NSM Series
RS-485 Modbus RTU Networking Setpoint Module with Digital Display

Features
- Supports standalone operation on RS-485 communication failure
- Large easy-to-read liquid crystal display (LCD), with LED backlight (white)
- A stylish bi-directional rotating dial and one compact touch key to provide ease of operation
- Choice of 2-10 or 0-10 VDC outputs for both setpoint value and analog input via same jumper setting
- Retains last entered settings on power resumption
- A system key enables a 24 VAC output to provide the desired mode of operation such as energy saving mode, etc.
- External temperature sensor or 0-10 VDC input capability

Configurable operating parameters via setup menu
- Choice of ºC, ºF, % or blank engineering unit display
- High and low setpoint limits
- Offset adjustment of readout value
- Choice of constant display of analog input or setpoint value

General
The NSM Series Modbus RTU networking setpoint modules are designed for use with DDC air handling and terminal unit controllers. The bi-directional rotating dial enables the room occupant to adjust the setpoint of the remote controller .

A 0(2)-10 VDC output signal proportional to a configurable range of the analog input is also available to the remote controller .

A system key allows the occupant to turn on a 24 VAC output to activate a desired mode of operation of the controller such as energy saving mode, etc. An icon corresponding to the desired mode of operation will be shown on the LCD screen to indicate that the 24 VAC output is being turned on.

Ordering
To order, specify complete model number.
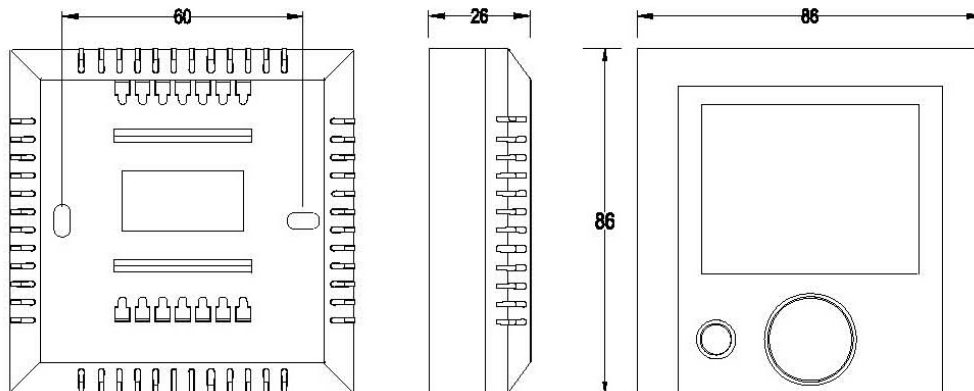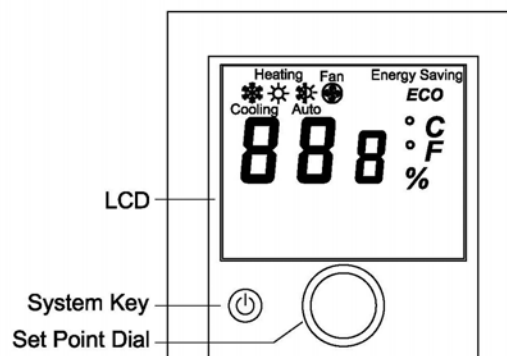
Figure 1: Dimensions in mm

Figure 2: Display Control Unit Layout

Specifications

Product model numbers	NSM-01
Power requirements	24 V ±15%, 50/60 Hz
Power consumption	1 VA @ 24 VAC
Analog output load impedance	Minimum 10,000 Ω
Analog output source impedance	Maximum 1,000 Ω
Display range	-99 to 999
Setpoint range	-99 to 999
Analog input	Passive TE10 Series NTC temperature sensor (-50 110ºC) or Active 0-10 VDC corresponding to ºC, ºF, % or blank units
Analog outputs of setpoint value and analog input	2-10 or 0-10 VDC, selectable by same jumper
Digital output	20 VA @ 24 VAC
Constant display on LCD	Choice of measured temperature or temperature setpoint value
Offset adjustment of temperature indication (field recalibration)	+2, +1, 0, -1 and -2 K (+2, +1, 0, -1 and -2 R) throughout the range, factory setting 0
Sensor sampling time	2 s
Sensing element	NTC thermistor, 10 kΩ @ 25°C, ±1%
Upper and lower setpoint limits	Configurable, factory setting 0-50°C
Energy saving mode	24 VAC voltage output via thyristor
RS-485 communication speed	Baud rate fixed at 19,200 bps
Device MAC addressing	01-32 via parameter setup menu, factory set address "255"
Modbus RTU network guideline	Maximum 32 devices and maximum 1,000 m cable length
Enclosure	Material: Self-extinguishing, molded ABS Finish: Off white housing and faceplate
Protective class	IP30
Ambient/Storage temperature limits	0 to 50ºC / -30 to 50ºC, 10% to 90% RH non-condensing
Electrical ratings	Thyristor output: 24 V, 0.3 A resistive, 0.3 A inductive, 50/60 Hz
Connectors	Non-removable screw-type terminal blocks and removable wire plugs
Power and voltage signal wires	Wire size 1 mm^2 or 18 AWG solid copper recommended
RS-485 communication wires	22 or 24 AWG twisted shielded pairdouble-insulated
Sensor and signal wires	22 AWG twisted shielded pair double-insulated cable
Accessories and options	See Figure 3: Accessories and Options
Agency approval	CE Mark compliant to EMC Directive pending
Dimensions	See Figure 1: Dimensions in mm
Shipping weight	0.12 kg (0.3 lb)

The performance specifications above are nominal and subject to tolerances and application variables of generally acceptable industry standards. The manufacturer shall not be liable for damages resulting from misapplication or misuse of its products.
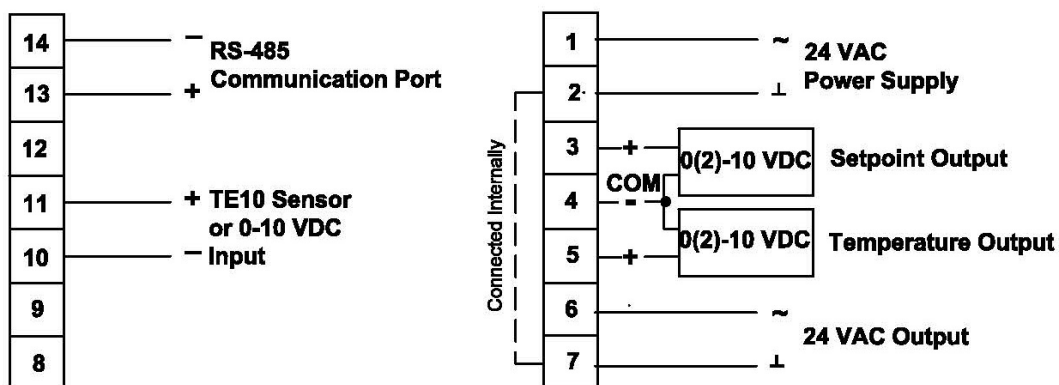
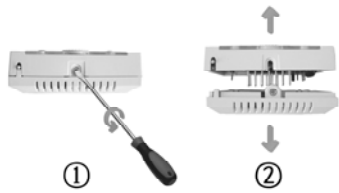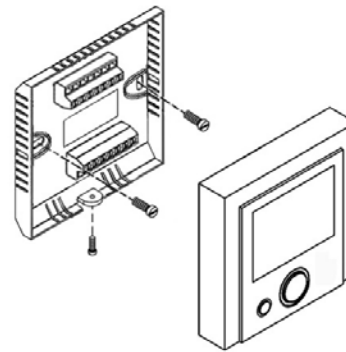## Figure 3: Wiring Diagrams

Figure 4: Cover Removal Procedure

1. Loosen the fixed screw.
2. Slightly twist the screw driver to crack open the cover from the base.
3. Hold the base firmly with one hand and remove the cover with another hand by pulling away from the base forcibly.

## Figure 5: Mounting Details

Mounting

The temperature controller can be surface mounted or secured to a standard European 75 x 75 x 35 mm electrical box. See Figure 4: Mounting Details. Two mounting screws are included.

Figure 6: Accessories

Description	Part No.
Probe-type Temperature Sensor	TE10-1
Duct-mount Temperature Sensor	TE10-2

Figure 7: Wiring Terminals and Jumper Settings
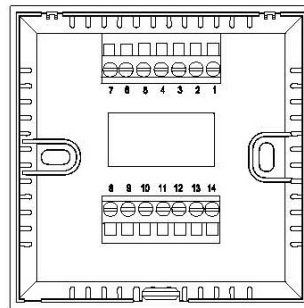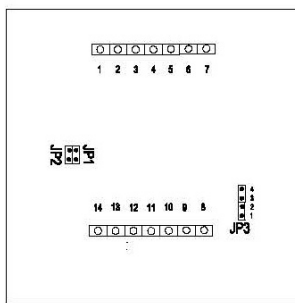
Jumper Settings		
Jumper Number	Jumper in Open Position	Jumper in Closed Position
JP1	With External Analog Input	With Built-in Sensor
JP2	For 2-10 VDC Output	For 0-10 VDC Output (Factory Setting)
JP3	Jumper Across Pins 1 & 2 - for Passive TE10 Series Sensor Input (Factory Setting)	Jumper Across Pins 3 & 4 - for Active 0-10 VDC Input

Module Errors Reporting

When the following errors are reported on the LED display unit, these errors will prevent the controller from normal operation and all controller functions will be locked out:

E-1   EEPROM read/write error
E-2*   Temperature sensor open-circuited
E-3   Temperature sensor short-circuited

* If jumper JP1 is at open position and external sensor is used, E-2 means the external sensor may have been disconnected from Terminals 10 and 11. Check the external sensor's connectivity and resistive value. If E-2 error is still reported, return the thermostat to the manufacturer for repair.

When the error E-1 or E-3 is reported or when the error E-2 is reported with jumper JP1at open position and external sensor being installed, return the thermostat to the manufacturer for repair.

Application Notes

■ Move jumper JP1 to open position if external sensor is wired to Terminals 10 and 11.

■ Move jumper JP2 to open position if 2-10 VDC proportional output is required.

■ Move JP3 to Pins 1 and 2 if external passive TE Series temperature sensor is used.

■ Move JP3 to Pins 3 and 4 if external active 0-10 VDC analog input is used.

■ 22 or 24 AWG twisted shielded pair double-insulated cable is recommended as external sensor wiring and its length must not exceed 25 m.

■ Do not bundle and run power wiring and external sensor wiring in the same conduit.

■ When using the external temperature sensor, run the wires away from any electric motors or power wiring. Failure to do so may result in poor module performance due to electrical noise.

■ For standard models, It is highly recommended that the 24 VAC power supply is interlocked to the air-conditioning system so that the module is shut down when the air-conditioning system is turned off.

- LCD displays measured temperature constantly except when setpoint adjustment is being made.
- The backlight will turn on for 5 seconds when the adjustment dial is being rotated.
- Increase or decrease setpoint by rotating the adjustment dial clockwise or counter-clockwise. During the dial rotation, the LCD shows the setpoint value.
- Activate or deactivate the 24 VAC output by pressing momentarily the system key.
- The module allows authorized service agent only to change the following operating parameters in the field:

Symbol	Function	Description
0	MCU firmware revision level	Firmware revision 0x.x appears after entering the setup menu
1	Controller MAC address setting	To set the device MAC address from 01 to 32 (I01 to I32), default setting 255 (IFF)
2	Configuration of analog input	201 = active 0-10 VDC when JP3 is shorted between 3 & 4 202 = passive TE10 Series NTC sensor when JP3 is shorted between 1 & 2 (factory setting)
3	Choice of engineering unit	3-C = ºC (factory setting) 3-F = ºF 3-P = % 3-0 = no specified unit

4	Low-end value of analog input readout	From: -50 (when 202 and 3-C are set), factory setting = 0 or
		          -99 (when 201 and 3-C, 201 and 3-F, or 201 and 3-0 are set), default setting
		              = 0 or
		          -58 (when 202 and 3-F are set), default setting = 58 or
		              0 (when 201 and 3-P are set)
		To: current high-end value of analog input minus 4 units

5	High-end value of analog input readout	From: current low-end value of analog input plus 4
		To: I10 (when 202 and 3-C are set), factory setting = 50 or
		          999 (when 201 and 3-C, 201 and 3-F, or 201 and 3-0 are set), default setting = 50 or
		          230 (when 202 and 3-F are set), default setting = 230 or
		          I00 (when 201 and 3-P are set)

6	Low-end value of setpoint range	From low-end value of analog input readout to high-end value of setpoint range minus 4 units
7	High-end value of setpoint range	From low-end value of setpoint range plus 4 units to high-end value of analog input readout
8	Choice of display icon to show on-off status	8-1 = none (factory setting) 8-2 = cooling 8-3 = heating 8-4 = auto 8-5 = fan 8-6 = ECO
9	Display offset for analog input readout value	-50 to 99, factory setting = 0
u	Choice of constant display of analog input or setpoint value	u-1 = constant display of X1 input value (factory setting) u-2 = constant display of setpoint value
rS	Restoration of default factory settings	rS1 = Retain current settings (factory setting) rS2 = Restore default factory settings