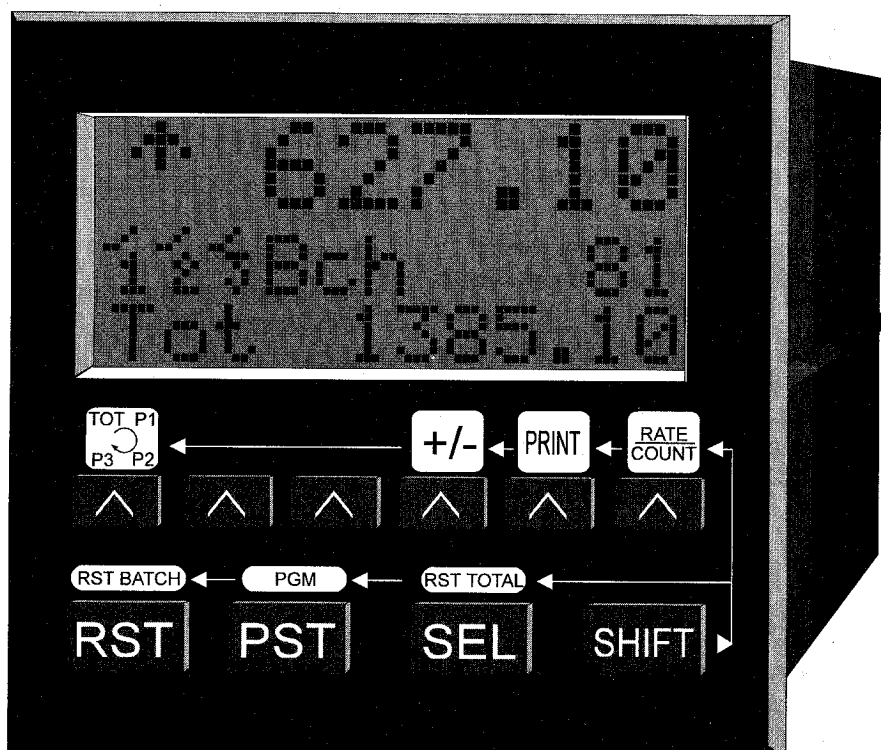


TRUMETER

Keep you in control



**9100 Predetermining
Counter/Ratemeter**



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;
- 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.

Trumeter Co. Ltd., Radcliffe, MANCHESTER M26 1NX, England

Tel: (+44) (0)161-724 6311 Fax: (+44) (0)161-724 9455

e-mail: sales@trumeter.com

Please visit our internet site at <http://www.trumeter.com>

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.

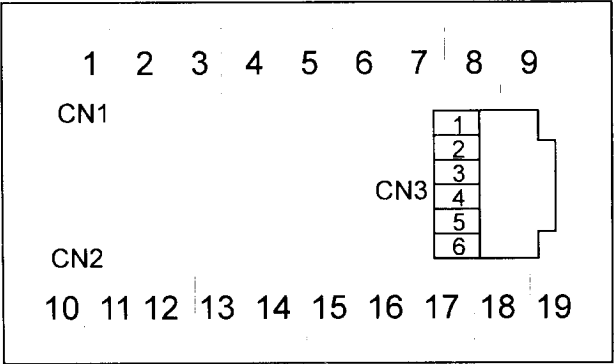
The normal sequence for outputs, in count mode, is for P1 and P2 to be set between zero and P3, since the value of P3 determines the end of a cycle of counting; outputs 1 and 2 will therefore change state at preset points within the count cycle. If you have chosen 'automatic reset' mode, then reaching 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.



Connectors from rear

To ensure correct operation this unit must be installed in accordance with the "Recommended Installation Procedures for Micro-Processor Based Products" - Trumeter product number 015580-01.

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	AC mains E
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)
2	Transmit (TX)
3	0V
4	N.C.
5	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 (6 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.

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.

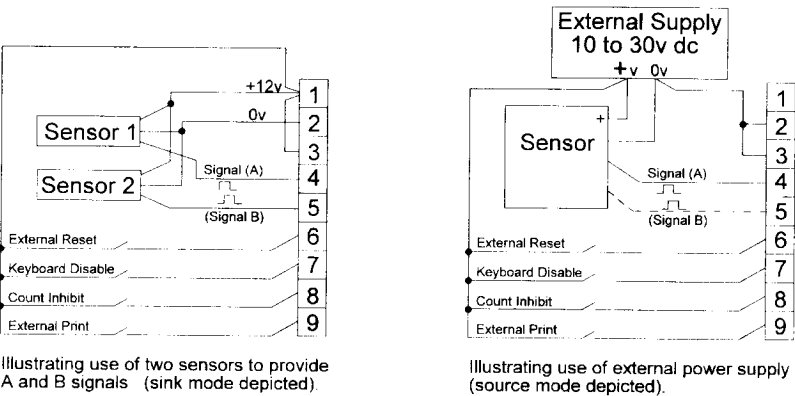
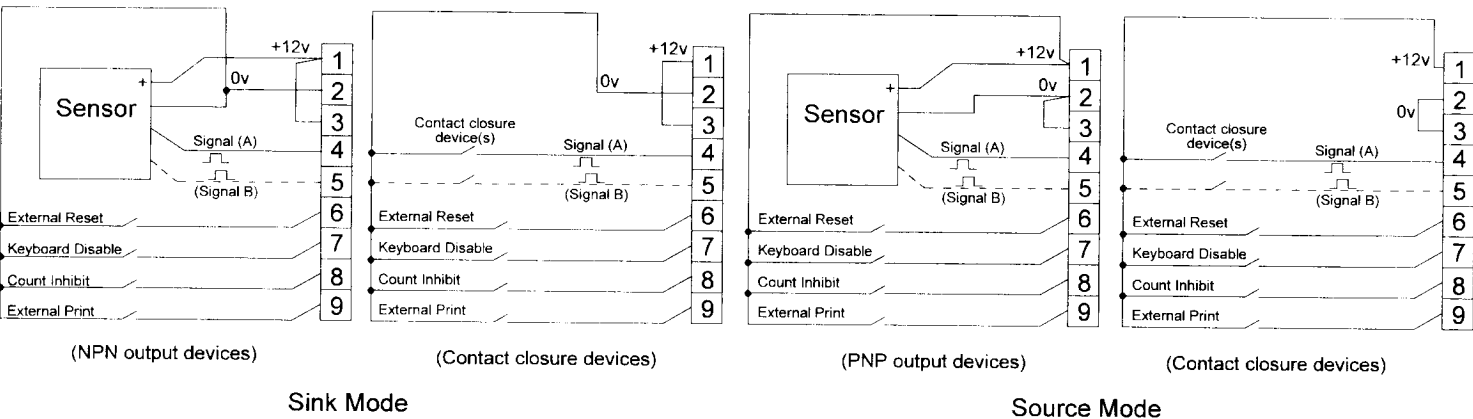
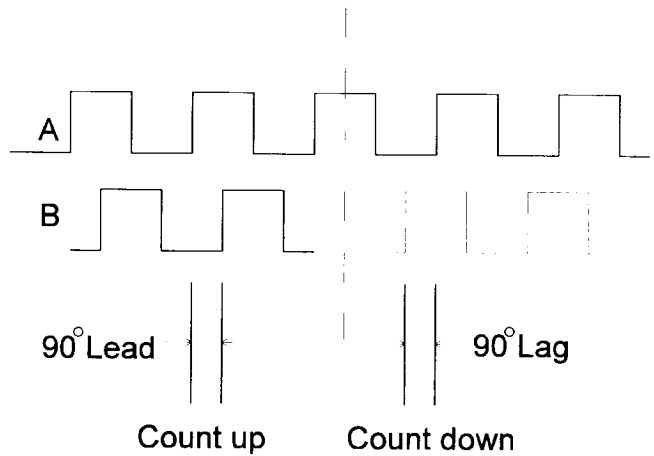
Two 3-wire devices connected to inputs A and B respectively can provide signals for bi-directional counting (either for quadrature or A-B modes).

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.

TIMING DIAGRAM

The timing diagram below illustrates how the direction of count is controlled in quadrature mode by the lead or lag of the pulses on Input A with respect to Input B.



FRONT PANEL FUNCTIONS

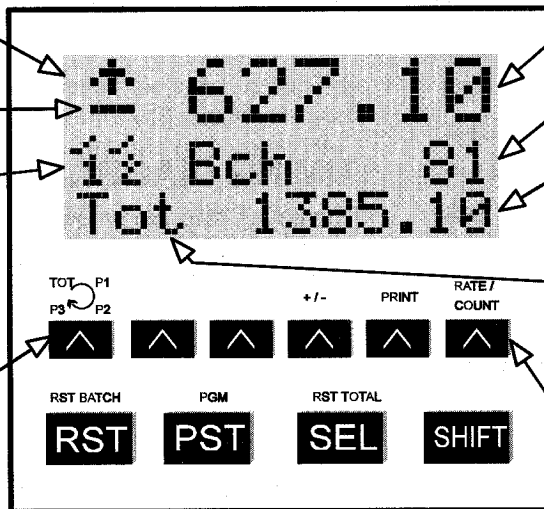
RUN MODE

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



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.

Digit 1

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
Shift-RST resets the Batch count value
Shift-SEL resets the Total count value.

PST enters the PRESET programming mode
Shift-PST enters the main (PGM) programming mode.

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.

PROGRAMMING MODES

Keyboard:-

From RUN mode, press PST to enter limited PRESET programming, or SHIFT-PST to enter full PGM program mode.

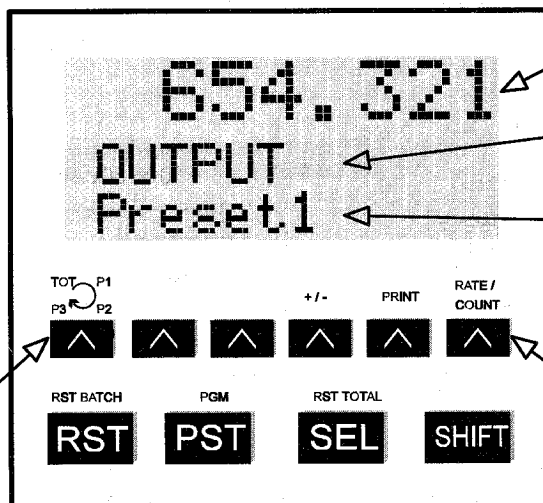
In both programming modes, the following keys are active:

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).

Digit 6



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

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.

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.

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

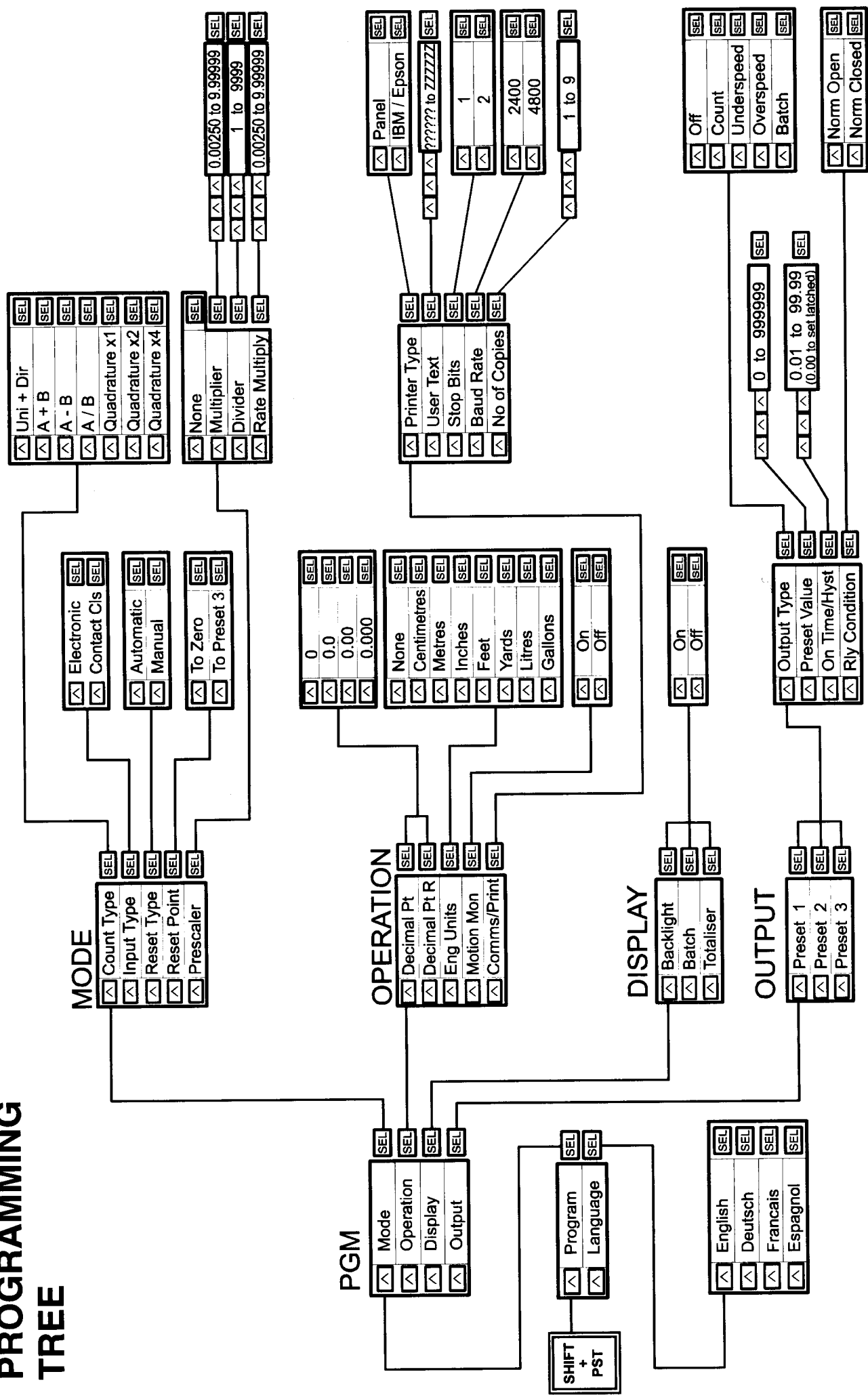
On pressing  at the end of a branch (represented above by  being within the box boundary) you are returned to the previous menu level.

Additional Operations

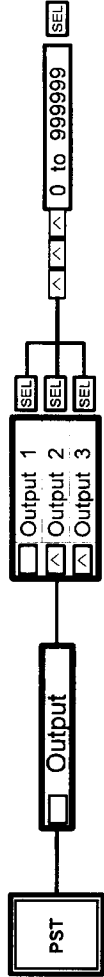
 Escape back one level. All the settings which have been chosen by  are retained.

 Exit Program mode. All settings chosen by  are retained.

PROGRAMMING TREE



PRESET PROGRAMMING



INVALID Message

The word INVALID appears on the top line under two conditions.

- If the counting multiplier prescaler is set to less than 0.00250. Enter a value higher than this value.
- If the reset type is Automatic AND the ON time for R3 is set to latch. For Automatic reset, enter a pulse ON time for R3. Alternatively, set up for manual reset.

MODE PROGRAMMING CONSIDERATIONS

- **Choose count type appropriate to your application** (see descriptions on page 2).
- **Choose type of input to suit your type of sensor:**
 - "Electronic" gives a fast input capability: up to 10kHz repetition rate.
 - "Contact closure" has additional de-bouncing and is limited to 30Hz.
- **Choose type of reset required:**
 - "Automatic" resets all latched relays on completion of cycle,
 - "Manual" requires a reset action from the front panel or the external input.
- **Choose reset point:**
 - "To P3" starts the cycle at P3 and completes at zero.
 - "To zero" starts the cycle at zero and completes at preset value P3.

- **Choose multiplier or divider and/or rate multiplier to determine the units in which your basic count will take place.**

Divider 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).

OPERATION PROGRAMMING CONSIDERATIONS

- Choose the decimal point position for the Count and Totaliser displays. (lines 1 and 3)
- Choose the decimal point position for the Rate display (line 1 when in Rate mode).
- Choose what engineering units need to appear on printouts.
- Decide whether an output (Motion Mon) is needed to indicate whether your application has stopped. Choosing this option configures output 2 as Motion Monitor.
- Set up operating parameters for the printer and any user text you wish to appear in the printout.
- To change user text, press Digit keys 1 to 6 for the six left characters and Shift + Digit keys 1 to 6 for the six right characters.
- Decide how the front panel display is to appear during operation (display menu).

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.

SPECIFICATION

Dimensions

72 x 72mm (2.83in) DIN case
Depth behind panel: 120mm (4.72in) incl external connections

Panel Cut-out

68 x 68mm (2.68in) +0.7 -0mm (0.02in) (DIN 43700)
Max. panel thickness 11.0mm

Power Supply

85 to 265 VAC

Auxiliary output

12VDC \pm 10% 100mA for powering sensors

Display

3 line high contrast supertwist backlit LCD:
LINE 1: 8 digit alphanumeric
LINE 2: 12 digit alphanumeric
LINE 3: 12 digit alphanumeric

Keyboard

Sealed elastometric keyboard with 10 keys.

Connections

Terminals

1x9 way and 1x10 way plug in terminal strips with wire clamps.
Each way capable of accepting up to 2 OFF 2.5mm² (0.1in²) conductors.

Communications Port

RJ11 6-pin plug

Count Inputs

Uni-directional count A and direction B. A-B, A+B, A/B
bi-directional quadrature x1, x2 or x4.
10-30v DC. Duty cycle 40:60 to 60:40. Max freq 10kHz
30Hz contact closure (not quadrature x1, x2 or x4)

Counting Prescaler

Multiplier 0.00250 to 9.99999; Divider 1 to 9999

Timing Prescaler

Multiplier 0.00250 to 9.99999

Rate Input

Input A only. 10 -30v DC. Maximum 600k PPM (10kHz), minimum 4.7 PPM (0.078Hz ie one pulse every 12.8s)

Control Inputs

External reset, count inhibit, keyboard disable, external print. Max 30Hz contact closure or solid state input. 10 - 30v DC opto-isolated.

Manual Reset

Can be disabled on installation or remotely operated.

Remote reset

Contact closure or pulse (max 30Hz)

Automatic reset

Program to reset to zero on reaching preset 3 or vice versa.

Control Outputs

3 SPST relays. Contacts 5A 260VAC, 220VDC 1300VA/150W
Programmable for pulsed, latched or disabled.

Approvals

CE approved. UL and CUL approval pending

Front Panel Sealing

IP65/NEMA4 when properly mounted using gasket supplied.

Operating Temperature

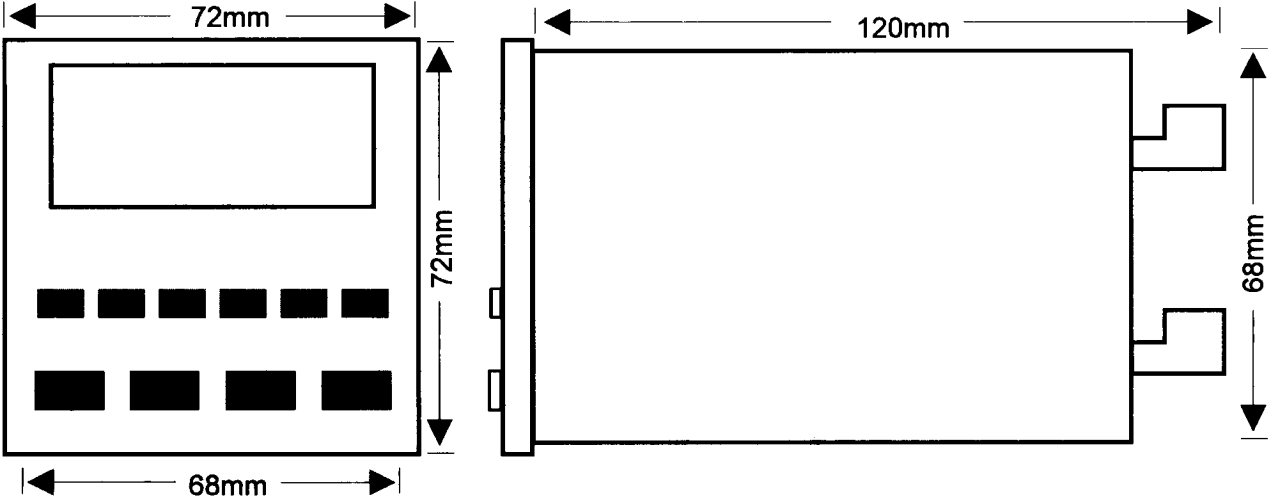
-10°C to +60°C

Storage Temperature

-20°C to +70°C

Relative Humidity

85% at 25°C non-condensing



CLAIMS AND GUARANTEE

Trumeter guarantees this product for a period of one year from the date of shipment against defects in workmanship or materials. This guarantee does not cover defects arising from accidental damage, misuse, accident, misapplication, or if the product has been modified or repaired by unauthorised personnel or has been improperly installed.

Within the guarantee period Trumeter will replace or repair (at its discretion) faulty units which are returned properly packed and carriage paid to: Trumeter Co. Ltd., Technical Services Department, Milltown Street, Radcliffe, MANCHESTER M26 1NX, England or to your local distributor.

LIABILITY

Under no circumstances will Trumeter be liable for any losses, expenses, consequential or incidental damage arising from the purchase of this unit or in connection with the purchaser's inability to use it for any purpose.