TANKN€T®
BY ACROLON TECHNOLOGIES, INC.

TC-1 Controller

*** USER'S GUIDE ADDENDUM ***

Night Air Cooling

Firmware Version 3.9

Document Version: 1.0

Addendum Summary

This addendum describes how to enable and use the new night air cooling modes available with TC-1 controller firmware version 3.9 and higher.

Night air cooling modes allow a single TC-1 controller to cool space temperature via fresh air draw (ventilation) or mechanical refrigeration (A/C). TC-1 night air logic uses both inside and outside air temperatures to determine which method of cooling to employ.

Basic Features:

- ❖ Uses two probes: one inside and one outside.

- ❖ Offers two different night air cooling modes: NA1 and NA2

- ❖ Set point (SP1) specifies the maximum desired space temperature

- ❖ Night Air Mode 1 (NA1) uses a second set point (SP2) to specify maximum outside air temperature above which fresh air ventilation is inhibited.

- ❖ Night Air Mode 2 (NA2) uses SP1 and a fixed scale factor against which thermostat differential (Dif) is multiplied and then subtracted from inside air temperature to dynamically determine when it's appropriate to engage fresh air ventilation.

- ❖ If outside air temperature is too high for ventilation, then mechanical cooling will be engaged instead.

- ❖ New set point input routines allow SP1 and SP2 to be adjusted individually or together, simultaneously.

Acrolon Technical Support

Hardware Set up

The following describes the hardware configuration required for proper night air cooling operation. For complete controller installation details, please see TC-1 Installation Guide and related advisories.

- Power the TC-1 via appropriate mains voltage (Line/Neutral/Earth) per TC-1 Installation Instructions.

- Attached a TP-1 and a TP-2 temperature probe to the controller's probe bus per the following: Install the TP-1 within the control space as close to the controller as possible. Install the TP-2 probe in a location suitable for monitoring outside air temperature, avoiding direct sun light or heat generating equipment. IMPORTANT: Use only shielded, CAT-5 cable to extended the probe cables. Ground the cable shield at the controller end only. Do not ground the shield at any other location along the bus. Do not exceed 75' of total probe cable length. Run probe cabling in a bus fashion (e.g., from controller to TP-1 probe and then from the TP-1 to the TP-2). Make all cable splices as close to the probes as possible and use only moisture-proof, gel-filled IDC connectors for splices. Ensure that shield is contiguous throughout the bus (e.g., from controller through to last probe in the chain.

- Wire RELAY 1 contacts to the control input for space ventilation

- Wire RELAY 2 contacts to the control input for the space A/C unit (optional).

- Attach network cable to the controller per TC-1 User's Guide and per Echelon's FT wiring guidelines.

Initial Software Set up

Enable Extended Functions:

- Enter program mode by pressing and releasing the PGM button

- Press the PGM button to advance to the 'CC' and turn this menu item 'On' via the UP or DOWN button

- Press the PGM button to advance to 'diF' (thermostat differential) and adjust as desired via UP/DOWN buttons. A minimum of one degree (1F) is recommended.

- Press the PGM button to advance to 'EF' (Extended Functions) and turn this setting 'On' via the UP or DOWN button

- Press & Hold the PGM button to exit programming mode.

**Select Desired Night Air Cooling Mode** (NA1 or NA2):

- Enter program mode by pressing and releasing the PGM button

- Press the PGM button until either one of the MODE LEDs begins to blink or the word "OFF" flashes in the SETPOINT window.

- Press and release the UP or DOWN button until the desired MODE is selected. With extended functions (EF) enabled, the controller will present several additional operating modes. Use the UP or DOWN button to select the desired Night Air Cooling mode which is indicated as either "NA1" or "NA2" in TEMPERATURE display window.

- Press & Hold the PGM button to exit programming mode.

Configuring Temperature Probes

- Enter program mode by pressing and releasing the PGM button

- Press the PGM button to advance to the 'CC' and turn this menu item 'On' via the UP or DOWN button

- Press the PGM button to advance to 'CP' and set to 'P1' via UP/DOWN buttons.

- Press the PGM button to advance to 'HP' and set to 'P2' via UP/DOWN buttons.

- Press & Hold the PGM button to exit programming mode.

Night Air Cooling Mode #1 (NA1)

In Night Air Cooling Mode 1, the TC-1 will monitor inside and outside air temperatures and determine the appropriate method for keeping space temperature from exceeding the temperature specified by Set Point 1 (SP1). A second set point (SP2) is provided for the purposes of specifying the maximum outside air temperature above which fresh air ventilation shall be inhibited.
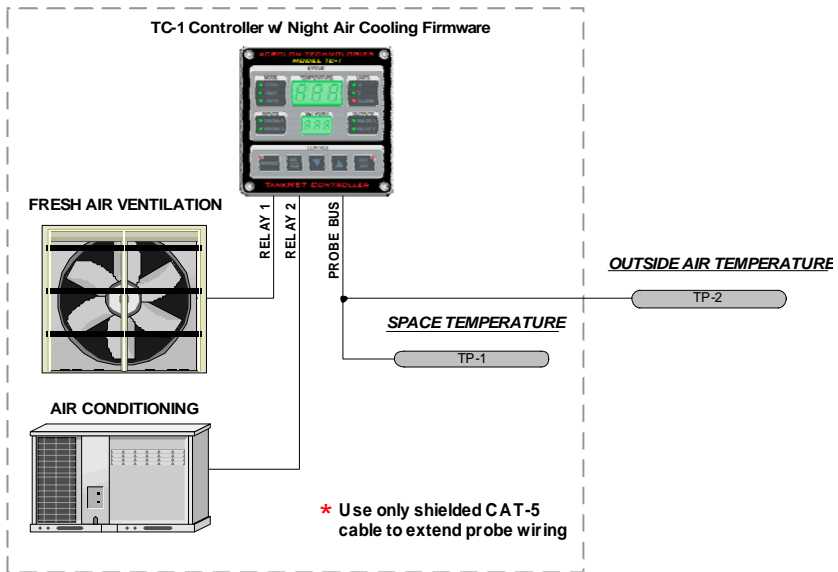
Adjusting Set Points (SP1 & SP2):

Initial adjustment of SP1 (desired space temperature) and SP2 (maximum outside air temperature above which fresh air ventilation will be inhibited) should be done independently from each other to establish the desired offset between space temperature and maximum allowable outside air temperature. Once this initial temperature offset has been specified, an alternate method of adjusting space temperature (SP1) can be used that will automatically preserve this offset.

Set up - Intial Adjustment of Set Points

- Enter program mode by pressing and releasing the PGM button

- Press the PGM button to advance to 'SP1' as shown in the TEMPERATURE display window. This is the desired space temperature set point. Ajust SP1 to the desired value using the UP/DOWN buttons.

- Press the PGM button once again to advance to 'SP2'. This is the maximum allowable outside air temperature set point. Ajust SP2 to the desired value using the UP/DOWN buttons.

- Press & Hold the PGM button to exit programming mode.

Operation - Adjusting Space Temperature

- Press and hold the PGM button.

- While holding the PGM button depressed, use the UP/DOWN buttons to adjust the desired space temperature (SP1) as shown in the SETPOINT display window. Note that when SP1 is adjusted in this manner, SP2 is automatically adjusted as needed to maintain the offset specified during intial adjustment.
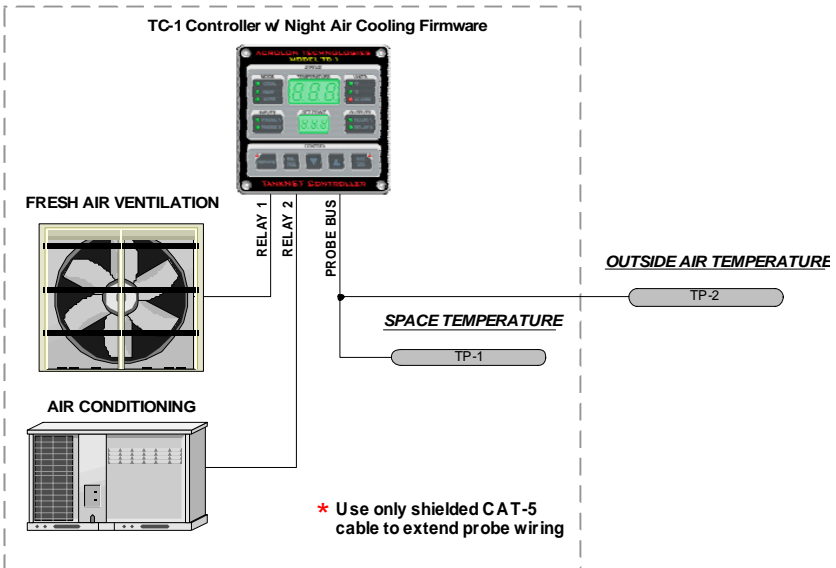
Simplified Logic:

```
If (TP1 >= SP1+dif)  // space temperature higher than desired
{
        if (TP2<=SP2-dif)
                Close_Relay1_Contacts // ventilate
        else
                Close_ Relay2_contacts // outside air too hot, engage
                                            mechanical cooling
}
else Open_Relays_1&2_contacts  // set point satisfied, no cooling
                                    required
```

Note: Operation of Relay 1 and Relay 2 are mutually exclusive. If relay 1 is engaged, relay 2 will be disengaged and vice-versa.

Night Air Cooling Mode #2 (NA2)

In Night Air Cooling Mode 2, the TC-1 will monitor inside and outside air temperatures and trigger ventilation as appropriate to maintain space temperature below Set Point 1 (SP1). Unlike NA1 mode, NA2 mode does not require the operator to manage a second set point (maximum allowable outside air temperature). Instead, NA2 mode triggers ventilation whenever outside air temperature is lower than inside air temperature by twice the thermostat's differential.

Operation - Adjusting Space Temperature

- Press and hold the PGM button.
- While holding the PGM button depressed, use the UP/DOWN buttons to adjust the desired space temperature (SP1) as shown in the SETPOINT display window.

Simplified Logic:

```
If (TP1 >= SP1+dif)  // space temperature higher than desired
{
        if (TP2 <= TP1-(2*dif) )
                Close_Relay1_Contacts // ventilate
        else
                Close_ Relay2_contacts // outside air too hot, engage
                                          mechanical cooling
}
else   Open_Relay1_Contacts // set point satisfied, no cooling required
```

Displaying Indoor and Outdoor Temperatures

With the configuration settings described in this addendum,
PROBE 1 represents space temperature, while PROBE 2 represents
outside air temperature.

Selecting a Probe Display

- Press / release the PGM button until one of the PROBE indicators begins to blink.

- Use the UP or DOWN button to select the desired probe

Note: Upon exiting programming mode, the controller will revert back to displaying the temperature of the probe specified by the 'CP' parameter, which per this addendum is TP1 or space temperature.