NBT

SM800

EXPANSION MODULE REFERENCE

1. Overview **2**

1.1. Basic I/O *2*

1.2. High Speed Counter *2*

1.3. High Speed Change Detect *2*

2. Mounting **3**

3. Addressing **4**

4. Logic Power **4**

5. Wiring Diagrams/General Information **5**

5.1. Digital Input *5*

5.2. Digital Output *6*

5.3. Analog Input *7*

5.4. Analog Output *9*

5.5. High Speed Counter *11*

5.6. High Speed Change Detect *13*

1. Overview

1.1. Basic I/O

The NBT I/O Expansion Modules provide point expansion capability to the basic internal I/O capability of the NBT SM805TM (RA-PLC). This expansion can include up to 120 additional points in modular increments.

Available Basic I/O modules are:

- Digital Input Module (8 points)
- Digital Output Module (8 points)
- Analog Input Module (8 points)
- Analog Output Module (4 points)

The first expansion module connects directly to the SM805 with a 26 pin ribbon cable. Subsequent modules are successively daisy chained from the first, also with 26 pin ribbon cables.

A total of 15 expansion modules may be connected on the expansion bus, each individually addressable via jumpers.

1.2. High Speed Counter

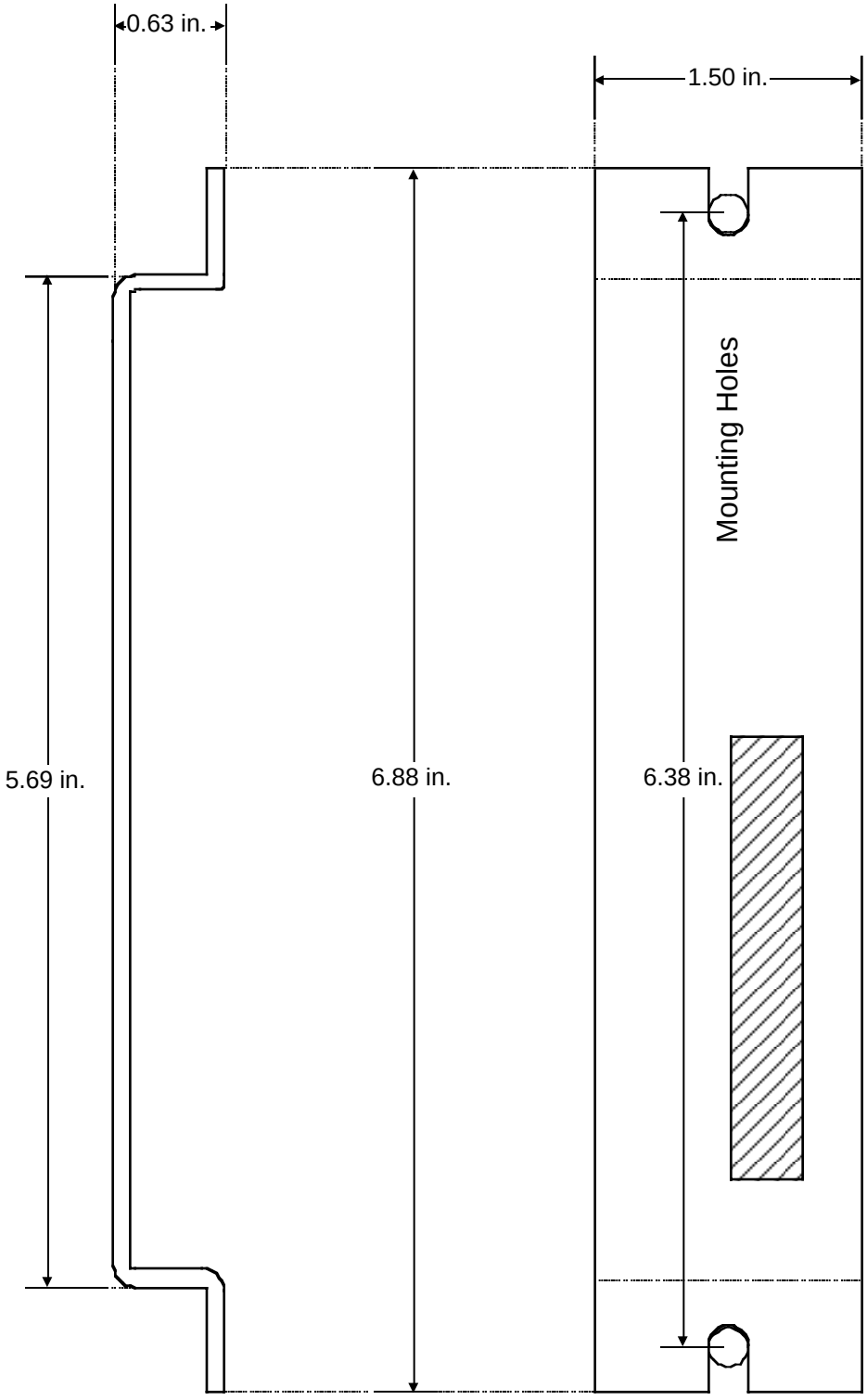
The NBT High Speed Counter Module provides both pulse count totals and pulse rate registers for 4 inputs. The remaining 4 registers are standard digital inputs. The maximum pulse rate is 2 kHz.

1.3. High Speed Change Detect

The high speed change detect insures capture of very short duration pulses for alarming purposes. The module can be configured to capture OFF-ON transitions, ON-OFF transitions, or both. Eight points are available per module.

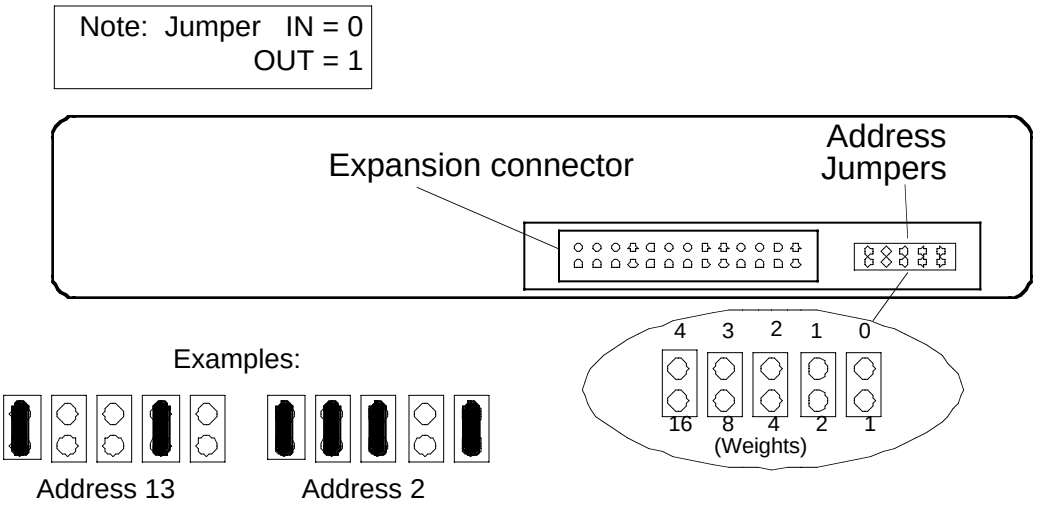
2. Mounting

These modules are suitable for desktop or panel mount. The modules are 3.5” x 5.5” x 1.5” in size. The panel mounting bracket has two 0.188 inch holes spaced 6.38 inches apart, as illustrated below.



3. Addressing

Each I/O expansion card has a jumper selection for addressing purposes. Each card must be set for a unique address between 1 and 15. This address is used in the setup of points (Module Addr) to indicate the associated board.



The expansion cards provide "pluggable" terminal strip connections to field wiring. Wire sizes up to size 14 AWG can be accommodated.

The expansion I/O cards connect to the base unit via a 26 conductor ribbon cable. Up to 15 cards can be connected to a single base unit.

4. Logic Power

The expansion modules operate on power from the base unit via the expansion bus ribbon cable. All expansion points utilize optical isolators for total isolation. The LED indicators on the digital input and output boards are driven by the bus ribbon cable and represent the status as seen by the opto isolator.

The "field side" of the digital inputs may be powered externally, or may be internally jumpered to common power on the terminal strip. The digital outputs will switch a live load and can be internally jumped to a common source.

The analog boards require an isolated power source independent of the actual "loop" power for operation. The required power can be connected to the same supply as the

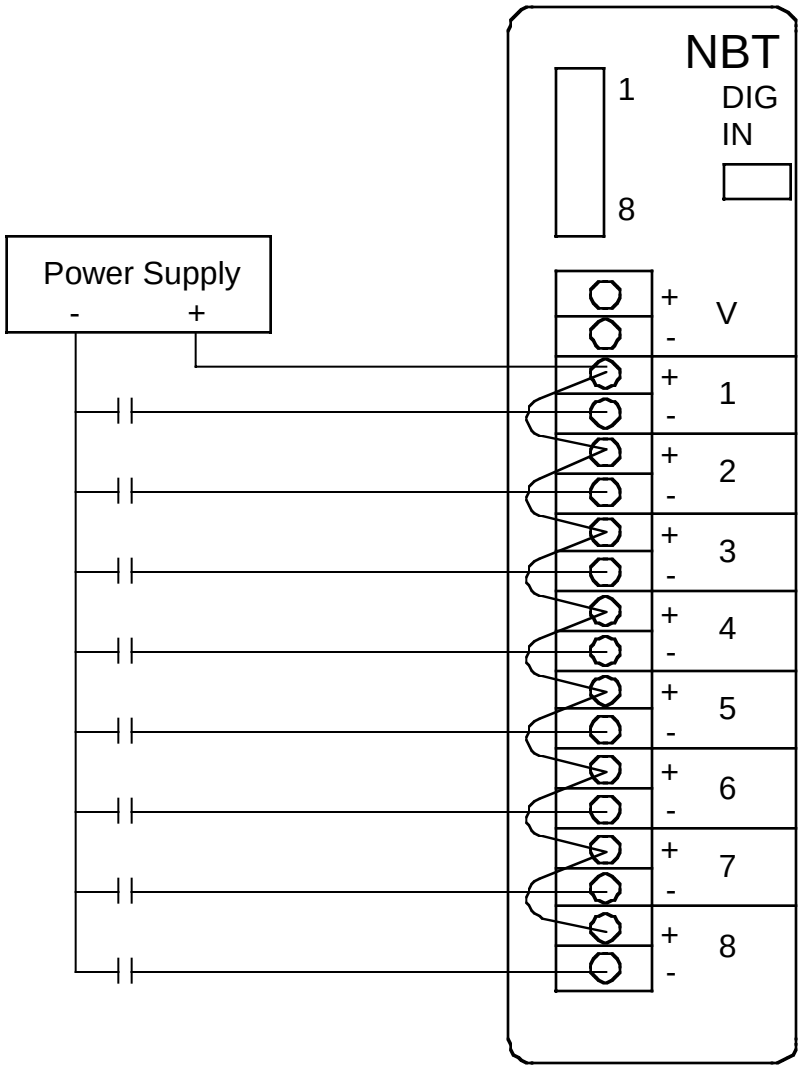
base unit, or they may be connected to the same power supply as the instruments (if galvanic isolation is not required).

5. Wiring Diagrams/General Information

5.1. Digital Input

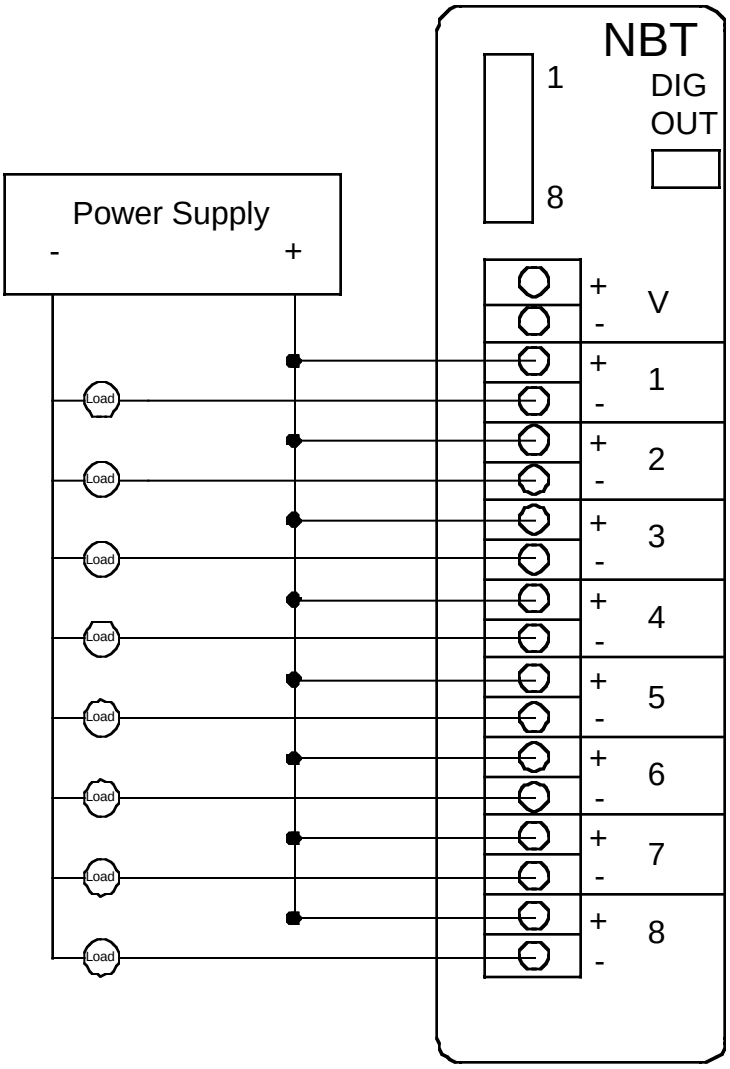
There are no internal jumpers or adjustments on the digital modules intended for field configuration. The Digital Input module comes with each point occupying 2 terminal strip positions and both legs isolated from power or ground.

Digital points can be configured to use an internally bused voltage, an externally supplied voltage, or "live" contacts. The modules operate with 8 - 100 VDC and 16 - 35 VAC.



5.2. Digital Output

There are no internal jumpers or adjustments on the digital modules intended for field configuration. The Digital Output module comes with each point occupying two terminal strip positions and both legs isolated from power or ground. DC digital output points utilize medium or high power FET relay drivers, suitable for connection to external relay coils or small indication loads (24VDC 1.0 amp or 4.0 amp max.). AC digital outputs use an optically isolated triac output (solid state relay) capable of handling up to 4.0 amps at 120VAC. Transient clamping is provided.

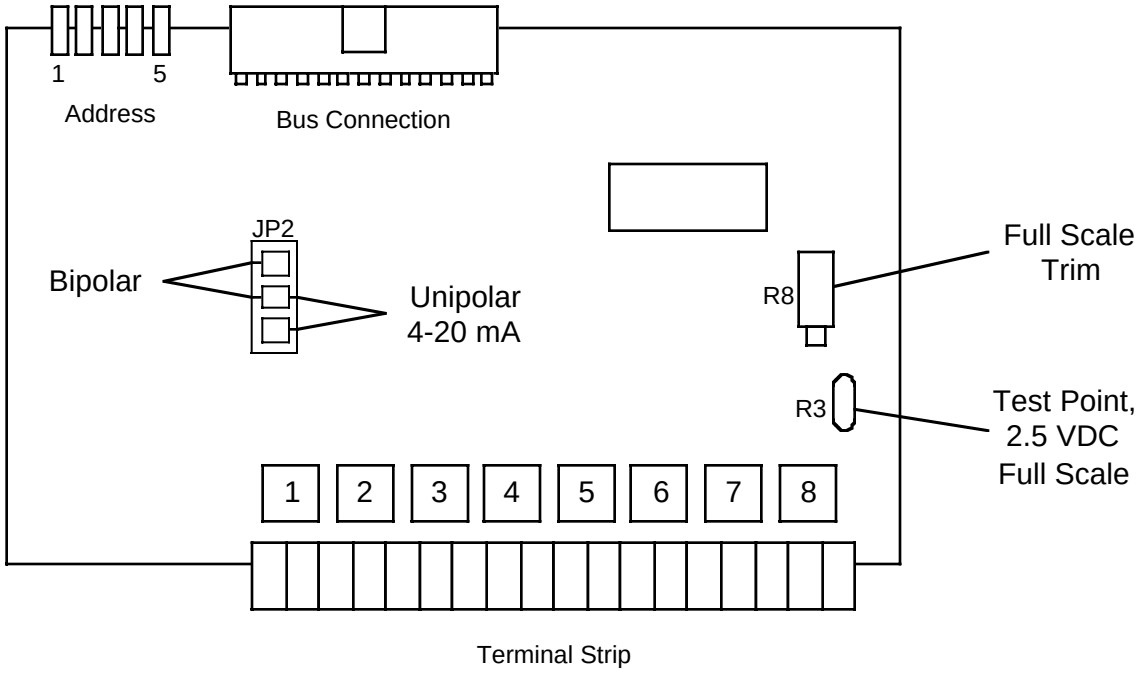


5.3. Analog Input

A Full Scale trim pot (R8) is located in the Analog In module which is adjusted at the factory for correct calibrated value. Over a long period of time there may be minor trim adjustments required. The analog input value will go high with an open circuit.

Jumper JP2 is a 3 pin jumper located in the AI module.

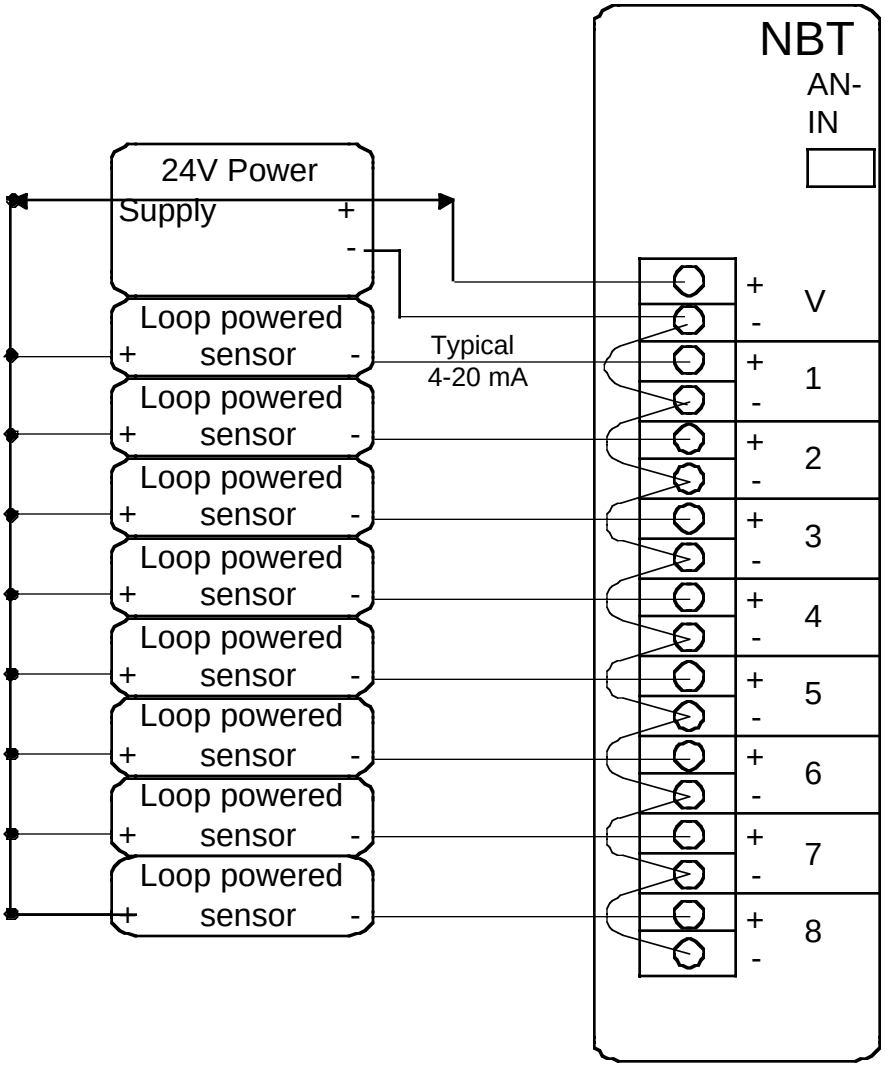
JP2	1-2	selects bipolar operation of the A/D
	2-3	selects unipolar operation



The four analog input modules (AIXA01-AIXA04) require +/-12 VDC (or 24 VDC) for full range operation. Load current for an analog input module is approx. 30 ma.

Each expansion module uses an independent A/D converter with 10 or 12 bit resolution. Note that the points within a single expansion module are not optically isolated from each other. They each, however, can withstand continuous common mode voltages of +/- 200 VDC, and momentary (10 sec) common mode voltages of +/- 500 VDC (SWC - Surge Withstand Capability). Optical Isolation allows the entire field side of the module to float to voltages of 500 volts. Surge protectors are typically set at about 75 V. Contact the factory for other options.

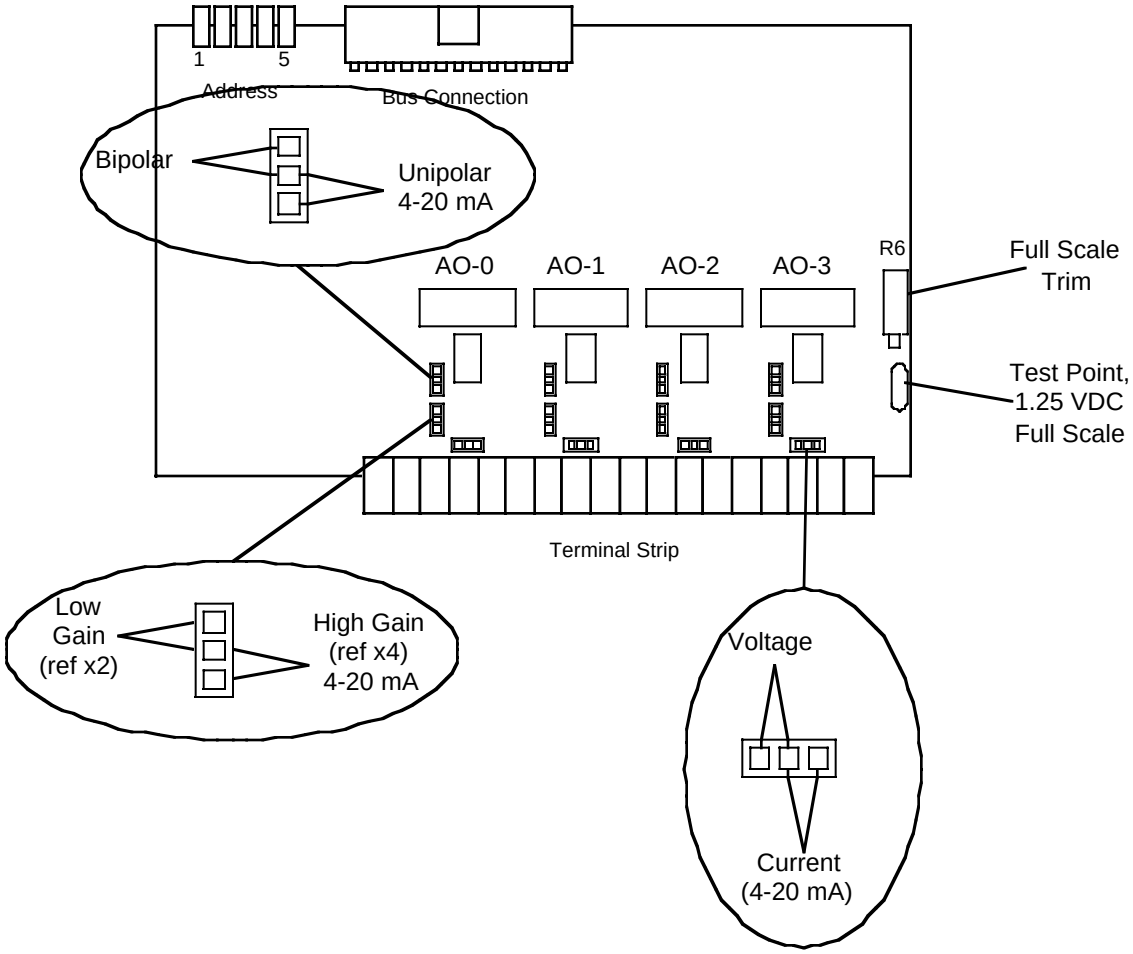
Analog input wiring diagram.

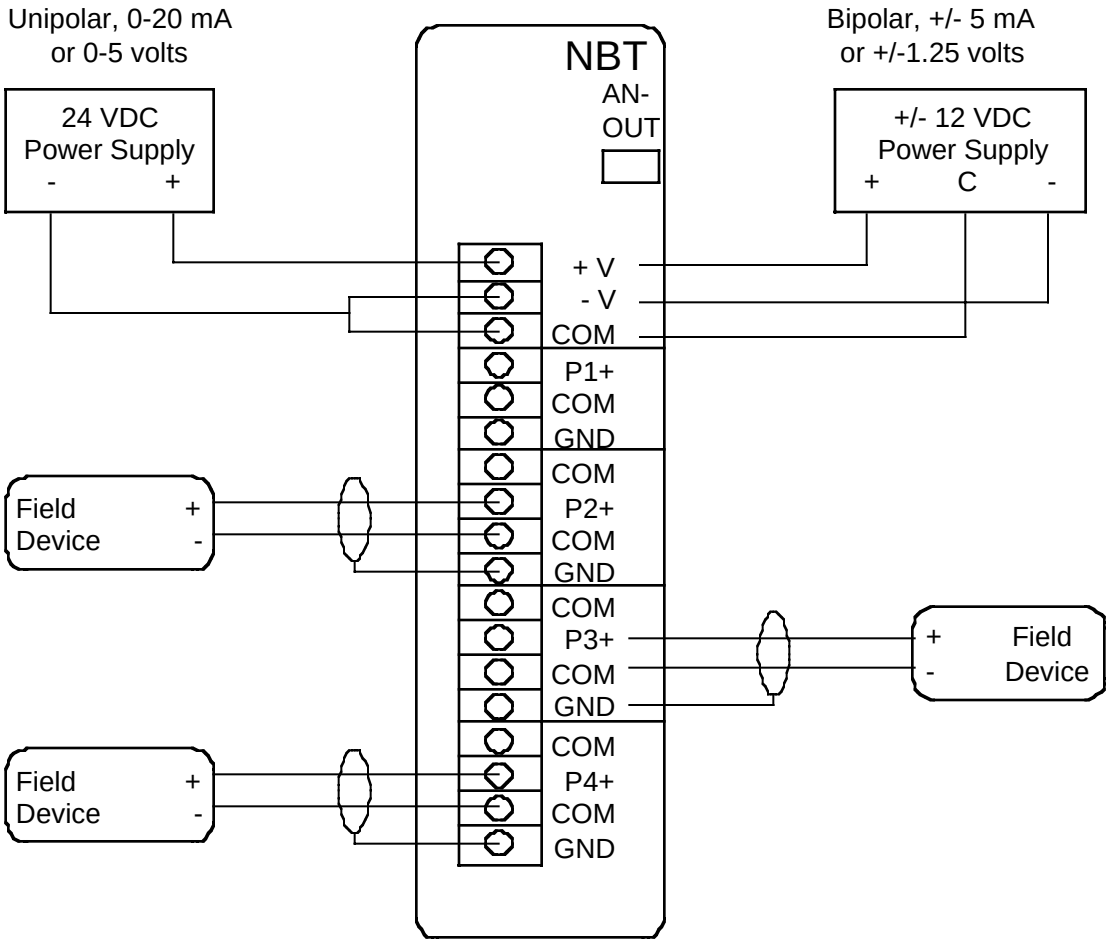


5.4. Analog Output

A Full Scale trim pot (R6) is located on the right side of the AO module which is adjusted at the factory for correct value. Over a long period of time there may be minor adjustments required.

Jumpers are available on each point to select range and voltage or current mode.

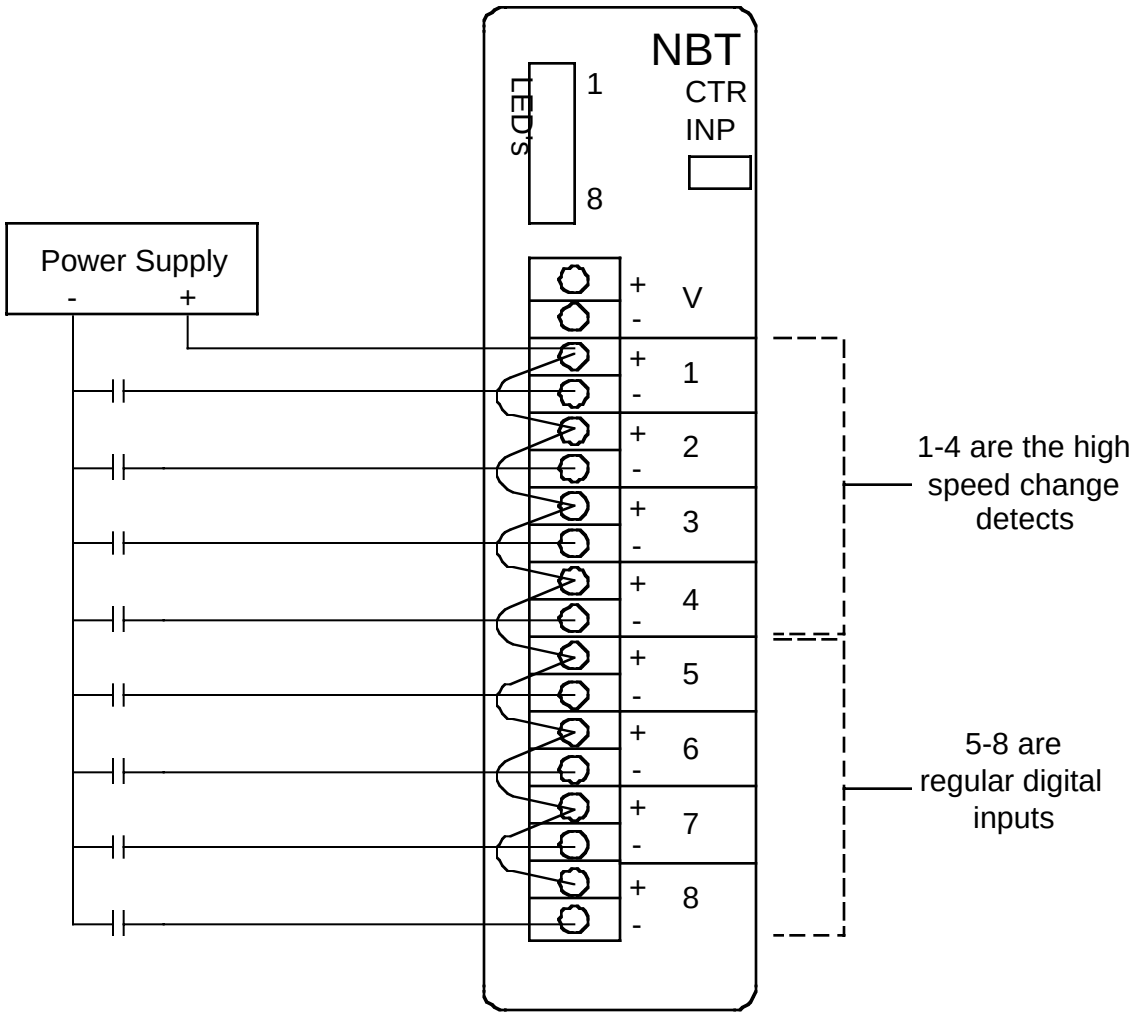




The analog output module requires a minimum of 16 VDC for unipolar operation. For bipolar operation, the power supply should be +/-12 VDC.

Analog outputs can be ordered for most standard voltage and current ranges. Optional scaling can be configured on a per point basis. Resolutions are available in 10 or 12 bits. The field side of the analog output module is optically isolated

5.5. High Speed Counter



LED's (1-8) flash from **bottom to top** on power up.

This card provides four points of instantaneous counts and pulse rates. Prescale options are 1, 2, 5, and 10. The bus interface is designed for using the first 4 inputs and provides count and rate inputs for each.

The count for terminal strip point *n* (1-4) is read as register *n-1* (0-3). The associated rate is read as register *n+3* (4-7). For example, if register 0 is the instantaneous count, then register 4 is the rate value for input #1 of the card.

(Use point type "CTR-IN" for counter inputs)

Use the following table to select the prescale value:

PRESCALE VALUE

	1	2	5	10
JP2	in	out	in	out
JP3	in	in	out	out

JP4: IN = one minute intervals
OUT = one second intervals

Counter Scaling in Table 1

In the SM805, Table 1, a counter input (CTR-IN) point can have a full scale value of 0 to 255. A non-zero scale will multiply the input count values by the full scale value. Thus, if the full scale value is 15, *each* incoming pulse would cause the totalized value in the 'max' and 'min' columns to be increased by 15.

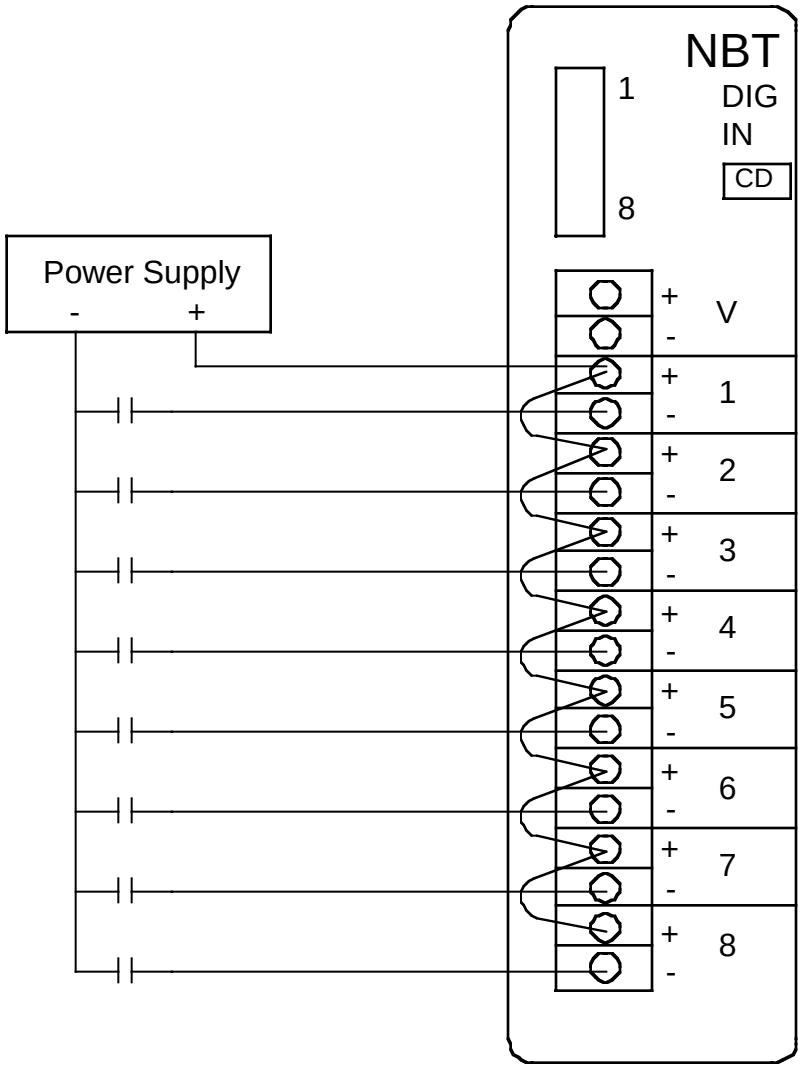
If the counter input (CTR-IN) point has a decimal point specified as 1, then the effective value of each pulse would be 1.5 units, if the full scale value is 15.

An offset of 3 will suppress the least significant 3 digits of the totalized value. (three is the only special case value, otherwise the value is zero). A scale factor of 4750 and an offset of 3 would result in an accumulated value of 4.75 (gallons, for example) per pulse.

Sampling

The CTR-IN point type creates a sample type of "Totalize" for any samples recorded, regardless of whether the "SmplType" column entry is a point number or 253, or 254 (253 = one min. & one max. sample every hour - cumulative; 254 = one min. & one max. sample every hour, but resets each time to give just the current sample value).

5.6. High Speed Change Detect



LED's (1-8) flash from **top to bottom** on power up.

JP2 IN: Hold pulse(see JP3)
OUT: CD on any edge

JP3 IN: Hold any 1
OUT: Hold any 0

JP4 IN: LED’s show input (normal)
OUT: LED’s show bus data

Note: The change detect card is usable on all models.