

**SERIES 9000PT/N4 MICROPROCESSOR BASED
INDICATING PRESSURE TRANSMITTER
(with available P.I.D. Option)**



**INSTRUCTIONS FOR INSTALLATION,
OPERATION AND MAINTENANCE**

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TABLE OF CONTENTS

INTRODUCTION..... 3

 Description
 Specifications
 Features

OPERATING INSTRUCTIONS 5

PROGRAMMING AND INITIAL SETUP..... 9

 Input Range Selection
 Terminal Block Detail
 Initial Setup & Programming
 Overview/Key Description

WIRING 9 & 10

 Detail 'A'
 Detail 'B'

PID OPTION SETUP 11

ORDERING INFORMATION 13

1. DESCRIPTION:

The Sigma Controls Model 9000PT/N4 pressure transmitter is a state of the art, microprocessor based instrument with industry standard 4/20MA two-wire output and digital output for remote control monitoring.

Both pressure and temperature information is available on the screen and via the digital output in MODBUS® RTU format.

Using high accuracy media isolated silicon strain gauge and microprocessor signal conditioning, the 9000PT/N4 offers a broad range of features and benefits.

The integral large (0.5") alphanumeric display provides local indication of pressure or loop current, and the unit is fully user programmable for specific application needs.

With lease line, dial up or spread spectrum radio modems, the 9000PT/N4 functions as a stand-alone RTU in a SCADA system and via the integral MVNET data communications can seamlessly integrate with Sigma Controls 'MYRIAD' series of pump controllers and monitors or 'INFILINK' PC based remote monitoring software.

2. SPECIFICATIONS:

Ranges:

Ft Water; 0/12, 0/35, 0/70, 0/115, 0/160, 0/350 (Custom calibration at no charge.)

Pressure (PSIG):

5, 15, 30, 50, 100, 300, other ranges available, consult factory.

Thermal Limits:

Maximum Operating:
-40° C/85° C (-40° F/185° F)

Compensated: 0° C/50° C
(-32° F/122° F)

Temperature Effects:

± 0.25% output span
within compensated range.

Accuracy:

= ± 0.1% BFL

Input/Output:

7.8-36VDC/
4/20MADC/Digital

Electrical Connection:

Integral compression screw
Terminal block

Cable Color Code:

Black (-) 24VDC
Blue Digital Output 'B'
Yellow Digital Output 'A'
Red (+) 24 VDC

Process Connection:

PT- 1/2" NPT (F) 316SS
N4- 1/2" NPT (M) 316SS

316SS body, Buna N 'O'
Ring, Neoprene Grommet,
316SS Diaphragm,
Aluminum or ABS
Enclosure

Electrical Connections:

PT-1/2" NPT (F)
N4 – Sealed Nema 4X
Enclosure

Local Indication:

4 Digit LCD 0.5" high,
fully user programmable
for zero span, decimal point,
engineering unit.

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Materials of Construction:

The 9000PT/N4 may be connected directly to the process via the integral 1/2" NPT process connection or remotely via tubing.

The 9000PT ships with 36" of lead wire for field connection. Additional wire can be supplied or the user can access the integral screw terminal block by removing the four screws located on the front face of the circuit board.

The 9000N4 ships with a 1/2 inch knockout hole on the right side of the box. The front panel is removed by unscrewing the four thumbscrews and then the panel itself. This will expose the electrical connections and the pushbuttons. The board does not need to be removed.



CARE MUST BE EXERCISED WHEN REMOVING THE 9000PT CIRCUIT BOARD FOR CABLE ATTACHMENT.

4. LIGHTNING AND VOLTAGE SURGE PROTECTION:

All solid-state circuitry of sensors, displays, and controllers supplied by Sigma can be affected by voltage surges and lightning strike transient voltage spikes. Optional surge protectors are available which provide adequate protection for all but the most severe surges and transient voltage spikes normally caused by a near-by or direct lightning strike.

These units provide protection for electronic equipment installations, and should be used in any area where lightning may occur.

Should cable length from the sensor to the control room exceed 200 feet, a surge suppressor should be installed as close to the sensor as possible. Miniature units that can be fitted inside the transmitter housing are available (contact factory).

5. ELECTRICAL CONNECTION:

The attached cable may have two or four wires depending on model.

Two-wire units provide 4/20MA at a normal 24VDC. Red is positive and black is negative. While reverse polarity protection is standard, care should be observed while connecting to live circuits.

Four-wire units provide 4/20MA on the red and black cable as detailed above, and digital data output on the blue and yellow wires.

The type of digital output, MODBUS® is a factory option. See model number matrix for specific digital output type.

OPERATING THE 9000 TRANSMITTER

1) Connect the unit using the black (-) and red (+) wires to a 24VDC power source.

The LCD display will illuminate and alternate between the current level or pressure and the selected engineering units, i.e.:

8.6 then PSI
12.0 then FEET 2
or whatever units have been selected,

2) To view the current temperature, press the minus (-) button, and the display will show the process temperature in degrees °C.

To view the actual loop current being transmitted from the 9000, press the plus (+) button and the display will show the output milliamps in the form XX:XX with 3 dots between the digits ie: 4:63 which is 4.63 milliamps output.

QUICK RE-RANGE

To change the range of the transmitter from the factory calibration, carry out the following steps:

Step 1: Press and hold the 'ENTER' button for 10 seconds to enter the menus.

The first screen to appear will be 'UNIT'. Use the (+) or (-) buttons to scroll through the following items:

UNIT -- OFFSET -- 4 -- 20 -- SET1 -- RST1 -- SET2 -- RST2 -- FILT -- RATE -- ADDR -- STOR.

Step 2: With '4' displayed, press 'ENTER' to confirm that the displayed value is 0. Press 'ENTER' to return to the menu and the '4' display. Advance to the 20 setting. Press 'ENTER' to see the current range of the 20MA point.

Use the (+) or (-) buttons to change the upper or lower scaling point to the new desired value. With new numbers selected press the 'ENTER' button to return to the menu.

'TIP' Pressing the 'ENTER' button while holding either the (+) or (-) buttons, button will increase or decrease the number by 10 counts for each 'ENTER' pressed.

Pressing the (+) or (-) button while holding the other of the (+) or (-) buttons will cause the count to increase or decrease by 100 counts per press of the button.

CHANGING THE ENGINEERING UNIT

The Model 9000 offers 3 selections of engineering units, PSI, FEET, and INCHES.

To change the desired engineering units, follow these steps.

Step 1: Press and hold the 'ENTER' button for 10 seconds until 'UNIT' appears on the display.

Step 2: With 'UNIT' on the display, press the 'ENTER' button to show the current selection. Press the (+) or (-) buttons to select a new engineering unit. With the desired engineering unit selected, press 'ENTER' button to return to the menu.

Note that if you change the engineering unit, you will have to adjust OFST, 4MA, 20MA, SET1, RST1, SET2, and RST2 to values appropriate for the selected engineering units.

ADVANCE TO THE 'OFST' ITEM

The 'OFST' item allows for the 4 and 20MA output points and the relay setpoints to be changed for applications (such as an elevated tank) where 4MA or 20MA and relay setpoints occurs at a value different from the base range, and you wish to use that offset and a zero point for the display and outputs.

Step 1: With 'OFST' on the display, use the 'ENTER' button to show the current engineering unit considered the zero point. Increasing this value 'pushes' the zero point upwards, and decreasing it 'pushes' it downwards. (Due to limitations of showing numbers on the display, the smallest negative value that can be shown will have 3 digits (-XXX), instead of the 4 digits that a positive value can display (XXXX).

Press 'ENTER' to return to the menu.

NOTE: This setting operates differently in software prior to Version 2.5, and is best kept at zero for those units.

ADVANCE TO '4' ITEM

The '4' item allows the setting of where the 4MA output of the transmitter occurs, at zero pressure display or at some other level. (Setting this to the maximum expected pressure, and the 20MA item to zero pressure will 'flip' the 4-20 output, so that as the level goes down, the 4-20 signal goes up.)

Press 'ENTER' to return to the menu.

ADVANCE TO THE '20' ITEM

The '20' item allows the setting at which pressure the 20MA output of the transmitter occurs.

Press 'ENTER' to return to the menu.

ADVANCE TO THE 'RELAY' ITEMS

If your transmitter does not have the relay option installed, it is not necessary to do anything with these settings. You can use them to display status information as if the relay option is connected to the transmitter.

SET1, RST1, SET2, RST2

The relay settings are used as follows:

If the setpoint (SET1 or SET2) are above the reset point (RST1 or RST2), the relay will turn on when the reading reaches or passes the setpoint, and remains on until the reading drops to or below the reset point.

If your unit doesn't have the relay option, you can still use these settings, and monitor the internal thresholds of the relays by means of the (+) and (-) buttons as described elsewhere.

Press 'ENTER' to return to the menu.

ADVANCE TO THE 'FILT' ITEMS

The filter "smoothes" of the transmitter if the process is unstable and is the number of samples taken by the processor in a given time. Increase the value in order to 'dampen' the readings. This number (1-32) indicates the number of prior readings averaged to produce the currently displayed reading.

ADVANCE TO THE 'RATE' ITEM

RATE is the interval between readings and is used with 'FILT' to slow the response of the transmitter to a "noisy" process. Increasing the 'RATE' number dampens the response. This number indicates the number of approximately 1/2 second intervals between the units taking the readings. A value of zero indicates the unit is taking readings about every 1/4 second. The valid range is from 0 to 225 (about 127.5 seconds).

ADVANCE TO THE 'ADDR' ITEM

ADDR allows the user to select a mode address for the MODBUS® digital output. If the transmitter is not being used in a network, leave the value at the factory default of 5. The settable range is from 1 to 246. Although 247 is a valid MODBUS® address, it is reserved for use of the CALMATE Field Calibration Unit, when it is used to program the transmitter.

COMPLETE THE SETUP PROCEDURE

After all settings are revised and/or changed, advance to the 'STOR' screen and press the 'ENTER' button to save all modified items.

If the unit remains in the menu mode for more than 30 seconds without any button presses, the unit will exit the menu mode and revert to the prior settings.

NOTE: At any time during normal operation, several status displays can be called up on the display.

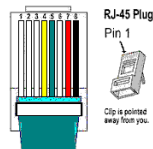
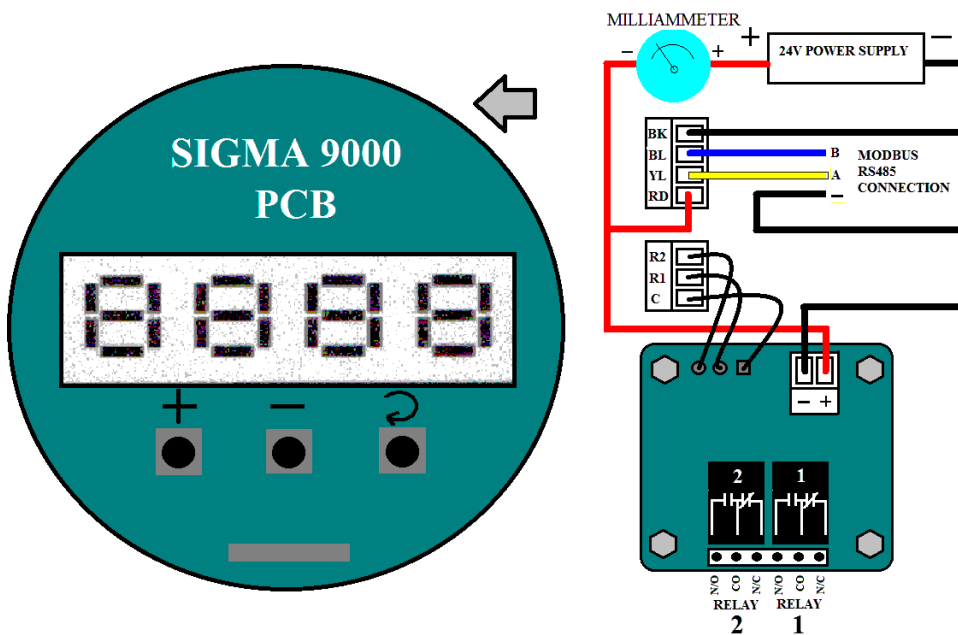
Pressing the (+) button will show the current output of the transmitter in milliamps as follows:
4:00

Pressing the (-) button will display the current temperature in degrees 'C'.

Pressing both the (+) and (-) simultaneously will display the state of the relay outputs. The display will show 'ON' or 'OFF' on the left side for relay 1, separated by 3 dots : and the same on the right side for relay 2.

DETAIL 'A' WIRING

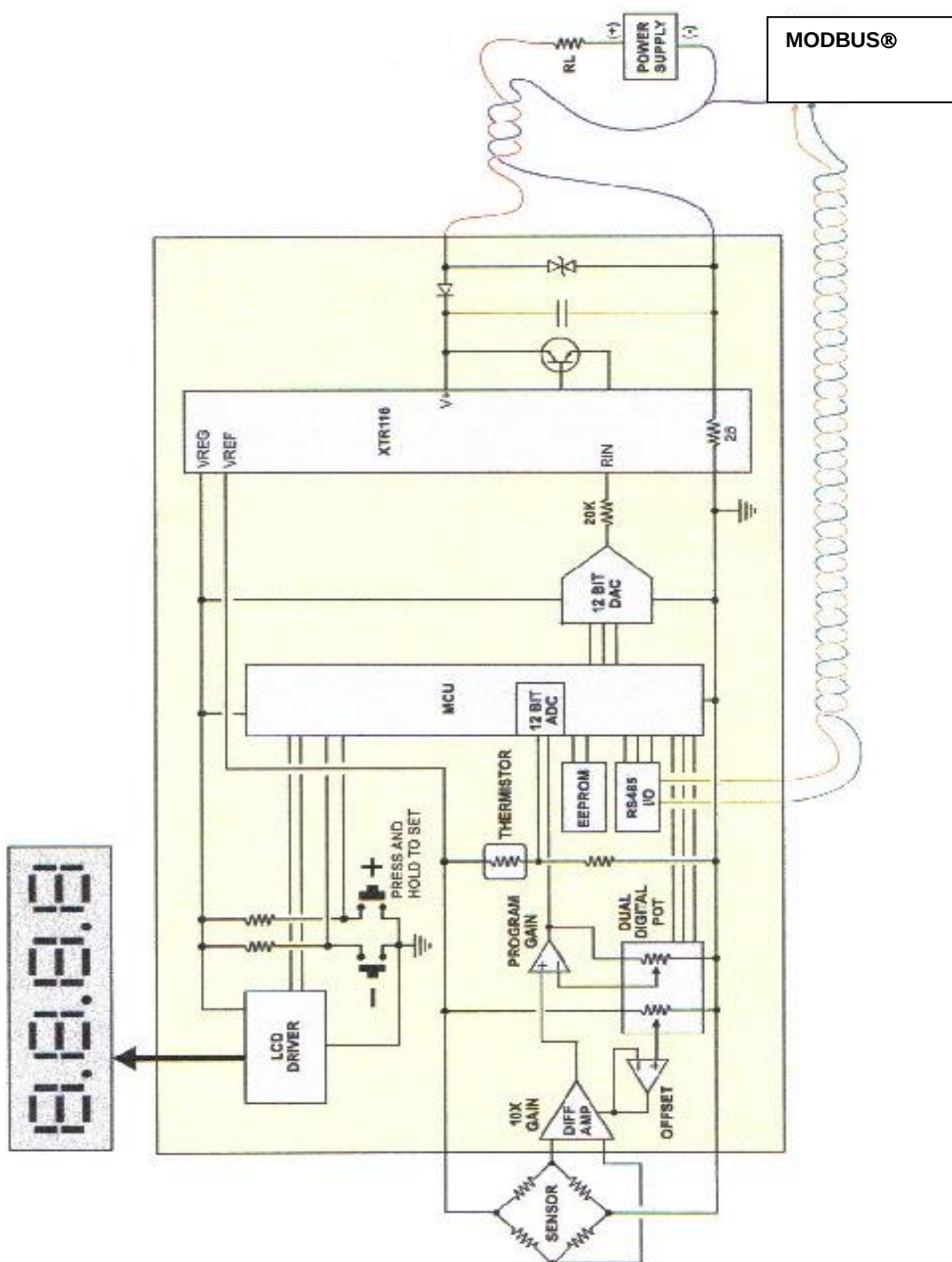
SIGMA 9000 TRANSMITTER WIRING



CONNECTION TO 700 SERIES, 100 SERIES,
USB DONGLE
AND MYRIAD WITH RJ45 (8 PIN) JACKS

RED = +24VDC (OPTIONAL), BLACK = -24VDC / COMMON, GREEN = +RS485, YELLOW = -RS485
THE SIGMA RS485 MODBUS NETWORK USES A 4 WIRE CABLE BASED ON A TELEPHONE CABLE. THE PINOUT
HAS BEEN SET SO THAT IT CLOSELY MATCHES THE COLORING ON THE SIGMA SUBMERISBLE CABLE. EACH
OF THE DIAGRAMS BELOW SHOW HOW TO CONNECT THESE 4 WIRES TO VARIOUS HARDWARE. **THIS
NETWORK IS NOT COMPATIBLE AND SHOULD NOT BE CONNECTED TO SIGMA MVNET RS485
CONNECTIONS OR LEGACY MP SENSORS.**

DETAIL 'B' BLOCK DIAGRAM



PID OPTION SETUP

To change the 9000 pressure transmitter PID option settings:

On power up, press the (+) button while the software revision level message (P.-1.1) is being shown.

You will be able to change the units, 4 and 20MA setpoints, the relay settings (relay board is optional), and the filter and MODBUS® node settings. The sample rate setting has been disabled, and is at the maximum (about 3 times per second).

When you are done, go to the 'STOR' button and press 'ENTER'.

As with the basic 9000, if you do not press any button for more than 30 seconds, the 9000 will exit this mode without changing the existing settings.

To change the PID settings, press and hold the enter button until you see 'STOR' on the display (about 10 seconds).

Press the (+) or (-) buttons to scroll through the following settings:

Press 'ENTER' to see the settings or to change them.

Press 'ENTER' again to return to the settings menu.

Pressing the 'PSET' button sets the setpoint in PSI or other units for the PID loop.

Pressing the 'PGAN' button sets the setpoint in PSI or other units for the PID loop.

NOTE: Numbers below 0.10 will be set to 0.10 and above 50.00 will be set to 50.00 by the software on exiting the PID settings.

Pressing the 'PINT' button sets the integral for the PID loop (range 0.00 to 99.99)

Pressing the 'PDER' button sets the derivative function for the PID loop (range 00.00 to 99.99)

Pressing the 'PDED' buttons sets the dead band pressure range in the selected units.

Pressing the 'POLL' button sets the output lower limit (in % between 4.00 and 20.00MA) range 0.00 (4MA to 99.99% (20MA).

Pressing the 'POLH' sets the output upper limit (in % between 4.00 and 20.00MA) range 0.00 (4MA to 99.99% (20MA).

Pressing the 'POUT' buttons sets the manual mode PID output % (in % between 4.00 and 20.00MA) range 0.00 (4MA to 99.99% (20MA).

Pressing the 'PAUT' button sets if the 9000 is in auto (PID mode (on) or manual mode (off)

Pressing the 'PDOR' button sets if the PID is acting in direct (FOR) or reverse (BAC) modes.

Pressing the 'STOR' button stores the PID settings.

Note that the gain, integral, and derivative settings take effect as soon as they are entered, (before exiting the PID setup mode).

Once you have unlocked the PID setup mode, you can re-enter it by pressing the 'ENTER' button within 30 seconds.

If you enter the PID mode, and press 'ENTER' while at the 'STOR' setting and do not go to another setting, pressing 'ENTER' at this point will exit the PID setup mode and 'relock' the PID setup mode.

While the PID mode is running, the display will show the current pressure in the selected units.

Pressing the (+) button, you can see the computed loop current in MA.

Pressing the (-) button, you will see the temperature of the 9000 unit.

ORDERING INFORMATION

MODEL	ENCLOSURE	RANGE	I/O	OPTIONS
9000PT 9000N4	PT = NEMA 7 EXPLOSION PROOF N4 = NEMA 4X WEATHER PROOF	* A	B	*

ENCLOSURE TYPE

9000PT = NEMA7 EXPLOSION PROOF

9000N4 = NEMA4 WEATHER PROOF

A) * RANGES

005 = 0/5 PSIG	12 FT H ₂ O
015 = 0/15 PSIG	35 FT H ₂ O
030 = 0/30 PSIG	70 FT H ₂ O
100 = 0/100 PSIG	230 FT H ₂ O
300 = 0/300 PSIG	690 FT H ₂ O

B) INPUT/OUTPUT

1) 4/20MA

2) 4/20MA AND MODBUS®

C) *OPTIONS

PID = INTEGRAL P.I.D. CONTROLLER

MB = MOUNTING BRACKET

TVSS = TRANSIENT SUPPRESSOR

EXAMPLE: 9000PT-100-1-MB-TVSS

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