



9100

CE

Predetermining Counter / Ratemeter

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OVERVIEW

The 9100 is a versatile multi-function counter/ratemeter and process controller. Features include:-

- LCD three-row dot matrix display with backlight;
- simultaneous display of instantaneous, batch and total counts;
- seven count modes;

BASIC OPERATION

Inputs A and B receive count pulses. The 9100 counts these and also measures the rate at which the pulses are arriving on input A only (input B in quadrature x 1 mode).

The progress of the count or the rate is shown on the front panel display according to the mode and the scale values you program into the unit.

Outputs R1, R2 and R3 change state when the count or the rate becomes equal to a preset value (P1, P2 or P3) which you set for each output. Each of the three outputs can be programmed to respond either to a count value or a rate value, as required. Each output can be independently programmed to remain in the changed state for an amount of time which you can set (the 'on time') - this is called Pulsed Mode - or to remain in the changed state until the end of a complete count cycle - this is called Latched Mode.

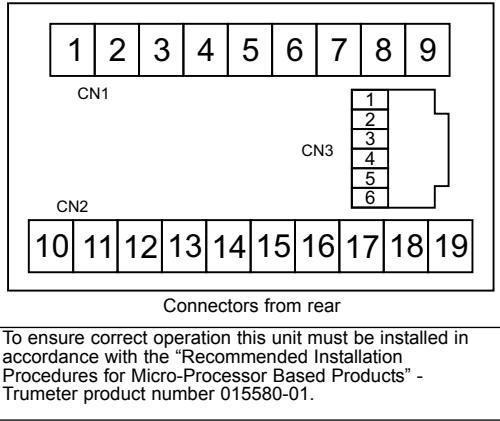
The normal sequence for outputs, in count mode, is for P1 and P2 to be set between zero and P3, since the value of P3 determines the end of a cycle of counting; outputs 1 and 2 will therefore change state at preset points within the count cycle. If you have chosen 'automatic reset' mode, then reaching the end of a count cycle resets all latched outputs to their initial state. If you have chosen 'manual reset' mode, then latched outputs remain latched until the counter is reset from the front panel or by a pulse on the External Reset input.

Output 1 can alternatively be set up as a batch counter, which you can preset to operate when a certain number of count cycles have been completed.

Output 2 can alternatively be set up as a 'motion monitor'. In this mode, if no count pulse has been received for 12.8 seconds (equivalent to 4.7 rpm when using a shaft encoder), then relay R2 operates to provide an indication that the process has stopped. When the next pulse is received, R2 releases and timing starts again.

EXTERNAL CONNECTIONS

Two terminal blocks are provided at the back of the counter, arranged as shown. The terminal strips may be unplugged from the counter to facilitate easy wiring.



- comprehensive prescaling for direct display in units of your choice;
- three fully programmable relay outputs for process control;
- simple, straightforward visual programming;
- programming in any of four European languages.

COUNT TYPES

UNI + DIR
Count is incremented or decremented by input A. Direction is determined by input B:-
Input B open - Increment
Input B closed - Decrement

A+B
Count is incremented by either input A or input B.

A-B
Count is incremented by input A and decremented by B.

A/B
Count is incremented by input A. Display is derived from input A divided by input B. Manual reset (keyboard or remote) is required to clear the B count value.

Quadrature Counting Modes
For all quadrature modes, the phase of input A must lag or lead that of input B by 90 degrees.
For an incrementing count, A must lead B by 90 degrees.
For a decrementing count, A must lag B by 90 degrees.

Quadrature x1
Count is incremented or decremented on the rising edge of input B.

Quadrature x2
Count is incremented or decremented on the rising and falling edges of input A.

Quadrature x4
Count is incremented or decremented on the rising and falling edges of both inputs.

Note: In the quadrature counting modes, use electronic sensors because inputs A and B are not debounced.

Connector CN1

1	DC Output 12V
2	DC Output 0V
3	Signal Common
4	Count Input A
5	Count Input B
6	External Reset
7	Keyboard Disable
8	Count Inhibit
9	External Print

Connector CN2

10	AC Mains L
11	AC Mains N
12	N.C.
13	Relay R1 Common
14	Relay R1 Contact
15	Relay R2 Common
16	Relay R2 Contact
17	Relay R3 Common
18	Relay R3 Contact
19	No Connection

Connector CN3					
1	Receive (RX)	5	N.C.	2	Transmit (TX)
2	Transmit (TX)	6	N.C.	3	0V
3	0V			4	N.C.
4	N.C.			5	N.C.
5	N.C.			6	N.C.
6	N.C.				

COMMUNICATIONS PORT (CN3)

RS232-C communication is used to allow connection of the 9100 to a printer. Printouts of the user text (12 characters) and count or rate value plus engineering units may be initiated from the keyboard or external printer input.

Baud rate, number of stop bits and number of print copies are selected in program mode.

If the printer type is set to IBM/Epson, a PC can be used to remotely execute a Print or Reset: Connect the PC's serial port transmit pin to the 9100's RJ11 receive pin, and send an ASCII P (50 Hex) to execute a Print or an ASCII R (52 Hex) to execute a Reset.

The data may be read into a PC by connecting the RJ11 transmit pin to the PC's serial port receive pin, instead of a printer. In Manual Reset mode only, the 9100 can be automatically reset as soon as a Print is executed (by the keyboard or externally). This feature can be turned on or off using the Comms/Print menu (see page 6).

CONNECTION OF SENSORS

A "sensor" can be a 3-wire proximity switch, 3-wire photocell or incremental shaft encoder etc.

3-wire devices should use input A as the single input for unidirectional counting.

For bi-directional (quadrature) counting, input A and input B must be 90° out of phase, lag or lead.

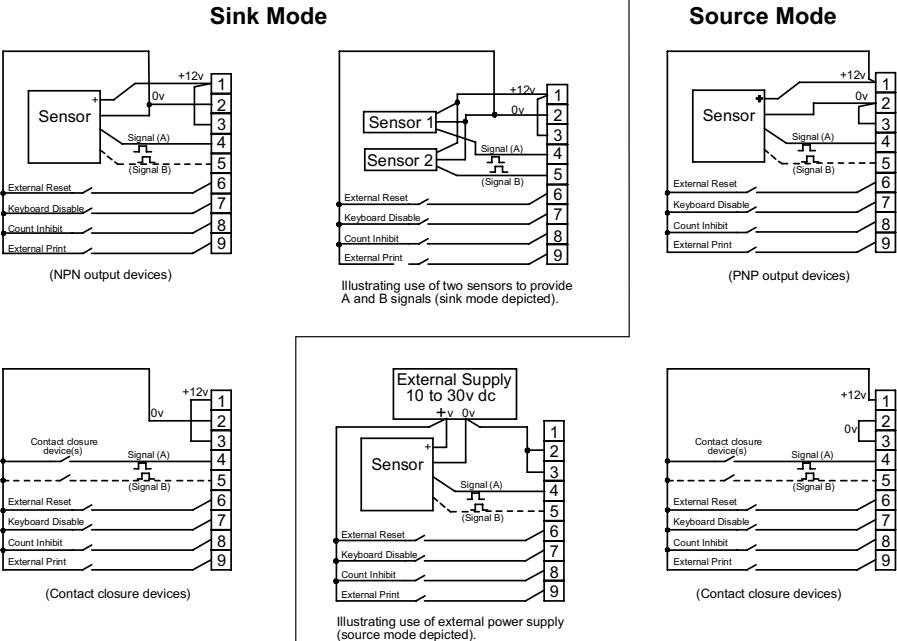
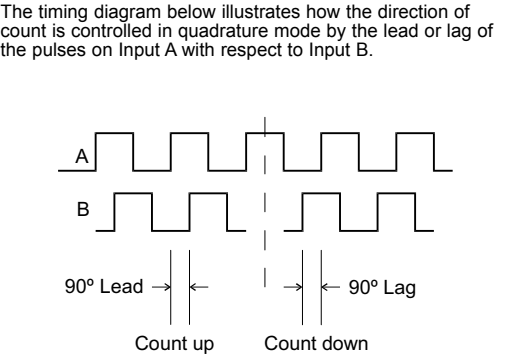
Two 3-wire devices connected to inputs A and B respectively can provide signals for bi-directional counting (either for quadrature or A-B modes).

When signal is generated by contact closure devices, choose "contact cls" in programming. This ensures adequate de-bouncing but limits the count rate to 30 counts per second.

The external control inputs are permanently set in de-bounce mode but may also be driven by electronic devices, subject to the 30 count per second limitation.

Please note:
Any signal cables connected to this device must not exceed 30 metres in length.
If any signal cables are installed that are routed outside the building, it will be necessary to install additional surge protection devices.

TIMING DIAGRAM



FRONT PANEL FUNCTIONS

This symbol is either an up- or down- arrow showing the direction of count, or a letter 'R' for Rate.

Minus sign for negative values.

These symbols show which relays are operated. In this example, 1 and 2 are operated, whilst 3 is not operated.

Digit 6

Digit 1

RUN MODE

Line 1 displays Count value or Rate value, as determined by <Shift-Digit 1>.

Line 2 displays Batch count, unless disabled during programming.

Line 3 displays Total count, unless disabled during programming. Pressing <Shift-Digit 6> sequentially causes this line to display the preset value for output 1, then 2, then 3, then back to Total.

Shows "Tot" for Total count. Shows the following during display of preset values:-

- CP1,2 or 3 for count outputs.
- US1,2 or 3 for Underspeed outputs.
- OS1,2 or 3 for Overspeed outputs.
- BP1 for Batch count output.
- MM2 for Motion Monitor output.
- NA1,2 or 3 for unconfigured outputs.

Keyboard:-

Digit keys 1 to 6 and the SEL key do not have any function in this mode except in combination with SHIFT.

RST resets the count value PST enters the PRESET programming mode
Shift-RST resets the Batch count value Shift-PST enters the main (PGM) programming mode.
Shift-SEL resets the Total count value.

Shift-Digit 1 toggles the line 1 display between Count value and Rate value.
Shift-Digit 2 causes the current count values to be printed.
Shift-Digit 6 cycles the line 3 display between Total count and the preset values for outputs 1,2 and 3.

VOLUMETRIC DISPENSING /FLUID BLENDING APPLICATION

Process

- Receive signal from conveyor system.
- Stop conveyor and open valve 1
- Close valve 1 and open valve 2
- Close valve 2 and open valve 3
- Close valve 3 and start conveyor system.

Utilise:-

- External Reset input to receive signal from conveyor.
- All relays at rest to stop conveyor and operate valve 1.
- Output 1 to transfer to valve 2
- Output 2 to transfer to valve 3
- Output 3 to close all valves and start conveyor.

Program:-

- Count and Input types to suit sensors used,
- Prescalers to suit measurement units required,
- Reset type to Manual.
- Output 1:-
 - Output type to Count.
 - Preset value equal to quantity of fluid from valve 1.
 - On-time to zero (latched).
- Output 2:-
 - Output type to Count.
 - Preset value equal to quantity of fluid from valve 2 + valve 1.
 - On-time to zero (latched).
- Output 3:-
 - Output type to Count.
 - Preset value equal to quantity of fluid from valve 3 + valve 2 + valve 1.
 - On-time to zero (latched).
- Relay Condition for each output: to suit operating circuitry for conveyor and valves.

CUT TO LENGTH APPLICATION

Process

- Run machine.
- Slow when nearing required length.
- Stop at required length and cut.
- Repeat until roll/magazine etc. is empty.
- Stop.
- Manually reload roll/magazine etc. and restart.

Utilise:-

- Output 1 to power machine at normal speed.
- Output 2 to reduce machine speed.
- Output 3 to stop machine and operate guillotine.

Program:-

- Count and Input types to suit sensors used,
- Prescalers to suit measurement units required,
- Reset type to Automatic.
- Output 1:-
 - Output type to Batch.
 - Preset value equal to number of lengths on roll.
 - On-time to zero (latched).
- Output 2:-
 - Output type to Count
 - Preset value equal to length minus slow-feed length.
 - On-time to zero (latched).
- Output 3:-
 - Output type to Count.
 - Preset value equal to length required.
 - On-time sufficient for guillotine operation.
- Relay Condition for each output: to suit machine operating circuitry.

PROGRAMMING MODES

Keyboard:-

From RUN mode, press PST to enter limited PRESET programming, or SHIFT-PST to enter full PGM program mode. In both programming modes, the following keys are active:

Digit 1 steps through the available options in the menu.
SEL selects the option displayed. This may be a parameter or the next menu in the tree.
RST escapes back one level in the menu tree.
PST exits back to RUN mode from anywhere within the menu tree.
Where the SElected option is a text or numeric value, Digit keys 1 to 6 are available to modify the value.
Shift-Digit 3 toggles the minus sign on and off for the line 1 display.

This example shows that the OUTPUT programming menu has been selected and that for the option chosen (Preset 1) the value currently stored is 654.321. The value can be altered using the digit keys.

Pressing SEL at this point makes the displayed value current and blanks line 1. You can then select another option.
(Example, use the digit 1 key to step on to Preset 2).

Line 1 displays any numeric value associated with the selection.

Line 2 displays the title of the current menu.

Line 3 displays the option selected in the current menu.

Digit 1

Digit 6

Keyboard:-

From RUN mode, press PST to enter limited PRESET programming, or SHIFT-PST to enter full PGM program mode. In both programming modes, the following keys are active:

Digit 1 steps through the available options in the menu.
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Shift-Digit 3 toggles the minus sign on and off for the line 1 display.

CONVENTIONS USED IN THE PROGRAMMING TREE DRAWING

(see page 6)

Step through options using Digit 1 key.

Use digit increment keys to set up a value.

To programme the User Text, the left 6 characters are cycled using the keys, and the right 6 characters are cycled using SHIFT and keys together.

The user characters will cycle in the following sequence:

-, 'dot', /, 0 - 9, A - Z, 'space'

Select displayed option. This may be a parameter or the next menu along the tree.

On pressing at the end of a branch (represented above by being within the box boundary) you are returned to the previous menu level.

Additional Operations

Escape back one level. All the settings which have been chosen by are retained.

Exit Program mode. All settings chosen by are retained.



OPERATION PROGRAMMING CONSIDERATIONS

- ## MODE PROGRAMMING CONSIDERATIONS

- Divisor is available for instances where a multiplier would be inexact. (example: divide by 3 is exact, whereas multiply by 0.33333 cannot be). Rate multiply is available to modify the basic count rate unit of 1 pulse per minute. (example: multiply by .01667 (1/60) to convert to seconds).



If the counting multiplier prescaler is set to less than 0.00250. Enter a value higher than this value.

OUTPUT PROGRAMMING CONSIDERATIONS

- Decide, for each of the three relay outputs, whether the relay state will depend upon a Count value, or upon a Rate value.
- Choose which output to configure (R1, R2 or R3).
- Note that if R2 has been configured in the Operation menu as Motion Monitor, choosing R2 here produces a warning box and the choice of removing the option.

For each output:

- Choose COUNT output type if a change of state must depend on reaching a set COUNT value.
- Choose OVERSPEED or UNDERSPEED (see below) if a change of state must depend on reaching a set Rate value.
- Choose OFF if the output is not required.
- Choose PRESET VALUE and use the digit keys to set the value required.
- Choose the at-rest condition of the relay contact (open or closed)
- Note that output 1 is configurable to depend on the value of Batch count, if required. This menu option does not appear when programming the other outputs.
- Note that output 2 is configurable as a MOTION MONITOR. This is programmed in the OPERATION menu.

If COUNT output type is chosen:

- Choose ON TIME/HYST and use digit keys to set the On-time value required.
- Entering a value determines the length of time the relay remains operated before releasing.
- Entering zero determines that the relay will not release until a Reset is performed (latched mode).

If RATE output type is chosen:

- Choose ON TIME/HYST and use digit keys to set the Hysteresis value required.
- Entering a value determines the difference which must occur in the rate value for the relay to release.
- In OVERSPEED, the relay operates when the rate rises above the preset value and releases when the rate falls below the preset value by the amount of Hysteresis.
 - In UNDERSPEED, the relay operates when the rate falls below the preset value and releases when the rate rises above the preset value by the amount of Hysteresis.
- Entering zero hysteresis determines that the operate and release points are the same.

Dimensions, Abmessungen, Dimensiones, Dimensioni

