting the External Inputs	19
Thermistor Input	19
Discrete Input	19
Connecting External Outputs	19
Connecting the Power	20
Setup	22
I/STAT (M/STAT) Dialogue	22
I/STAT and M/STAT Operations and Parameters	22
I/STAT Normal Operations	22
On/Off	22
Call	23
Service Mode Operations	23
Password	23
Selecting Parameter Groups	24
Modifying an Analog Value	24
Modifying a Discrete Value	24
Checking an Input Point Value	25
Controlling an Output Point Value	25
TAC Xenta 102-AX Location I.D. Address	25
Calibration Techniques	27
One Point Calibration	27
Two Point Calibration	28
Box Constant (Airflow) Calibration	28
Calibrate Space Sensor	29
Factory Calibration Setting	30
TAC Xenta 102-AX Parameters	31
Parameter Editing	31

Unit Parameters (UP)	31
Duct Area (nciDuctArea)	32
Pickup Factor (nciPickupFactor)	32
Box Constant (nciBoxConstant)	33
Damper Stroke (nciDriveTimeDmpr)	33
Heating Stroke (nciDriveTimeUO2)	33
Heating Delay (nciDelayStartUO2)	33
Heating Output (nciOutputTypeUO2 and nciOutputTypeUO3)	34
Heating Actuator Normal Stroke (nciInvertUO2)	34
Fan Stroke Time (nciDriveTimeUO1)	34
Fan Delay on Stop (nciDelayStopUO1)	34
Fan Output Type (nciOutputTypeUO1)	34
Pressure Dependent Mode Enable (nciVAVSelctnCntrl.OP.dEP)	35
Engineering Units (nciVAVSelctnCntrl.OP.EU)	35
Operational Parameters (oP)	35
Override Duration (nciOverridDuratn)	36
STAT Adjustment Range (nciSetpntOffRnge)	36
Unoccupied Cooling Setpoint (nciSetPnts.unoccupied_cool)	36
Standby Cooling Setpoint (nciSetPnts.standby_cool)	36
Occupied Cooling Setpoint (nciSetPnts.occupied_cool)	37
Occupied Heating Setpoint (nciSetPnts.occupied_heat)	37
Standby Heating Setpoint (nciSetPnts.standby_heat)	37
Unoccupied Heating Setpoint (nciSetPnts.unoccupied_heat)	37
Cooling Band (nciCoolingBand)	37
Heating Band (nciHeatingBand)	37
Effective Setpoint Source (nciVAVSelctnCntrl.oP.ESS)	37
Calibrate Space Sensor (nciVAVSelctnCntrl.oP.CSS)	37
Prove Performance (nciVAVSelctnCntrl.oP.PP)	37
Airflow Parameters (AP)	38
Cooling Low Flow Setpoint (nciMinFlow)	39
Cooling High Flow Setpoint (nciMaxFlow)	39
Heating Airflow Setpoint (nciMinFlowHeat)	39
Heating Low Flow Setpoint (nciMinFlowWarmup)	39
Heating High Flow Setpoint (nciMaxFlowWarmup)	39
Standby Air Flow Setpoint (nciMinFlowStand)	39
Unoccupied Air Flow (nciUnoccuAirFlow)	40
Calibrate Primary Low Flow (nciVAVSelctnCntrl.AP.CPL)	40
Calibrate Primary High Flow (nciVAVSelctnCntrl.AP.CPH)	40
Calibrate Box Constant (nciVAVSelctnCntrl.AP.CbC)	40
Factory Calibration Setting (nciVAVSelctnCntrl.AP.FSC)	40
Airflow Filter Coefficient (nciAirFlowCoeff)	40

CO ₂ Low Limit (nciCO2LoLimitCln)	41
CO ₂ High Limit (nciCO2HiLimitCln)	41
Parallel Fan Start (On) Airflow (nciAirFlowFanOn)	41
Parallel Fan Start (Off) Airflow (nciAirFlowFanOff)	41
Hardware Configuration Parameters (HCP)	41
Logical Address (nciAssignedAddr)	42
Fan Type (nciFanTypeVAV)	42
Auxiliary Heating Stages (nciVAVSelctnCntl.HP.AHS)	43
Close Damper Direction (nciDirectionDmpr)	43
Input 1 Selection (nciUniln1Selctn)	43
Input 2 Selection (nciUniln2Selctn)	44
Input 3 Selection (nciUniln3Selctn)	44
Input 4 Selection (nciUniln4Selctn)	45
Point Data Display	45
Universal Input 1 (nvoUnvInput1)	46
Universal Input 2 (nvoUnvInput2)	46
Universal Input 3 (nvoUnvInput3)	47
Universal Input 4 (nvoUnvInput4)	47
Airflow (nvoAirFlow)	47
Velocity Pressure in Pascals (nvoAirPressure)	47
DC Input Voltage (nvoRawHWValues.lowDCVoltage)	47
Reference Half Scale Voltage (nvoRawHWValues.hlfVrPstvLsVrMin)	47
Reference Full Scale Voltage (nvoRawHWValues.VrefPositive)	47
Reference Ground Voltage (nvoRawHWValues.VrefMinus)	47
Damper Actuator (nviRelStpt)	47
Universal Output 1 (nviUnvOutput1)	47
Universal Output 2 (nviUnvOutput2)	48
Universal Output 3 (nviUnvOutput3)	48
Free Points	48
Glossary	49
Pinout Chart	50
Specifications	51
Index.	53

FCC Warning

The Federal Communications Commission (FCC) requirements prescribe certification of personal computers and any interconnected peripherals in the FCC rules and regulations.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: this device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

This equipment generates and uses radio frequency (rf) energy for its operation and, if not installed and used in accordance with the installation and operation manual, may cause interference to radio and television reception. It has been found to comply with the limits for a Class A computing device pursuant to the aforementioned regulations. These are designed to provide reasonable protection against such interference when operated in a residential area. Only peripherals (computer input/output devices) certified to comply with the Class A limits may be connected to this device. Operation with noncertified computer peripherals is likely to result in interference with radio and television reception. If this equipment does cause interference to radio or television reception, the user is encouraged to correct the situation by one or more of the following measures.

- ◆ Relocate the receiver with respect to the computer.
- ◆ Move the computer away from the receiver.
- ◆ Plug the equipment into a different outlet, so that the computing device and receiver are on different branch circuits.
- ◆ Disconnect and remove any unused cables that may be acting as a transmission source.
- ◆ Make certain that the computing device is plugged into a grounded outlet receptacle.

If necessary, contact CSI for additional suggestions.

Overview

This controller is directed at single-duct pressure-independent Variable Air Volume (VAV) box control within a LONWORKS® network. The intention of the TAC Xenta 102-AX design is to reduce the total install cost through pre-engineered control algorithms and simplified installation requirements.

Modes of Operation

TAC Xenta 102-AX controllers use hardware and software designed for specific applications. The TAC Xenta 102-AX can operate in a stand-alone configuration or as part of an interconnected network. Benefits and limitations of these configurations are described below.

- ◆ Overall features:
 - ◇ All network variables are preconfigured at the factory. This allows stand-alone operation by providing the required data, and simplifies integrated operation by eliminating manual entry of the application.
 - ◇ All network configuration parameters are preconfigured to default settings. This reduces setup time for both stand-alone and integrated configurations.
- ◆ Stand-alone operation:
 - ◇ No interface controller or host workstation is required.
 - ◇ Changes and setup may be performed through a LONWORKS® editor, an I/STAT, or an M/STAT.
- ◆ Integrated operation:
 - ◇ A LONWORKS® system, including a LONWORKS® editor or similar software, and a host workstation, is required.
 - ◇ Changes and setup may be performed through a LONWORKS® editor, an I/STAT, or an M/STAT.

About This Manual

This manual focuses primarily on operations performed using an I/STAT or M/STAT. If the TAC Xenta 102-AX controller is part of an integrated LONWORKS® system, then you may also use a LONWORKS® editor to perform some functions.

See Also:

0-004-7839-0, SW & HW Reference Handbook

ANSI E1A-709.1

ANSI E1A-709.2

ANSI E1A-709.3

ANSI E1A-709.4

LONMARK® Interoperability Association Documentation:

8010, *LONMARK® HVAC Functional Profile: VAV Controller (VAV)*

Documentation:EB147, *LONWORKS® Installation Overview*EB161, *LonTalk® Protocol*

EB173, THE SNVT MASTER LIST AND PROGRAMMER'S GUIDE

AN1225, FUZZY LOGIC AND THE NEURON® CHIP®

AN1278, LONWORKS® SOFTWARE REVIEW

This installation guide will cover the three key elements of the TAC Xenta 102-AX.

- ◆ Hardware Description — A description of the TAC Xenta 102-AX hardware.
- ◆ Installation — A step by step description of the installation of the TAC Xenta 102-AX and its associated hardware.
- ◆ Unit Setup — A description of the parameters used in configuring and commissioning the TAC Xenta 102-AX.

In the “TAC Xenta 102-AX Parameters” section, each paragraph heading describing a parameter accessible through the I/STAT is also identified with the LON network variable, or network configuration parameter in parenthesis. For instance, the unit parameter Duct Area has a paragraph heading Duct Area (**nciDuctArea**). The LON network variables and network configuration parameters are accessible through the LONWORKS editor.

Hardware Description

The TAC Xenta 102-AX controller provides sufficient applications flexibility to address multiple VAV configurations. This controller is designed to operate in a stand-alone configuration or, with the support of a communications network, as an integral part of a comprehensive building automation system.

The TAC Xenta 102-AX is equipped with an integrated air velocity transducer and a motorized bidirectional actuator in a single package. It includes built-in hardware for mounting on a standard VAV box damper shaft, with the following features:

- ◆ Plug-on input terminals for a thermostat, communications, power, and four external devices.
- ◆ Two input ports for the integrated air velocity sensor.
- ◆ Plug-on terminals for three external outputs.
- ◆ Indicator lamps for communication, power, and self-test, and LonWorks Service display.

Controller

The TAC Xenta 102-AX is packaged in a plastic enclosure with a snap-on cover. The enclosure meets Nema 1 and IEC IP10 requirements and is rated for use in plenum applications (UL Flammability 94-5V). The controller measures 197 mm × 159 mm × 64 mm (7.75"W × 6.25"L × 2.5"H) as shown in [Figure 1](#).

All I/O connections are provided through plug-on terminal blocks located on the left and right side of the controller housing. The terminal blocks for a space temperature sensor, communications, and four external input connections are located along the left side of the unit. Controller power connections and output connections are located along the right side of the controller. Positioned directly behind the input terminal blocks are three LEDs that are used to indicate communications activity and power.

Power

Electrical power for the TAC Xenta 102-AX is connected through a two-position terminal block labeled TB1, on the bottom right side of the controller. The controller should be connected to a single 24 VAC Class-2 power source. The controller electronics; its outputs (triacs and the integrated actuator), a thermostat, and all of the sensor/contact inputs derive power from this source (9 VA for the controller alone, up to 55 VA maximum for controller and outputs).

Note: *Operational errors may occur if equipment is inadequately grounded. Symptoms may include, but are not limited to: intermittent LON communications, or improper control actions. Refer to “Connecting the Power” on page 21 during equipment installation.*

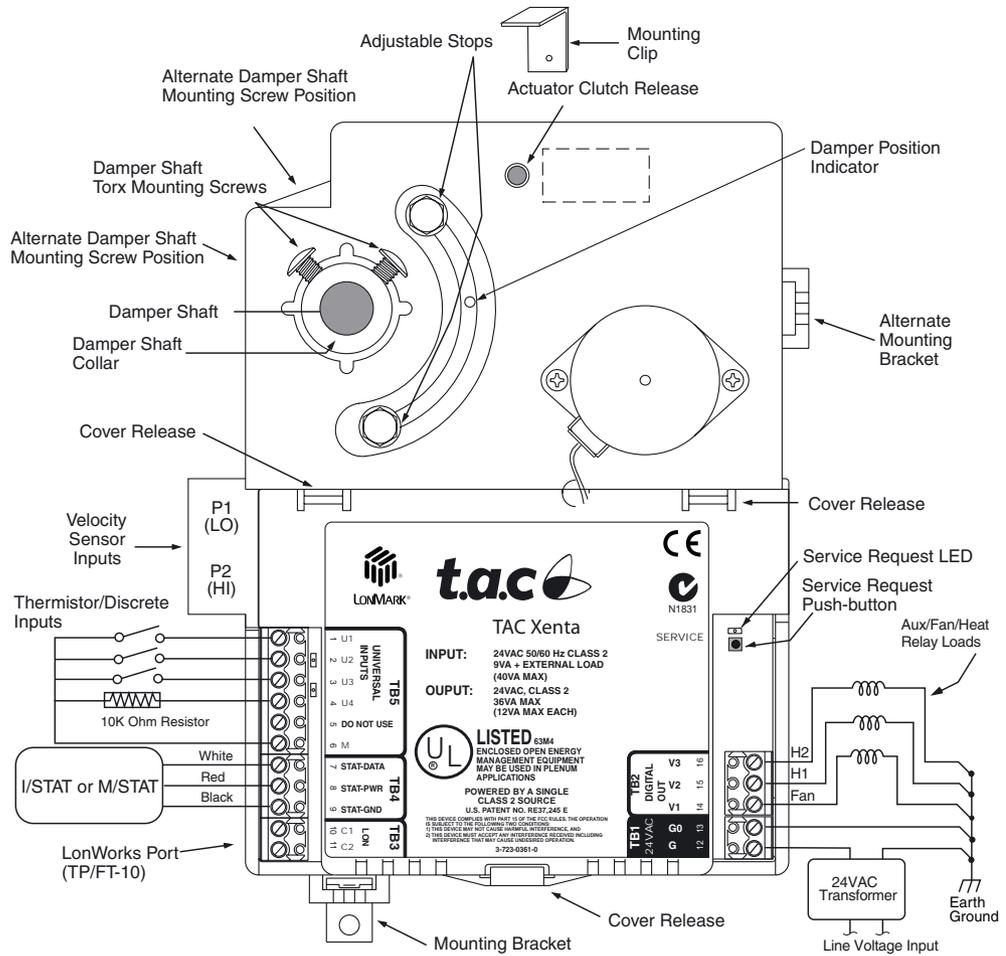


Figure 1. TAC Xenta 102-AX (Cover Installed)

Communications

The TAC Xenta 102-AX supports one communications port, labeled TB3, located on the left side of the controller. The electrical interface, which conforms to the FTT (Free Transceiver Topology) standard, will operate over a single pair cable. Refer to “Specifications” on page 51.

In addition, the capacitance of the cable may not exceed that listed in “Specifications” on page 51, for each cable type.

Cable termination in accordance with the specification provided in the *LONWORKS FTT-10A Transceivers User’s Guide* is required. Single termination. If a shielded cable is used, the shield should be connected to earth ground through a 470K ohm, 1/4 watt, ≤ 10%, metal film resistor, at one location on the LON.

The FTT-10 LON can be configured with a significant degree of freedom in cable configuration, including numerous connection stubs and star arrangements. However, longer end-to-end distances can be achieved when the LON is wired in the more conven-

tional bus topology. When connected in a *free topology* manner a single LonWorks Termination Module (TAC part no. 0-073-0905) should be connected, using *green* wires, somewhere on the LON with a preference for a central location.

When the LON is configured in a *bus topology*, connect two Termination Modules, using the *red* wires, with one positioned at each end of the LON bus.

Two LEDs adjacent to TB4 indicate transmit (amber) and receive (green) activity.

FTT-10A LON Ground

Note: *This procedure applies to all FTT-10A LON connections.*

- ◆ Ensure that the FTT-10A LON cable shield drain wire is not connected to the controller FTT-10A LON terminal block.
- ◆ Connect the shield drain wire to Electrical Service Earth Ground at *only* one end of the cable (e.g., at one Headend PC, Router or Repeater). Make the connection through a 470K ohm $\frac{1}{4}$ Watt resistor. Refer to [Figure 9](#).

Thermostat

The thermostat connection is a three-position terminal block, labeled TB4, on the lower left side of the controller. There are three functional levels of thermostats that can be connected to the TAC Xenta 102-AX, as follows:

- ◆ I/STAT (intelligent thermostat) — described below.
- ◆ S/STAT (thermostat with slide adjustment, pushbutton override, and M/STAT port) — refer to “S/STAT” on page 9.
- ◆ TTS100WJ (thermistor temperature sensor with M/STAT port) — refer to “TTS100WJ” on page 10.
- ◆ Thermistor temperature sensor — refer to “Thermistor” on page 10.

I/STAT

The I/STAT is packaged in a small plastic enclosure measuring 110 mm × 70 mm × 20 mm (4.5" L × 2.75" W × 0.9" D), as shown in [Figure 2](#), and is suitable for wall mounting on a standard 50 mm × 102 mm (2" × 4") handibox. The I/STAT can also be mounted on a European wall box or flat surface. A three-digit 7-segment display is located at the top, eight push-buttons and four discrete LEDs are located along the right side, and a space temperature sensor is located inside of the I/STAT.

Note: *There is also a maintenance version of the I/STAT, called the M/STAT, that is functionally equivalent to the I/STAT, but is equipped with an interface cable so that it can be used as a portable maintenance tool. The S/STAT and TTS100WJ both provide maintenance ports for connection of an M/STAT.*

Three-Digit Display

The three-digit, seven-segment display is used for both numeric and alphabetic data. Numeric data is normalized to accommodate each displayed value: values from 0.00 to 9.99 display with two fractional digits, values from 10.0 to 99.9 display with one frac-

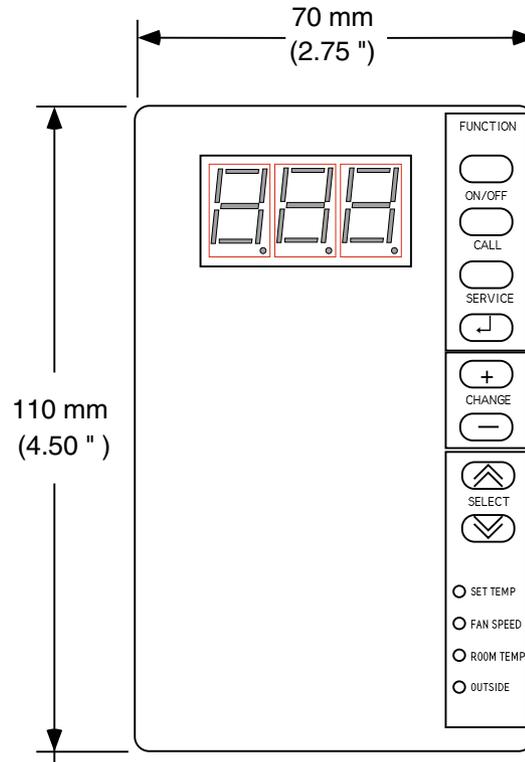


Figure 2. I/STAT

tional digit, integer values of 100 or greater display with no fractional digits, and integer values greater than 999 display as --- (to indicate overflow). The --- also indicates negative values greater than -99 (i.e. -100).

The display of alphabetic data, normally parameter names, has limitations imposed by the seven-segment display. The seven display segments consist of three horizontal segments (top, center, and bottom) and four vertical segments (upper left, upper right, lower left, and lower right). Generally, when it is necessary to display alphabetic data, the three positions will contain the first letters of the words that represent the data (for example, “Calibrate Space Sensor” would be represented by the three letters **CSS**). The letters are often a combination of upper and lower case. (For example, there is no way to form a capital “N” in seven segments. Therefore, a lower-case n is used which turns “Heating Actuator Normal Stroke” into **HnS**.)

Push-Buttons

The eight push-buttons, arrayed along the right-hand side, are organized into three groups: Function, Change, and Select. Each group is described below.

Function

The first group initiates all of the dialogue between you and the controller (refer to “[I/STAT \(M/STAT\) Dialogue](#)” on page 22). Although the details of each function will be described later, the following will give you an idea of what they do:

- ◆ On/Off — switches the controller from an unoccupied mode of operation to bypass mode (refer to “Override Duration (nciOverridDuratn)” on page 36). Generally, the effect is to raise or lower the space temperature setpoint to what it would be under normal occupied (day time) conditions.
- ◆ Call — provides a tenant with the means for notifying maintenance personnel when there is a problem in the controlled space. This capability is achieved using the network variable within the TAC Xenta 102-AX.
- ◆ Service — the Service key allows the operator (maintenance personnel) to access the configuration parameters of the TAC Xenta 102-AX. It also allows the installer to initiate the broadcast of the Neuron I.D.

Pressing the Service key for 10 seconds forces the controller unit to send a “LonNode” Service pin message. The display flashes **SEr** as the Neuron node ID request message is sent. The STAT will display a solid **SEr** if the application in the controller is offline.

Service Mode is entered by pressing the Service key and then entering the password (refer to “Service Mode Operations” on page 23) Thereafter the Service key can be used in the same manner as an escape key on a PC. For example: after making changes to a parameter data field, pressing the Service key will abort the changes made.

After entering the correct password, the Service key will produce a menu of options for selection (refer to “I/STAT (M/STAT) Dialogue” on page 22) as follows:

- ✧ **UP** (Unit Parameters) — allows the system installer/technician to match the TAC Xenta 102-AX control program to the VAV equipment configuration. These parameters are typically entered once, during the installation phase of the project. The parameter details are provided in “Unit Parameters (UP)” on page 31.
- ✧ **oP** (Operational Parameters) — allows the facilities manager to review and set TAC Xenta 102-AX parameters, such as heating and cooling setpoints, that typically change from day to day based on the occupants of the space, the seasons, and so on. The parameter details are provided in “Operational Parameters (oP)” on page 35.
- ✧ **AP** (Airflow Parameters) — allows the Air Balance Engineer to configure the airflow settings and to calibrate the airflow sensor to its environment. This operation is typically performed only once, during the commissioning phase of the project. The dialogue details are provided in “Calibration Techniques” on page 27.
- ✧ **HCP** (Hardware Configuration Parameters) — allows the installation contractor/Engineer to set the TAC Xenta 102-AX hardware configuration parameters from an I/STAT or M/STAT. For example, this parameter allows the installer to define the number of stages of auxiliary heat. The parameter details are provided in “Hardware Configuration Parameters (HCP)” on page 41.
- ✧ **Pdd** (Point Data Display) — allows the maintenance engineer, and/or facilities manager, to display and control the values of points in the TAC Xenta 102-AX. The dialogue details are provided in “I/STAT (M/STAT) Dialogue” on page 22.

- ◆ Enter — the Enter [↵] key serves the same purpose as the Enter key on a PC. It is used to select parameters for editing and for accepting changes to the data after editing.

Change

The Change [+/-] keys allow the operator to increase or decrease the value shown on the seven-segment display. Use these keys to perform the following actions:

- ◆ Increment and decrement the SET TEMP value. The adjustment, which can be positive or negative, is limited by the STAT Adjustment Range (**SAr**) parameter.
- ◆ Increment and decrement individual digits of a displayed parameter.

The top three LEDs, of the four that are located on the lower right portion of the I/STAT, indicate which digit is selected. If the top LED is illuminated, the rightmost digit is selected. If the second LED is illuminated, the center digit is selected. If the third LED is illuminated, the left most digit is selected (refer to [Table 1](#)).

Table 1. Digit Selection By LED

LED Name	Function When Lighted
SET TEMP	Edits the rightmost digit
FAN SPEED	Edits the center digit
ROOM TEMP	Edits the leftmost digit
OUTSIDE	Not Used

Select

The Select keys perform different actions, depending on the contents and state of the LED, as follows:

- ◆ LED selection — if the I/STAT is not in the service mode, pressing the [↵] or [^] key, will select the next lower, or higher, LED. The value corresponding to the illuminated LED legend will be displayed in the three-digit display.
- ◆ Parameter selection — if the display contains one of the parameters, from a menu of parameters, pressing the [↵] or [^] key, will select the next, or previous, parameter.
- ◆ Digit selection — if the display contains a data value, pressing the [↵] or [^] key, will select the next digit to the right, or to the left, for adjustment with the change keys.

LEDs

The four LEDs on the lower right portion of the I/STAT have different meanings, depending on where you are in the dialogue, as follows:

- ◆ Normal mode — if the service key has not been pressed, the LEDs indicate which value, of the four values indicated on the legends next to each LED, is being displayed.
- ◆ Service mode — if the service key has been pressed, the LEDs are only used for digit selection as described above.
- ◆ Prove Performance — if the TAC Xenta 102-AX is in the Prove Performance mode, the LEDs indicate the current status of output points as described in [“Prove Performance \(nciVAVSelctnCntl.o.P.P\)” on page 37](#).

S/STAT

The S/STAT is packaged in a small plastic enclosure measuring 110 mm × 70 mm × 20 mm (4.5" L × 2.75" W × 0.9" D) suitable for wall mounting on a standard 50 mm × 102 mm (2" × 4") handibox. The S/STAT can also be mounted on a European wall box or flat surface. The S/STAT is shown in [Figure 3](#).

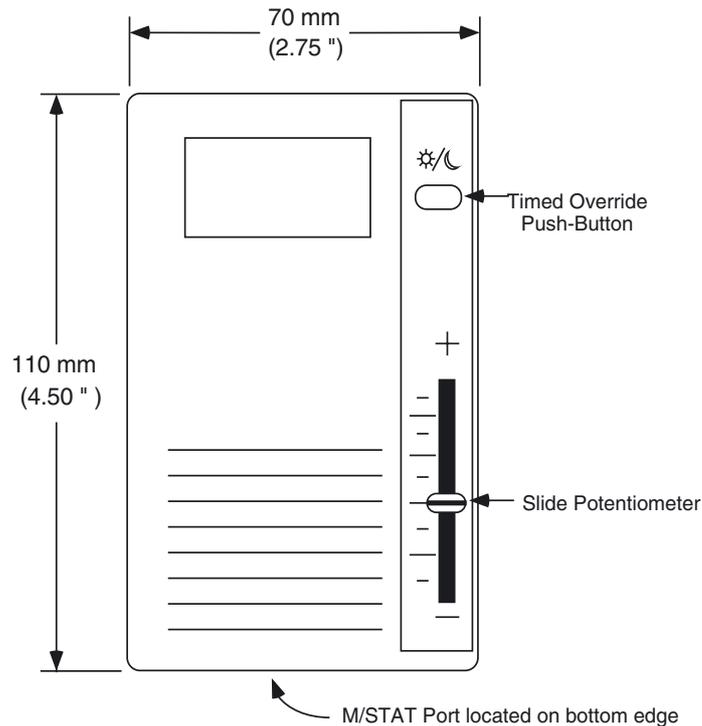


Figure 3. S/STAT

Timed Override Push-Button

The Timed Override push-button switches the controller from an unoccupied mode of operation to bypass mode (refer to “[Override Duration \(nciOverridDuratn\)](#)” on page 36). Generally, the effect is to raise or lower the space temperature setpoint to what it would be under normal occupied (day time) conditions.

Slide Potentiometer

The Slide Potentiometer is used to adjust the temperature setpoint for the controlled space. The adjustment, which can be positive or negative, is limited by the “STAT Adjustment Range (**SAr**)” parameter (refer to “[STAT Adjustment Range \(nciSetpntOf-fRnge\)](#)” on page 36 for details).

Maintenance Port

The S/STAT provides a maintenance port on its bottom surface, allowing the connection of an M/STAT. While connected, the M/STAT can be used to program the TAC Xenta 102-AX in the same manner as an I/STAT.

TTS100WJ

The TTS100WJ is packaged in a small plastic enclosure measuring 110 mm × 70 mm × 20 mm (4.5" L × 2.75" W × 0.9" D) suitable for wall mounting on a standard 50 mm × 102 mm (2" × 4") handibox. The TTS100WJ can also be mounted on a European wall box or flat surface. The TTS100WJ, shown in [Figure 4](#), is similar to the S/STAT, although the TTS100WJ does not have a timed override push-button or a slide potentiometer. The TTS100WJ consists of a thermistor input and a maintenance port.

Maintenance Port

The TTS100WJ provides a maintenance port on its bottom surface, allowing the connection of an M/STAT. While connected, the M/STAT can be used to program the TAC Xenta 102-AX in the same manner as an I/STAT.

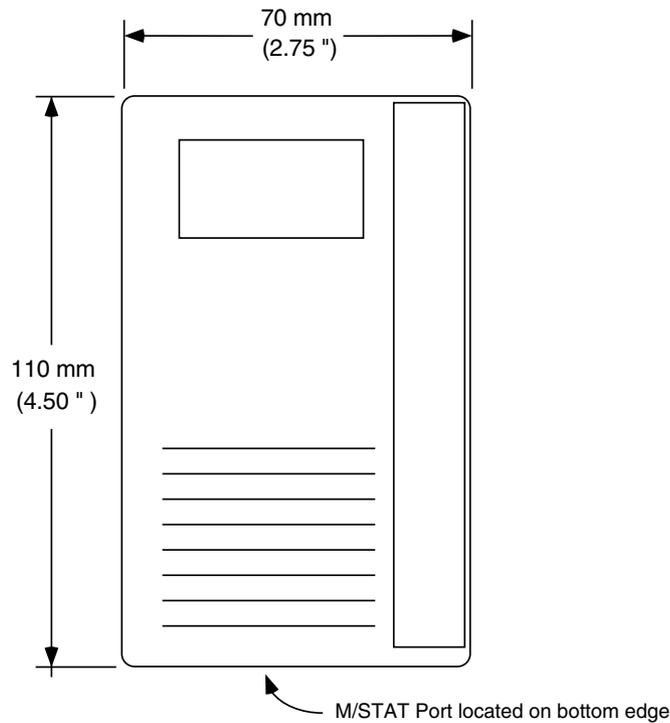


Figure 4. TTS100WJ

Thermistor

You may connect a thermistor (rather than an I/STAT) to the I/STAT port of the TAC Xenta 102-AX (refer to “Thermistor” on page 17). In this configuration, any necessary programming must be performed from a LONWORKS host workstation.

External Inputs

Located along the left side of the TAC Xenta 102-AX are four external input connections for contacts or sensors. These input terminals may be connected to such devices as a duct temperature sensor or contact, a CO₂ sensor, common equipment shutdown (smoke, fire, etc.) contacts, occupancy sensor contact, etc.

The configuration of the board is the same for discrete and analog inputs (0 – 5 V). The input termination pin provides +5VDC excitation voltage for dry contacts, thermistors, or other resistive devices. The current is low enough that the +5VDC can be overridden by a self-power analog transmitter. A pin is available for the ground reference of discrete and thermistor inputs.

Air Velocity Sensor

The TAC Xenta 102-AX provides an on-board differential pressure sensor for monitoring the velocity pressure signal from a flow detection probe that is inserted in the inlet duct of the VAV box. The sensor provides an accurate measurement of the velocity pressure across a span of 0 – 249 Pascals (0 – 1.0" Water Column). While the sensor is specified for a calibrated pressure range of 0 – 249 Pascals (0 – 1.0" Water Column), the sensor will typically provide an accurate pressure indication up to 311 Pa (1.25" Water Column). The resolution will typically be 0.1% of span 1.07 Pa (0.0043" Water Column).

External Outputs

The TAC Xenta 102-AX provides three hardware control outputs located along the right side of the controller for connection of external devices. These outputs are driven by optically-isolated triacs and provide 24 VAC power to the controlled device. Each output can be one of the following.

- ◆ Discrete — a single triac is connected to a discrete actuator, or an interposing relay. The triac can be energized or de-energized to control the actuator or relay.
- ◆ Pulse Width Modulation (1-Out-PWM) — a single triac output is connected to the PWM input. The TAC Xenta 102-AX software controls the PWM actuator by energizing the triac for a period of time that is proportional to the desired analog value.
- ◆ Bidirectional motor (2-Out-PWM) — two triac outputs are connected to the increase and decrease inputs to the motor. The TAC Xenta 102-AX software controls the bidirectional actuator by energizing the appropriate triac (either increase or decrease) for a period of time that is proportional to the desired change in that direction, in the same manner as the 1-Out-PWM.
- ◆ Damper Actuator — The integrated damper actuator provides adjustable stops on both the open and close movements, and a clutch release for manually setting the damper position. It has an integrated four-wire electrical connection to the TAC Xenta 102-AX electronics that is installed at the factory, and has a 2.4 second/degree rotation speed at 24 VAC at 50 Hz (2 seconds/degree at 60 Hz).

Indicator Lamps

The TAC Xenta 102-AX provides LEDs to indicate FTT-10A LON transmit and receive, and self-test/power status. The power LED is illuminated, and remains that way, when the TAC Xenta 102-AX is powered up.

Communications LEDs

The two LEDs adjacent to TB4 indicate LON communications activity. The amber LED illuminates whenever the TAC Xenta 102-AX transmits data and the green LED flickers whenever the TAC Xenta 102-AX receives data. The RX LED may remain illuminated most of the time.

Service Request LED

The operating state of the Neuron IC-hosted node is indicated by the activity of the Service Request LED on the TAC Xenta 102-AX. Refer to [Table 2](#).

Table 2. Indicator Light Activity

Behavior Number	Behavior	Context	Likely Explanation
1	Lamp continuously off.	Power-up of a Neuron 3150 IC-based node with any PROM.	Bad node hardware.
2	Lamp continuously on.	Power-up of a Neuron 3150 IC-based node with any PROM.	Bad node hardware.
3	Lamp lights for 1 second, is off for 2 seconds, and then is continuously on.	Power-up/Reset.	Node is applicationless
4	Lamp off for approximately 1.25 seconds, then on for 0.25 seconds, then repeats the sequence.	Anytime	Watchdog timer resets are occurring. Possible corrupt EEPROM or bad hardware.
5	Lamp continuously cycles through a 1 second on and 1 second off sequence.	Anytime.	Node is in an unconfigured state, but has an application. Application may be offline.
6	Lamp is off for approximately 10 seconds (on a 10MHz Neuron IC). After this off time, the service LED should turn on and stay on.	Using EEBLANK.	Indicates the completion of the blanking process.
7	The off duration is approximately 1 second. The service LED should then turn on and stay on.	First power-up.	Indicates an applicationless state.
8	The off duration is 1 – 15 seconds, depending on the application size and system clock. The Service LED should then begin flashing on and off in 1 second intervals.	First power-up.	Indicates an unconfigured state.

Table 2. Indicator Light Activity (Continued)

Behavior Number	Behavior	Context	Likely Explanation
9	The off duration is indefinite (1 – 15 seconds to load internal EEPROM), and then remains off.	First power-up.	Indicates a configured state.
10	The Service LED flashes briefly and then remains off.	Anytime	Node is in a configured state and is running normally.

The TAC Xenta 102-AX controller ships from the factory in the configured state with the application. On power-up the TAC Xenta 102-AX's Service Pin LED should blink as defined in behavior number 10 in Table 2. A network management tool must be used to commission the device onto a network. When the TAC Xenta 102-AX is configured, the Service Request LED will blink as defined in behavior number 10 in Table 2.

When adding an TAC Xenta 102-AX to a network, you must have a network management tool ready to receive the Neuron I.D. You initiate the Service Request at the TAC Xenta 102-AX by one of two methods.

1. Press the service button on the I/STAT (M/STAT). If the I/STAT is displaying **SEr** and it is *not* flashing, then the node is in the off-line mode (the application is not running). You must use the second method to initiate the Service Pin.
2. Push the button by the Service Pin LED causing the controller unit to send a "LonNode" Service request message.

Note: *If the TAC Xenta 102-AX is offline (the I/STAT will display **SEr** without flashing) the I/STAT or M/STAT will be inoperative, and you cannot send a Service Request.*

Note: *The controller **must** be online for the application to operate. Controllers are shipped ready to power up in an online mode.*

Installation Procedures

This section provides installation instructions for mounting the TAC Xenta 102-AX and installing the input and output connections. Identify the input and output terminals and record their physical terminal block and pin number in the Pinout Chart included in this Installation Guide.

Mounting the Controller

If the manufacturer has already attached the TAC Xenta 102-AX to the VAV box, proceed to “[Connecting the Thermostat](#)” on page 16. Otherwise, perform the following steps.

1. Check the mounting location for the TAC Xenta 102-AX. The TAC Xenta 102-AX is typically mounted with the controller extending down or to the right from the damper shaft. However, the controller can be operated in any vertical plane position.

Note: *Installing the controller to the right (with the barbed fittings pointing down) will help to prevent condensate from migrating into the on-board velocity sensor.*

With a downward extension, the available area around the damper shaft must measure 160 mm (6") down from the lower edge of the shaft, 120 mm (4.5") to the right, 40 mm (1.5") to the left and 45 mm (1.75") above the shaft. Ensure the location allows enough clearance for servicing.

2. The actuator is designed to mount over a 12.7 mm ($\frac{1}{2}$ ") diameter shaft with a minimum of 63.5 mm (2.5") of exposed shaft. If the damper shaft diameter is less than 12.7 mm ($\frac{1}{2}$ "), an adapter may be required. The TAC Xenta 102-AX will not work with larger damper shaft diameters.
3. If the exposed damper shaft is less than 51 mm (2") but at least 25.4 mm (1") long, move the two damper shaft mounting screws to the alternate lower damper shaft positions (see [Figure 1](#)).
4. Select the mounting bracket (see [Figure 1](#)) that will provide the most stability for the operation of the actuator. Position the mounting clip in the desired mounting bracket. Do not insert the clip more than half-way into the bracket. This will allow the clip and the back of the actuator to properly align with the VAV box. (see [Figure 1](#)).
5. Rotate the VAV damper shaft by hand to the fully closed position. Note whether the damper is rotated clockwise (CW) or counter-clockwise (CCW) to close.
6. Slip the controller over the damper shaft. Position the actuator and, using a self tapping sheet metal screw, secure the mounting clip to the VAV box.
7. Next, press the actuator toward the box until the mounting clip snaps into the bracket or the back of the actuator comes in contact with the VAV box.

8. Press and hold the red actuator clutch release (see [Figure 1](#)) and rotate the actuator collar nearly closed position, the 5° index mark if the damper shaft was rotated counter-clockwise to close ([Step 5](#)). Rotate the actuator collar to the 85° index mark if the damper shaft was rotated clockwise to close ([Step 5](#)).
9. Tighten the two damper shaft Torx™ mounting screws using a T25 Torx driver. The minimum torque required to secure the TAC Xenta 102-AX to the damper shaft depends on the shaft material. The maximum torque for the screws is 3.4 N • m (30 inch-pounds).

Note: *The damper should rotate freely when the clutch is released. If it does not, the actuator may not be properly aligned with the damper shaft — it may be necessary to repeat [Steps 4 through 9](#) using a new orientation.*

10. If the damper does not provide a mechanical stop in the open direction, or it is not desirable to use the damper's open stop, set the adjustable stops on the TAC Xenta 102-AX to the desired position. Use a 1/4" hex driver to adjust the screw stop on the TAC Xenta 102-AX.

Connecting the Air Velocity Sensor

Perform the following steps to connect the airflow detection probe or pickup ring to the controller.

1. Connect the low pressure side of the velocity sensor to the barbed fitting labeled P1 (LO) on the TAC Xenta 102-AX.
2. Connect the high pressure side of the velocity sensor to the barbed fitting labeled P2 (HI) on the TAC Xenta 102-AX.

Caution: *Do not make connections to the pressure sensor or transmitter with excessive force. Applying excessive force on either fitting could cause permanent damage to the sensor or transmitter.*

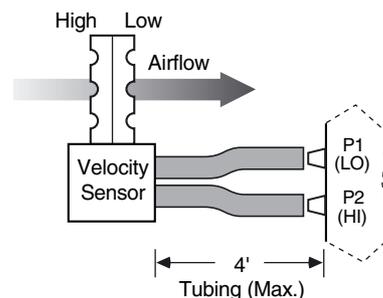


Figure 5. Velocity Sensor Connections

Notes: *Use a recommended maximum length of 4' (1.4 m) FRPE polyethylene tubing or 6.34 mm (0.25") O.D./0.125" (3.175 mm) I.D. Tygon tubing.*

Do not expose the on-board velocity transmitter to moisture during installation or operation. If moisture is a potential problem, orient the tubing and controller so that the barbed fittings are situated at an elevation higher than the lowest part of the tubing to create a trap for any moisture accumulation.

Connecting the Thermostat

An I/STAT, S/STAT, TTS100WJ, or thermistor may be connected to the space temperature input port. Perform the steps described below for the type of device being connected to the space temperature input port (TB4).

I/STAT and TTS100WJ

The I/STAT and TTS100WJ mount on a standard electrical utility box. If using an I/STAT or a TTS100WJ, perform the following steps.

1. Ensure power is disconnected from the TAC Xenta 102-AX.

Warning: *Failure to disconnect power from all interconnected equipment when performing electrical installation may result in electrical shock or burns.*

2. The I/STAT location should be no more than 30m (100 feet) from the controller. Pull the wire through the I/STAT base and secure it to the wall using suitable fasteners.
3. Connect the white lead (signal/data) on the I/STAT to TB4-1 (Data) on the controller.
4. Connect the red lead (+12V power) on the I/STAT to TB4-2 (Power) on the controller.
5. Connect the black lead (Ground) on the I/STAT to TB4-3 (Ground) on the controller (see [Figure 6](#)).

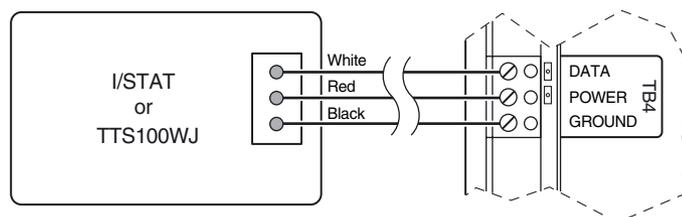


Figure 6. I/STAT Connection

Note: *When using shielded cable, the drain/shield wire may be used to connect the black (ground) lead from the I/STAT. In retrofit applications, the three conductors of the existing thermostat cable may be used for distances up to 30 m (100 feet). Refer to “Cables” on page 51.*

6. Reconnect power to the controller connected to the I/STAT.

S/STAT

The S/STAT mounts on a standard electrical utility box. The S/STAT can also be mounted directly to the wall using suitable fasteners and anchors. If using an S/STAT, perform the following steps.

1. Ensure power is disconnected from the TAC Xenta 102-AX.

Warning: *Failure to disconnect power from all interconnected equipment when performing electrical installation may result in electrical shock or burns.*

2. The S/STAT location should be no more than 30m (100 feet) from the controller. Pull the wire through the S/STAT base and secure it to the wall using suitable fasteners.
3. Connect the white lead (signal/data) on the S/STAT to TB4-1 (Data) on the controller.
4. Connect the red lead (+12V power) on the S/STAT to TB4-2 (Power) on the controller.
5. Connect the black lead (ground) on the S/STAT to TB4-3 (Ground) on the controller (see [Figure 7](#)).

Note: *When using shielded cable, the drain/shield wire may be used to connect the black (ground) lead from the S/STAT. Ensure that the shield wire is not in contact with any conductive surfaces. In retrofit applications, the three conductors of the existing thermostat cable may be used for distances up to 30m (100 feet). Refer to “Cables” on page 51.*

6. Twist the blue lead (slide pot override) and yellow lead (override push-button) on the S/STAT together, and connect them with a single conductor to TB5-4 (U4) (see [Figure 7](#)).

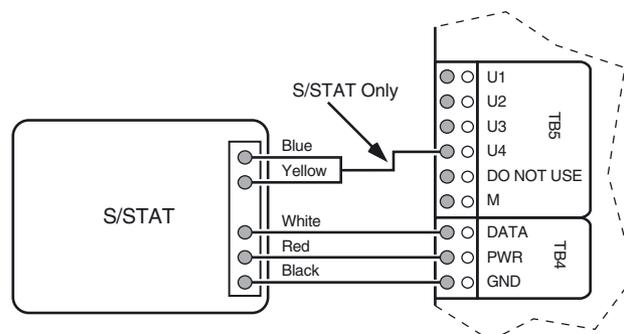


Figure 7. S/STAT Connection

Caution: *Do not connect any wiring to TB5-5 (No Connect).*

Thermistor

If using a 10K ohm thermistor sensor instead of an I/STAT, S/STAT, or TTS100WJ, connect the sensor to TB4 as explained below and illustrated in [Figure 8](#).

1. Connect one lead on the thermistor to TB4-1(Data) on the controller.
2. Connect the other lead on the thermistor to TB4-3 (Ground) on the controller.

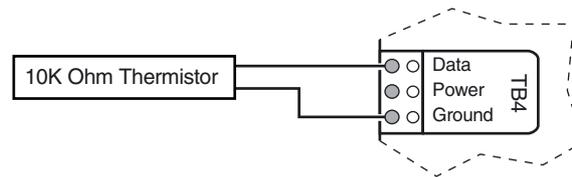


Figure 8. Thermistor Connection to I/STAT Port

Connecting the Communications Cable

Each TAC Xenta 102-AX on the communication LON must have a unique address. The Neuron I.D. provides a unique address for every node.

- ◆ Do not allow any power source to come in contact with the LON wiring or the LON port on the TAC Xenta 102-AX.
- ◆ Ensure that the LON cable shield drain wire is not connected to the controller LON terminal block.

The LON port (TB3), located along the lower left side of the controller, provides asynchronous communications to the FFT-10A network. Connect the controller to the FFT-10A LON as follows.

Caution: Ensure that the FFT-10A LON shield is grounded at only one point.

1. Connect one lead to TB3-1 (C1) on the controller.
2. Connect the other lead to TB3-2 (C2) on the controller.
3. If a shielded cable is used, the shield should be connected to earth ground through a 470K ohm, 1/4 watt, $\leq 10\%$, metal film resistor at one location on the LON (see Figure 9).

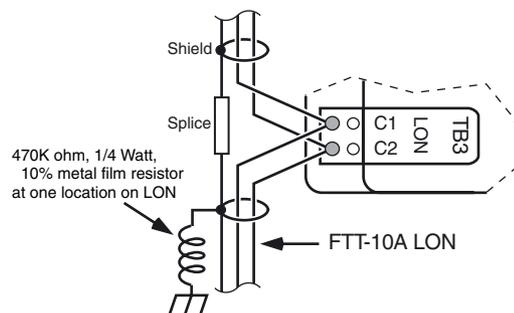


Figure 9. LON Connection

Note: Use 16- to 24-AWG, low-capacitance, twisted pair, shielded cable (refer to “Specifications” on page 51). Multi-pair cable can be used to support multiple LONs but should not be used for other signaling or power purposes.

4. Connect a terminator, anywhere on a free topology segment. Connect a terminator on each end of a bus topology.

Connecting the External Inputs

The TAC Xenta 102-AX provides plug-on input terminals for four input connections designed to support thermistor temperature, discrete contact inputs or a CO₂ sensor.

Warning: *Failure to disconnect power from all interconnected equipment when performing electrical installation may result in electrical shock, burns, or component damage.*

Thermistor Input

Perform the following steps to connect an auxiliary thermistor to the TAC Xenta 102-AX.

1. Connect one lead of the thermistor to the desired input TB5-1 (U1) through TB5-4 (U4) terminal.
2. Connect the other lead to the ground terminal on the input terminal block TB5-6 (Ground) (see [Figure 10](#)).

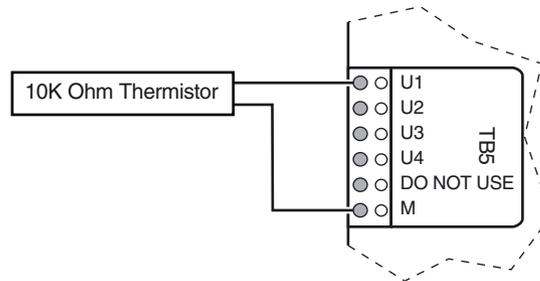


Figure 10. Auxiliary Thermistor Connection

Discrete Input

For contact sensing on the TAC Xenta 102-AX, perform the following steps.

1. Connect one lead from the contact to the desired input TB5-1 (U1) through TB5-4 (U4) terminal.
2. Connect the other lead of the contact to TB5-6 (M) (see [Figure 11](#)).

CO₂ sensor Input

For CO₂ sensor input on the TAC Xenta 102-AX, perform the following steps.

1. Connect one lead from the sensor to the input TB5-3 (U3).
2. Connect the other lead of the sensor to TB5-6 (M).
3. Calculate and enter the scaling factor according to instructions in the TAC Xenta 102-AX SW & HW Reference Guide under **nciGainUI3**.

Connecting the Power

To ensure proper operation of the controller, it is imperative that the unit be correctly grounded. Use the following grounding requirements during unit installation.

Note: *Note: You must establish a proper earth ground connection point prior to connecting ground wires to electrical equipment.*

- ◆ The 24 VAC transformer secondary lead must be securely connected to the Electrical Service Earth Ground wire.
- ◆ The Electrical Service Earth Ground wire must then be connected to the ground terminal on the controller power terminal block (see [Figure 13](#)).

Warning: *Failure to disconnect power from all interconnected equipment when performing electrical installation may result in electrical shock, burns, or component damage.*

Perform the following in terminating the power to the controller,

1. Connect one secondary lead from a separate, isolated 24 VAC transformer to TB1-1 (G).
2. Connect the second secondary lead from the transformer to earth ground.
3. Using 14-AWG wire (2.1 mm²) connect TB1-2 (G0) to the same ground connection used to ground the wire lead from the transformer (see [Figure 13](#)).

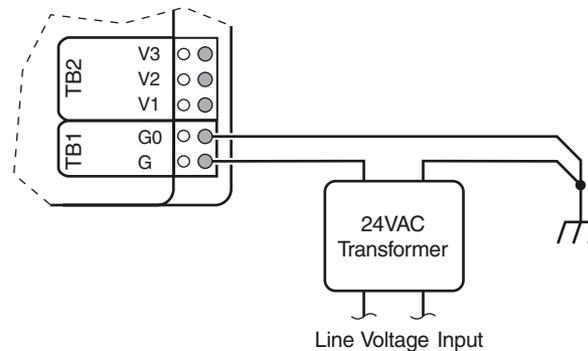


Figure 13. Power Connection

Note: *Operational errors may occur if equipment is inadequately grounded. Refer to “Connecting the Power” on page 21 during equipment installation.*

Note: *Connecting TB1 Ground to another chassis bonding post separated by seams, welds, or fasteners could present continuity ground faults.*

Setup

I/STAT (M/STAT) Dialogue

This section describes the basic dialogue required to properly configure the TAC Xenta 102-AX using the I/STAT. The I/STAT description found in the Hardware Description section gives an overview of the function of the individual keys. The field configuration information is found in [“Parameter Editing” on page 31](#).

I/STAT and M/STAT Operations and Parameters

Note: *The following operation and navigation discussion applies to both the I/STAT and the M/STAT. For brevity, the discussion uses I/STAT as the subject device.*

The I/STAT and M/STAT allow you to perform both normal operations and Service mode operations at the TAC Xenta 102-AX. When the TAC Xenta 102-AX is intended to operate as a stand-alone unit, or when the controller must be modified at the unit, these devices are the only way to modify the TAC Xenta 102-AX parameters.

The normal operations mode of the I/STAT allows a user to control the Occupancy Override Button (On/Off) and the Call button (toggle). In addition, a user can display and control the points associated with the four LED selections (Set Temp/Fan Speed/Room Temp/Outside).

Under the password-protected Service mode, you may access Unit Parameters, Operational Parameters, Airflow Parameters, Hardware Configuration Parameters, and Point display. These selections allow a user to display or modify every parameter associated with the TAC Xenta 102-AX.

Information displayed by the 7-segment display depends upon the current mode of the I/STAT. In the Service mode, the 7-segment display shows the currently selected function information.

When an operator error occurs during input, the contents of the 7-segment display flash at 0.5-second intervals. The display reverts to non-flashing display when any key is pressed.

I/STAT Normal Operations

In addition to the basic display and control features accessed through the Select button, the I/STAT keypad provides three other normal mode functions: On/Off, Call, and Service mode.

On/Off

This function provides occupancy override if in an Unoccupied or Standby state of the TAC Xenta 102-AX from the I/STAT. The On/Off LED shows the current status of occupancy status. When the On/Off key is pressed while the LED is off, the controller is placed in bypass mode, and an interval timer begins to count down for the period of the override duration. Refer to [“Override Duration \(nciOverridDuratn\)” on page 36](#).

The controller has four occupancy conditions; occupied, unoccupied, bypass, and standby. Bypass is the state it is in during the override state. The ON/OFF LED is off only in the unoccupied state.

Call

The Call function allows control of a defined output network variable. Each time the call button is pressed the network variable (**nvoAlarm** in the node object) will log the request.

Service Mode Operations

You may enter the Service mode after pressing the Service key and entering the I/STAT password. The Service mode allows you to display and adjust the TAC Xenta 102-AX parameters.

Table 3. Service Functions Selection

Parameter Setup Code	Parameter Group
UP	Unit Parameters
oP	Operational Parameters
AP	Airflow Parameters
HCP	Hardware Configuration Parameters
Pdd	Point Display

Caution: *Ensure that you set the engineering units to the desired type, SI (Système International) or Imperial, before you begin changing parameters. The default setting of the I/STAT is SI. Refer to “Engineering Units (nciVAVSelctnCntl.UP.EU)” on page 35, for the procedure.*

Password

The first step is entering the TAC Xenta 102-AX password. The password itself is edited from a PC using a network based editing tool.

1. Press the service key. The display will show 0.00. The default password is 183.
2. Press the [+] key to increase or the [-] key to decrement the left most digit.
3. Press the [-] key to enter the value and move onto the next digit. Press the Service key to escape this mode and return to normal operation. (Refer to Note below.)
4. Repeat steps two and three until all three digits are complete. The last [-] key press should cause the I/STAT to display **UP** for Unit Parameters. If it does not and the password flashes, then the password you entered does not match the password in the TAC Xenta 102-AX.

Note: *If the password editor is not accessible, press the ⌘ or ⌥ keys to release the lock on the service button. The lock occurs after an error is made in entering the service password, or if you escape from this mode.*

Selecting Parameter Groups

Refer to “Unit Parameters (UP)” on page 31 for an explanation of the **UP** and a description of the functions. After the password is entered, the mnemonic for the first parameter group, Unit Parameters (**UP**), appears in the display. You may cycle through all the parameter group mnemonics as follows.

1. Press the [↖] key once to display the mnemonic for Operational Parameters (**oP**).
2. Press the [↖] key once to display the mnemonic for Air Flow Parameters (**AP**).
3. Press the [↖] key again to display the mnemonic for Hardware Configuration Parameters (**HCP**).
4. Press the [↖] key again to display the mnemonic for Point (**Pdd**) status group.
5. Pressing the [↖] key again will return to the **UP** group.

Modifying an Analog Value

Refer to “Unit Parameters (UP)” on page 31 for an explanation of the **UP** and a description of the functions.

1. With the **UP** displayed on the I/STAT, press the [↵] key once.
2. The I/STAT will display **dAr** (the parameter for duct area). Press the [↵] key.
3. The I/STAT will display the current value of the **dAr** parameter. For this example we will use the default value of 0.05. The following is provided to assist in understanding the editing function of the display.
4. Press the [↔] keys to move between the LEDs on the lower right of the I/STAT.
 - ◇ SET TEMP - This LED will be lit if the [+] and [-] keys are to edit the right most digit.
 - ◇ FAN SPEED - This LED will be lit if the [+] and [-] keys are to edit the center digit.
 - ◇ ROOM TEMP - This LED will be lit if the [+] and [-] keys are to edit the left most digit.
5. To change the value from 0.05 to 0.13, press the [↖] key once (the ROOM TEMP LED should be on).
6. Press the [↖] key once (the FAN SPEED LED should be on). Press the [+] key once. The resulting display will be 0.15.
7. Press the [↖] key once (The SET TEMP LED should be on). Press the [-] key twice. The resulting display will be 0.13.
8. Press the [↵] key to enter the value into the TAC Xenta 102-AX. Press the Service key to escape without entering the value into the TAC Xenta 102-AX. In either case the I/STAT will take you back to **dAr**.

Modifying a Discrete Value

Refer to “Unit Parameters (UP)” on page 31 for an explanation of the **UP** and a description of the functions. The I/STAT is currently displaying the **dAr** parameter in the **UP** group from the previous example.

1. Press the [↔] key until the I/STAT displays the Heating Output Type (**Ho**) parameter. Press the [↵] key. The I/STAT will display the current value of **Ho**, which, for this example, is the default value of **1oP**.
2. Press the [+] key to select the next option (**2oP**) or [-] to select the previous option (**diS**). Pressing [+] or [-] repeatedly will cycle through all of the options.

Note: When editing a discrete parameter, the editor will not roll over through all of the choices. You must use the + and – to see all of the options.

3. When the display shows the value you want to select, press the [↵] key to enter the value in the TAC Xenta 102-AX. Press the Service key to escape without entering the value into the TAC Xenta 102-AX. In either case the I/STAT will take you back to **Ho**.

Checking an Input Point Value

Refer to “Point Data Display” on page 45 for an explanation of the **Pdd** and a description of the functions. The I/STAT is currently displaying the **Ho** parameter in the **UP** groups from the previous example.

1. Press the Service key, to redisplay **UP**.
2. Press the [↔] key through **oP**, **AP**, and **HCP** until **Pdd** is displayed. Press the [↵] key.
3. The I/STAT will display **UI1** for the first universal input. Pressing the [↔] or [↵] keys scrolls the display through the mnemonics. Stop when the display shows the mnemonic **AFL**. This is the input for airflow.
4. Press Enter[↵]. The I/STAT will display the current value of the airflow.
5. Press the Service key once to escape from **AFL**.

Controlling an Output Point Value

1. Press the [↵] key until the displays shows **Uo1**.
2. Press the [↵] key. The I/STAT will display the current status of output 01 which is the position of the damper.

TAC Xenta 102-AX Location I.D. Address

To select or change the TAC Xenta 102-AX address, perform the following steps.

1. Select **HCP** and press the Enter [↵] key.
2. Select the parameter **Adr** by pressing the [↔] or [↵] keys.
3. Press the Enter [↵] key. The current address appears in the 7-segment display.

Note: The TAC Xenta 102-AX Location I.D. address is used to assign, from the I/STAT, a physical location to the node. This will allow the operator a correlation of the location and the Neuron I.D. number.

4. Use the [+/-] keys to change the left most digit while the ROOM TEMP LED is on.
5. Press the [↔] or [↵] keys to switch to the next digit.

6. Use the [+/-] keys to change the center digit while the FAN SPEED LED is on.
7. Press the [↵] or [↶] keys to switch to the next digit.
8. Use the [+/-] keys to change the right most digit while the SET TEMP LED is on.
9. Press the Enter [↵] key to accept the change, or the Service key to escape without changes.

Calibration Techniques

The TAC Xenta 102-AX on-board velocity sensor leaves the factory calibrated. The calibration applies the correct offset and gain for the TAC Xenta 102-AX and the sensor. Once installed and operating in the field it may be desirable to adjust the offset and gain to compensate for the turbulence and inconsistencies associated with VAV box installations. The TAC Xenta 102-AX has different types of calibration, each with unique characteristics.

Airflow calibration allows you to adapt the airflow transducer to compensate for airflow turbulence. The pickup probe installed at the inlet of the VAV box is designed to read the velocity pressure with a minimum amount of turbulence. Turbulent airflow can be caused by inlet or discharge ducts being at sharp angles to the VAV box, or by excessively high static pressure. The following techniques allow you to make corrections to the eventual airflow reading used by the control algorithm by adjusting the transducer offset and gain, or by adjusting the box constant used in calculating the airflow value. There are three techniques of performing airflow calibration: one point calibration, two point calibration, and box constant calibration. Use *only* one of these calibration methods. Perform the following steps before any of the calibration methods.

Airflow calibration / Minimum settings

1. Airflow Parameters (AP). At least Airflow setpoints:
 - a. Cooling Maximum (CHF), nciMaxFlow – Mandatory
 - b. Cooling Minimum (CLF), nciMinFlow – One and Two Point Calibration
2. Unit Parameters (UP)
 - a. Duct Area (dAr), nciDuctArea = $dA = \frac{\Pi d^2}{4}$. NOTE! M2 and Feet2
 - b. Throttling range (dS), nciDriveTimeDmpr. (Damper stroke time)

NOTE! The I/STAT can not display airflow values less than 10l/sec

One Point Calibration

One point calibration is performed to adjust the offset of the sensor. The calibration is performed to adjust the offset so that the airflow reading will match the minimum airflow reading defined for the box.

1. From the Airflow Parameters (**AP**) group, select **CPL**. Press the Enter [↵] key when **CPL** is displayed. The TAC Xenta 102-AX will take control of the airflow damper to attempt to maintain the Cooling Low Flow Setpoint (**CLF**). The I/STAT will display the current airflow.
2. When the airflow has stabilized, use an accurate airflow measuring device (e.g. balometer) to determine the actual volume of air leaving the VAV box.

3. Enter the corrected Airflow value into the I/STAT. Press the Enter [-] key to accept the value (or Service key to escape the damper will be released for normal operation and no changes will have been made).
4. The I/STAT will display **CPH**. Press the service key to accept the one point calibration and halt any further calibration, or press the Enter [-] key to proceed with the gain calibration.

Note: *This technique allows you to zero out the controller. With no airflow being supplied from the air handling unit, the controller should read zero airflow. Performing the one point calibration ensures that the airflow reported will also be zero.*

Two Point Calibration

Two point calibration is performed to define the offset and the gain of the airflow sensor. This technique is typically used by air balancing engineers who want to ensure that the airflow minimum and maximum limits are met. This is a two-point calibration technique using the minimum cooling airflow to set the offset and the maximum cooling airflow limit to set the gain. The procedure starts by picking up at [Step 4](#) of the one point calibration procedure:

1. With **CPH** (Calibrate Primary High) displayed on the I/STAT, press the Enter [-] key. Note: To enter this menu the CPL value must be altered.
2. The TAC Xenta 102-AX will take control of the damper and attempt to control the airflow to the Cooling High Flow (**CHF**). The I/STAT will display the current airflow. Allow the airflow time to stabilize at the new value.
3. When the airflow has stabilized, use an accurate airflow measuring device (e.g. balometer) to determine the actual volume of air leaving the VAV box.
4. Enter the corrected airflow value into the I/STAT. Press the Enter key to accept the value (or Service key to escape). Escape will abort both point adjustments. In either case, the damper will be released for normal operation and the two point calibration is complete.

Box Constant (Airflow) Calibration

The third technique is box constant calibration. Since the transducer is factory calibrated, the only unknown in the airflow calculation is the box constant. This form of calibration is done at the maximum cooling airflow limit and is used to adapt the airflow reading to the conditions found at the installation. The calculation for airflow volume is

$$Volume = Area \cdot K \cdot \sqrt{VP}$$

where:

Volume = is the volume of air measured in the period of time (cubic feet per minute or liters per second).

Area = $dA = \frac{\Pi d^2}{4}$ = the cross sectional area of the VAV box at the pickup probe

location (square feet or square meters).

\sqrt{VP} = is the square root of the velocity pressure at the probe (inches of water or pascals).

K factor = is a coefficient defined by the box manufacturer.

The velocity pressure is the force generated by air moving in the duct. This is actually the difference in the pressure of the moving air and the static pressure of the air in the duct. The K factor is determined by examining the airflow curve for the VAV box and the probe. This number is based upon laboratory conditions, which are not often found in the field. The K factor must take into account all anomalies in the duct work, the VAV box, and the placement of the pickup probe. It is for this reason that the calibrate box constant (**CbC**) has been developed. The box constant is a combination of the area and the pickup probe factor.

$$\text{Volume} = \text{boxconstant} \cdot \sqrt{VP}$$

The **CbC** is performed as follows:

1. From the Airflow Parameters group (**AP**) select **CbC**. The TAC Xenta 102-AX will take control of the damper and attempt to control the airflow to the Cooling High Flow (**CHF**). Allow the airflow time to stabilize at the new value.
2. When the airflow has stabilized, use an accurate airflow measuring device (e.g. balometer) to determine the actual volume of air leaving the VAV box.
3. Enter the corrected airflow value into the I/STAT. Press the Enter key to accept the value (or Service key to escape). The damper will be released for normal operation and the **CbC** calibration is complete.
4. Escape from the **AP** group and enter the **UP** parameters group. Select the parameter **bC** and press the Enter key. The I/STAT will display the new box constant for the VAV box. The calibration of the airflow transducer is unaffected.

Note: The pickup factor, **PF**, will also be adjusted, based on the duct area and the new box constant.

1. Press the Service key to exit.

Calibrate Space Sensor

To calibrate the space temperature sensor using the reading from a *presumably* more accurate thermal measurement standard, select **oP** from the Service mode and then use the following steps.

1. Select **CSS** using the [↵] or [↶] keys, then press the Enter [↵] key.
2. The current space temperature displays. Enter the new temperature by pressing the [+/-] keys until the display shows the desired reading, then press the Enter key to accept the change.
3. The I/STAT will produce a new offset (b) value in the appropriate Hardware Coefficients, and the 7-segment display will redisplay **CSS**.
4. Press the Service key to exit.

Factory Calibration Setting

The TAC Xenta 102-AX supports an airflow parameter that gives you the ability to return the offset and gain to the original airflow calibration settings performed at the factory. This feature is used in the event some operator or mechanical errors occurred during the one-point or two-point calibration. The following procedure explains how to restore the original airflow calibration settings:

1. From the Airflow Parameters group (**AP**), use the [↵] or [↶] keys to select **FCS**.
2. Press the Enter key while the **FCS** parameter is displayed.
3. Selecting **YES**, sets the factory-calibrated offset and gain for the airflow transducer previously used, after you press Enter.

Selecting **no** or pressing the Service key will abort the operation.

TAC Xenta 102-AX Parameters

Parameter Editing

The Unit Parameters (**UP**), Operational Parameters (**OP**), Airflow Parameters (**AP**), and Hardware Configuration Parameters (**HCP**), allow you to customize the VAV control configurations previously defined in the setup of the TAC Xenta 102-AX. You may select to view the data in either SI units (*Le Système International d'Unités*) or Imperial units. The default display is in SI units when Imperial Units is selected. When Imperial units is selected the TAC Xenta 102-AX will automatically convert all SI units into Imperial units.

Caution: *Ensure that you set the engineering units to the desired type, SI (Système International) or Imperial, before you begin changing parameters. The default setting of the I/STAT is SI. Refer to “Engineering Units (nciVAVSelctnCntl.UP.EU)” on page 35, for the procedure.*

If you choose to accept the factory defaults for setpoints, bands, etc., you do not need to change any of the TAC Xenta 102-AX unit and operational parameters. If you do elect to modify the parameters you may use either the I/STAT or M/STAT.

To select parameter settings once the TAC Xenta 102-AX is installed, perform the following steps.

1. Press the [↵] or [↵] keys to display the parameter code on the 7-segment display, and then press the Enter [↵] key. The code for the first parameter within the parameter function appears.
2. Use the [↵] or [↵] keys to select the desired parameter, and then press the Enter [↵] key.
3. Use the Change [+/-] keys to modify the selected parameter value, and then press the Enter [↵] key.

Note: *If no change is made, press Service to exit.*

Note: *Not all functions allow modification.*

Unit Parameters (UP)

The Unit Parameters (**UP**) address the physical configuration of the individual VAV box.

The following table contains the parameters found in **UP**, their range and default settings. (To display or change the Unit Parameter settings in [Table 4](#), select **UP** from the Service mode. Refer to “I/STAT (M/STAT) Dialogue” on page 22 for I/STAT navigation.)

Table 4. Unit Parameter Settings

Parameter Name		Default	Parameter Description	Range
dAr	<i>dAr</i>	0.05	Duct Area	0 – 1.20 m ² (0 – 12.9 feet ²)
PF	<i>PF</i>	0.95	Pickup Factor	0 – 6.55 m/sec. per 1000 (0.00 – 20.3 feet/min. per 1000)
bC	<i>bC</i>	0.05	box Constant (duct area × Pickup Factor)	0 – 1.95 kiloliters/sec. (0.00 – 6.52 feet ³ /min. per 1000)
dS	<i>dS</i>	230	Damper Stroke Time	0 – 999 Seconds
HS	<i>HS</i>	60	Heating Stroke Time	0 – 999 Seconds
Hd	<i>Hd</i>	30	Heating Delay on Start	0 – 999 Seconds
Ho	<i>Ho</i>	diS	Heating Output	diS = discrete 1oP = 1 output, PWM 2oP = 2 outputs, PWM
HnS	<i>HnS</i>	nC	Heating Actuator Normal Stroke	nC = Normally closed actuator no = Normally open actuator
FS	<i>FS</i>	30	Fan Stroke Time	0 – 999 Seconds
Fd	<i>Fd</i>	60	Fan delay on Stop	0 – 999 Seconds
Fo	<i>Fo</i>	diS	Fan Output Type	diS = discrete 1oP = 1-output-PWM
dEP	<i>dEP</i>	no	Pressure Dependent Mode Enable	no = Pressure Independent mode enabled YES = Pressure dependent mode enabled
EU	<i>EU</i>	SI	Engineering Units	SI = Système International IU = Imperial Units

Duct Area (**nciDuctArea**)

The Duct Area (**dAr**) parameter allows you set the area of the duct in your configuration. The units are in inches (meters). Because the I/STAT is limited to displaying three characters, the SI units for duct area will be in meters rather than millimeters. For example, a duct area of 500 square centimeters will be entered as 0.05 square meters.

The **dAr** parameter is used in conjunction with the airflow Pickup Factor (**PF**) to automatically calculate the primary airflow reading. If the VAV manufacturer supplies the duct diameter rather than the area, calculate the duct area using the following equation:

$$dA = \frac{\pi d^2}{4}$$

Pickup Factor (**nciPickupFactor**)

The Pickup Factor (**PF**) is a value attributed to the characteristics of the probe located in the air stream of the VAV box.

The on-board airflow sensor on the TAC Xenta 102-AX is of a differential pressure design. The “High” flow port is connected to the pickup probe at the “Total Pressure” port. The “Low” flow port is connected to the pickup probe at the “Static Pressure” port. The difference in the High and Low pressures results in a “velocity pressure.”

The Pickup Factor is a constant which is derived from the relationship of the velocity pressure and the velocity of the airflow. (The Pickup Factor is also known as the K factor.) The following equation represents the relationship.

$$\text{Air Velocity} = K\sqrt{VP}$$

The Pickup Factor can be derived from a diagram furnished with the VAV box or with the Pickup Probe itself. The **PF** parameter will be displayed in thousands. For example, a **PF** of 950 will display as 0.95.

The Pickup Factor (**PF**) parameter for airflow sensor is used in conjunction with the **dAr** parameter to automatically calculate the primary reading. The airflow volume is derived as follows:

$$\text{Airflow Volume} = \text{Area} \times K\sqrt{VP}$$

where Area is the cross sectional area at the pickup probe.

Box Constant (**nciBoxConstant**)

The **bc** parameter allows you to define the box constant. The box constant is determined by multiplying the duct area by the pickup factor and may also be available from the VAV box manufacturer.

Note: In Imperial units, the box constant is equal to the airflow when the velocity pressure is equal to 1" Water Column.

Damper Stroke (**nciDriveTimeDmpr**)

The Damper Stroke Time (**ds**) parameter is the number of seconds that the VAV damper takes to move from fully closed to fully open.

The expected controller type is always a 2-output pulse width modulating actuator. The integrated actuator will stroke its full 90 degrees in approximately 185 seconds. If the actuator stops are set for a 60 degree rotation then the **ds** should be set for approximately 123 seconds. The correct damper stroke must be defined to ensure good control response and for the damper position network output variable to indicate the correct value.

Heating Stroke (**nciDriveTimeUO2**)

The Heating Stroke Time (**HS**) parameter is the pulse duration in seconds which will cause the heating actuator to control from full close to full open.

The value of **HS** will depend upon the Heating Output (**Ho**) type. For 2 position control, leave the **HS** at its default setting. For 2-output PWM control, **HS** will be the throttling time of the actuator. For 1-output PWM, **HS** will be the pulse duration required to cause the PWM device to go to the maximum output. For example, in order for the PWM transducer to output a 10 VDC signal, a 5.2 second pulse is required. This will require that **HS** will be 5.2 seconds. For the 1-output duty cycle (time proportioning), **HS** will be the throttling time of the actuator.

Heating Delay (**nciDelayStartUO2**)

The Heating Delay (**Hd**) parameter sets the minimum delay in seconds before a stage of auxiliary two-position heating is started.

This is comparable to an interstage delay-before-make relay. As the space temperature decreases, a stage of auxiliary heat is required. The control strategy will prevent the output from energizing for the duration of **Hd**.

Heating Output (**nciOutputTypeU02** and **nciOutputTypeU03**)

The Heating Output type (**Ho**) parameter allows you to define the type of valve actuator being used to control the first stage of auxiliary heat.

0 = **diS** = Discrete — relay/triac (TB2-2, Output 2, discrete output)

1 = **1oP** = Pulse width modulation, 1 output — PWM transducer (TB2-2, Output 2, discrete output)

2 = **2oP** = Pulse width modulation, 2 outputs — bidirectional actuator (TB2-2, Output 2, discrete output = Increment, TB2-3, Output 3, discrete output = Decrement)

Note: **2oP** requires the number of states of auxiliary heat to be set at one. **2oP** will automatically take control of the second and third hardware output for controlling the actuator. Refer to “External Outputs” on page 11.

The **Ho** and **HS** parameters work together to define the heating output control. The **Ho** parameter will define the type of output control. The **HS** parameter will define the output response duration.

Heating Actuator Normal Stroke (**nciInvertU02**)

The Heating Actuator Normal Stroke (**HnS**) parameter defines the operation of the first stage of heat. Use a setting of **nC** for actuators which are normally closed. Use a setting of **no** for actuators which are normally open.

For example, if **Ho** = **diS** (two-position) and **HnS** = 0 (normally open), the TAC Xenta 102-AX network output variable will operate as follows: When the value of the first stage of heating point is 0% Open, the hardware output will be energized. When the value is 100%, the hardware output will be de-energized.

Fan Stroke Time (**nciDriveTimeU01**)

The Fan Stroke Time (**FS**) parameter determines the time base used for analog (PWM) output operation. You may modify or read this value in seconds from the I/STAT or M/STAT.

Fan Delay on Stop (**nciDelayStopU01**)

The Fan Delay on Stop (**Fd**) parameter specifies the length of time in seconds that the output will stay active after it has been controlled off.

The **Fd** parameter is comparable to a delay-before-break relay. The longer the duration, the longer the fan will run after it is no longer required. This parameter will allow the fan to remove latent heat from the heating coils after they have been controlled off. The delay will also help prevent short cycling.

Fan Output Type (**nciOutputTypeU01**)

This parameter (**Fo**) defines whether the output will be an On/Off discrete output type operation, or a PWM analog output type of operation.

Pressure Dependent Mode Enable (nciVAVSelctnCntrl.UP.dEP)

Setting this parameter (**dEP**) to **YES** enables the device to operate in Pressure Dependent mode, ignoring the airflow input. The damper will be driven based on terminal load. When the parameter is changed to **no**, the device will operate in the pressure independent mode.

Engineering Units (nciVAVSelctnCntrl.UP.EU)

The Engineering Units (**EU**) parameter specifies whether SI or Imperial units will be used for display and calculations. When the **EU** parameter is set to **SI**, Système International units are used. When the **EU** parameter is set to **Iu**, imperial units are used.

Operational Parameters (oP)

The Operational Parameters (**oP**) are used to define how the VAV box will control in its given environment. The parameters associated with **oP** affect the temperature setpoints and how they are displayed on the I/STAT.

The following table contains the parameters found in **oP**, their range and default settings. (To display or change the Operational Parameter settings in [Table 5](#), select **oP** from the Service mode. Refer to “[I/STAT \(M/STAT\) Dialogue](#)” on page 22 for I/STAT navigation.)

Table 5. Operational Parameter Settings

Parameter Name		Default Value	Parameter Description	Range
od	<i>od</i>	2	Bypass Override Duration	0.0 – 23.9 Hours
SAr	<i>SAr</i>	4.0	STAT Adjustment Range	0.00 – 9.9° C (0.0 – 17.9° F)
UCS	<i>UCS</i>	28.0	Unoccupied Cooling Setpoint	10.0 – 35.0° C (50.0 – 95.0° F)
SCS	<i>SCS</i>	25.0	Standby Cooling Setpoint	10.0 – 35.0° C (50.0 – 95.0° F)
oCS	<i>oCS</i>	23.0	Occupied Cooling Setpoint	10.0 – 35.0° C (50.0 – 95.0° F)
oHS	<i>oHS</i>	21.0	Heating Setpoint	10.0 – 35.0° C (50.0 – 95.0° F)
SHS	<i>SHS</i>	19.0	Standby Heating Setpoint	10.0 – 35.0° C (50.0 – 95.0° F)
UHS	<i>UHS</i>	16.0	Unoccupied Heating Setpoint	10.0 – 35.0° C (50.0 – 95.0° F)–
Cb	<i>Cb</i>	2.0	Cooling Band	0.0 – 9.9° C (0.0 – 7.9° F)
Hb	<i>Hb</i>	2.0	Heating Band	0.0 – 9.9° C (0.0 – 17.9° F)
ESS	<i>ESS</i>	ACu	Effective Setpoint Source	ACu = Actual nor = Norm

Table 5. Operational Parameter Settings (Continued)

Parameter Name		Default Value	Parameter Description	Range
CSS	CSS	–	Calibrate Space Sensor	–
PP	PP	–	Prove Performance	–

Override Duration (**nciOverridDuratn**)

The Override Duration (**od**) parameter controls the number of hours that the operating mode of the VAV controller will be overridden when the On/Off button on the I/STAT or S/STAT is pressed. The state of the occupancy network input variable determines the operating mode.

If the occupancy network input variable has been controlled On to the occupied mode, then pressing the On/Off button has no effect. If the occupancy network input variable is in the unoccupied or standby mode, pressing the On/Off button will control Occupancy to the Bypass mode for the duration of **od**. Pressing the On/Off button while in Bypass mode will cancel the override and return the control of the TAC Xenta 102-AX to unoccupied or Standby mode setpoints.

If you set the **od** parameter value to 0, the On/Off button is disabled and it will not affect the operation of the TAC Xenta 102-AX.

STAT Adjustment Range (**nciSetpntOffRnge**)

The STAT Adjustment Range (**SAr**) parameter determines the range of temperature control, in degrees, that an operator has using an I/STAT or an S/STAT. The range is equally divided across the active setpoint, which limits the adjustment in either direction to one-half of the total range.

The Stat Adjustment Range is applied to the limits of the Stat Adjust point in the negative and positive direction. The default increment range of the Stat adjustment is 0.1°. An **SAr** of 8 will allow the occupant to raise and lower the setpoint by +4 to –4 degrees.

Note: The Stat adjustment function is disabled when the space temperature is being controlled to unoccupied setpoints (**UCS** and **UHS**).

Unoccupied Cooling Setpoint (**nciSetPnts.unoccupied_cool**)

The Unoccupied Cooling Setpoint (**UCS**) parameter is used as the active cooling setpoint when the network variable for the occupancy command is in the unoccupied mode.

Standby Cooling Setpoint (**nciSetPnts.standby_cool**)

The Standby Cooling Setpoint (**SCS**) parameter, combined with the setpoint offset, for the STAT adjustment, is used as the active cooling setpoint when the network variable for the occupancy command is in the Standby mode.

Occupied Cooling Setpoint (nciSetPnts.occupied_cool)

The Occupied Cooling Setpoint parameter (**oCS**), combined with the setpoint offset from the STAT adjustment, is used as the active cooling setpoint when the network variable for the occupancy command is in the occupied mode.

Occupied Heating Setpoint (nciSetPnts.occupied_heat)

The Occupied Heating Setpoint parameter (**oHS**), combined with the setpoint offset from the STAT adjustment, is used as the active heating setpoint when the network variable for the occupancy command is in the occupied mode.

Standby Heating Setpoint (nciSetPnts.standby_heat)

The Standby Heating Setpoint (**SHS**) parameter, combined with the setpoint offset, for the STAT adjustment, is used as the active heating setpoint when the network variable for the occupancy command is in the Standby mode.

Unoccupied Heating Setpoint (nciSetPnts.unoccupied_heat)

The Unoccupied Heating Setpoint (**UHS**) parameter is used as the active heating setpoint when the network variable for the occupancy command is in the unoccupied mode.

Cooling Band (nciCoolingBand)

The Cooling Band (**Cb**) parameter defines the energy band, in degrees, that surrounds the active cooling setpoint (one-half of the span above the setpoint, and one-half below the setpoint).

Heating Band (nciHeatingBand)

The Heating Band (**Hb**) parameter defines the energy band, in degrees, that surrounds the active heating setpoint (one-half of the span above the setpoint, and one-half below the setpoint).

Effective Setpoint Source (nciVAVSelctnCntl.oP.ESS)

The Effective Setpoint Source (**ESS**) parameter controls the value that displays on the I/STAT when you select SET TEMP. A value of **ACu** (Actual) displays the current active cooling or active heating setpoint. This is the default setting. The I/STAT will display the setpoint that is closest to the temperature in the space. A value of **nor** (norm) displays the average of the active cooling and active heating setpoints. To select the **ESS** parameter, use the [+/-] key to toggle the selection.

Calibrate Space Sensor (nciVAVSelctnCntl.oP.CSS)

When you select the operational parameter, Calibrate Space Sensor (**CSS**), the current value of the space temperature point displays. From this display, you may calibrate the space temperature sensor using the reading from a presumably more accurate thermal measurement standard. The calibration procedure adjusts the offset value associated with the space temperature input.

Prove Performance (nciVAVSelctnCntl.oP.PP)

The operator parameter, Prove Performance (**PP**), allows you to evaluate the performance of the VAV controller.

1. Select the **PP** parameter. The space temperature sensor network variable is put into the Test mode.

The current state of the VAV controller constantly displays on the I/STAT display. The values of the space temperature and airflow display alternately, at one second intervals.

The LEDs on the lower section of the I/STAT illuminate or extinguish, depending upon the states of the fan, and either one/two stages of cooling or one/two/three stages of heating as shown in Table 6.

Table 6. Prove Performance LED

LED	Output on when LED Illuminated
Set Temp	Fan
Fan Speed	Heating 1
Room Temp	Heating 2
Outside	

Note: Pressing the [+/-] keys will change the space temperature by 0.1 ° at each key press.

The display and LEDs will continue to reflect the current state of the VAV, “proving the performance” of the VAV control parameters as the temperature moves through its range.

- Stop the sequence at any time by pressing the Service key. The I/STAT 7-segment displays the **PP** parameter.

Airflow Parameters (AP)

To display or change the airflow balancing parameters in Table 7, select **AP** from the Service mode. Use the [↵] or [↶] keys to select the parameter to be displayed or modified.

Table 7. Airflow Balance Parameter Settings

Parameter Name		Default Value	Parameter Description	Range
CLF	CLF	0.20	Cooling Low Flow Setpoint	0.0 – 9.99 kiloliters/sec. (0.0 – 21.1 CFM per 1000)
CHF	CHF	0.60	Cooling High Flow Setpoint	0.0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
HAF	HAF	0.30	Heating Airflow Setpoint	0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
HLF	HLF	0.20	Heating Low Flow Setpoint	0.0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
HHF	HHF	0.60	Heating High Flow Setpoint	0.0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
SAF	SAF	0.20	Standby Air Flow Minimum Setpoint	0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
UAF	UAF	0.00	Unoccupied Air Flow	0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
CPL	CPL	–	Calibrate Low Airflow	0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
CPH	CPH	–	Calibrate High Airflow (sub-menu of CPL)	0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)

Table 7. Airflow Balance Parameter Settings (Continued)

Parameter Name		Default Value	Parameter Description	Range
CbC	CbC	–	Calibrate Box Constant	0 – 9.99 kiloliters/sec. (0.00 – 21.1 CFM per 1000)
FCS	FCS	–	Factory Calibration Setting	no = No change YES = Return to factory settings
AFC	AFC	50.0	Airflow Filter Coefficient	0.00 – 99.9
CoL	CoL	0.00	CO ₂ Low Limit (Equates to 0% Airflow Reset)	0 – 5.0 PPM per 1000
CoH	CoH	0.00	CO ₂ High Limit (Equates to 100% Airflow Reset)	0 – 5.0 PPM per 1000
Fon	Fon	0.00	Parallel Fan Start (On) Airflow	0 – 9.99 Liters/sec per 1000. 0.00 – 21.1 CFM per 1000
FoF	FoF	0.00	Parallel Fan Stop (Off) Airflow	0 – 9.99 Liters/sec. per 1000 (0.00 – 21.1 CFM per 1000)

Cooling Low Flow Setpoint (nciMinFlow)

The Cooling Low Flow (**CLF**) parameter is the minimum cooling airflow delivered under no cooling load in kiloliters/second (kL/s) or thousands of cubic feet per minute (Kilo CFM).

Cooling High Flow Setpoint (nciMaxFlow)

The Cooling High Flow (**CHF**) parameter is the maximum cooling airflow delivered under full cooling load in kiloliters/second (kL/s) or thousands of cubic feet per minute (Kilo CFM).

Heating Airflow Setpoint (nciMinFlowHeat)

The Heating Airflow Setpoint (**HAF**) defines the airflow through a VAV box when in heating mode.

Heating Low Flow Setpoint (nciMinFlowWarmup)

The Heating Low Flow (**HLF**) parameter is the minimum warm airflow delivered under no load in kiloliters/second (kL/s) or thousands of cubic feet per minute (Kilo CFM). **HLF** is used with Central Plan Heat/Warmup as the minimum airflow for heating.

Heating High Flow Setpoint (nciMaxFlowWarmup)

The Heating High Flow (**HHF**) parameter is the maximum warm airflow delivered under full load in kiloliters/second (kL/s) or thousands of cubic feet per minute (Kilo CFM). **HHF** is used as the maximum airflow for Central Plant Heat/Warmup.

Standby Air Flow Setpoint (nciMinFlowStand)

The Standby Air Flow Setpoint (**SAF**) defines the minimum airflow through a VAV box when in the Standby mode. This parameter can be modified or read in SI units of liters per second per thousand, or in Imperial units as units of cubic feet per minute (CFM) per thousand.

Unoccupied Air Flow (nciUnoccuAirFlow)

The Unoccupied Air Flow setpoint (**UAF**) defines the minimum airflow through a VAV box when the area is unoccupied. The parameter can be modified or read in SI units of liters per second per thousand, or in Imperial units as units of cubic feet per minute (CFM) per thousand.

Calibrate Primary Low Flow (nciVAVSelctnCntrl.AP.CPL)

Use the steps in “[Calibration Techniques](#)” on page 27 to calibrate the primary cooling low flow (**CPL**) on the TAC Xenta 102-AX. This function calibrates the offset (b) factor of the appropriate Hardware Coefficient.

Calibrate Primary High Flow (nciVAVSelctnCntrl.AP.CPH)

Use the procedure shown in “[Calibration Techniques](#)” on page 27. This function calibrates the Gain (m) factor of the appropriate Hardware Coefficient and is only used in conjunction with **CPH**.

Calibrate Box Constant (nciVAVSelctnCntrl.AP.CbC)

Use the procedure shown in “[Box Constant \(Airflow\) Calibration](#)” on page 28. This function calibrates the pickup probe in the VAV box.

Factory Calibration Setting (nciVAVSelctnCntrl.AP.FSC)

Use the procedure shown in “[Factory Calibration Setting](#)” on page 30. This function resets the hardware coefficients to the original airflow calibration settings performed at the factory.

Airflow Filter Coefficient (nciAirFlowCoeff)

The Airflow Filter Coefficient (**AFC**) parameter is used to adjust the amount of software filtering applied to the airflow input. The parameter ranges from 0 (no filtering) to 99.9 (full filtering). The filtering of the hardware input occurs once per second, even though the scan rate of the input variable may be ten seconds. The filter will be implemented with the following equation:

$$y_n = y_{n-1} \times AFC + x_n \times (1 - AFC)$$

where:

AFC = parameter value

y_n = input variable value

y_{n-1} = previous value of variable

x_n = raw input

This parameter will remove much of the point value fluctuation caused by turbulence found in the airstream. This will improve the airflow calibration process and will dampen the changes in the damper control as the amount of filter is increased.

Note: *As a note of warning, the larger the filter, the more damped the airflow reading, causing sluggish control.*

CO₂ Low Limit (nciCO2LoLimitCln)

This and the following parameter are used in conjunction to reset the Airflow Setpoint. An increase in CO₂ above the low limit will cause the Airflow Setpoint to increase. This configuration parameter establishes the carbon dioxide (CO₂) low limit. When the value received is at or exceeds the threshold value defined in configuration parameter **nciCO2LoLimitCln**, the current cooling or heating mode’s minimum airflow volume will be changed by applying the network input variable **nviAirFlowReset**. The percentage value of this input variable is applied to the current minimum airflow value for an increase in air volume.

This parameter can be modified or read in SI or Imperial units of parts per million (ppm) per thousand.

	PPM	Reset
Low	4000	0%
High	5000	100%

A ppm reading of 4000 will not affect the airflow setpoint. a ppm reading of 4500 will reset the airflow limit upwards by 50%.

CO₂ High Limit (nciCO2HiLimitCln)

This configuration parameter establishes the carbon dioxide (CO₂) high limit. When the value received is at or exceeds the threshold value defined in configuration parameter **nciCO2HiLimitCln**, the current cooling or heating mode’s minimum airflow volume will be changed by applying the network input variable **nviAirFlowReset**. The percentage value of this input variable is applied to the current minimum airflow value for an increase in air volume.

This parameter can be modified or read in SI or Imperial units of parts per million (ppm) per thousand.

Parallel Fan Start (On) Airflow (nciAirFlowFanOn)

This configuration parameter sets the airflow fan on when the parallel fan is present.

This parameter can be modified or read in SI units of liters per second per thousand. If the stat display is set for Imperial units, the reading will be in units of cubic feet per minute (CFM) per thousand.

Parallel Fan Start (Off) Airflow (nciAirFlowFanOff)

This configuration parameter sets the airflow fan off when the parallel fan is present.

This parameter can be modified or read in SI units of liters per second per thousand. If the stat display is set for Imperial units, the reading will be in units of cubic feet per minute (CFM) per thousand.

Hardware Configuration Parameters (HCP)

The Hardware Configuration Parameters allow you to modify or change the setup settings. The settings can be altered through the I/STAT, or a LONWORKS editor from a host. In any case, the latest modification to the configuration takes precedence.

You may change the Location I.D. address settings on **Adr**, define fan type on **FAn**, heating stages on **AHS**, and closed damper rotation on **Cdr**. The **IxS** settings allow you to select the input type for the unit.

Table 8. Hardware Configuration Parameter Settings

Parameter Name	Default Value	Parameter Description	Range
Adr	000	Location I.D. Address (non-Neuron)	000 – 999
FAn	non	Fan Type	non = None PAr = Parallel SEr = Series
AHS	noH	Auxiliary Heating States	noH = No auxiliary heat H1S = 1 Heating stage H2S = 2 Heating stages H3S = 3 Heating stages
Cdr	C	Closed Damper Rotation (Close Direction)	C = Clockwise CC = Counter-clockwise
I1S/I1S	I1S	Input 1 Selection	non = None dUC = Duct Temperature ECn = Emergency Contact UnI = Universal Input
I2S	I2S	Input 2 Selection	non = None oCC = Occupied Sense Detect UnI = Universal Input
I3S	I3S	Input 3 Selection	non = None Co2 = Sensor Detect Present oA = Outside Air Temp. Detect UnI = Universal Input
I4S	I4S	Input 4 Selection	non = None rSP = Room STAT Present UnI = Universal Input

Logical Address (nciAssignedAddr)

The **Adr** parameter allows you to set the TAC Xenta 102-AX Location I.D. address from 000 to 999. Ensure that each device on the LON has a unique logical/location address. The addressing allows the operator to assign a numerical location to the node. This address will assist the commissioning process by correlating the location with the Neuron I.D. number.

Fan Type (nciFanTypeVAV)

The **FAn** parameter allows you to set the fan type.

Table 9. Fan Type

Numerical	I/STAT Mnemonic	Type
0	non	None
1	PAr	Parallel
2	SEr	Series

Auxiliary Heating Stages (nciVAVSelctnCntrl.HP.AHS)

The **AHS** parameter allows you to set the number of auxiliary heating stages. The third stage of heat is achieved by staging the outputs as defined in the following table.

Table 10. Auxiliary Heating Stages

Stages	I/STAT Mnemonic	Hardware Output Status		
		1	2	3
1	H1S	Fan	On	Off
2	H2S	Fan	Off	On
3	H3S	Fan	On	On

The **H3S** setting implies that the heating coil for the first stage has a significantly lower heating capacity than the coil in proximity to the third output. The **H3S** will typically be used where output 2 is pulling in approximately 15 KW, and output 3 is pulling in approximately 30 KW.

Close Damper Direction (nciDirectionDmpr)

The **Cdr** parameter determines the close direction of the damper actuator. 0 = **C** or CW, 1 = **CC** or CCW.

Input 1 Selection (nciUniln1Selctn)

The **i1S** parameter allows you to select what type of input will be accepted on TB5-1. The available inputs are duct temperature sensor, emergency contact, or universal input.

Table 11. Input 1 Selection

Mnemonic	Description
0= non	None *
1= duC	Duct Temperature
2 = ECn	Emergency Contact
3= Uni	Universal Input

* Note! With this value a temperature sensor may be connected without influencing the application. The value will appear in **nvoAuxTemp1**. (TAC Xenta 102-AX program version 1.10 or higher).

Duct Temperature

When the **i1S** parameter is set to **duC**, this point becomes the input for an auxiliary temperature sensor (thermistor). The temperature is used to determine the central plant heat requirement. The local contact is connected to TB5-1, Input 1. The unit will go into central plant heat/warmup mode when the duct temperature is greater than the space temperature.

Local Emergency Command Notification

This point is the input for local emergency command notification when the **i1S** parameter is set to **ECn**. The local contact is connected to TB5-1 (U1) (see Figure 14),.

The signal at this input is interpreted as follows:

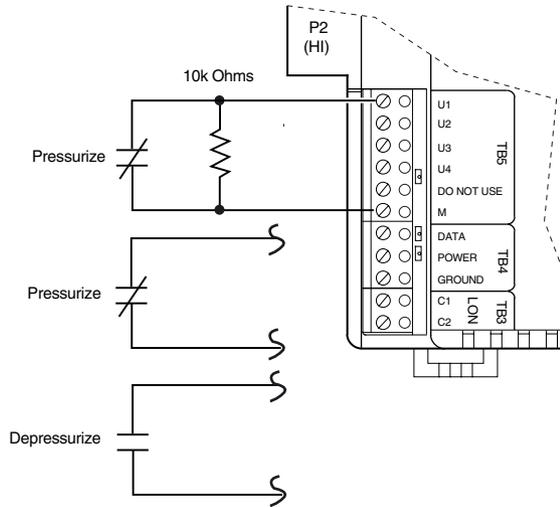


Figure 14. Local Emergency Command Terminations

- ◆ Closed contact — A short circuit is interpreted as normal.
- ◆ Open contact — An open circuit is interpreted as depressurization notification. This condition turns the fan off and closes the dampers.
- ◆ Closed contact through 10K resistor — A mid-range value is interpreted as pressurize notification. This condition turns the parallel fan off and causes the damper to control to the maximum cooling airflow limit (**CHF**).

Input 2 Selection (**nciUnitIn2Selctn**)

Table 12. Input 2 Selection

Mnemonic	Description
0= non	None
1= oCC	Occupied Sensor Detector
2= Uni	Universal Input

The **i2S** parameter allows you to select a local occupancy sensor detector or universal input connected to TB5-2 (U2).

Occupied Sensor

This configuration indicates than an occupied sensor is present. The local contact is connected to TB5-2 (U2). A closed contact is always an indication of occupancy. the open contact can indicate unoccupied or standby state. This is modified through a network tool. The default open contact indicates unoccupied state.

Universal Input Point

If the **i2S** parameter is set to **Uni**, this becomes a free input. It can be connected to a discrete contact or switch, or to an analog input. The local contact is connected to TB5-2 (U2).

Input 3 Selection (nciUniln3Selctn)

The **I3S** parameter allows you to select CO₂ sensor detection, Outside Air temperature sensor, or a universal input on TB5-3 (U3).

Table 13. Input 3 Selection

Mnemonic	Description
0= non	None
1= Co2	CO ₂ Sensor Detection
2= oA	Outside Air
3= Uni	Universal Input

CO₂ Sensor

This configuration indicates that a CO₂ sensor detector is present. The local contact is connected to TB5-3 (U3). See the TAC Xenta 102-AX SW & HW Reference Guide.

Outside Air Temperature Sensor

This point is input for an outside air temperature sensor (thermistor), or other analog input. It is enabled by setting **I3S** = **oA**. The input is connected to TB5-3 (U3).

Universal Input Point

If the **I3S** parameter is set to **Uni**, this becomes a free input. It can be connected to a discrete contact or switch, or to an analog input. The input is connected to TB5-3 (U3).

Input 4 Selection (nciUniln4Selctn)

The **I4S** parameter allows you to select S/STAT Setpoint Adjustment, S/STAT Occupied Button, or a universal input on TB5-4 (U4).

Table 14. Input 4 Selection

Mnemonic	Description
0= non	None
1= SSP	S/STAT Sensor Present
2= Uni	Universal Input Air

S/STAT Sensor Present

This configuration indicates that an S/STAT thermostat device is present. The input is connected to TB5-4 (U4).

Universal Input Point

If the **I4S** parameter is set to **Uni**, this becomes a free input. It can be connected to a discrete contact or switch or to an analog input. The local contact is connected to TB5-4 (U4).

Point Data Display

This Point Data Display allows you to display the values of the network variables and some hardware characteristics from the I/STAT or M/STAT. The display is presented in percentage of range for the input or output.

To select an item to display, perform the following steps.

1. Press the [↵] or [↶] keys to display the **Pdd** code on the 7-segment display and then press the Enter [↵] key. The code for the first parameter within the **Pdd** parameter function appears.
2. Use the [↵] or [↶] keys to select the desired parameter and then press the Enter [↵] key.
3. Use the Change [+/-] keys to modify the selected parameter value and then press the Enter [↵] key.

Note: When Point Data or Calibrate/Prove Performance is active, the edit time out is disabled.

Table 15. Point Data Display Parameter Settings

Parameter Name	Default Value	Parameter Description	Range
U1	U. 1	Universal Input 1	0.0 – 100.00%
U2	U. 2	Universal Input 2	0.0 – 100.00%
U3	U. 3	Universal Input 3	0.0 – 100.00%
U4	U. 4	Universal Input 4	0.0 – 100.00%
AFL	AFL	Airflow in Liters/sec.	0.0 – 9.99 kiloliters/sec. (0.0 – 21.1 CFM per 1000)
PrS	PrS	Velocity Pressure	0 – 999 Pascals (absolute) (0.00 – 4.01" Water Column absolute)
dCi	dCi	DC in Voltage	0.0 – 99.9 Volts
rHS	rHS	Reference Half Scale Voltage	0.0 – 99.9 Volts
rFS	rFS	Reference Full Scale Voltage	0.0 – 99.9 Volts
rg	r9	Reference Ground Voltage	0.0 – 99.9 Volts
dAC	dAC	Damper Actuator	0.0 – 100.00%
Uo1	Uo1	Universal Output 1	0.0 – 100.00%
Uo2	Uo2	Universal Output 2	0.0 – 100.00%
Uo3	Uo3	Universal Output 3	0.0 – 100.00%

Universal Input 1 (nvoUnvInput1)

This is the value status for the universal input point 1. It displays in the percentage of the selected engineering units (SI or Imperial) input that is detected on this point.

Universal Input 2 (nvoUnvInput2)

This is the value status for the universal input point 2. It displays in the percentage of the selected engineering units (SI or Imperial) input that is detected on this point.

Universal Input 3 (nvoUnvInput3)

This is the value status for the universal input point 3. It displays in the percentage of the selected engineering units (SI or Imperial) input that is detected on this point.

Universal Input 4 (nvoUnvInput4)

This is the value status for the universal input point 4. It displays in the percentage of the selected engineering units (SI or Imperial) input that is detected on this point.

Airflow (nvoAirFlow)

Airflow is the flow value as calculated from the hardware input, calibration constants, and box factor. This value can be read in SI units of liters/second per thousand from the I/STAT (or M/STAT) at menu **Pdd**, submenu **AFL**, or from the TAC Xenta 102-AX LNS Plug-In. If the I/STAT display is set for Imperial units, the reading will be in units of Cubic Feet per Minute (CFM) per thousand.

Velocity Pressure in Pascals (nvoAirPressure)

This parameter allows you to view the air flow value in pascals. This value can be read in SI units of Pascals (absolute) from the I/STAT at menu **Pdd**, submenu **Prs**, or from the TAC Xenta 102-AX LNS Plug-In. If the stat display is set for Imperial units, the reading will be in units of inches of Water Column.

DC Input Voltage (nvoRawHWValues.lowDCVoltage)

This parameter presents the current DC input voltage. to monitor and detect possible brown-out conditions. If the voltage drops below 1.636 VDC the controller will deactivate the triacs. This value may be read in tenths of a volt.

Reference Half Scale Voltage (nvoRawHWValues.hlfVrPstvLsVrMin)

Provides the reference half scale voltage at the TAC Xenta 102-AX. This value may be read in tenths of a volt.

Reference Full Scale Voltage (nvoRawHWValues.VrefPositive)

Provides the reference full scale voltage at the TAC Xenta 102-AX. This value may be read in tenths of a volt.

Reference Ground Voltage (nvoRawHWValues.VrefMinus)

Provides the reference ground voltage at the TAC Xenta 102-AX. This value may be read in tenths of a volt.

Damper Actuator (nviRelStpt)

This point reflects the primary damper position, as a percentage, and ranges from 0 to 100 in the chosen engineering units (SI or Imperial). Normally it is controlled by the VAV control program, based on the air volume required to maintain the space temperature. Outputs from the VAV controller to the actuator are not brought out to a terminal board in the integrated configuration, as they are connected directly to the actuator.

Universal Output 1 (nviUnvOutput1)

This is the value status for **Uo1**. It displays in the percentage of the selected engineering units (SI or Imperial) output that is detected on this point.

Universal Output 2 (nviUnvOutput2)

This is the value status for **Uo2**. It displays in the percentage of the selected engineering units (SI or Imperial) output that is detected on this point.

Universal Output 3 (nviUnvOutput3)

This is the value status for **Uo3**. It displays in the percentage of the selected engineering units (SI or Imperial) output that is detected on this point.

Free Points

Each of the inputs can generate a level percent value that could be used for other applications or for monitoring. Any of the hardware outputs can be bound from the network to a percent load standard network variable type. This will allow some other controller to control the outputs on this controller.

Glossary

FTT

Free topology transceiver.

LonTalk®

A protocol developed by Echelon® Corporation based upon the open systems interconnection (OSI) model developed by the International Standard Organization (ISO). Designed to support the needs of application across a broad range of industries and requirements, the protocol is presented to programmers and installers as a collection of services that may be optionally invoked. Typically, an installer may change a service choice when installing or reconfiguring a node in a particular LONWORKS application.

LonWorks®

A system for manipulating the open architecture variables and configuration parameters in a LonTalk-based device.

Neuron IC

A processor produced by e g Toshiba or Cypress and used as the enabling processor for LonTalk based products.

Neuron I.D.

The unique identification number of a particular Neuron IC device.

Service Request/Service Pin

A Neuron IC sends a broadcast message containing its Neuron ID and program ID to a LONWORKS application.

Pinout Chart

TAC Xenta 102-AX

Location: _____

Location I.D. Number: _____

Input	Terminal Block	Point Type/ Address	Point Description
U1	TB5-1	Ui1	Duct Temperature, Local Emergency Command or Universal Input Point
U2	TB5-2	Ui2	Local Occupancy or Universal Input Point
U3	TB5-3	Ui3	CO ₂ Sensor, Outside Air Temperature Sensor, or Universal Input Point
U4	TB5-4	Ui4	S/STAT Setpoint Adjustment and S/STAT Occupied Button or Universal Input Point
Output	Terminal Block	Point Type/ Address	Point Description
V1	TB2-1 (24VAC)	Uo1	Fan
V2	TB2-2 (24VAC)	Uo2	Heating Stage 1
V3	TB2-3 (24VAC)	Uo3	Heating Stage 2

Specifications

Dimensions

TAC Xenta 102-AX:

Housing: 197 mm × 159 mm × 64 mm (7.75"W × 6.25"L × 2.5"H)

PCB: 102 mm × 178 mm (4.8" W × 3.425" L)

I/STAT and S/STAT: 70 mm × 114 mm × 23 mm (2.75"W × 4.5"L × 0.9"D)

Damper Shaft Mounting Screws

Torque Minimum: Varies according to shaft material

Torque Maximum: 3.4 N • m (30 inch-pounds)

Torx head (T25) screws #10-32

Operating Environment

Temperature: 0°C to 50°C (32°F to 122°F)

Humidity: 10% to 90%, non-condensing

Input power:

24 VAC @ 9VA + output load, 4 A fused (with I/STAT)

24 VAC @8 VA + output load, 4 A fused (without I/STAT)

Cables

G and G0:

Min. cross-sectional area 0,75 and 1,5 mm².

Cable with modular jack for RS232 serial communication port: Max. 10 m (32 ft).

C1 and C2:

TP/FT-10 allows the user to wire the control devices with virtually no topology restrictions. The max. wire distance in one segment depends on the type of wire and the topology, see the table below.

The TAC Xenta Network guide gives a more detailed description.

I/STAT, S/STAT, and TTS100WJ: 18–24 AWG three conductor cable or shielded, twisted pair (Belden 9184 equivalent) 30 m (100 ft) maximum from the controller. Total capacitance may not exceed 4 000 pF.

The S/STAT will require four conductors.

Table 16. Cables

Cable	Max. bus length doubly terminated bus topology m (ft)	Max. node-to-node distance, singly terminated free topology m (ft)	Max. length, singly terminated free topology m (ft)
Belden 85102, single twisted pair	2700 (9000)	500 (1600)	500 (1600)
Belden 8471, single twisted pair	2700 (9000)	400 (1300)	500 (1600)
UL Level IV 22AWG, twisted pair	1400 (4600)	400 (1300)	500 (1600)
Connect-Air 22AWG, one or two pairs	1400 (4600)	400 (1300)	500 (1600)
Siemens J-Y(st)Y 2x2x0.8 4-wire helical twist, solid, shielded	900 (3000)	320 (1000)	500 (1600)
TIA568A Cat. 5 24AWG, twisted pair	900 (3000)	250 (820)	450 (1500)

Actuator

Clutch release for manual setting of damper position.

Minimum Torque: 6 N • m (53 lb./in)

Rotation Speed:

At 24 VAC 60Hz: 2.0 Sec./Degree (± 0.12)

At 24 VAC 50HZ: 2.4 Sec./Degree (± 0.15)

Single Termination Bus Topology
Double Termination Bus Topology
Star Topology
Loop Topology
Mixed Topology

TAC Xenta 102-AX Inputs

Quantity: 4

AI inputs:

10K ohm Thermistor NTC Dale 1M1002-C3

Range: -10°C to 50°C (14°F to 122°F)

Resolution: 0.1% Span

Accuracy: 0.25% Typical (.5% max) Ratiometric

DI inputs:

Contact excitation: 5 V @ 0.5 mA, contact
input duration 0.2 second minimum

CFM Pressure Input:

Quantity: 1

Span: 0 – 249 Pa (0 – 1.0" Water Column)

Resolution: 1.07 Pa (0.0043" Water Column)

Accuracy: 5% @ 250 Pa (1.00" Water Column)

TAC Xenta 102-AX Outputs

Quantity: 3 on terminal block

Type: 3 low voltage triac, voltage sourcing

24 VAC @ 0.75 A max. each output (2.0 A max. total)

Operating Mode: 2-position, 3-state Floating,
Time Proportional Modulation

Communications Port

Tranceiver: FTT-10A LON® (TP/FT-10)

Baud rate: 78KBPS

Index

A – B

actuator

- description of 11
- internal floating damper 11

Adr 42

AFC 39, 40

AFL 46, 47

AHS 42, 43

air velocity sensor

- description of 11
- installation of 15
- resolution 11

airflow calibration

See calibration techniques.

airflow filter coefficient 40

airflow parameters 38–40

- AFC 39, 40
- CbC 40
- CHF 38, 39
- CLF 38, 39
- CoH 39, 41
- CoL 39, 41
- CPH 38, 40
- CPL 38, 40
- CSL 39
- FCS 39, 40
- FoF 41
- Fon 41
- HAF 38, 39
- HHF 38, 39
- HLF 38, 39
- SLF 38, 39
- UAF 40

auxiliary heating stages 43

bC 32, 33

box constant calibration 28

C

cables

- I/STAT, specification 51
- S/STAT, specification 51

calibrate

- box constant 40
- primary high flow 40
- primary low flow 40
- space sensor 36, 37

calibration techniques

- box constant 28
- definition of 27
- one point 27
- space sensor 29
- two point 28

Call key 7

capacitance calculation
network cables 4

Cb 35, 37

CbC 40

Cdr 42, 43

CFM

pressure input specifications 52

CHF 38, 39

CLF 38, 39

close damper direction 43

CO₂

- high limit 41
- low limit 41

CO₂ sensor 45

connection of 19

CoH 39, 41
 CoL 39, 41
 cooling band 35, 37
 CPH 38, 40
 CPL 38, 40
 CSL 39
 CSS 36, 37

D

dAc 46, 48
 damper shaft
 optional adapters for 14
 dCI 46, 47
 dEP 32, 35
 DI
 connection of 19
 TB5 19
 dimensions
 I/STAT 5, 51
 of controller 3
 S/STAT 9, 51
 TTS100WJ 10
 DIP switches
 location of 3
 discrete input
 See DI
 See inputs, DI

dS 32, 33

E

earth ground 21
 effective setpoint source 37
 electrical service earth ground 21
 Enter key 8
 ESS 35, 37
 EU 32, 35

F

factory calibration setting 40
 FAn 42
 fan type 42
 FCS 39, 40
 Fd 32, 34
 flow detection probe 11
 Fo 32, 34
 FoF 41
 Fon 41
 Free Points 48
 FS 32, 34
 FTT LAN
 cable 4, 18
 connection of 18
 description of 4
 grounding 5
 LEDs 5
 TB3 4

G

grounding
 earth ground 21
 FTT LAN 5
 I/STAT 16

inputs 21
 operational errors, symptoms 3
 outputs 20
 power supply 21

H

HAF 38, 39
 hardware parameters 41–45
 Adr 42
 AHS 42, 43
 Cdr 42, 43
 FAn 42
 I1S 42, 43
 I2S 42, 44
 I3S 42, 45
 I4S 42, 45
 Hb 35, 37
 Hd 32, 33
 heating band 35, 37
 heating setpoint 35
 HHF 38, 39
 HLF 38, 39
 HnS 32, 34
 Ho 32, 34
 HS 32, 33
 HSP 35

I

I/STAT
 cable run 16
 call key 7
 description of 5
 dimensions of 5
 function push-buttons
 Enter key 8
 installation of 16
 keypad 6
 description of 6
 location of 6
 LEDs

normal mode 8
 prove performance 8
 service mode 8
 LON node service request 7
 On/Off key 7
 operations 22
 parameters
 HP 7
 oP 7
 Pnt 7
 UP 7
 service key 7
 TB4 16
 three-digit display 5
 I1S 42, 43
 I2S 42, 44
 I3S 42, 45
 I4S 42, 45
 input
 1 selection 43
 2 selection 44
 3 selection 45
 4 selection 45
 inputs
 air velocity sensor 11
 CO₂ sensor 11
 CO₂ sensor input connection 19
 DI
 specifications 52
 discrete input connection 19
 external connections for 11
 general specifications 52
 grounding 21
 I/STAT 11
 installation of 16
 See also I/STAT
 location of 3
 overview 3
 S/STAT 11
 installation of 17
 See also S/STAT
 See also air velocity sensor
 thermistor 11
 connection of optional 19
 installation of 17
 See also thermistor
 TTS100 11

installation
 LAN cable 18

L

LAN
 cables 4
 distances 4
See FTT LAN

LAN communications 18

LED
 FTT LAN 5
 Madrid VAV communications 5

LEDs
 communications 3
 FTT LAN 12
 location of 3
 overview 3
 power 12
 Prove Performance function 38
 self-test 3, 12

logical address 42

M

M/STAT
 call key 7
 description of 5
 functions of 9, 10
 HP parameters 7
 keypad 6
 location on S/STAT 9
 location on TTS100WJ 10
 operations 22
 service key 7

mounting of controller
 procedure 14–15
 required area 14

MR-VAV-AX
 dimensions of 3
 mounting procedure 14–15
 required area 14

N

nvoAuxTemp1 43

O

occupancy 44

oCS 35, 37

od 35, 36

oHS 37

On/Off key 7

one point calibration 27

operating Environment 51

operational parameters 35–38
 Cb 35, 37
 CSS 36, 37
 ESS 35, 37
 Hb 35, 37
 HSP 35
 oCS 35, 37
 od 35, 36
 oHS 37
 PP 36, 37
 SAr 35, 36
 SCS 35, 36
 SHS 35, 37
 UCS 35, 36
 UHS 35, 37

outputs
 actuator 11
 bidirectional motor 11
 discrete 11
 location of 3
 overview 3
 pulse width modulation 11
 triacs 11
 connection of 20
 grounding 20
 maximum output 20
 TB2 20

override duration 35, 36

P

Parallel Fan

Start (Off) Airflow 41

Start (On) Airflow 41

parameters

airflow 38–??

AFC 39, 40

CbC 40

CHF 38, 39

CLF 38, 39

CoH 39, 41

CoL 39, 41

CPH 38, 40

CPL 38, 40

CSL 39

FCS 39, 40

FoF 41

Fon 41

HAF 38, 39

HHF 38, 39

HLF 38, 39

SLF 38, 39

UAF 40

hardware 41–45

Adr 42

AHS 42, 43

Cdr 42, 43

FAn 42

I1S 42, 43

I2S 42, 44

I3S 42, 45

I4S 42, 45

operational 35–38

Cb 35, 37

CSS 36, 37

ESS 35, 37

Hb 35, 37

HSP 35

oCS 35, 37

od 35, 36

oHS 37

PP 36, 37

SAr 35, 36

SCS 35, 36

SHS 35, 37

UCS 35, 36

UHS 35, 37

point data display

AFL 46, 47

dAc 46, 48

dCI 46, 47

PrS 46, 47

rFS 46, 47

rg 46, 47

rHS 46, 47

UI1 46, 47

UI2 46, 47

UI3 46, 47

UI4 46, 47

Uo1 46, 48

Uo2 46, 48

Uo3 46, 48

selecting

a discrete parameter 24

a group 24

an analog parameter 24

an input point value 25

an output point value 25

unit 31–35

bC 32, 33

dA 32

dEP 32, 35

dS 32, 33

EU 32, 35

Fd 32, 34

Fo 32, 34

FS 32, 34

Hd 32, 33

HnS 32, 34

Ho 32, 34

HS 32, 33

PF 32

password

default 23

procedure 23

PF 32

pinout chart 50

plenum 3

point data display

AFL 46, 47

dAc 46, 48

dCI 46, 47

PrS 46, 47

rFS 46, 47

rg 46, 47
 rHS 46, 47
 UI1 46, 47
 UI2 46, 47
 UI3 46, 47
 UI4 46, 47
 Uo1 46, 48
 Uo2 46, 48
 Uo3 46, 48
 power supply
 connection of 21
 grounding 21
 input location 3
 location of input 3
 power for
 inputs 3
 outputs 3
 STATs 3
 TB1 21
 type 3
 PP 36, 37
 pressurize 44
 prove performance 36, 37
 PrS 46, 47
 PWM, description of output 11

R

rdA 32
 rFS 46, 47
 rg 46, 47
 rHS 46, 47

S

S/STAT
 cable run 17
 description of 9
 dimensions of 9
 installation of 17
 M/STAT port 9
 slide potentiometer 9
 TB4 17

timed override 9
 SAr 35, 36
 SCS 35, 36
 Service key 7
 Service request
 initiating from an I/STAT 7
 initiating from the NP-VAV 13
 Service request LED
 function of 12
 troubleshooting with 12
 setpoint
 cooling high flow 39
 cooling low flow 39
 heating airflow 39
 heating high flow 39
 heating low flow 39
 occupied cooling 37
 occupied heating 37
 standby air flow 39
 standby cooling 36
 standby heating 37
 unoccupied air flow 40
 unoccupied cooling 36
 unoccupied heating 37
 SHS 35, 37
 SLF 38, 39
 slide potentiometer 9
 space sensor calibration 29
 space temperature sensor
 See I/STAT
 See S/STAT
 See Thermistor
 See TTS100WJ
 STAT adjustment range 35, 36

T

TB1
 grounding 21
 location of 3
 power supply connection 21
 TB2
 triac output connections 20

TB3
description of 4
FTT LAN connection 18
LEDs 5
location of 3, 4

TB4
connection of 18
I/STAT connection 16
location of 3
S/STAT connection 17
space temperature sensor 16–18
thermistor connection 18

TB5
connection of DI 19
location of 3
S/STAT 17
thermistor connection 19

TB5-3
connection of CO₂ sensor 19

thermistor
connection of 19
optional device 19
TB4 18
TB5 19

three-digit display 5

timed override 9

TTS100WJ
description of 10
dimensions of 10
M/STAT port 10

two point calibration 28

U

UAFF 40
UCS 35, 36
UHS 35, 37
UI1 46, 47
UI2 46, 47
UI3 46, 47
UI4 46, 47
UL Flammability 94-5V 3
unit parameters 31–35
bC 32, 33
dAr 32
dEP 32, 35
dS 32, 33
EU 32, 35
Fd 32, 34
Fo 32, 34
FS 32, 34
Hd 32, 33
HnS 34
Hns 32
Ho 32, 34
HS 32, 33
PF 32
Uo1 46, 48
Uo2 46, 48
Uo3 46, 48

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