

APPLICATION NOTE

YS1000 Series Signal Conditioning Cards

OVERVIEW

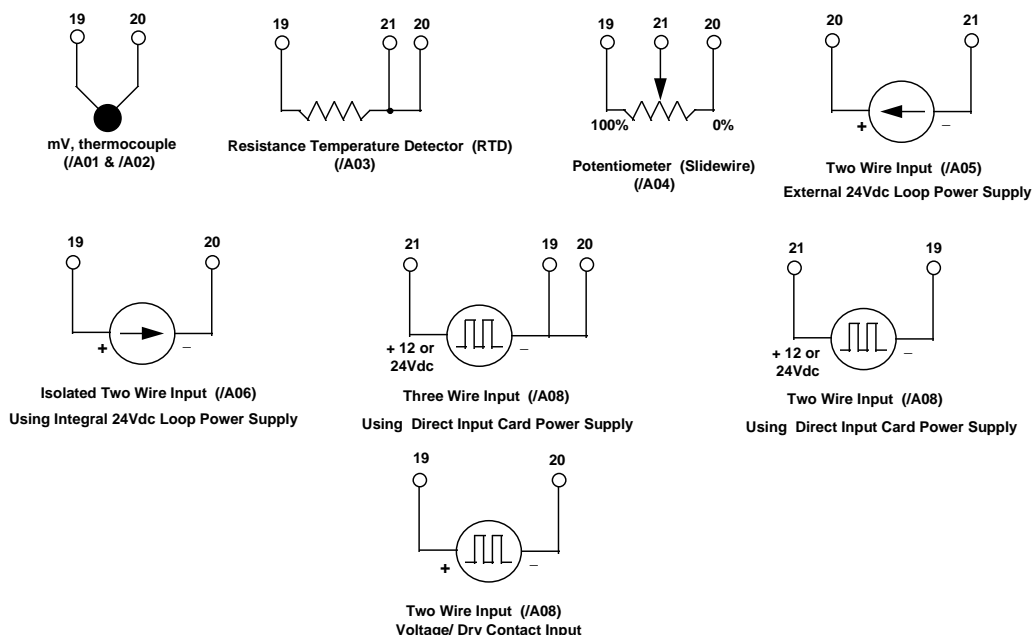
YS1000 Series instruments can accept **ONE** direct input when a signal conditioning option is specified. The direct input **replaces** one of the non-isolated 4 to 20mA DC (using a 250Ω shunt resistor) or 1 to 5VDC inputs. YS1700 can accept five analog inputs. YS1500 can accept four and YS1310, YS1350, YS1360 can accept two analog inputs. In all cases, one input can be signal conditioned.

These options are designated as /A01 through /A08 in the model number, shown on the serial plates on both the instrument enclosure and signal conditioning card chassis. The wiring terminations are at the rear of the instrument enclosure. Refer to the electrical diagrams and terminal numbers at the upper right for more details.

All direct input configuration is performed from the instrument front panel using the SC MAINT display under the ENGINEERING group MENU. The zero, span and input characterization are configured easily using the front panel display. The instrument instruction manual has a section describing the step-by-step procedure to configure the specific signal conditioning card.

YS1000 series instruments have an integral 24VDC power supply to provide loop power to **two** field transmitters. This supply is rated at 60mA DC maximum. The signal conditioning card operates from

Direct Input Interconnections (Options /A01 - /A08)

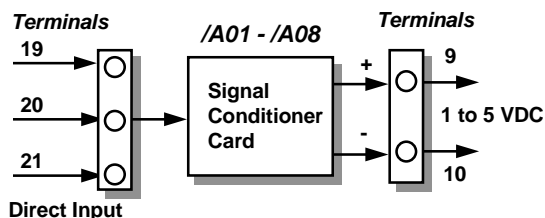


this power supply, limiting the available loop power to **one** transmitter.

A YS1000 direct input is internally routed to Terminals 9 & 10. This 1 to 5 VDC signal is proportional to the direct input after signal conditioning for zero, span, linearization, etc. If the signal conditioned input is used as the process variable (PV) on a YS1500, YS1310, YS1350 or YS1360, a single wire between Terminal 9 (+) and 1 (+) is required. Since signal common on all analog inputs are internally connected, a wire between Terminals 10 (-) & 2 (-) is not

required. In the YS1700 Programmable Controller, the X5 input (Terminals 9 & 10) can be addressed directly in a custom program, eliminating the need for hardwiring. Refer to the functional block diagram at the left.

Any optional input card can be ordered after the original purchase of the instrument and easily installed in the field. If a user has a YS1000 series instrument and a new input requirement occurs, the input card can be installed onto the main circuit board by removing the instrument chassis from the enclosure. The signal conditioning card is simply inserted into a supporting sub-chassis near the rear of the main circuit board. Front panel configuration allows easy implementation of the direct signal conditioned input.



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mV & Thermocouple Input (/A01 & /A02)

The /A01 signal conditioning card (Model EM1*B) allows a mV input from -50 to +150mVDC. The minimum input span is 10mVDC and the maximum is 100mVDC. This option is used only in specialized applications where a low level mVDC signal is received from an external device.

The thermocouple card (Model ET5*B/YS) is the most widely used direct input option. This is a microprocessor-based card that can accept the most commonly used thermocouples.

The thermocouple type is configured in the SC MAINT menu. The selections are B/E/J/K/T/R/S or N. The engineering units are selected: °C, F or K. The zero and span of the thermocouple are configured, as well as upscale or downscale burn-out, if required.

The thermocouple card assembly includes two wires connected to a small connector. This connector must be installed onto the mating connector (CN6) on the main circuit card to allow a reference temperature reading. If this connection is NOT made, the temperature reading will have an ambient temperature offset and incorrect reading.

Resistance Temperature Detector (RTD) Input (/A03)

YS1000 Series instruments can accept one 100Ω platinum RTD input by ordering the /A03 option (Model ER5*B). The on-board microprocessor allows easy configuration for DIN/ANSI PT or JPT (Japanese Standard) RTD's.

As with the T/C input, the engineering units (°C, F, or K), zero and span, and upscale/downscale burn-out require configuration. The menu-driven SC MAINT display is easy-to-use and allows fast configuration of this direct input card.

Potentiometer Input (/A04)

In applications where the final control element is a motorized valve, it is desirable to have a valve position input to the control instrument. Most motorized valve positioners have a potentiometric (slidewire) device that can be directly connected to a YS1700 by using the /A04 option (Model ES1*B). This input permits valve position to be shown on the YS1700 front panel display as the MV (control) output.

Using the SC MAINT menu, the total potentiometer resistance is configured into the instrument. A potentiometer up to 30KΩ total resistance can be used, but the general specification for total span is 100Ω to 2KΩ.

Input Isolator (/A05)

This optional card is used only if an analog input signal is non-isolated. The YS1000 Series instruments have all analog inputs (4 to 20mADC or 1 to 5VDC) referenced to signal common. If a non-isolated signal is introduced, a ground loop current may be present, providing an input offset and error.

The /A05 card (Model EH1*B) provides the necessary optical isolation to eliminate any potential ground loop currents. Most field transmitters provide this necessary isolation, but some older two-wire or four-wire (110VAC powered) transmitters may not incorporate this feature.

No YS1000 Series instrument configuration is required. Refer to the wiring diagram on the first page for field terminations.

Two-Wire Input Isolation (/A06)

Option /A06 (Model EA5*B) provides optical isolation and a 24Vdc loop power supply for one two-wire transmitter. The power supply is *isolated* from the field transmitter and has current limiting. The signal input terminals (Terminals 20 & 21) provide an internal 250Ω precision resistor. As with the /A05 option, isolation may be required to prevent the introduction of ground loop currents within the electrical connections from the field device.

This popular direct input option is used for non-isolated transmitters. No YS1000 configuration is required. Zero and span potentiometers are accessible from the circuit card to permit calibration using a precision voltage source and voltmeter.

Non-Isolated Two-Wire Transmitter Input (/A07)

This option card provides a 24VDC loop power supply for a two-wire transmitter, as with Option /A06. The card was originally designed for the Yokogawa μXL Distributed Control System. It was carried into the YS1000 family with the other signal conditioning cards described herein. YS1000 series instruments have an integral 24VDC loop power supply that can provide power to **TWO** transmitters as a standard feature. This option card is **NOT** required for loop power and should rarely be used.

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Frequency Inputs (/A08)

YS1000 Series instruments can accept one frequency input in lieu of an analog signal by installing the /A08 option (Model EP3*A). This card can accept two wire or three wire inputs, or a dry contact closure. The maximum electrical frequency is 10KHz. The minimum dry contact frequency is 5Hz.

On the circuit card, a series of jumper sockets allow selection of an input filter for a dry contact input, minimizing the effects of relay chatter. An input load resistance is selectable: 200, 500 or 1000 Ω . A 12 or 24VDC power supply can be selected by placing a jumper in the appropriate position. Refer to the instrument instruction manual for more detailed information.

Summary

YS1000 series instruments can optionally be provided with one signal conditioning card. Any of these cards can be ordered with the YS1000 series instrument or after installation. The thermocouple and RTD input cards feature on-board microprocessors that allow maximum versatility. All configuration is performed at the instrument front panel. No external device is required.