Hints for various applications.

NAMUR Sensors

NAMUR sensors are normally driven from 8.2V but many manufacturers have units which can work from higher voltages. The NAMUR sensor normally gives a current of less than 1mA (0.8mA typical) or more than 2.2mA (4mA typical) into a 1K load, depending on state.

The input impedance of the 1100P is 1K (switch 2 on) which should give a voltage lower than 1V or higher than 2.2V depending on state. The threshold level should be approximately 1.6V to provide reliable operation under normal circumstances. This is approximately 20% of the 8.2V supply.

Some NAMUR sensors can drive more than 4mA (4V) when powered from a 15V supply. If a NAMUR sensor is erratic at 8.2V it may perform better at 15V but make sure the manufacturer has rated it for this voltage.

Optical Sensors

Reflective or shutter type optocouplers can have their LEDs powered from pin 6+ and pin 7-. The maximum available current is 20mA so a current limiting resistor will be required.

Variable Reluctance (magnetic) Sensors

Variable reluctance sensors generate a voltage signal whose frequency and amplitude both vary. There is no output voltage when there are no input pulses. In this condition the sensor can appear to be an open circuit and 50Hz noise may be detected on long runs of cable causing false readings at zero. Switching in switch 4 will present the cable with a 10K input impedance which can reduce this noise without significantly loading the sensor. Increasing the threshold setting may also help but this will introduce an amount of “dead band” at zero when there will be no output until the amplitude has increased sufficiently.

All Sensors To Be Powered From The Model 1100P

Ensure that the maximum sensor current is less than 20mA otherwise degradation of accuracy or damage to the unit may occur.

Model 1100P - Pulse to Current Converter User Guide

The model 1100P is designed to accept a pulse input from many types of sensor to provide an analogue 4~20mA signal for process instrumentation. An integral power supply provides either 8.2V or 15V DC stabilised at up to 20mA to power 3 wire devices such as proximity switches.

Applications include anemometers, revolution counters, and water flow turbines.

Four DIP switches on the front of the unit may be configured to allow input from the following devices:-

Reed switch, NPN transistor, PNP transistor, optocoupler, variable reluctance pickup, NPN proximity switch, PNP proximity switch, NAMUR proximity switch, voltage pulses.

Switch	Open	Closed
1	15V supply on pin 6 *NPN & PNP 3-wire sensors* and most other devices.	8.2V supply on pin 6 *NAMUR sensors*
2	1K pull-down resistor on pin 5 disabled	1K pull-down resistor on pin 5 enabled - NAMUR sensors.
3	10K pull-down resistor on pin 5 disabled	10K pull-down resistor on pin 5 enabled - *PNP sensors*.
4	10K pull-up resistor on pin 5 disabled	10K pull-up resistor on pin 5 enabled - *NPN sensors, reed switches, optocouplers*

Switch settings for Standard Sensor Types

0 = Open 1 = Closed X = Does not matter AOT = Adjust to suit

Sensor	Terminals Used			Switches			Threshold	
				1	2	3	4	%
AC Pulses (0V threshold)	5		7	X	0	0	0	0
AC Pulses (capacitive coupled)	5		7	X	0	1	1	50
DC Pulses (Threshold 0 - 15V)	5 +		7 -	0	0	0	0	AOT
DC Pulses (Threshold 0 - 8.2V)	5 +		7 -	1	0	0	0	AOT
Variable reluctance sensor	5		7	X	0	0	0	0 - 5
NPN 3 wire proximity switch	5 sig.	6 +	7 -	0	0	0	1	50
PNP 3 wire proximity switch	5 sig.	6 +	7 -	0	0	1	0	50
NAMUR proximity switch	5 -	6 +		1	1	0	0	20
Reed Switch	5		7	X	0	0	1	50
Optocoupler (LED may be powered from pin 6+ and pin7- with suitable resistor).	5 C	6 +LED	7 E -LED	0	0	0	1	50
NPN transistor	5 C		7 E	X	0	0	1	50
PNP transistor	5 C	6 E		X	0	1	0	50

Threshold Adjustment

The threshold adjustment sets the minimum voltage level to which the 1100P responds. This is calibrated as 0 - 100% of the supply voltage available on pin 6. For device powered form the 1100P such as proximity switches, the values given above should suffice.

For voltage inputs the optimum setting is usually ½ the waveform amplitude. For example if the input is a 5V square wave the optimum setting is approximately 2.5V which is 17% with switch 1 out and 30% with switch 1 in.

With devices which have a variable amplitude output such as variable reluctance sensors, the theoretical setting would be 0% as these generate an AC waveform. Sometimes a setting just above zero will reduce problems with 50Hz noise on long runs of cable.

Input Protection

The input pin (5) has a 10K resistor in series with diodes connected to both power rails. This provides continuous protection for up to 50V DC or AC RMS.

Outputs

The primary output is a current (usually 4~20mA) on pins 8+ and 9-. This is sourced from an on board unregulated 24VDC power supply. This is normally adequate for most installations. This voltage depends on load and line conditions and is usually between 22 and 30 volts. This will drive loads up to about 850 ohms.

The current output can sink from an external power supply if required. In this case use pin 9 as + and pin 4 as -. The output drive transistor is rated to 60V DC and 2 watts so higher voltage external power supplies can be used to increase the load which may be driven.

The current output passes through a 250ohm 1% resistor which generates a 1~5V (4~20mA) or 0~5V (0~20mA) signal. This is connected to pins 3+ and 4- on the module. This voltage may be used at the same time as the current, however a load of 10K degrades current accuracy by approximately 1%. If the unit is to be used specifically for voltage output, pins 8 & 9 should be connected together to provide a current path.

For voltage outputs other than 0~5V or 1~5V the load resistor value will not be 250ohm. The maximum voltage output on these units is 10V DC. To drive higher voltage outputs use the current output and a suitable load resistor. For example a 0~20mA output with a 600ohm resistor (2 x 1K2 in parallel) will give 0~12V DC.

The output stage is fitted with a current limiting circuit to protect the output against overload. This is usually set at approximately 125% of nominal range. This limiter is in the circuit connecting to pin 9 so that it works with external power supplies as well.

Note that pin 8 connects directly to the internal 24V DC power supply and pins 4 & 7 are connected to the internal ground. NEVER CONNECT A SHORT CIRCUIT BETWEEN PIN 8 AND PINS 4 OR 7 AS SERIOUS DAMAGE WILL OCCUR.