

# TEC226x-4(+PIR) and TEC220x-4(+PIR) Series LONWORKS® Network Staged Thermostat Controllers

Technical Bulletin

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# TEC226x-4(+PIR) and TEC220x-4(+PIR) Series LONWORKS® Network Staged Thermostat Controllers

## Technical Bulletin

### Network Variables (NVs) and Configuration Parameters (CPs) List

Table 1 shows the NVs and CPs for the TEC226x-4(+PIR) and TEC220x-4(+PIR) Series Thermostat Controllers. Each Network Variable Input (NVI), Network Variable Output (NVO), and Network Configuration Input (NCI) has a reference number as defined in the XIF Resource File, and some objects have a subcategory number.

The Bit column shows the bit number for each of the entry fields. If a value is supplied, the true Metasys® Target reference is the value + 1. For example, if the Bit column has a value of 0, then the true mapping index is 1. You must know the true mapping index when mapping LONWORKS® Point Objects into a Metasys system.

The Metasys Target Reference is equal to the value in the **No.** column plus the value in the **Sub** column or **Bit** column (if available) in the format **NV.<No. >.<Bit/Sub>**. For example, using filter alarm for nvoScsStatus as an example, the Metasys Target Reference is **NV.22.14**.

**Note:** If the format has not been changed from the default SNVT\_state\_64, when viewed using a LONWORKS network configuration tool, the nvoScsStatus screen is a 64-bit field, one for each entry field.

**Table 1: NVs and CPs per Model (Part 1 of 5)**

No.	Sub	Bit	Metasys Target Reference	NV or CP Name	Model							
					TEC2264-4(+PIR) Econ, Prog.	TEC2204-4(+PIR) Econ, NonProg.	TEC2263-4(+PIR) Multi-Stage, Prog.	TEC2203-4(+PIR) Multi-Stage, NonProg.	TEC2261-4(+PIR) Single Stage, Prog.	TEC2201-4(+PIR) Single Stage, NonProg.	TEC2262-4(+PIR) Heat Pump, Prog.	TEC2202-4(+PIR) Heat Pump, NonProg.
0			NV.0	nviSpaceTemp	X	X	X	X	X	X	X	X
1			NV.1	nviOutdoorTemp	X	X	X	X	X	X	X	X
2			NV.2	nviOccManCmd	X	X	X	X	X	X	X	X
3			NV.3	nviApplicMode	X	X	X	X	X	X	X	X
4			NV.4	nviSetPoint	X	X	X	X	X	X	X	X
5			NV.5	nviTimeSet	X	N/A	X	N/A	X	N/A	X	N/A
6			NV.6	nciDaySched[0]	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.6.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.6.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A

**Table 1: NVs and CPs per Model (Part 2 of 5)**

No.	Sub	Bit	Metasys Target Reference	NV or CP Name	Model							
					TEC2264-4(+PIR) Econ, Prog.	TEC2204-4(+PIR) Econ, NonProg.	TEC2263-4(+PIR) Multi-Stage, Prog.	TEC2203-4(+PIR) Multi-Stage, NonProg.	TEC2261-4(+PIR) Single Stage, Prog.	TEC2201-4(+PIR) Single Stage, NonProg.	TEC2262-4(+PIR) Heat Pump, Prog.	TEC2202-4(+PIR) Heat Pump, NonProg.
	3		NV.6.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.6.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>7</b>			<b>NV.7</b>	<b>nciDaySched[1]</b>	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.7.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.7.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A
	3		NV.7.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.7.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>8</b>			<b>NV.8</b>	<b>nciDaySched[2]</b>	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.8.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.8.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A
	3		NV.8.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.8.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>9</b>			<b>NV.9</b>	<b>nciDaySched[3]</b>	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.9.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.9.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A
	3		NV.9.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.9.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>10</b>			<b>NV.10</b>	<b>nciDaySched[4]</b>	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.10.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.10.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A
	3		NV.10.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.10.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>11</b>			<b>NV.11</b>	<b>nciDaySched[5]</b>	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.11.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.11.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A
	3		NV.11.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.11.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>12</b>			<b>NV.12</b>	<b>nciDaySched[6]</b>	X	N/A	X	N/A	X	N/A	X	N/A
	1		NV.12.1	occupied_event_1	x	N/A	x	N/A	x	N/A	x	N/A
	2		NV.12.2	unoccupied_event_2	x	N/A	x	N/A	x	N/A	x	N/A
	3		NV.12.3	occupied_event_3	x	N/A	x	N/A	x	N/A	x	N/A
	4		NV.12.4	unoccupied_event_4	x	N/A	x	N/A	x	N/A	x	N/A
<b>13</b>				<b>nciSetPts</b>	X	X	X	X	X	X	X	X
	1		NV.13.1	occupied_cool	x	x	x	x	x	x	x	x
	2		N/A	standby_cool	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3		NV.13.3	unoccupied_cool	x	x	x	x	x	x	x	x
	4		NV.13.4	occupied_heat	x	x	x	x	x	x	x	x
	5		N/A	standby_heat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	6		NV.13.6	unoccupied_heat	x	x	x	x	x	x	x	x

**Table 1: NVs and CPs per Model (Part 3 of 5)**

No.	Sub	Bit	Metasys Target Reference	NV or CP Name	Model							
					TEC2264-4(+PIR) Econ, Prog.	TEC2204-4(+PIR) Econ, NonProg.	TEC2263-4(+PIR) Multi-Stage, Prog.	TEC2203-4(+PIR) Multi-Stage, NonProg.	TEC2261-4(+PIR) Single Stage, Prog.	TEC2201-4(+PIR) Single Stage, NonProg.	TEC2262-4(+PIR) Heat Pump, Prog.	TEC2202-4(+PIR) Heat Pump, NonProg.
<b>14</b>				<b>nciCfg1RtuHp</b>	X	X	X	X	X	X	X	X
Associate with UNVT_cfg_1_rtu_hp format file												
	1		NV.14.1	password	x	x	x	x	x	x	x	x
	2		NV.14.2	unoccupied_timer	x	x	x	x	x	x	x	x
	3		NV.14.3	anticycle	x	x	x	x	x	x	x	x
	4		NV.14.4	power_up_delay	x	x	x	x	x	x	x	x
	5		NV.14.5	temporary_occ_time	x	x	x	x	x	x	x	x
	6		NV.14.6	heating_stages_CPH	x	x	x	x	x	x	x	x
	7		NV.14.7	cooling_stages_CPH	x	x	x	x	x	x	x	x
	8		NV.14.8	heat_max_setpoint	x	x	x	x	x	x	x	x
	9		NV.14.9	cool_min_setpoint	x	x	x	x	x	x	x	x
	10		NV.14.10	OA_temp_heat_lockout	x	x	x	x	x	x	x	x
	11		NV.14.11	OA_temp_cool_lockout	x	x	x	x	x	x	x	x
	12		NV.14.12	calib_room_sensor	x	x	x	x	x	x	x	x
	13		NV.14.13	calib_outside_air_sensor	x	x	x	x	x	x	x	x
	14		NV.14.14	deadband	x	x	x	x	x	x	x	x
	15		NV.14.15	fan_mode	x	x	x	x	x	x	x	x
	16		NV.14.16	fan_control	x	x	x	x	x	x	x	x
	17		NV.14.17	fan_delay	x	x	x	x	x	x	x	x
	18		NV.14.18	keypad_lockout	x	x	x	x	x	x	x	x
	19		NV.14.19	proportional_band	x	x	x	x	x	x	x	x
	20		NV.14.20	temperature_units	x	x	x	x	x	x	x	x
	21		NV.14.21	frost_protection	x	x	x	x	x	x	x	x
	22		NV.14.22	menu_scroll	x	x	x	x	x	x	x	x
<b>15</b>				<b>nciCfg2RtuHp</b>	X	X	X	X	N/A	N/A	X	X
Associate with UNVT_cfg_2_rtu_hp format file												
	1		NV.15.1	di1_config	x	x	x	x	x	x	x	x
	2		NV.15.2	di2_config	x	x	x	x	x	x	x	x
	3		NV.15.3	aux_contact_config	x	x	x	x	x	x	x	x
	4		NV.15.4	number_of_events	x	N/A	x	N/A	x	N/A	x	N/A
	5		NV.15.5	progressive_recovery	x	N/A	x	N/A	x	N/A	x	N/A
	7		NV.15.7*	a.hp_rev_valve_config	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	8		NV.15.8**	a.number_of_heating_stages	x	x	x	x	N/A	N/A	N/A	N/A
	9		NV.15.9	number_of_cool_or_hp_stages	x	x	x	x	N/A	N/A	x	x
	10		NV.15.10	econo_min_position	x	x	N/A	N/A	N/A	N/A	N/A	N/A
	12		NV.15.12*	b.hp_high_balance_point	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	13		NV.15.13**	b.econo_changeover_setpoint	x	x	N/A	N/A	N/A	N/A	N/A	N/A
	15		NV.15.15*	c.hp_low_balance_point	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	16		NV.15.16**	c.econo_mixed_air_setpoint	x	x	N/A	N/A	N/A	N/A	N/A	N/A
	18		NV.15.18*	d.hp_comfort_or_economy_mode	N/A	N/A	N/A	N/A	N/A	N/A	x	x

**Table 1: NVs and CPs per Model (Part 4 of 5)**

No.	Sub	Bit	Metasys Target Reference	NV or CP Name	Model							
					TEC2264-4(+PIR) Econ, Prog.	TEC2204-4(+PIR) Econ, NonProg.	TEC2263-4(+PIR) Multi-Stage, Prog.	TEC2203-4(+PIR) Multi-Stage, NonProg.	TEC2261-4(+PIR) Single Stage, Prog.	TEC2201-4(+PIR) Single Stage, NonProg.	TEC2262-4(+PIR) Heat Pump, Prog.	TEC2202-4(+PIR) Heat Pump, NonProg.
	19		NV.15.19**	d.econo mechanical_cool_enable	x	x	N/A	N/A	N/A	N/A	N/A	N/A
	20		NV.15.20	hp compressor_auxheat_interlock	N/A	N/A	N/A	N/A	N/A	N/A	x	x
*Used for heat pump models, do not map for rooftop models.												
**Used for rooftop models, do not map for heat pump models.												
<b>16</b>			<b>NV.16</b>	<b>nciHvacType</b>	X	X	X	X	X	X	X	X
<b>17</b>				<b>nciScchModel</b>	X	X	X	X	X	X	X	X
	1		NV.17.1	Thermostat Model	x	x	x	x	x	x	x	x
	2		NV.17.2	Software Version	x	x	x	x	x	x	x	x
<b>18</b>			<b>NV.18</b>	<b>nvoSpaceTemp</b>	X	X	X	X	X	X	X	X
<b>19</b>				<b>nvoUnitStatus</b>	X	X	X	X	X	X	X	X
	1		NV.19.1	mode	x	x	x	x	x	x	x	x
	2		NV.19.2	heat_output_primary	x	x	x	x	x	x	x	x
	3		NV.19.3	heat_output_secondary	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	4		NV.19.4	cool_output	x	x	x	x	x	x	x	x
	5		NV.19.5	econo_output	x	x	N/A	N/A	N/A	N/A	N/A	N/A
	6		NV.19.6	Fan_output	x	x	x	x	x	x	x	x
	7		NV.19.7	in_alarm	x	x	x	x	x	x	x	x
<b>20</b>			<b>NV.20</b>	<b>nvoDischAirTemp</b>	X	X	X	X	X	X	X	X
<b>21</b>			<b>NV.21</b>	<b>nvoEffectOccup</b>	X	X	X	X	X	X	X	X
<b>22</b>				<b>nvoScchStatus</b>	X	X	X	X	X	X	X	X
For all non heat pump models, associate with UNVT_thermo_state_rtu												
	1	2	NV.22.3	fan_output	x	x	x	x	x	x	N/A	N/A
	2	3	NV.22.4	cooling_stage_1	x	x	x	x	x	x	N/A	N/A
	3	4	NV.22.5	cooling_stage_2	x	x	x	x	N/A	N/A	N/A	N/A
	4	5	NV.22.6	auxiliary_contact	x	x	x	x	x	x	N/A	N/A
	5	6	NV.22.7	heating_stage_1	x	x	x	x	x	x	N/A	N/A
	6	7	NV.22.8	heating_stage_2	x	x	x	x	x	x	N/A	N/A
	7	12	NV.22.13	service_alarm	x	x	x	x	x	x	N/A	N/A
	8	13	NV.22.14	filter_alarm	x	x	x	x	x	x	N/A	N/A
	9	17	NV.22.18	di2_direct_status	x	x	x	x	x	x	N/A	N/A
	10	18	NV.22.19	di1_direct_status	x	x	x	x	x	x	N/A	N/A
	11	22	NV.22.23	set_clock_alarm	x	N/A	x	N/A	x	N/A	N/A	N/A
	12	23	NV.22.24	frost_protection_alarm	x	x	x	x	x	x	N/A	N/A
	13	24	NV.22.25	local_pir_motion	x	x	x	x	x	x	N/A	N/A
	14	25	NV.22.26	fan_lock_alarm	x	x	x	x	x	x	N/A	N/A
For all heat pump models, associate with UNVT_thermo_state_hp												
	1	2	NV.22.3	fan_output	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	2	3	NV.22.4	compressor_stage_1	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	3	4	NV.22.5	compressor_stage_2	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	4	5	NV.22.6	auxiliary_contact	N/A	N/A	N/A	N/A	N/A	N/A	x	x

**Table 1: NVs and CPs per Model (Part 5 of 5)**

No.	Sub	Bit	Metasys Target Reference	NV or CP Name	Model							
					TEC2264-4(+PIR) Econ, Prog.	TEC2204-4(+PIR) Econ, NonProg.	TEC2263-4(+PIR) Multi-Stage, Prog.	TEC2203-4(+PIR) Multi-Stage, NonProg.	TEC2261-4(+PIR) Single Stage, Prog.	TEC2201-4(+PIR) Single Stage, NonProg.	TEC2262-4(+PIR) Heat Pump, Prog.	TEC2202-4(+PIR) Heat Pump, NonProg.
	5	6	NV.22.7	heating_stage_1	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	6	7	NV.22.8	reversing_valve	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	7	12	NV.22.13	service_alarm	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	8	13	NV.22.14	filter_alarm	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	9	17	NV.22.18	di2_direct_status	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	10	18	NV.22.19	di1_direct_status	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	11	22	NV.22.23	set_clock_alarm	N/A	N/A	N/A	N/A	N/A	N/A	x	N/A
	12	23	NV.22.24	frost_protection_alarm	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	13	24	NV.22.25	local_pir_motion	N/A	N/A	N/A	N/A	N/A	N/A	x	x
	14	25	NV.22.26	fan_lock_alarm	N/A	N/A	N/A	N/A	N/A	N/A	x	x
<b>23</b>			<b>NV.23</b>	<b>nvoEffectSetpt</b>	X	X	X	X	X	X	X	X
<b>24</b>			<b>NV.24</b>	<b>nvoSetpoint</b>	X	X	X	X	X	X	X	X
<b>25</b>			<b>NV.25</b>	<b>nciSndHrtBt</b>	X	X	X	X	X	X	X	X
<b>26</b>			<b>NV.26</b>	<b>nciMinOutTm</b>	X	X	X	X	X	X	X	X
<b>27</b>			<b>NV.27</b>	<b>nciRcvHrtBt</b>	X	X	X	X	X	X	X	X
<b>28</b>			<b>NV.28</b>	<b>nciMajVer</b>	X	X	X	X	X	X	X	X
<b>29</b>			<b>NV.29</b>	<b>nciMinVer</b>	X	X	X	X	X	X	X	X
<b>30</b>			<b>N/A</b>	<b>nciLocation</b>	x	x	x	x	x	x	x	x

## Network Variable Inputs (NVIs) Table

Table 2: NVIs (Part 1 of 2)

Parameter	NVI Name and SNVT Type	Range and Enumeration Definition
Room Temperature	nviSpaceTemp SNVT_temp_p	Valid Range: -40 to 122°F (-40 to 50.0°C) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data. <b>Note:</b> This NVI allows the temperature setpoint for the occupied mode to be changed via the network. When bound or written to, the internal temperature reading (internal sensor) is no longer used. To change the thermostat back to using its internal sensor, break the bind for bound stats, or for commanded stats, issue a reset to the thermostat. This NVI is subject to the Receive Heartbeat Time, nciRcvHrtBt.
Outdoor Air Temperature	nviOutdoorTemp SNVT_temp_p	Valid Range: -40 to 122°F (-40 to 50.0°C) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data <b>Note:</b> This NVI provides outdoor air temperature information to the thermostat from a bound network temperature value or when an outside air sensor is connected to the OS and Scm terminals. Once bound, or when the outside air sensor is connected, the thermostat automatically displays the value.
Occupancy	nviOccManCmd SNVT_occupancy	0 = OC_OCCUPIED* 1 = OC_UNOCCUPIED* 2 = OC_BYPASS 3 = OC_STANDBY (Not used) 0XFF = OC_NUL (Release to internal schedule)** *OC_OCCUPIED and OC_UNOCCUPIED commands always have authority over the local occupancy routines of the thermostat whether they are through a local input or a PIR cover. **OC_NUL command releases the thermostat controller to use its own internal occupancy routine driven by the local schedule (by a digital input or onboard PIR cover). <b>Note:</b> This NVI commands the Space Comfort Controller into different occupancy modes. It is typically sent by a supervisory node to manually control occupancy modes, or to override the scheduled occupancy. Default Null Value: OC_NUL = 0xFF
System Mode	nviApplicMode SNVT_hvac_mode	0 = HVAC_AUTO (Default) 1 = HVAC_HEAT 2 = HVAC_MRNG_WRMUP (Not used) 3 = HVAC_COOL 4 = HVAC_NIGHT_PURGE (Not used) 5 = HVAC_PRE_COOL (Not used) 6 = HVAC_OFF 7 = HVAC_TEST (Not used) 8 = HVAC_EMERG_HEAT (Not used) 9 = HVAC_FAN_ONLY (Not used) 10 = HVAC_FREE_COOL (Not used) 11 = HVAC_ICE (Not used) 12 = HVAC_MAX_HEAT (Not used) 13 = HVAC_ECONOMY (Not used) 14 = HVAC_DEHUMID (Not used) 15 = HVAC_CALIBRATE (Not used) 16 = HVAC_EMERG_COOL (Not used) 17 = HVAC_EMERG_STEAM (Not used) 0XFF = HVAC_NUL (Not used) <b>Note:</b> This NVI coordinates the Space Comfort Controller with any node that may need to control the heat/cool changeover of the unit. This NVI is subject to the Receive Heartbeat Time, nciRcvHrtBt.

**Table 2: NVIs (Part 2 of 2)**

Parameter	NVI Name and SNVT Type	Range and Enumeration Definition			
<b>Occupied Cooling and Heating Setpoints</b>	<b>nviSetpoint</b> SNVT_temp_p	Occupied Cooling - Valid Range: 54 to 100°F (12 to 37.5°C) Occupied Heating - Valid Range: 40 to 90°F (4.5 to 32°C) Standby Cool Setpoint (Not used) Standby Heat Setpoint (Not used) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data <b>Note:</b> This NVI allows the temperature setpoints for the occupied mode to be changed via the network. The unoccupied setpoints are not changed. <b>Note:</b> If one setpoint of a pair of heating and cooling setpoints (for example, Occupied Heat Setpoint and Occupied Cool Setpoint) is overridden, the other setpoint of the pair may be automatically adjusted by the thermostat to maintain the minimum deadband between the two setpoints.			
<b>Date and Time</b>	<b>nviTimeSet</b> SNVT_time_stamp	Sub	Name	Valid Range	Default Value
		1	year	0 to 3000	0
		2	month	0 to 12	0
		3	day	0 to 31	0
		4	hour	0 to 23	0
		5	minute	0 to 59	0
		6	second	0 to 59	0
		<b>Note:</b> This NVI is used to set the time and date of the Space Comfort Controller. TEC226x-4(+PIR) models only.			

## Network Variable Outputs (NVOs) Table

All NVOs are updated no faster than the Minimum Send Time (nciMinOutTm) configuration value, if used. An NVO transmits immediately when its value changes significantly. Additionally, this variable is also transmitted as a heartbeat output on a regular basis as dictated by the Maximum Send Time (nciSndHrtBt) configuration value.

**Table 3: NVOs (Part 1 of 3)**

Parameter	NVO Name and SNVT Type	Range and Enumeration Definition		
Room Temperature	nvoSpaceTemp SNVT_temp_p	Valid Range: -40 to 122°F (-40 to 50°C) Default Null (release) Value: 621.07°F (327.67°C) 0x7FFF represents invalid data. <b>Note:</b> This NVO monitors the effective space temperature sensor that the Space Comfort Controller is using for control. This output echos the value of the input. In the event of a sensor failure, the value 621.07°F (327.67°C or 0x7FFF) is sent as an invalid value.		
Unit Status	nvoUnitStatus SNVT_hvac_status	Sub	Name	Valid Value
		01	mode	HVAC_HEAT HVAC_MRNG_WRMUP (Not used) HVAC_COOL HVAC_NIGHT_PURGE (Not used) HVAC_PRE_COOL (Not used) HVAC_HVAC_OFF HVAC_HVAC_TEST (Not used) HVAC_HVAC_EMERG_HEAT (Not used) HVAC_FAN_ONLY (Not used) HVAC_MAX_HEAT (Not used)
		02	heat_output_primary	0 to 100%
		03	heat_output_secondary	0 to 100%
		04	cool_output	0 to 100%
		05	econ_output	0 to 100%
		06	fan_output	0 to 100%
		07	In_alarm	0 = No alarms 1 = Alarm On 0xFFFF = Alarm disabled (Not used)
<b>Note:</b> This NVO reports the Space Comfort Controller status. It combines the Operating mode, the capacity of heating and cooling used, and an indicates if any alarms are present in the object.				
Outdoor Temperature	nvoOutdoorTemp SNVT_temp_p	Valid Range: -40 to 122°F (-40 to 50°C) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data <b>Note:</b> This NVO is used to monitor the outdoor air temperature. In the event of a sensor failure, the value 621.07°F (327.67°C or 0x7FFF) is sent as an invalid value. <b>Note:</b> For this to function, an outside air sensor must be connected to the OS and Scm terminals.		

**Table 3: NVOs (Part 2 of 3)**

Parameter	NVO Name and SNVT Type	Range and Enumeration Definition
<b>Supply Temperature</b>	<b>nvoDischAirTemp</b> SNVT_temp_p	Valid Range: -40 to 122°F (-40 to 50°C) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data <b>Note:</b> This NVO is used to monitor the temperature of the air that leaves the Space Comfort Controller. In the event of a sensor failure, the value 621.07°F (327.67°C or 0x7FFF) is sent as an invalid value. <b>Note:</b> For this to function, a supply air sensor must be connected to the MS and Scom terminals.
<b>Occupancy</b>	<b>nvoEffectOccup</b> SNVT_occupancy	0 = OC_OCCUPIED 1 = OC_UNOCCUPIED 2 = OC_BYPASS 3 = OC_STANDBY (Not used) 0XFF = OC_NUL (Release to internal schedule) <b>Note:</b> OC_BYPASS can be initiated by either OccManCmd or a local input. NvoEffectOccup is only in OC_BYPASS for the duration of the ToccTime (nciCfg1RtuHp), until reinitiated by either a transition of the local input or an update to nviOccManCmd. This NVO indicates the actual occupancy mode of the unit. The information is typically reported to a supervisory controller or provided to another Space Comfort Controller to coordinate operation of multiple units. Default Null Value: OC_NUL = 0xFF

**Table 3: NVOs (Part 3 of 3)**

Parameter	NVO Name and SNVT Type	Range and Enumeration Definition			
<b>Thermostat's I/O Status</b>	<b>nvoSccStatus</b> UNVT_thermo_state_rtu UNVT_thermo_state_hp	Bit	Name	Valid Value	Default Value
		2	fan output	0 = Off 1 = On	N/A
		3	cooling stage 1 compressor stage 1	0 = Off 1 = On	N/A
		4	cooling stage 2 compressor stage 2	0 = Off 1 = On	N/A
		5	auxiliary contact	0 = Off 1 = On	N/A
		6	heating stage 1	0 = Off 1 = On	N/A
		7	heating stage 2 reversing valve	0 = Off 1 = On	N/A
		12	service alarm	0 = Off 1 = On	N/A
		13	filter alarm	0 = Off 1 = On	N/A
		17	di2 direct status	0 = Activated 1 = Not Activated	N/A
		18	di1 direct status	0 = Activated 1 = Not Activated	N/A
		22	set clock alarm	0 = Off 1 = On	N/A
		23	frost protection alarm	0 = Off 1 = On	N/A
		24	local pir motion	0 = Off 1 = On	N/A
25	fan lock alarm	0 = Off 1 = On	N/A		
<b>Note:</b> This NVO reports the status of the Space Comfort Controller's inputs and outputs.					
<b>Setpoint</b>	<b>nvoEffectSetpt</b> SNVT_temp_p	Valid Range: 40 to 100°F (4.5 to 37.5°C) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data <b>Note:</b> This NVO is used to monitor the effective temperature setpoint, which may depend on nciSetpoints, nvoEffectOccup, nviSetpoint, and any local setpoint adjustment. For example, if the occupancy state is unoccupied and the heat/cool state is heat, the effective setpoint would be equal to the unoccupied heating setpoint defined in nciSetpoints.			
<b>Local Setpoint Output</b>	<b>nvoSetPoint</b> SNVT_temp_p	Valid Range: 40 to 100°F (4.5 to 37.5°C) Default Null (release) Value: 621.8°F (327.67°C) 0x7FFF represents invalid data <b>Note:</b> This NVO monitors the space temperature setpoint.			

## Configuration Properties (CPs)

Table 4: CP and NCIs (Part 1 of 5)

Parameter	CP Name and NCI Type	Function			
Schedule	nciDay_Sched[x] x = 0 to 6 UNVT_day_sched	Sub	Name	Default Value	
		1	occupied_event_1	0	
		2	unoccupied_event_2	1439	
		3	occupied_event_3	0	
		4	unoccupied_event_4	1439	
		Valid Range: 0 to 1,439 minutes 2 or 4 events can be entered, depending on the nb_of_events variable. Starting and ending times are entered in minutes. For example, 11:59 P.M. is equal to 1439 minutes (23 hours * 60 minutes + 59 minutes) <b>Note:</b> This CP defines the schedule for every day of the week (from Monday (Day 0) to Sunday (Day 6). This NCI is linked with the nvoEffectOccup variable.			
Temperature Setpoints	nciSetPts SNVT_temp_setpt	Sub	Name	Valid Range	Default Value
		1	occupied_cool	54 to 100°F (12 to 37.5°C)	75°F (24°C)
		2	standby_cool	Not Used	N/A
		3	unoccupied_cool	54 to 100°F (12 to 37.5°C)	80°F (26.5°C)
		4	occupied_heat	40 to 90°F (4.5 to 32°C)	72°F (22°C)
		5	standby_heat	Not Used	N/A
		6	unoccupied_heat	40 to 90°F (4.5 to 32°C)	62°F (16.5°C)
		<b>Note:</b> This CP defines the space temperature setpoints for various heat, cool, and occupancy modes. The stand-by setpoints can be modified, but are not used by the controller, as it does not support Stand-By occupancy mode.			

**Table 4: CP and NCIs (Part 2 of 5)**

Parameter	CP Name and NCI Type	Function			
		Sub	Name	Valid Range	Default Value
Thermostat's Common CPs	nciCfg1RtuHpt UNVT_cfg_1_rtu_hp	1	password	0 to 1000	0
		2	unoccupied timer	0.5 to 24.0 hours	0.5 hours
		3	anticycle	0 to 5 minutes (in 1 min. increments)	2 minutes
		4	powerup delay	10 to 120 sec.	10 sec.
		5	temporary occ time	0 to 12 hours	3 hours
		6	heating stages cph	3 to 8 CPH	4 CPH
		7	cooling stages cph	3 or 4 CPH	4 CPH
		8	heat maximum setpoint	40 to 90°F (4.5 to 32°C)	90°F (32°C)
		9	cool minimum setpoint	54 to 100°F (12 to 37.5°C)	54°F (12°C)
		10	oa temp heat lockout	-15 to 120°F (-26 to 49°C)	120°F (49°C)
		11	oa temp cool lockout	-40 to 95°F (-40 to 35°C)	-40°F (-40°C)
		12	calib room sensor	±5°F (±2.5°C)	0°F
		13	calib outdoor air sensor	±5°F (±2.5°C)	0°F
		14	deadband	2 to 4F° (1F° increments) (1 to 2C°)	2F° (1C°)
		15	fan mode	0 = On 1 = Auto 2 = Smart	0 = On
		16	fan control	0 = Off 1 = On	1 = On
		17	fan delay	0 = Off 1 = On	0 = Off
		18	keypad lockout	0 = No_Lockout 1 = Level_1 2 = Level_2	No_Lockout
		19	proportional band	2.0 to 8.0F° (1.1 to 4.4C°)	2F° (1.1C°)
		20	temperature units	0 = °C 1 = °F	°F
		21	frost protection	0 = Off 1 = On	0 = Off
		22	temperature scale	0 = °C 1 = °F	°F

**Table 4: CP and NCIs (Part 3 of 5)**

Parameter	CP Name and NCI Type	Function			
		Sub	Name	Valid Range	Default Value
Thermostat's Common CPs (continued)	nciCfg2RtuHpt UNVT_cfg_2_rtu_hp	01	di1 config	0 = None 1 = RemNSB 2 = RemOVR 3 = Filter 4 = Service	0 = None
		02	di2 config	0 = None 1 = RemNSB 2 = RemOVR 3 = Filter 4 = Service	0 = None
		03	aux contact config	0 = NORMALLY_OPEN 2 = NORMALLY_CLOSED	0
		04	number of events	2 or 4	2
		05	progressive recovery	0 = Off 1 = Active	0 = Off
		06	a.hp rev valve config	1 = Normally Heat 2 = Normally Cool	2
		07	a.number of heating stages	1 = 1 Stage 2 = 2 Stages	2
		08	number of cool or hp stages	1 = 1 Stage 2 = 2 Stages	2
		09	econo min position	0 to 100%	0%
		10	b.hp high balance point	34.0 to 90.0°F (1.1 to 32.2°C)	90.0°F (32.2°C)
		11	b.econo changeover setpoint	14 to 70°F (-10.0 to 21.1°C)	55.0°F (12.8°C)
		12	c.hp low balance point	-40.0 to 30.0°F (-40.0 to -1.1°C)	-12.0°F (-24.4°C)
		13	c.econo mixed air setpoint	50.0 to 90.0°F (10.0 to 32.2°C)	50.0°F (10.0°C)
		14	d.hp comfort or economy mode	0 = Comfort 1 = Economy	0 = Comfort
		15	d.econo mechanical cool enable	0 = Off 1 = On	0 = Off
		16	hp compressor auxheat interlock	0 = Off 1 = On	0 = Off

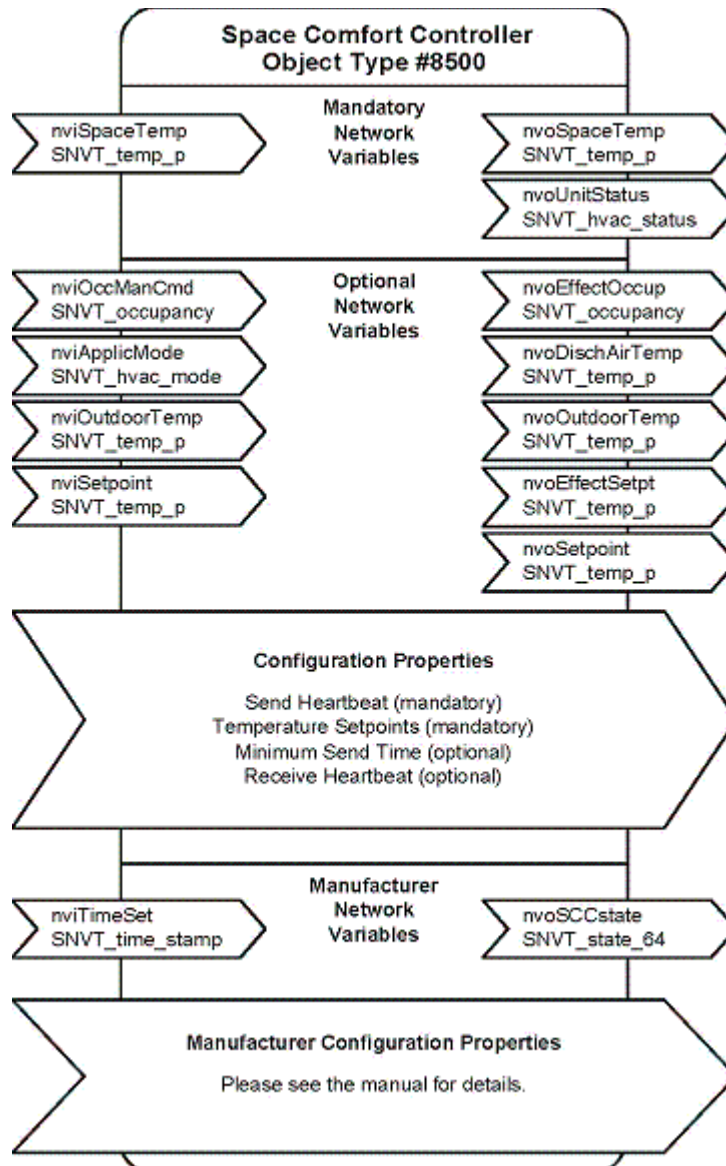
**Table 4: CP and NCIs (Part 4 of 5)**

Parameter	CP Name and NCI Type	Function			
HVAC Unit Type Identifier	nciHvac_type SNVT_hvac_type	Value	Identifier	Name	
		0	HVT_GENERIC	Not Used	
		1	HVT_FAN_COIL	Fan Coil Unit	
		2	HVT_VAV	Not Used	
		3	HVT_HEAT_PUMP	Heat Pump	
		4	HVT_ROOFTOP	Rooftop Unit	
		5	HVT_UNIT_VENT	Not Used	
		6	HVT_CHIL_CEIL	Not Used	
		7	HVT_RADIATOR	Not Used	
		8	HVT_AHU	Not Used	
		9	HVT_SLF_CONT	Not Used	
				<b>Note:</b> This CP helps the user identify the type of equipment being monitored.	
Thermostat's Model Number	nciSccModel UNVT_model_info_2	Sub	Name	Valid Range	Default Value
		01	Thermostat Model	01 = TEC2264-4 02 = TEC2261-4 04 = TEC2262-4 06 = TEC2263-4 09 = TEC2204-4 10 = TEC2203-4 11 = TEC2201-4 12 = TEC2202-4	Depends on the model used
		02	Software Version	Unsigned short	Thermostat dependent
		<b>Note:</b> Use this CP to determine the model number and software version of the thermostat.			
Maximum Send Time	nciSendHrtBt SNVT_time_sec	Valid Range: 0 to 6,553.4 seconds Default Null Value: 0.0 seconds (no automatic update) <b>Note:</b> Setting nciSendHrtBt to 0 disables the Send Heartbeat mechanism. <b>Note:</b> This NV defines the maximum period of time that expires before the specified NVOs are automatically updated.			

**Table 4: CP and NCIs (Part 5 of 5)**

Parameter	CP Name and NCI Type	Function
<b>Minimum Send Time</b>	<b>nciMinOutTm</b> SNVT_time_sec	Valid Range: 0 to 6,553.4 seconds Default Null Value: 0.0 seconds (no minimum send time) <b>Note:</b> Setting nciRcvHrtBt to 0 disables the Minimum Send Time mechanism. <b>Note:</b> This NV defines the minimum period of time between automatic NVO transmissions.
<b>Minimum Receive Time</b>	<b>nciRcvHrtBt</b> SNVT_time_sec	Valid Range: 0 to 6,553.4 seconds Default Null Value: 0.0 seconds (no failure detected) <b>Note:</b> Setting nciRcvHrtBt to 0 disables the Receive Heartbeat mechanism. <b>Note:</b> This NV is used to control the maximum time that elapses after the last update to a specified NVI before the Space Comfort Controller starts to use its default values.
<b>Major Hardware or Software Revisions</b>	<b>nciMajVer</b> SCPT_maj_ver	Valid Range: 0 to 255 <b>Note:</b> This NV defines the major module hardware and software revisions.
<b>Minor Hardware or Software Revisions</b>	<b>nciMinVer</b> SCPT_min_ver	Valid Range: 0 to 255 <b>Note:</b> This NV defines the minor module hardware and software revisions.
<b>Location Label</b>	<b>nciLocation</b> SNVT_str_asc	Valid Range: Any NULL terminated ASCII string of 31 bytes total length. <b>Note:</b> This CP can optionally be used to provide more descriptive physical location information than can be provided by the Neuron® Chip's 6 byte location string. The location relates to the object and not to the node. This CP is not supported in Metasys system.

## Space Comfort Controller Object



**Figure 1: TEC226x-4(+PIR) and TEC220x-4(+PIR) Space Comfort Controller Object**

### Commissioning the Thermostat Using a LONWORKS Network Configuration Tool

A thermostat controller must first be commissioned using a LONWORKS network configuration tool before it can be added to the LON Integration of the Network Automation Engine (NAE). This process implements the initial configuration and assigns the Domain/Subnet/Node (DSN) address of the thermostat controller.

## Service Pin

To broadcast the thermostat's Neuron ID over the LONWORKS network:

1. Simultaneously press and hold the **YES/NO** keys until the display illuminates (approximately 5 seconds). The Status LED flashes once every 5 seconds to indicate the thermostat's Neuron ID is being broadcast on the LONWORKS network.
2. For manual entry, the Neuron ID is also on a label on the Echelon® chip under the thermostat cover.

## TEC22xx-4 Configuration Plug-in

The plug-in displays the CPs in a user friendly format for easy configuration. The user can also use LN Browser to display the device CPs for changing the default settings. See the information in the previous sections when making changes to the CPs.

### Installing the Plug-in

The TEC22xx-4 Configuration Plug-in must be installed on the same computer that is running the LONWORKS network configuration tool.

To install the plug-in:

1. Open a Web browser.
2. Browse to the following address:  
[http://www.johnsoncontrols.com/publish/us/en/products/building\\_efficiency/integrated\\_hvac\\_systems/hvac/thermostat\\_product/Network\\_Resource\\_File.html](http://www.johnsoncontrols.com/publish/us/en/products/building_efficiency/integrated_hvac_systems/hvac/thermostat_product/Network_Resource_File.html)

Alternatively, you may browse to the Johnson Controls® Web site at <http://www.johnsoncontrols.com/publish/us/en.html>

Then, use the following path:

**Building Efficiency > Integrated HVAC Systems > HVAC Control Products > Thermostats > Network Resource Files.**

3. Scroll to LONWORKS Network Devices.
4. Click and open the Johnson Controls TEC22xx-4 Plug-in zip file named **TEC22xx-4\_plug-in.zip**.
5. Click and save the plug-in file named **TEC22xx-4\_plug-in\_(Rel\_1.1\_January\_15\_2010).zip** to your desktop.
6. On your desktop, open the zip file and run the executable file named **TEC22xx-4\_plug-in.exe**.
7. Follow the on-screen prompts and accept all default settings.

**Note:** The installation adds the resource files to the LNS Resource File Catalog, which is used to correctly display the device data in LN Builder.

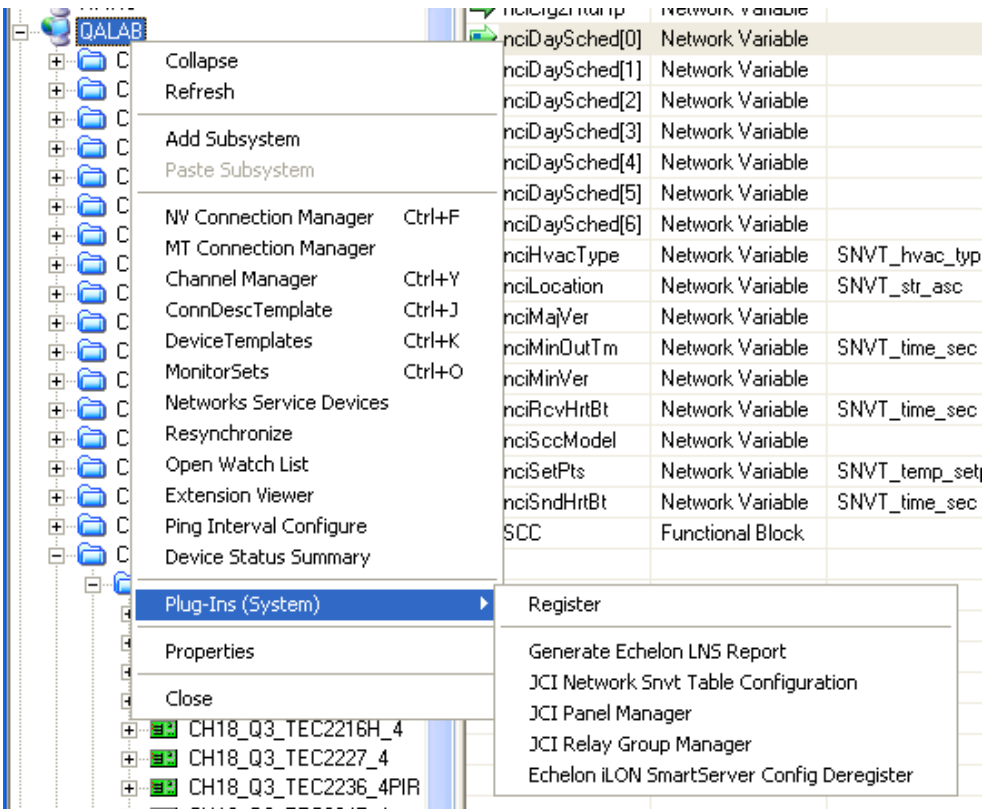
8. Go to the *Registering the Plug-in* section.

## Registering the Plug-in

You must register the plug-in after installation before you can use it. To register the plug-in:

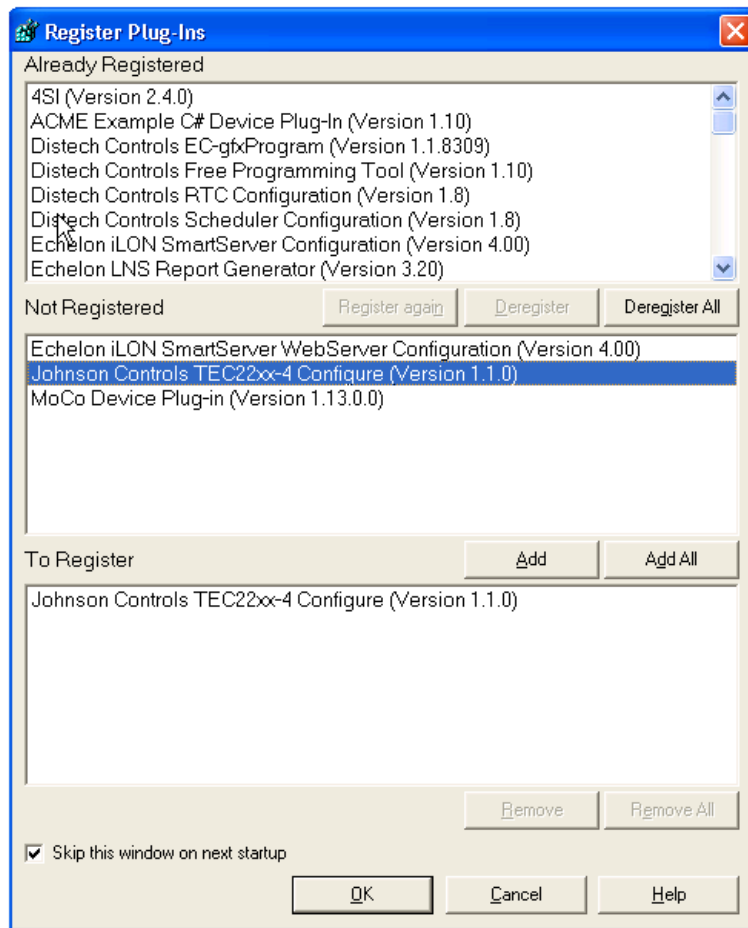
1. Using LN Builder, right-click the LNS database, and then select **Plug-Ins (System) > Register** (Figure 2). The Register Plug-Ins screen appears.

**Note:** The plug-in can also be registered at the device level.



**Figure 2: Preparing the Plug-in for Registration**

2. Select the **Johnson Controls TEC22xx-4 Configure (Version 1.1.0)** plug-in from the **Not Registered** field and click Add (Figure 3). The plug-in appears in the To Register field.



**Figure 3: Registering the Plug-in**

3. Click OK. The plug-in is now registered and the device template is added to the database if it does not already exist.

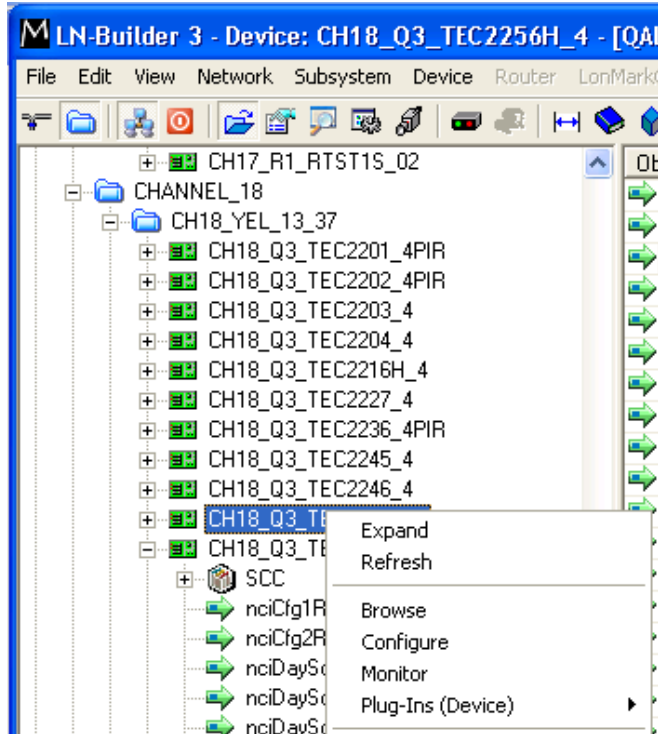
You are now ready to use the plug-in.

## Using LN Browser to Display NVs, NCIs, and CPs

LN Browser allows the user to display the CPs, NCIs, and NVs, which can be used to change the default configuration of the device.

To display the NV, NCI, and CP information in LN Builder:

1. Right-click the device and select Browse (Figure 4). The LN Browser appears.



**Figure 4: Launching the LN Browser**

2. Select the green colored C from the toolbar to display all CPs associated with the device you selected. Select the green N from the toolbar to display all of the NVs and NCIs associated with the device you selected. See Figure 5 as a reference for both of these selections.

**Note:** The LN Browser does not display the CPs by default. You must select and configure the Browser to display the CPs by selecting C.

- From the Browser menu, select Customize Columns to add or remove columns from the LN Browser. Use Figure 5 as a guide for customizing the columns.

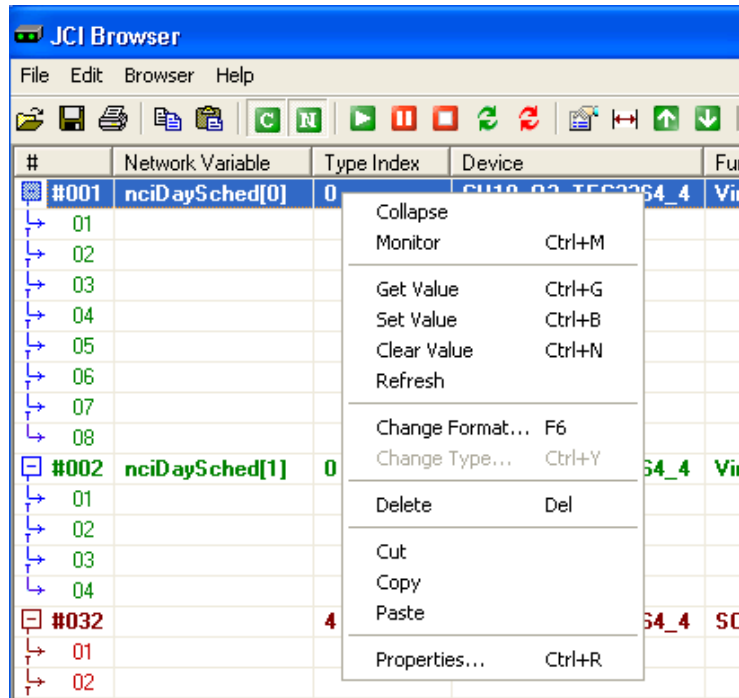
#	Network Variable	Type Index	Device	Function Bloc	Programmatic Name	Format Name	Value
#001	nciDaySched[0]	0	CH18_Q3_TEC2264_4	Virtual	nciDaySched[0]		0 60 0 120 1 224 2 28
01					Byte1	Unsigned Short	0
02					Byte2	Unsigned Short	60
03					Byte3	Unsigned Short	0
04					Byte4	Unsigned Short	120
05					Byte5	Unsigned Short	1
06					Byte6	Unsigned Short	224
07					Byte7	Unsigned Short	2
08					Byte8	Unsigned Short	28
#002	nciDaySched[1]	0	CH18_Q3_TEC2264_4	Virtual	nciDaySched[1]	UNVT_day_sched	120 180 540 600
01					occupied_event_1	Unsigned Long	120
02					unoccupied_event_2	Unsigned Long	180
03					occupied_event_3	Unsigned Long	540
04					unoccupied_event_4	Unsigned Long	600
#032		4	CH18_Q3_TEC2264_4	SCC	UCPTdaySched[0]	UCPTdaySched	60 120 480 540
01					occupied_event_1	Unsigned Long	60
02					unoccupied_event_2	Unsigned Long	120
03					occupied_event_3	Unsigned Long	480
04					unoccupied_event_4	Unsigned Long	540

**Figure 5: LN Browser Window**

Any NCIs that are not part of the standard resource files are not, by default, assigned a format. Figure 5 shows nciDaySchedule(X), which has both NCIs and CPs shown. Network variable nciDaySchedule(0) does not have a Format Name associated with it, but nciDaySchedule(1) does show a Format Name because it was changed manually.

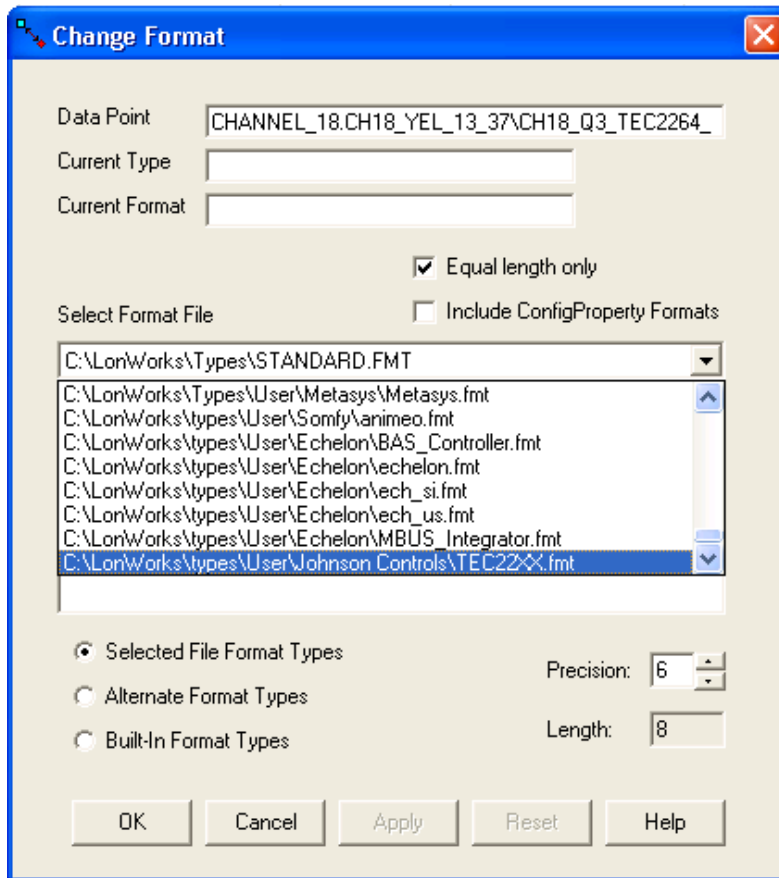
To change the NCI Format Name:

1. Right-click the NCI, and select Change Format (Figure 6). The Change Format window appears.



**Figure 6: Launching the Change Format Utility**

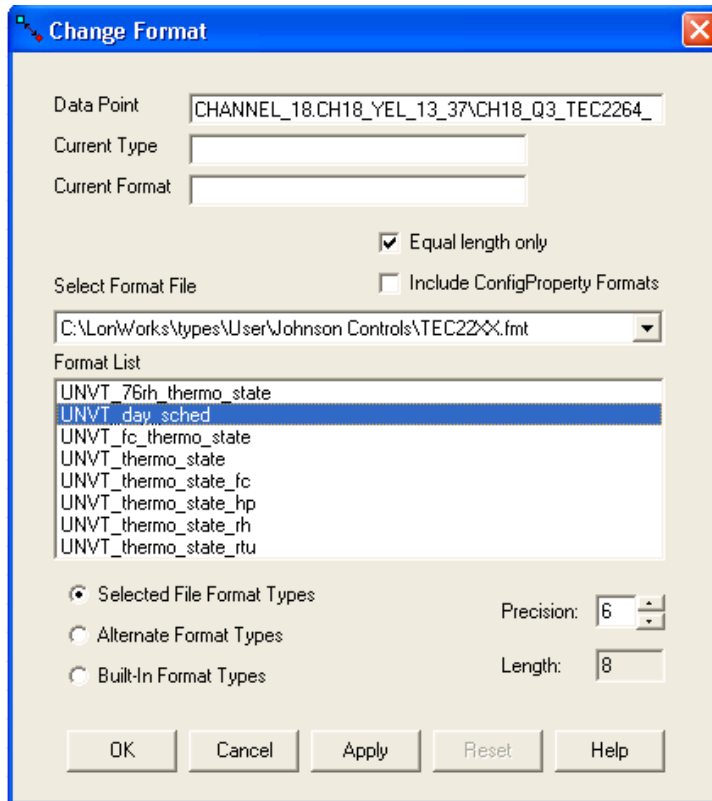
2. Select the **TEC22XX.fmt** format file from the Select Format File drop-down list (Figure 7). Available formats appear in the Format List field.



**Figure 7: List of .fmt Files in Change Format Window**

3. Select **UNVT\_day\_sched** in the Format List field for the nciDaySchedule(1) network variable (Figure 8).

**Note:** The Format List for each .fmt file varies depending on your selection. Take care to select the correct format for each .fmt file. Use the information in the LN Browser to identify the CP associated with the NCI.



**Figure 8: Available Format Files for TEC Plug-In**

Figure 5 shows both the NCI and the CP for nciDaySchedule(1). By identifying the Format Name of the CP, you can use that information to select the Format Name for the NCI.

**Note:** Changing the Format Name is for display purposes only and does not in any way affect the operation of the device.

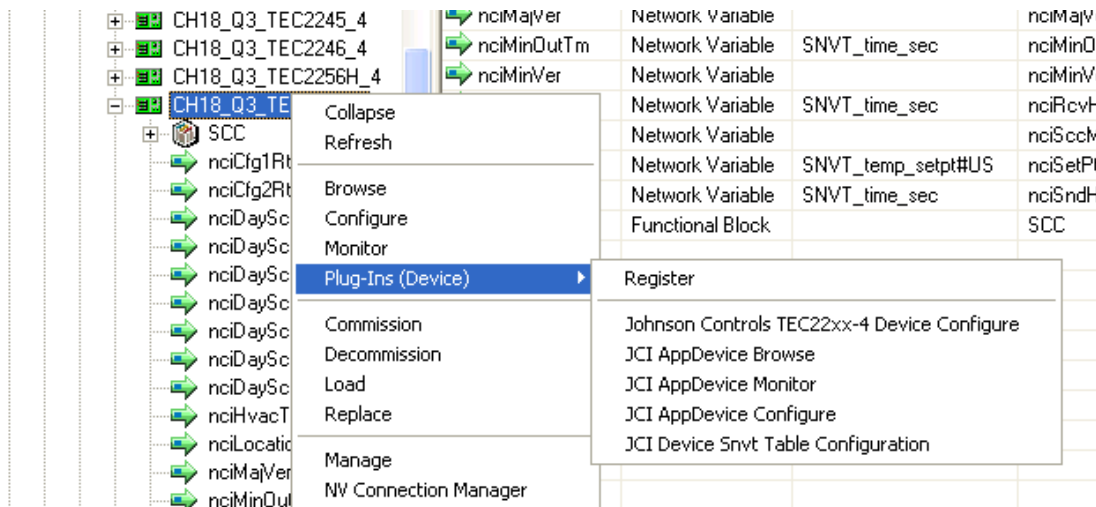
Table 5 shows the Format Name changes needed to show the correct data from the NCI and nvoScsStatus.

**Table 5: Device-Specific Format Naming**

LN Browser NCI Format Name Changes (PID - 8000115500040521)		
NCI	Default Format Name	Device Format Name
nciDaySchedule(X)	BLANK	UNVT_day_sched
nciCfg1RtuHp	BLANK	UNVT_cfg_1_rtu_hp#US
nciCfg2RtuHp	BLANK	UNVT_cfg_2_rtu_hp#US
nciScsModel	BLANK	UNVT_model_info2
nvoScsStatus (Rooftop Models)	SNVT_state_64	UNVT_thermo_state_rtu
nvoScsStatus (Heat Pump Models)	SNVT_state_64	UNVT_thermo_state_hp

### Running the Plug-in

From LN Builder, right-click the device and select Configure. Alternatively, you may also right-click the device and select **Plug-Ins (Device) > Johnson Controls TEC2xx-4 Device Configure** (Figure 9). The **Johnson Controls TEC22xx-4 Configure** window appears.



**Figure 9: Launching the Plug-in**

Figure 10 shows the CPs that are associated with the plug-in. Use this information and the information in Table 6 to change the default setting for customization.

#	Network Variable	Type Index	Device	Function Bloc	Programmatic Name	Format Name	Value
#001	nciDaySched[0]	0	CH18_Q3_TEC2204_4	Virtual	nciDaySched[0]		00051159101010
#008	nciSetPts	106	CH18_Q3_TEC2204_4	Virtual	nciSetPts	SNVT_temp_setpt#US	73.4,621.806,82.4,69.8,621.806,60.8
01					occupied_cool	Signed Long	73.4
02					standby_cool	Signed Long	621.806
03					unoccupied_cool	Signed Long	82.4
04					occupied_heat	Signed Long	69.8
05					standby_heat	Signed Long	621.806
06					unoccupied_heat	Signed Long	60.8
#009	nciCfg1RtuHp	0	CH18_Q3_TEC2204_4	Virtual	nciCfg1RtuHp		0101512110121411211501411981191241241
#010	nciCfg2RtuHp	0	CH18_Q3_TEC2204_4	Virtual	nciCfg2RtuHp		0101012101210101412531412531010
#032		4	CH18_Q3_TEC2204_4	SCC	UCPTdaySched[0]	UCPTdaySched	0 1439 0 0
01					occupied_event_1	Unsigned Long	0
02					unoccupied_event_2	Unsigned Long	1439
03					occupied_event_3	Unsigned Long	0
04					unoccupied_event_4	Unsigned Long	0
#040		12	CH18_Q3_TEC2204_4	SCC	UCPTcfg1RtuHp	UNVT_cfg_1_rtu_hp...	0 0.5 2 10 2 4 4 89.996 53.996 119.984
01					password	Unsigned Long	0
02					unoccupied_timer	Unsigned Short	0.5
03					anticycle	Unsigned Short	2
04					power_up_delay	Unsigned Short	10
05					temporary_occ_time	Unsigned Short	2
06					heating_stages_cph	Unsigned Short	4
07					cooling_stages_cph	Unsigned Short	4
08					heat_max_setpoint	Signed Long	89.996
09					cool_min_setpoint	Signed Long	53.996
10					oa_temp_heat_lockout	Signed Long	119.984
11					oa_temp_cool_lockout	Signed Long	-40
12					calib_room_sensor	Signed Long	0
13					calib_outside_air_sen...	Signed Long	0
14					deadband	Unsigned Short	2
15					fan_mode	fan_mode_b_t (Enum)	ON
16					fan_control	off_on_state_t (Enum)	OFF
17					fan_delay	off_on_state_t (Enum)	OFF
18					keypad_lockout	rem_lock_t (Enum)	NO_LOCKOUT
19					proportional_band	Unsigned Short	2
20					temperature_units	temp_unit_t (Enum)	FAHRENHEIT
21					frost_protection	off_on_state_t (Enum)	OFF
22					menu_scroll	scroll_type_t (Enum)	SCROLL_ACTIVE
#041		13	CH18_Q3_TEC2204_4	SCC	UCPTcfg2RtuHp	UNVT_cfg_2_rtu#US	NONE NONE NORMALLY_OPEN TWO_
01					di1_config	input_cfg_model_d_t (En...	NONE
02					di2_config	input_cfg_model_d_t (En...	NONE
03					aux_contact_config	aux_contact_cfg_t (Enum)	NORMALLY_OPEN
04					number_of_events	nb_of_events_t (Enum)	TWO_EVENTS
05					progressive_recovery	off_on_state_t (Enum)	OFF
06					number_heat_stages	nb_stages_t (Enum)	TWO_STAGES
07					number_of_cool_or_h...	nb_stages_t (Enum)	TWO_STAGES
08					econo_min_position	Signed Long	0.000
09					econo_changeover_s...	Signed Long	54.986
10					econo_mix_air_setpoint	Signed Long	54.986
11					econo_mechanical_c...	off_on_state_t (Enum)	OFF
12					hp_compressor_auxh...	off_on_state_t (Enum)	OFF

Figure 10: CPs Displayed from LN Browser

Table 6: Plug-in and CP Naming (Part 1 of 3)

CPs for Device Template (Program ID) 80000115500040521 Johnson Controls TEC22xx-4 Configure Plug-in			
TEC Plug-in Naming	TEC Plug-in Window Tab	Associated CP	CP Naming
Cooling Occupied	Heating - Cooling	nciSetPts	occupied_cool
Cooling Unoccupied	Heating - Cooling	nciSetPts	unoccupied_cool
Heating Occupied	Heating - Cooling	nciSetPts	occupied_heat
Heating Unoccupied	Heating - Cooling	nciSetPts	unoccupied_heat
Password	General	UCPTcfg1RtuHp	password

**Table 6: Plug-in and CP Naming (Part 2 of 3)**

<b>CPs for Device Template (Program ID) 80000115500040521 Johnson Controls TEC22xx-4 Configure Plug-in</b>			
<b>TEC Plug-in Naming</b>	<b>TEC Plug-in Window Tab</b>	<b>Associated CP</b>	<b>CP Naming</b>
Unoccupied Timer	General	UCPTcfg1RtuHp	unoccupied_timer
Anticycle	Hardware	UCPTcfg1RtuHp	anticycle
Powerup Delay	Hardware	UCPTcfg1RtuHp	power_up_delay
Temporary Occupied Time	General	UCPTcfg1RtuHp	temporary_occ_time
Heating Cycles Per Hour	Heating - Cooling	UCPTcfg1RtuHp	heating_stages_cph
Cooling Cycles Per Hour	Heating - Cooling	UCPTcfg1RtuHp	cooling_stages_cph
Heating Maximum Limit	Heating - Cooling	UCPTcfg1RtuHp	heat_max_setpoint
Cooling Minimum Limit	Heating - Cooling	UCPTcfg1RtuHp	cool_min_setpoint
Heating OA Temp Lockout	Heating - Cooling	UCPTcfg1RtuHp	oa_temp_heat_lockout
Cooling OA Temp Lockout	Heating - Cooling	UCPTcfg1RtuHp	oa_temp_cool_lockout
Room Sensor Offset	Hardware	UCPTcfg1RtuHp	calib_room_sensor
Outdoor Sensor Offset	Hardware	UCPTcfg1RtuHp	calib_outside_air_sensor
Deadband	Heating - Cooling	UCPTcfg1RtuHp	deadband
Fan Mode	General	UCPTcfg1RtuHp	fan_mode
Heating Mode Control	General	UCPTcfg1RtuHp	fan_control
Purge Delay	General	UCPTcfg1RtuHp	fan_delay
Keypad Lockout	General	UCPTcfg1RtuHp	keypad_lockout
Proportional Band	Heating - Cooling	UCPTcfg1RtuHp	proportional_band
Scale	General	UCPTcfg1RtuHp	temperature_units
Frost Protection	General	UCPTcfg1RtuHp	frost_protection
Menu Scroll	General	UCPTcfg1RtuHp	menu_scroll
Digital Input #1	Hardware	UCPTcfg2RtuHp	di1_config
Digital Input #2	Hardware	UCPTcfg2RtuHp	di2_config
Auxiliary Contact	Hardware	UCPTcfg2RtuHp	aux_contact_config
Menu Display	Scheduler	UCPTcfg2RtuHp	number_of_events
Progressive Recovery	General	UCPTcfg2RtuHp	progressive_recovery
Reversing Valve Configuration <sup>1</sup>	Model	UCPTcfg2RtuHp	hp_rev_valve_config
Number of Heating Stages <sup>2</sup>	Hardware	UCPTcfg2RtuHp	number_heat_stages
Number of Cooling or HP Stages	Hardware	UCPTcfg2RtuHp	number_of_cool_or_hp_stages
Minimum Position	Model	UCPTcfg2RtuHp	econo_min_position
High Balance Point <sup>1</sup>	Model	UCPTcfg2RtuHp	hp_high_balance_point
Changeover Setpoint <sup>2</sup>	Model	UCPTcfg2RtuHp	econo_changeover_setpoint

**Table 6: Plug-in and CP Naming (Part 3 of 3)**

<b>CPs for Device Template (Program ID) 80000115500040521 Johnson Controls TEC22xx-4 Configure Plug-in</b>			
<b>TEC Plug-in Naming</b>	<b>TEC Plug-in Window Tab</b>	<b>Associated CP</b>	<b>CP Naming</b>
<b>Low Balance Point<sup>1</sup></b>	Model	UCPTcfg2RtuHp	hp_low_balance_point
<b>Mixed Air Setpoint<sup>2</sup></b>	Model	UCPTcfg2RtuHp	econo_mix_air_setpoint
<b>Comfort Mode<sup>1</sup></b>	Model	UCPTcfg2RtuHp	hp_comfort_or_economy_mode
<b>Mechanical Cooling Enable<sup>2</sup></b>	Model	UCPTcfg2RtuHp	econo_mechanical_cool_enabled
<b>Compressor/Auxiliary Interlock</b>	Model	UCPTcfg2RtuHp	hp_compressor_auxheat_interlock
<b>Occ. Period 1 Begin</b>	Scheduler	UCPTdaySched(X)	occupied_event_1
<b>Occ. Period 1 End</b>	Scheduler	UCPTdaySched(X)	unoccupied_event_2
<b>Occ. Period 2 Begin</b>	Scheduler	UCPTdaySched(X)	occupied_event_3
<b>Occ. Period 2 End</b>	Scheduler	UCPTdaySched(X)	unoccupied_event_4
<b>Output Heartbeat</b>	Network	SCPTmaxSendTime	N/A
<b>Output Throttle</b>	Network	SCPTminSendTime	N/A
<b>Input Heartbeat</b>	Network	SCPTmaxRcvTime	N/A
<b>Location</b>	About	SCPTlocation	ascii
<b>Thermostat Model</b>	About	UCPTmodellInfo2	Byte1
<b>Thermostat Version</b>	About	UCPTmodellInfo2	Byte 2
<b>Echelon Module Major Version</b>	About	SCPTobjMajVer	N/A
<b>Echelon Module Minor Version</b>	About	SCPTobjMinVer	N/A
<b>Shown in Header of Plug-in</b>	N/A	SCPTHvacType	N/A

1. Use for heat pump models only.

2. Use for rooftop models only.

Use following sections as reference for the information contained within each tab of the plug-in and the changes you can make on each screen.

## Heating - Cooling Tab

Figure 11 shows the **Heating - Cooling** tab. You can make changes to any values in this screen. Click Apply to accept changes after you have finished your modifications.

**Note:** When you make changes to values, the text appears in red and the Apply button enables. To verify your changes have been accepted, the text appears in black after you click Apply, and the Apply button is disabled.

The screenshot shows the 'Johnson Controls TEC22xx-4 Configure' window for device 'HVT\_ROOFTOP' (TEC2264). The 'Heating - Cooling' tab is active, showing two columns of setpoints: Heating and Cooling. The Heating column includes: Occupied (70 °F), Unoccupied (56 °F), Maximum limit (88 °F), OA Temperature Lockout (110 °F), and Cycles per hour (7). The Cooling column includes: Occupied (77.5 °F), Unoccupied (86 °F), Minimum limit (58 °F), OA Temperature Lockout (-10 °F), and Cycles per hour (3). Below these are Proportional band (8) and Deadband (3 °F). At the bottom, there are 'Plug-In Display Units' (Metric/Imperial), 'Refresh All', 'Cancel', 'Apply', and 'Exit' buttons. The status bar shows 'Cnfg Online' and the device path 'QALAB/QALAB/CHANNEL\_18.CH18\_YEL\_13\_37/CH18\_Q3\_TEC2264\_4'.

Figure 11: Heating - Cooling Tab

## Hardware Tab

Figure 12 shows the Hardware tab. The Hardware tab allows you to modify the hardware input and output configuration of the TEC device.

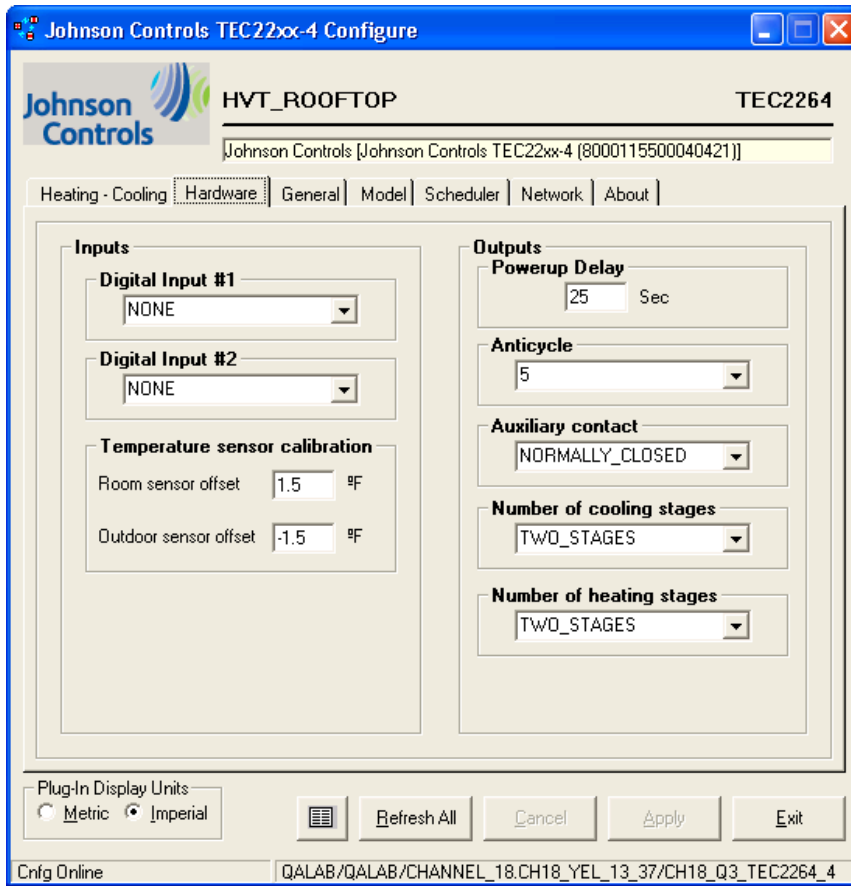


Figure 12: Hardware Tab

## General Tab

Figure 13 shows the General tab. You can change the temperature units, lockout level, unoccupied timer, and other general selections on this screen.

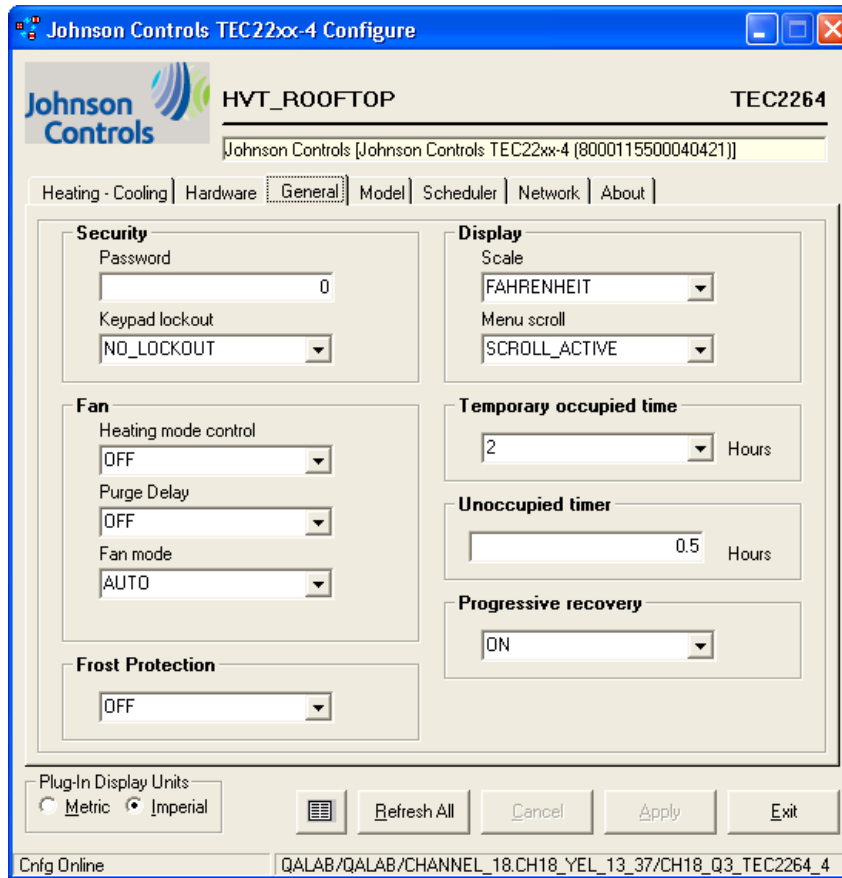
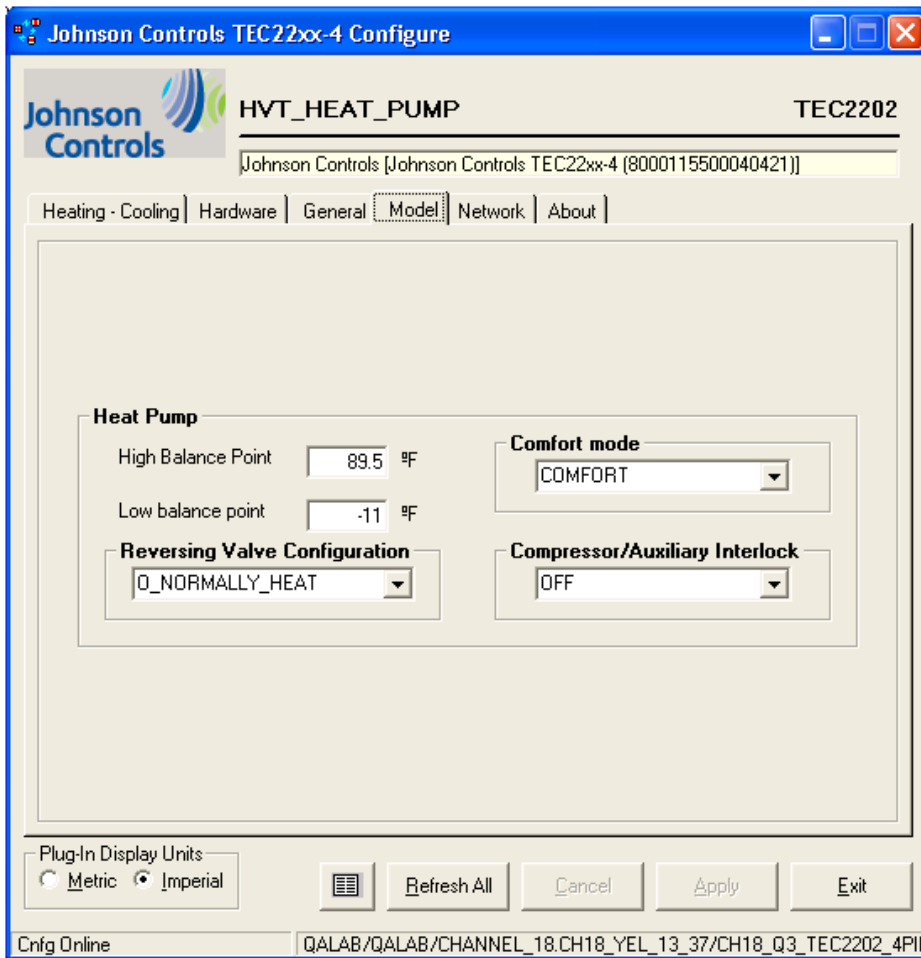


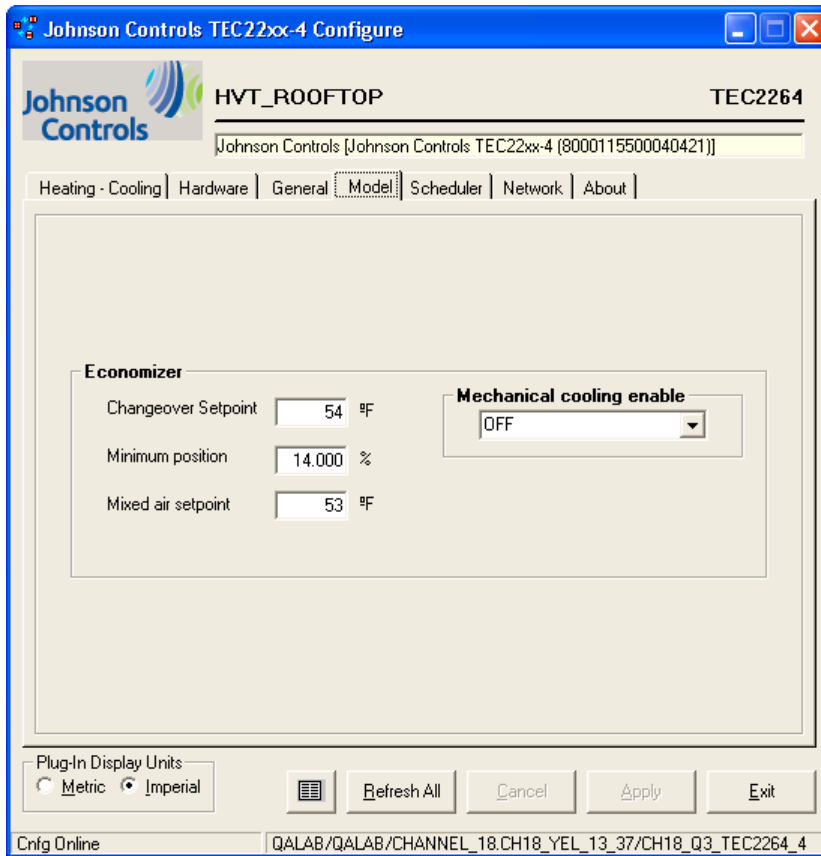
Figure 13: General Tab

## Model Tab

Figure 14 and Figure 15 show the Model tab. Depending upon the thermostat controller you are using, you can configure your heat pump or rooftop unit through this tab.



**Figure 14: Model Tab for Heat Pump Models**



**Figure 15: Model Tab for Rooftop Unit Models**

## Scheduler Tab

Figure 16 shows the Scheduler tab. The Scheduler tab is only available if the TEC supports scheduling. You can make changes using the plug-in or directly from LN Browser. A total of 7 schedules can be configured, one for each day. In addition, each schedule can have up to 2 occupied periods. Each occupied period has a beginning and ending cycle. The Menu Display can be changed from TWO\_EVENTS to FOUR\_EVENTS to show the second occupied period. See Figure 17 for the CPs associated with the Scheduler tab.

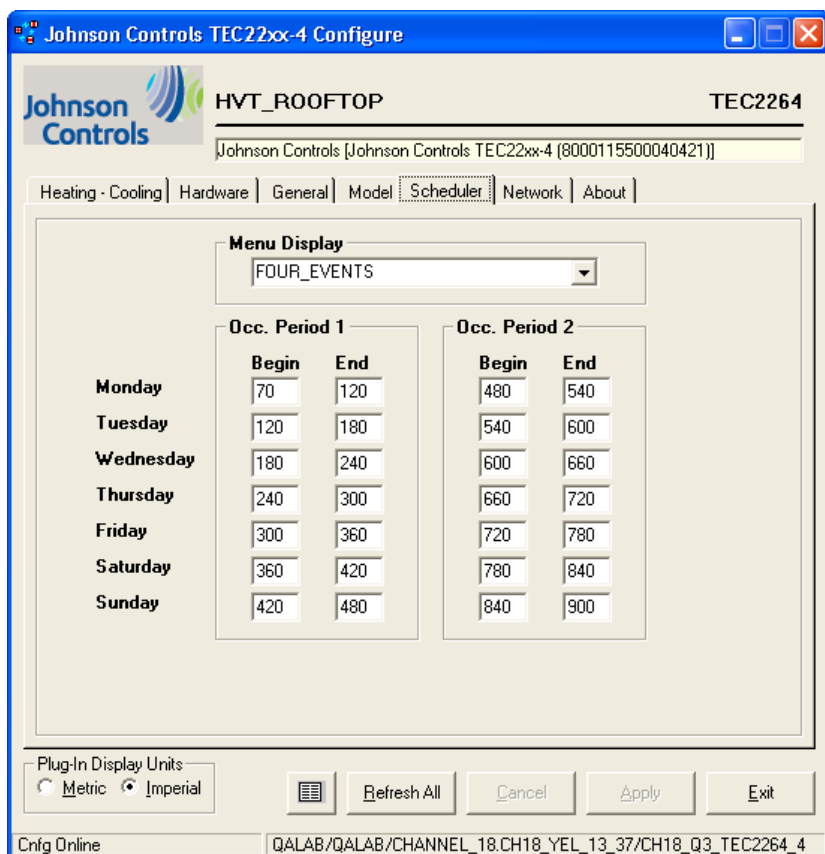


Figure 16: Scheduler Tab (Supported Models Only)

#	Network Variable	Type Index	Device	Function Bloc	Programmatic Name	Format Name	Value
#001	nciDaySched[0]	0	CH18_Q3_TEC2263_4	Virtual	nciDaySched[0]		0 0 5 159 0 0 5 159
01					Byte1	Unsigned Short	0
02					Byte2	Unsigned Short	0
03					Byte3	Unsigned Short	5
04					Byte4	Unsigned Short	159
05					Byte5	Unsigned Short	0
06					Byte6	Unsigned Short	0
07					Byte7	Unsigned Short	5
08					Byte8	Unsigned Short	159
#032		4	CH18_Q3_TEC2263_4	SCC	UCPTdaySched[0]	UCPTdaySched	0 1439 0 1439
01					occupied_event_1	Unsigned Long	0
02					unoccupied_event_2	Unsigned Long	1439
03					occupied_event_3	Unsigned Long	0
04					unoccupied_event_4	Unsigned Long	1439

**Figure 17: CPs Associated with Scheduler Tab Displayed in LN Browser**

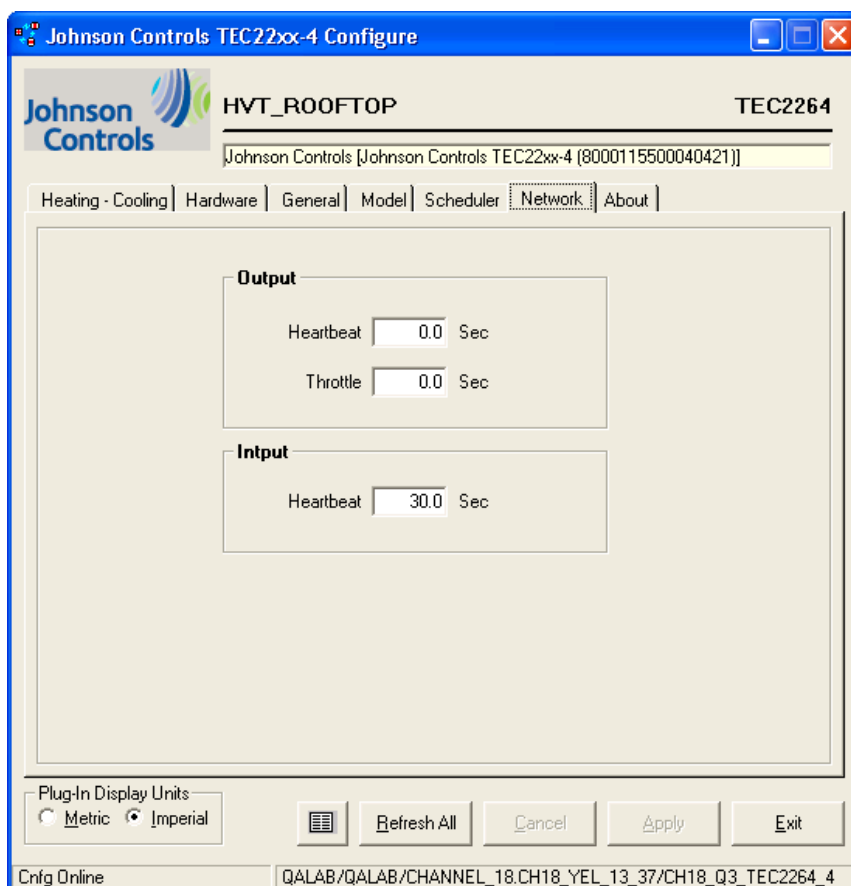
The schedules are entered in minute format where 12:00 A.M. is equal to zero minutes and 11:59 P.M. is equal to 1439 minutes. For example, if you want a beginning schedule of 6:00 A.M. and an ending schedule of 5:00 P.M., you would enter 360 in the Begin field and 1020 in the End field. The easiest way to calculate either the Begin or End schedule is to multiply the hour in military format by 60 and then add the number of minutes past the hour. For example, 1:12 P.M. is equal to the following formula:

(hour in military format) \* 60 + (minutes past the hour) = Begin or End schedule

$$13 * 60 + 12 = 792$$

## Network Tab

Figure 18 shows the Network tab. The Network tab allows you to set the minimum and maximum send times for the Network Variables. The Heartbeat is the maximum send time and Throttle is the minimum send time.



**Figure 18: Network Tab**

For the NVOs, the TEC device issues a network variable update at some time between the throttle and heartbeat settings. If a significant change occurs, the update may be processed immediately. Make sure you do not set the heartbeat to a smaller value than the throttle value. Also, make sure to use values large enough to prevent excessive network traffic.

For the NVIs, the TEC device sets any NVI that did not receive a network variable update within the time specified to a NULL value. Not all NVIs use the heartbeat function.

## About Tab

Figure 19 shows the About tab. Here, you can enter a description for the location of the TEC device (up to 31 characters) in the Location field. All other information is for identification purposes and may be requested by Customer Support.

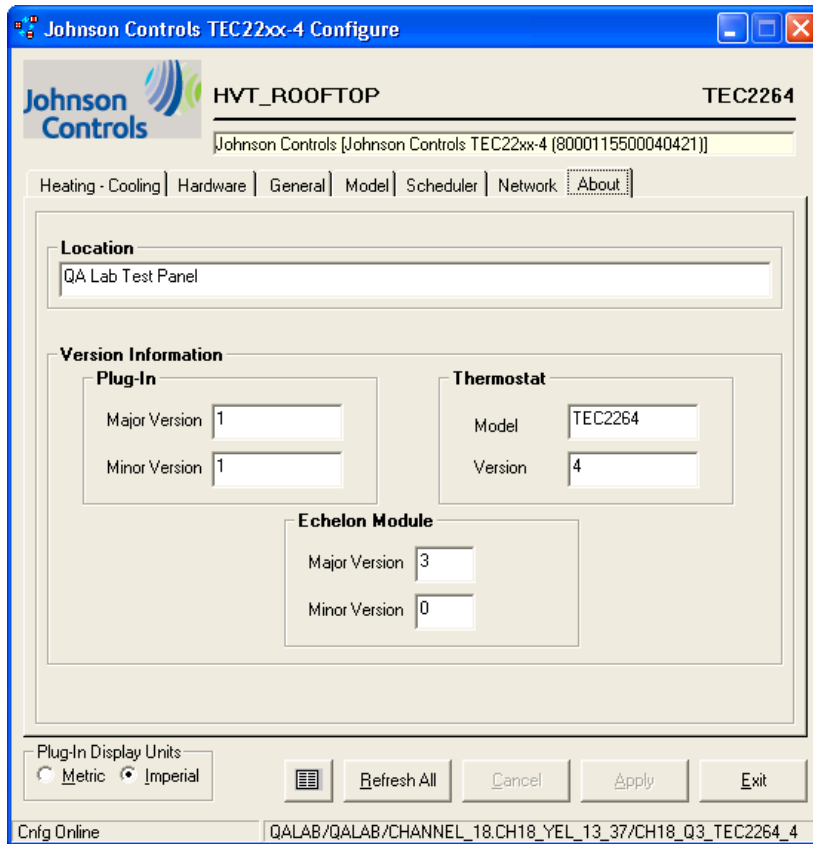


Figure 19: About Tab

## Adding a Thermostat to the Network Automation Engine (NAE)

Once a thermostat has been commissioned, it must be added to the NAE before its points can be mapped. To do this, select the LONWORKS Integration under the NAE (refresh the tree view if required to see a newly added LONWORKS Integration) and choose Field Device from the Insert menu. Assisted Definition using Auto Discovery is the easiest way to add a new thermostat online; however, this requires that the thermostat that is to be added is connected and ready to communicate. Device resource files are required. Refer to the *LONWORKS® Network Integration with NAE and LCS Technical Bulletin (LIT-1201668)* for instructions on how to add a LONWORKS device.

## LONWORKS Thermostat Controller Mapping

### Preparation

Before mapping a TEC226x-4(+PIR) or TEC220x-4(+PIR) Thermostat Controller into an NAE:

1. Decide which point objects within the thermostat need to be mapped. Only map the point objects that need to be viewed on a regular basis, because excessive mapping lowers system performance. Suggested point objects for mapping include: Room Temp, System Mode, Fan Status, Occupied Heat Setpoint, Occupied Cool Setpoint, Unoccupied Heat Setpoint, and Unoccupied Cool Setpoint. In addition, alarm points may be mapped if they are used, and other point objects may be mapped if required. Use the Engineering view to examine infrequently used point objects.
2. Verify that a LONWORKS Integration is defined in the NAE. The commissioned thermostat is mapped as a LONWORKS device under a LONWORKS Integration. Refer to the *LONWORKS® Network Integration with NAE and LCS Technical Bulletin (LIT-1201668)* for instructions on how to define a LONWORKS network integration.

At this point, the thermostat and the required point objects inside the thermostat can be mapped.

### Troubleshooting Guide

Use the information in Table 7 and Table 8 to assist in diagnosing and solving possible TEC226x-4(+PIR) or TEC220x-4(+PIR) Series Staged Thermostat Controllers problems.

**Table 7: Troubleshooting Details (Part 1 of 2)**

Symptom	Cause	Solution(s)
<b>No display on the thermostat</b>	Absent or incorrect supply voltage	1. Check that power supply voltage between RC and C is within the 19–30 VAC range. 2. Check for tripped fuse or circuit breaker.
	Overloaded power transformer	Verify that the transformer used is powerful enough (enough VAs) to supply all controlled devices including the thermostat.
<b>Keyboard menu does not access all functions</b>	Keyboard locked	Run the Johnson Controls TEC22xx-4 Configuration Plug-in and modify the Keypad Lockout field by setting it to <b>NO_LOCKOUT</b> or <b>LEVEL_1</b> . You can also make the changes directly from the Configuration Parameter (CP) using LN Browser.
<b>Temperature setpoints revert to original value after a certain time</b>	Temporary setpoint active for a period of time set by parameter TOccTime	To do a permanent change to the setpoints, you must enter the menu <b>RoomTemp Set</b> and modify the setpoints at desired temperature.

**Table 7: Troubleshooting Details (Part 2 of 2)**

<b>Symptom</b>	<b>Cause</b>	<b>Solution(s)</b>
<b>Thermostat does not call for heating</b>	Wrong mode selected	Select heating mode.
	Thermostat in Unoccupied mode	Select Override to force the thermostat Occupied heating setpoint.
	Anticycle delay active	Wait; the anticycling period must end before the equipment can start.
	Heating setpoint is satisfied	Raise the Heating setpoint.
	Heating lockout attained	1. Mode is locked out based on outside air temperature. 2. Change configuration parameter <b>H Lock</b> to value 120°F (49°C) to by-pass lockout.
	Wiring error	1. Start the Fan by forcing the Fan ON mode. 2. Put a jumper across terminals RH & W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC & RH.
<b>Thermostat does not call for cooling</b>	Wrong mode selected	Select cooling mode.
	Thermostat in Unoccupied mode	Select Override to force the thermostat Occupied cooling setpoint.
	Anticycle delay active	Wait; the anticycling period must end before the equipment can start.
	Cooling setpoint is satisfied	Lower the cooling setpoint.
	Cooling lockout attained	1. Mode is locked out based on outside air temperature. 2. Change configuration parameter <b>C Lock</b> to value -40 °F (-40 °C) to by-pass lockout.
	Wiring error	1. Start the fan by forcing the Fan ON mode. 2. Put a jumper across terminals RC & Y1. The cooling should come ON. If it does not, verify wiring.
<b>The thermostat does not turn on the fan</b>	Wiring error	1. Start the Fan by forcing the Fan ON mode. 2. Put a jumper across terminals RC & G. The fan should come ON If it does not, verify wiring.
<b>Digital display shows missing digits or erratic segments</b>	Defective display	Replace thermostat.

**Table 8: Heat Pump Troubleshooting Details**

Symptom	Cause	Solution
<b>Auxiliary heat does not operate</b>	Wrong mode selected	Select Emergency Heat mode.
	Thermostat in Unoccupied mode	Select Override to force the thermostat Occupied heating setpoint.
	Heating setpoint is satisfied	Raise the Heating setpoint.
	Anticycle delay active	Wait; the anticycling period ends and the equipment starts.
	High balance point attained	1. Mode is locked out based on outside air temperature. 2. Change configuration parameter High BP to value 90°F (32°C) to by-pass lockout.
	Heating lockout attained	1. Mode is locked out based on outside air temperature. 2. Change configuration parameter H Lock to value 120°F (49°C) to by-pass lockout.
	Wiring error	1. Start the Fan by forcing the Fan ON mode. 2. Put a jumper across terminals RH & W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC & RH.
	Wrong reversing valve configuration	1. Wrong selection of parameter Re Valve 2. Select O to energize the valve in cooling operation. Valve is normally heat. 3. Select B to energize the valve in heating operation. Valve is normally cool.
<b>Heat Pump does not operate in heating mode</b>	Wrong mode selected	Select Heating mode.
	Thermostat in Unoccupied mode	Select Override to force the thermostat Occupied heating setpoint.
	Heating setpoint is satisfied	Raise the Heating setpoint.
	Anticycle delay active	Wait; the anticycling period ends and the equipment starts.
	Heating setpoint satisfied	Raise the heating setpoint.
	Low balance point attained	1. Mode is locked out based on outside air temperature. 2. Change configuration parameter Low BP to value -12 °F (-24 °C) to by-pass lockout.
	Heating lockout attained	1. Mode is locked out based on outside air temperature. 2. Change configuration parameter H Lock to value 120°F (49°C) to by-pass lockout
	Wiring error	1. Start the Fan by forcing the Fan ON mode. 2. Put a jumper across terminals RH & W1. The heating should come ON. If it does not, verify wiring and check if a jumper is required between RC & RH.
	Wrong reversing valve configuration	1. Wrong selection of parameter Reversing Valve 2. Select <b>O</b> to energize the valve in cooling operation. Valve is normally heat. 3. Select <b>B</b> to energize the valve in heating operation. Valve is normally cool.

# Technical Specifications

## TEC226x-4(+PIR) and TEC220x-4(+PIR) Series LONWORKS Network Staged Thermostat Controllers

<b>Power Requirements</b>		19 to 30 VAC, 50/60 Hz, 2 VA (Terminals RC and C) at 24 VAC Nominal, Class 2 or Safety Extra-Low Voltage (SELV)
<b>Economizer Output Rating (TEC2204-4[+PIR] and TEC2264-4[+PIR] Models)</b>		0 to 10 VDC into 2k ohm Resistance (Minimum)
<b>Relay Contact Rating</b>		19 to 30 VAC, 1.0 A Maximum, 15 mA Minimum, 3.0 A In-Rush, Class 2 or SELV
<b>Analog Inputs</b>		Resistive Inputs (RS and UI3) for 10k ohm Johnson Controls Type II Negative Temperature Coefficient (NTC) Thermistor Sensors
<b>Digital Inputs</b>		Voltage-Free Contacts across Terminal C to Terminals DI1 and DI2
<b>Wire Size</b>		Unshielded Twisted Pair - 22 AWG (0.6 mm Diameter) Minimum, 18 AWG (1.0 mm Diameter) Recommended
<b>Sensor Type</b>		Local 10k ohm NTC Thermistor
<b>LONWORKS Network Standard</b>		64 Devices Maximum without repeater, 128 Devices Maximum with repeater; 6,250 ft (1,905 m) Maximum Length (Bus Topology)
<b>Temperature Range</b>	<b>Backlit Display</b>	-40.0°F/-40.0°C to 122.0°F/50.0°C in 0.5° Increments
	<b>Heating Control</b>	40.0°F/4.5°C to 90.0°F/32.0°C
	<b>Cooling Control</b>	54.0°F/12.0°C to 100.0°F/38.0°C
<b>Accuracy</b>	<b>Temperature</b>	±0.9F°/±0.5C° at 70.0°F/21.0°C Typical Calibrated
<b>Minimum Deadband</b>		2F°/1C° between Heating and Cooling
<b>Ambient Conditions</b>	<b>Operating</b>	32 to 122°F (0 to 50°C); 95% RH Maximum, Noncondensing
	<b>Storage</b>	-22 to 122°F (-30 to 50°C); 95% RH Maximum, Noncondensing
<b>Compliance</b>	<b>United States</b>	UL Listed, File E27734, CCN XAPX, Under UL 873, Temperature Indicating and Regulating Equipment
		FCC Compliant to CFR 47, Part 15, Subpart B, Class A LONMARK® Certification 3.4
	<b>Canada</b>	UL Listed, File E27734, CCN XAPX7, Under CAN/CSA C22.2 No. 24, Temperature Indicating and Regulating Equipment
		Industry Canada, ICES-003
	<b>Europe</b>	CE Mark, EMC Directive 2004/108/EC EN 61000-6-1 and EN 61000-6-3
<b>Australia and New Zealand</b>	C-Tick Mark, Australia/NZ Emissions Compliant	
<b>Shipping Weight</b>		<b>TEC226x-4 and TEC220x-4 Models:</b> 0.75 lb (0.34 kg) <b>TEC226x-4+PIR and TEC220x-4+PIR Models:</b> 0.77 lb (0.35 kg)



**Building Efficiency**

507 E. Michigan Street, Milwaukee, WI 53202

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