



TAC Xenta[®] 104-A

Roof Top Unit Controller

The TAC Xenta 104-A is a zone controller for roof top units, small AHU, and unit ventilator applications that have heating, cooling, and economizer functions. The controller keeps a constant zone temperature through sequenced control of the heating, cooling and OA/RA dampers.

By using a discharge air temperature sensor, the discharge and zone temperatures may be controlled in cascade if the TAC Xenta 104-A configuration properties are set accordingly. Cascade control also allows minimum and maximum limiting of the discharge air temperature. The fan On/Off is controlled by a 24 VAC isolated relay contact. The fan mode may be selected to operate continuous during the occupied mode, or cycle with heating or cooling demand from the zone.

The controller is a LonMark compliant device that communicates on a LonTalk TP/FT-10 network via a twisted-pair, polarity insensitive cable. It is able to operate both as a stand-alone unit and as part of a network system. All network variables can be monitored and configured via the network or by using the TAC Xenta OP (version 3.11 or higher).

A selection of wall modules with various options can be used with the TAC Xenta 104-A controller. The wall modules are from the STR100 series.

TECHNICAL DATA

Supply voltage 24 V AC -10% $+20\%$, 50–60 Hz

Power consumption:

Controller with TAC Xenta OP 5 VA

Digital outputs max. 4×19 VA = 76 VA

Total max. 81 VA

Ambient Temperature

Storage -25 °C to $+50$ °C (-13 °F to 122 °F)

Operation -25 °C to $+50$ °C (-13 °F to 122 °F)

Humidity max. 90% RH non-condensing

Mechanical

Enclosure ABS/PC

Enclosure rating IP 30

Flammability class, materials UL 94 5VB

Dimensions see Fig. 1

Weight 0.4 kg (0.88 lb)

Inputs/Outputs

Inputs X2–X3 for fan status and alarm sensor:

Voltage across open contact 23 V DC ± 1 V DC

Current through closed contact 4 mA

Minimum pulse input duration 17 s

Outputs V1–V4 for heating/cooling (triac):

Type of actuator increase/decrease

Minimum output voltage supply voltage $- 1.5$ V

Maximum load 0.8 A

Relay outputs for fan on-off control, K1 and KC1:

Maximum voltage 24 V AC

Maximum load 2 A

Input for bypass button on wall module:

Minimum pulse input duration 250 ms

Inputs for zone temperature and discharge/mixed air sensors,

B1–B2:

Thermistor type NTC, 1800 Ohm at 25 °C (77 °F)

Measuring range -10 °C to 50 °C (14 °F to 122 °F)

Accuracy $\pm 0,2$ °C ($\pm 0,4$ °F)

Input R1, setpoint adjustment on wall module:

Type 10 kOhm linear potentiometer

Adjustment range ± 5 °C (± 9 °F)

Accuracy $\pm 0,1$ °C ($\pm 0,2$ °F)

Application Program

Cycle time 5 s

Indication LED Colors

Power On green

Service red

LonMark Standard

. LonMark Interoperability Guidelines

. LonMark Functional Profile: RTU Controller

Communication protocol LonTalk

Physical channel TP/FT-10, 78 kbps

Neuron type 3150, 10 MHz

Agency Compliances

Emission:

CE EN 61000-6-3, C-Tick, FCC Part 15

Immunity:

CE EN 61000-6-1

Safety:

CE EN 61010-1

UL 916, C-UL US, Enclosed Energy Management Equipment (TAC Xenta 104-A/24)

Approved for plenum installations (TAC Xenta 104-A/24)

RoHS directive 2002/95/EG

Part Numbers

Controller 007305910

Manual 04-00068-01

Plug-in Terminal Blocks TAC Xenta 100 007309140

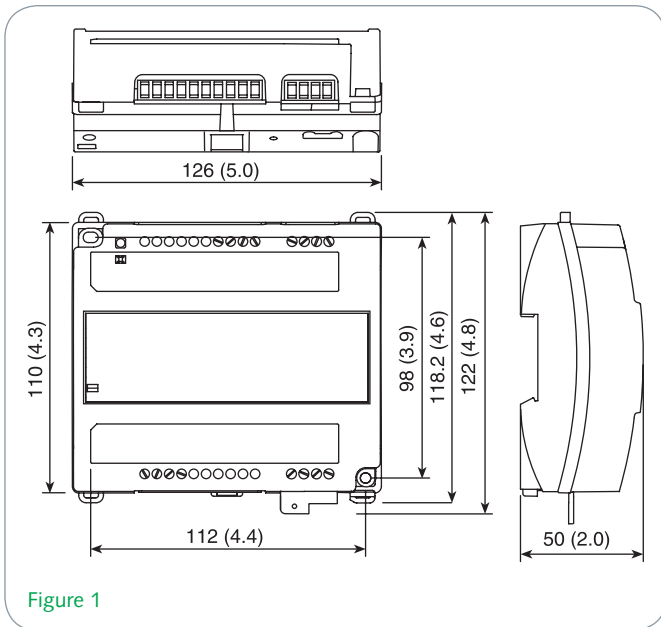


Figure 1

APPLICATION EXAMPLE

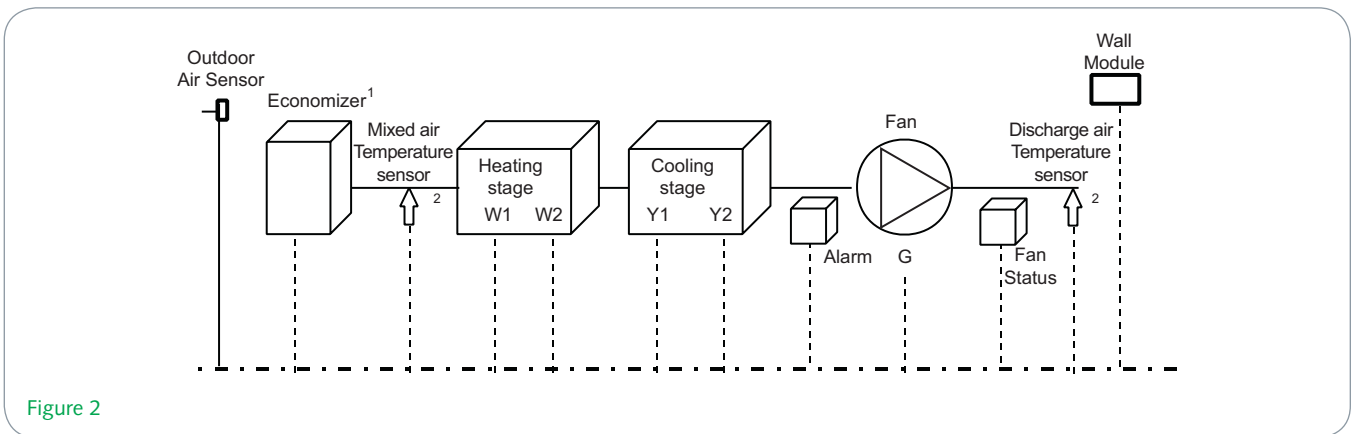


Figure 2

- 1) Only relevant in stand alone installations.
 - 2) One of the sensors can be used in a stand alone installation.
- Both can be used in a network installation.

MAIN FUNCTIONS

The TAC Xenta 104-A controller can be applied to the following HVAC systems:

- Standard RTU with 2 stage cool, 2 stage heat. (With or without economizer).
- Standard RTU with modulating tri-state re-heat instead of 2-stage heat. (With or without economizer).
- Split HVAC systems with 2 stage cool, 2 stage heat, (With or without economizer).
- Unit ventilators with tri-state heat, economizer, (with or without DX).
- Fan Coil Units with tri-state heat, economizer, (with or without DX).
- Standard "Residential" style furnace with or without DX.
- Very small AHUs with 2 stage cooling, 2 stage or tri-state heating. (With or without economizer).

The functions of TAC Xenta 104-A are determined by the occupancy mode, the application mode and the node state.

When the zone temperature falls below the heating setpoint, heating outputs will be staged On in sequence. If tri-state heating is selected, the increase output will begin to pulse On to open the tri-state heating valve. When the heating setpoint is satisfied, the two stage heating outputs will sequence off. If tri-state heating is selected, the decrease output will begin to pulse On to close the tri-state heating valve. When the zone temperature rises above the present cooling setpoint, cascade mixed air temperature control will modulate the economizer damper if the economizer is enabled via the floating lockout setpoint. When the economizer reaches 100%, or if the economizer is locked out, the two cooling outputs will be staged On in sequence. This cooling sequence is reversed when the room temperature falls below the cooling setpoint.

A minimum economizer damper position is set to maintain minimum ventilation requirements as determined by the facilities engineer.

Cascade Control

Cascade temperature control allows the zone temperature deviation from setpoint to establish an inversely reset discharge and/or mixed air temperature setpoint decreases, and vice versa. The minimum and maximum discharge and/or mixed air temperature setpoints can be adjusted using configuration parameters. Economizer and tri-state heating control are always based on cascade control.

Low Temperature Protection

When the zone temperature falls below an adjustable limit, the controller goes into the heating mode to ensure low temperature protection in the "Off" and "Fan only" modes.

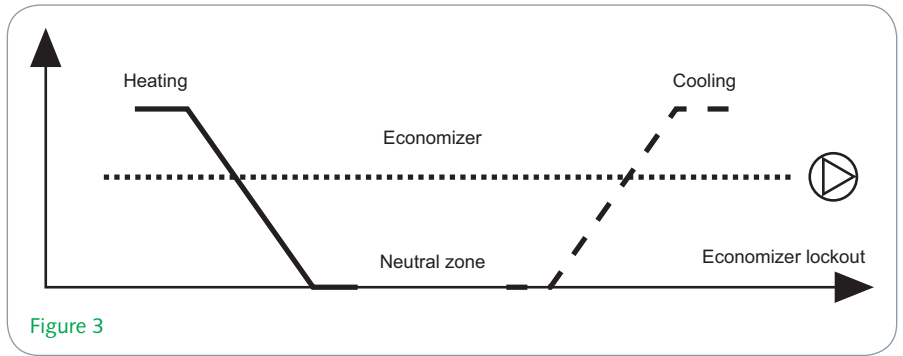


Figure 3

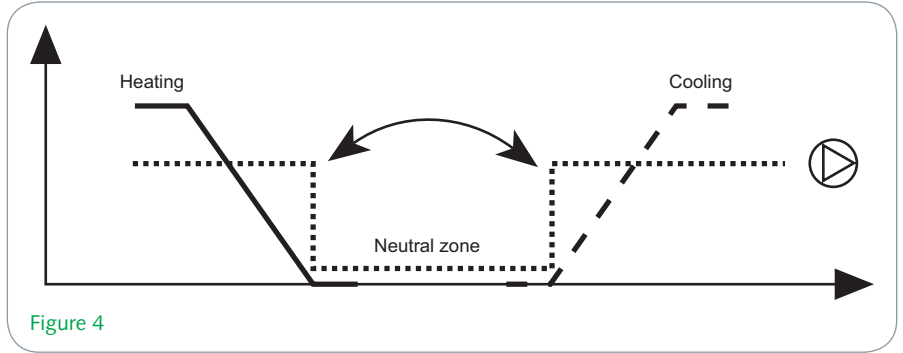


Figure 4

CONTROL FUNCTIONS

Economizer

The economizer will function only in the cooling or Auto changeover modes. The economizer will stay at the minimum position setpoint when the controller is in the "Comfort" operating mode. The economizer output is controlled via a PI regulator that normally uses the sensor connected to B2 as its input.

There is a built in software lock to hold the economizer at 100% outdoor air position if outdoor air is useful for cooling when any stage of mechanical cooling is on. This will provide maximum energy savings and prevent economizer damper hunting when the mechanical cooling is cycling on and off.

Cooling (DX)

The cooling outputs are controlled by a PI regulator that uses room temperature as its input. If cooling is allowed and outdoor temperature is above cooling lockout setpoint, it will sequence the two outputs on. The outputs have an adjustable anti-cycle timer for short cycle protection. An NV is available to read on the network to indicate the percent of cooling called for by the cooling regulator. The PI regulator tuning parameters can be adjusted via the TAC Xenta OP or an NV.

Staged Heating

The heating outputs are controlled by a PI regulator that uses room temperature as its input. If heating is allowed it will sequence the two outputs on. The heating outputs do not have a fixed delay set point. The timing and delay function is a result of the PI regulator.

Tri-state Heating

The heating outputs can be configured as tri-state control for controlling a heating valve in Unit Ventilator or small AHU applications. When tri-state is selected and the outdoor temperature is supplied as an NV (in a networked system), the heating controller uses the sensor connected to terminal U1.

When used as a stand alone controller (U1 used for outdoor air), the heating controller instead uses the sensor connected to terminal B2 and its value for heating as well as economizer control.

If a thermo actuator is used for heating and some modulation is desired then it must be connected to the increase output. Also the P and I band must be set very low to allow the output to operate as soon as the demand for heat exists. When heating demand is 100% the output will be on continually.

Night Free Cooling Mode

This can be accomplished by sending the operating mode "cooling only", then sending an NV for reduced room temperature set-points, and sending an NV for cooling lockout.

Sensor Options

If the controller is networked, the sensor connected to terminal B2 should be used as a mixed air sensor for economizer control and a sensor connected to U1 should be used as a discharge air sensor if set up for tri-state heating control. Then an NV for outdoor air temperature has to be used.

If a controller is set up as a stand-alone RTU control, then the sensor connected to terminal U1 must be outdoor air

temperature. This is used for economizer and compressor lockout. The sensor connected to terminal B2 is again used for mixed air temperature.

If set up as a stand-alone small Unit Ventilator controller (tri-state), the sensor connected to terminal B2 must be installed in the discharge air stream since it will be used as real value for both heating and economizer control.

If the controller is set-up using an NV for outdoor air temperature, the supply air temperature can be monitored and displayed at the TAC Xenta OP (nvoDisch-AirTemp), TAC Vista or bound to a NV in a TAC Xenta 300 or TAC Xenta 400.

This will provide a fully functional RTU control system, either stand-alone or networked. A network system can display both the mixed and supply air temperature for monitoring and diagnostics.

LOCKOUT FUNCTIONS

Economizer

There are three economizer lockout options. First, if the outdoor temperature sensor is connected and configured it will be used to determine economizer lockout. Second, if the outdoor sensor is not connected, an NV must be sent to give the controller the outdoor air temperature. Third, an enthalpy NV may be sent to the controller and an enthalpy lockout setpoint used to determine economizer operation. The economizer is also locked out on a loss of fan proof.

Cooling (DX)

If the outdoor temperature sensor is connected and configured it will be used to determine cooling lockout. If it is not connected then an NV must be sent to give outdoor temperature. Cooling is locked out on a loss of fan proof.

Heating

Locked out on a loss of fan proof.

OPERATING MODES

The RTU controller can be set to three different control modes: Occupied, Unoccupied, Bypass; and to five different control configurations: Heating only, Cooling only, Auto changeover, Fan only and Off. The emergency modes also allow a smoke purge mode or shutdown mode.

Fan Function Mode

Fan operation during the Comfort mode can be configured for continuous operation or fan cycling with zone heating/cooling functions.

When fan configuration is set for "Cycling", the fan will be Off until the zone temperature controller calls for heating or cooling.

INSTALLATION

The controller may be mounted on a DIN rail or fastened onto a ceiling or a wall with screws. Two sockets are provided for that purpose.

CABLES

Communication cables: refer to the TAC Xenta Network Guide, part number 0-004-7460.

Other cables: maximum length 30 m (100 ft), minimum wire size of 0.7 mm² (18 AWG) applies to all other cables and all other equipment. The cables are to be twisted, but not shielded.

CONFIGURATIONS OPTIONS

By changing the network variable nci-AppOptions (see fig. 6), it is possible to achieve different options in TAC Xenta 103-A.

The factory setting of the controller is that all auxiliary units are disabled. Below is a list of the different options:

- Occupancy sensor enabled/disabled
- Occupancy sensor normally open/normally closed
- Window contact enabled/disabled
- Heating valve enabled/disabled
- Cooling valve enabled/disabled
- Cooling damper enabled/disabled
- Carbon dioxide sensor and air quality controller enabled/disabled
- Heating valve actuator is of ON/OFF type/three-point increase/decrease
- Slave mode disabled/enabled
- Thermal actuator NC/NO

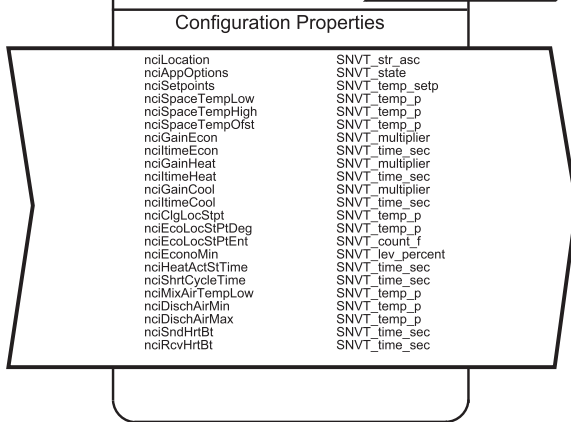
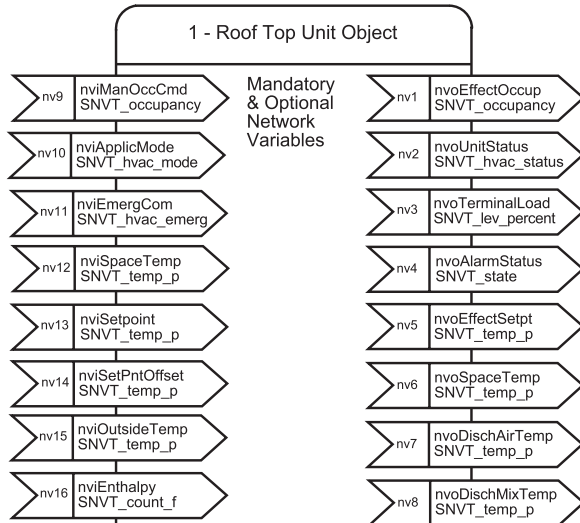
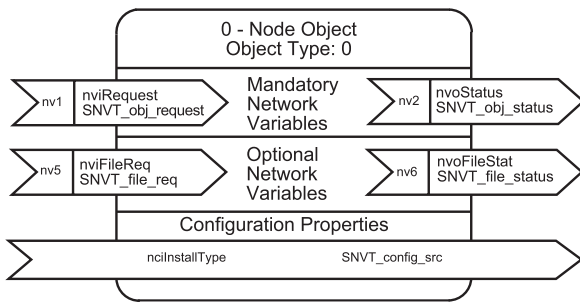


Figure 5: LonMark Objects and Network Variables

HARDWARE INTERFACE

Term. No.	Term. Name	Description
1	C1	TP/FT-10 communication channel
2	C2	TP/FT-10 communication channel
3	X3	Input, alarm
4	M	Measurement neutral
5	X2	Input, fan status
6	B2	Input, discharge/mixed air temperature sensor
7	M	Measurement neutral
8	U1	Input, OA/discharge air temperature sensor
9	D1	Output, indication on wall module
10	M	Measurement neutral
11	X1	Input, bypass button on wall module
12	R1	Input, setpoint offset dial on wall module
13	M	Measurement neutral
14	B1	Input, temperature sensor
15	G	24 V AC (G) input
16	G0	24 V AC (G0) input
17	OP	24 V AC supply for TAC Xenta OP
18	G	24 V AC supply for TAC Xenta OP
19	V1	Heating Stage 1 / increasing
20	VC1	Heating Common V1 / V2
21	V2	Heating Stage 2 / decreasing
22	V3	Cooling Stage 1
23	VC2	Cooling Common V3 / V4
24	V4	Cooling Stage 2

Term. No.	Term. Name	Description
25	M	Economizer Signal Common
26	Y1	Economizer Signal 2-10 VDC
27	K1	Fan Start / Stop 24 VAC
28	KC1	Fan Common 24 VAC

ROOM UNITS

The STR is a series of wall modules optimized for public facilities such as office buildings, hotels, hospitals, schools, and shopping malls.

The following room units can be configured with the TAC Xenta 104-A.

Model	Temp. Sensor	Mode Indicator	Setpoint Offset	Bypass Button	Back Light	SNVT Binding Required
STR100	X					
STR101	X	X				
STR102	X	X	X			
STR103	X	X		X		
STR104	X	X	X	X		
STR150	X	X	X	X		
STR350	X	X	X	X		X
STR351	X	X	X	X	X	X

PART NUMBERS

STR100	004600100
STR100-W (White)	004600110
STR101	004600200
STR102	004600300
STR103	004600700
STR104	004600400
STR150	004602800

LON Modules

STR350	004605000
STR351	004605100

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