Proximon Controls Pvt. Ltd.

An ISO 9001 Company

USER'S MANUAL

PRiCO

PRogrammable intelligent COunter

SPECIFICATIONS:

Counting modes:
1)Up counting
2)Down counting
3)Quadrature counting
4)Bi-directional counting

Display:
7-digit, seven segment LED display (10mm height)
1)Counter/Totaliser/Batch: 7- digit display
2)Rate : 5- digit display
3)Rpm : 6- digit display

Range:
1)Counter/Totaliser:Selectable least count 0.000001, 0.00001, 0.0001, 0.001, 0.01, 0.1, 1
2)Rate: Rate per minute (RM) / Rate per hour (RH) user selectable.(minimum frequency for Rate mode is 10 Pulses/minute)
3)RPM: 10 RPM to 360000 RPM

Set points: 3 user programmable set points.
SET1 , SET2 :Dedicated for COUNTER mode.
SET3 : User programmable for any one of COUNTER / TOTALISER /BATCH / RPM .

Relay operating mode:
1)Relay ON mode
2)Relay OFF mode
3)Pulse time mode
a) Time pulse repeat mode
b) Auto-reset mode

Count inputs:
1)Voltage pulse : 8 to 30 V DC amplitude from proximity switch, encoder.
2)Potential free contacts from limit switch, micro switch.

Input frequency:
1) 0 to 6 KHZ: In up / down mode.
2) 0 to 3 KHZ: In quadrature mode / bi-directional mode.

Sensor supply: 12 V DC, 60mA (+/- 10 %)

Scale factor: Programmable

$$\text{scale factor} = X * 10^{Y}$$

X = From 0.000001 to 9.999999
Y = 0, 1, 2, -1, -2, -3, -4, -5

Reset input:
1)Manual / Front panel reset: with enable / disable facility
2)Remote/ Back panel / Electrical reset: User selectable (minimum time for remote reset is 10 ms.)
3)Reset through programming mode: User selectable

Relay outputs: Three Relays (one relay for each set point)
Relay1/ Relay2 for set1/set2 operation (COUNTER)
Relay3 for set3 (COUNTER / TOTALISER / BATCH / RPM) – Programmable
Relay ratings: Rated for 5 Amp at 230 V AC

Memory retention: Upto 10 years

Protection:
1)Parameters
a)Password protected
b)Hardware protected (Dip switch setting)
2) Set points
a)Software protected (Through program configuration i.e. 'SdF 3.')

Supply: 230 V AC (+/- 10%)

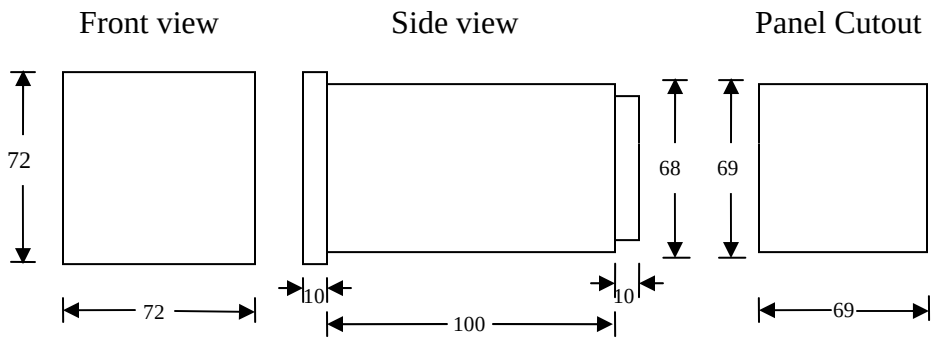
Mounting: Panel mounting

Weight: approximately 580 gms

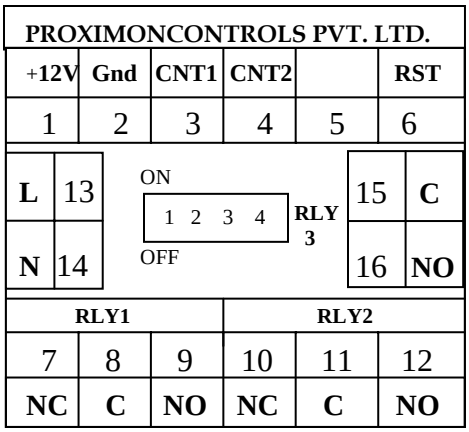
Operating temperature: 0^0 to 50^0 C

Relative humidity: 10 - 95% non-condensing

<u>OVERALL DIMENSIONS:</u>
(All dimensions are in mm.)



WIRING DETAILS:



Dip switch:
1 ON : No protection
1 OFF: VIEW mode
(i.e. parameters protected)

3 ON : Low freq. operation
3 OFF: High freq. operation

TERMINAL NO 1 : +12 V DC / 90mA (TO SENSOR)
TERMINAL NO 2 : GROUND (TO SENSOR)

TERMINAL NO 3 : CNT1 INPUT (SENSOR 1 OUTPUT)
TERMINAL NO 4 : CNT2 INPUT (SENSOR 2 OUTPUT)
TERMINAL NO 5 : NOT USED

TERMINAL NO 6 : BACKPANEL RESET

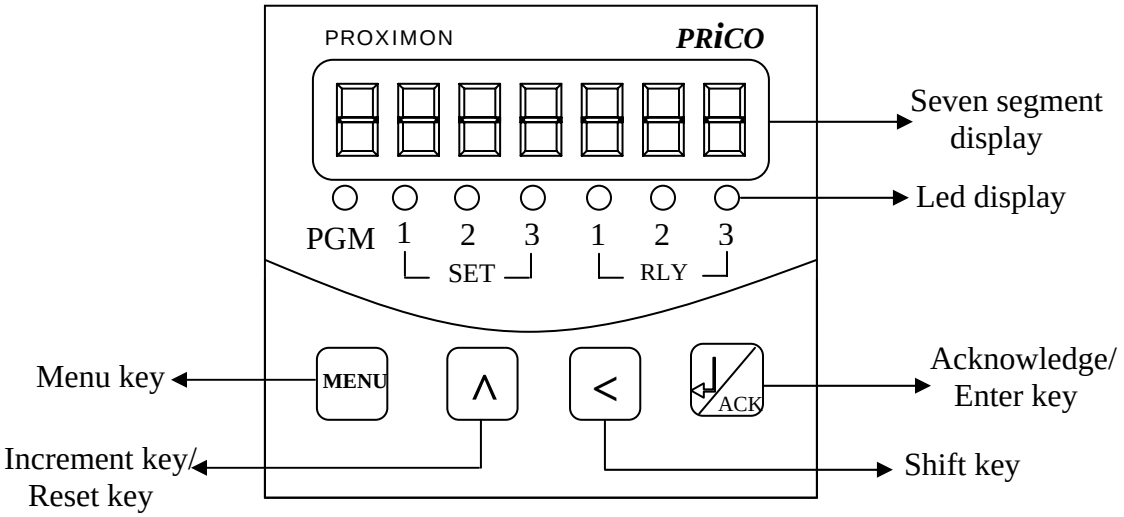
TERMINAL NO 7 : RELAY 1 NC CONTACT
TERMINAL NO 8 : RELAY 1 COMMON
TERMINAL NO 9 : RELAY 1 NO CONTACT

Relay ratings:
Rated for 5 Amp @
230 V AC resistive

TERMINAL NO 10 : RELAY 2 NC CONTACT
TERMINAL NO 11 : RELAY 2 COMMON
TERMINAL NO 12 : RELAY 2 NO CONTACT

TERMINAL NO 13 : 230 VOLT - LIVE
TERMINAL NO 14 : 230 VOLT NEUTRAL
} **~ 230V AC supply**

TERMINAL NO 15 : RELAY 3 COMMON
TERMINAL NO 16 : RELAY 3 NO CONTACT



SET POINT PROGRAMMING

To program SET 1, SET 2 , RELAY TIME AND SET 3:
Note: While entering set points
SET1 > SET2
SET2 > SET3 (If SET3 is programmed for COUNTER mode)

a) To **enter set point programming**, press **MENU key twice**. If in VIEW mode (i.e. parameters protected through Dip-switch 1) ; first press will show 'rESLn' followed by display (0000000) then press **MENU** key again to go to set point programming mode.
b) Set 1 led will go ON. Using increment (^) key and shift (<) key , user can set the desired values for set points. Press ACK key after feeding the set 1 value.
c) Set 2 led will go ON. Using increment (^) key and shift (<) key , user can set the desired values for set points. Press ACK key after feeding the set 2 value.

d) Pulse time | tIME 00.0 | will appear on display.

Relay operation time can be programmed in range between 00.0 sec to 99.9 sec
Press ACK key after feeding the programmable time. However ,this time is applicable only in Auto-Reset mode.
e) Set 3 led will go ON. Using increment (^) key and shift (<) key , user can set the desired values for set points. Press ACK key after feeding the set 3 value.
Now it will come to set 1 mode again.
f) Set 3 can be programmed for relay 3 operation in any one of **COUNTER , TOTALISER, BATCH and RPM** mode via. selecting **'SEt3'** through program configuration.
g) To exit from set point programming and to return back to original display mode i.e. (COUNT / TOTAL / BATCH / RATE / RPM)**, press MENU key once.**
h) **LOCKING THE SETPOINTS:**
This has to be done through **program configuration.** To **lock** the **set points** , select **'SdF 1', press ACK** and **exit** from program configuration.

USER'S GUIDE

DISPLAY MODES

There are five display modes to indicate:

a) **COUNT** (counter)
b) **TOTAL** (totaliser)
c) **BATCH** (batch number)
d) **RATE** (scaled rate output)
e) **RPM** (shaft speed)

The display mode by default is in **COUNT** (counter) mode. These different display modes can be switched successively by **pressing ACK key**.

If the user is using only a particular display mode, the desired display mode can be locked by selecting the desired option from 'SdF 2' to 'SdF 6'

SCALE FACTOR:

The user programmable scale factor facilitates the direct reading in desired engineering unit.

PRiCO multiples the number of pulses received at the count input with the scale factor, and displays the result in both COUNT mode and RATE mode as well.

COUNT display = number of pulses received * scale factor
RATE display = number of pulses received per minute * scale factor [RM]
or number of pulses received per hour * scale factor [RH]

The scale factor consists of two parts:
Mantissa = X; can be set between 0.000001 to 9.999999
Exponent= Y; can be 0, 1, 2, -1, -2, -3, -4, -5

$$\textbf{SCALE FACTOR} = X * 10^{Y}$$

COUNTING MODES:

UP DIRECTION : In this mode, ***PRiCO*** counts the number of pulses received on CNT1 input to count upwards towards the set point from zero.

DOWN DIRECTION : In this mode, ***PRiCO*** counts the number of pulses received on CNT1 input to count downwards from the set point towards zero.

QUADRATURE:This mode is suitable for using with sensors which generate 2 channels of output in quadrature (phase shift)e.g. rotary encoder. ***PRiCO*** counts up (increments), if the CNT1 input transitions precede the CNT2 input transitions and counts(decrements) down if the CNT2 input transitions precede CNT1 input.

BI-DIRECTION: In this mode, the CNT2 input determines the count direction for pulses that are being counted from CNT1 input. If CNT2 is at level 1 (12V) / kept open; counts pulses from CNT1 in up direction. If CNT2 is at level 0 (0V) / short terminals 2 and 4; counts pulses from CNT1 in down direction.

RESET TO ZERO/PRESET (i.e. SET 1): This is valid only for quadrature and bi-directional mode.

a)RESET TO ZERO: Whenever reset to zero is selected , ‘ 0 ’ is displayed on frontpanel reset and 0 is the reference for all the relays i.e. counting starts from 0 and whenever the displayed count equals the set points the output relays get energized.

b)RESET TO PRESET (i.e. SET 1): Whenever reset to preset is selected , ‘ SET 1 ’ value is displayed on frontpanel reset and SET1 is the reference for all the relays i.e. counting starts from SET1 and whenever the displayed count equals the set point (SET2 and SET3) the output relays (RELAY2 and RELAY3) get energized. Since the counting is referenced from SET1 value RELAY1 gets operated when COUNT reaches ‘0’.

COUNTING LOGIC

SENSOR →	PNP		NPN	
DIRECTION ↓	CNT1	CNT2	CNT1	CNT2
UP MODE	ADD	ADD	ADD	ADD
DOWN MODE	SUB	SUB	SUB	SUB
BI-DIR MODE	SUB ADD SUB	ADD (ON) (OFF)	ADD ADD SUB	SUB (OFF) (ON)

RELAY OPERATING MODES:

RLY ON MODE: The output relay is energized at the end of the counting cycle. When the displayed COUNT is equal to SET1 , RLY1 is switched ON and when the displayed COUNT equal to SET2 , RLY2 is switched ON.

RLY OFF MODE: The output relay is energized at the start of the counting cycle and de-energizes when the displayed COUNT equals the set point value .When the displayed COUNT is equal to SET1 , RLY1 is switched OFF and when the displayed COUNT is equal to SET2 , RLY2 is switched OFF.

NOTE:

1)When SET3 is programmed for COUNT mode; RLY3 behaves similar to RLY1 and RLY2 in RLY ON/OFF MODE.

2)When SET3 is programmed for TOTAL / BATCH / RPM mode; RLY3 goes ON only when the displayed value is greater than or equals the SET3 value else remains OFF.

PULSE TIME OPERATION:

TIME PULSE REPEAT MODE: (During relay operating time; continues the counting process). The output relay status (depending on RLY ON / OFF MODE) remain in that state for programmed time (from 00.0 sec to 99.9 sec) as set by the user. During this programmed time, ***PRiCO*** counts the pulses coming on its input and a new count cycle is started immediately (i.e. batch) and batch count gets incremented by 1. After this time has been expired; relays again go to their original state.

AUTO-RESET MODE: (During relay operating time; stop the counting process). The output relay status (depending on RLY ON / OFF MODE) remain in that state for programmed time (from 00.0 sec to 99.9 sec) as set by the user. During this programmed time, ***PRiCO*** stops counting the pulses coming on its input and locks either at set1(for up mode) or zero (for down mode) and batch count gets incremented by 1. After this time has been expired, it auto-resets i.e. a new count cycle is started (i.e. batch) and relays again go to their original state.

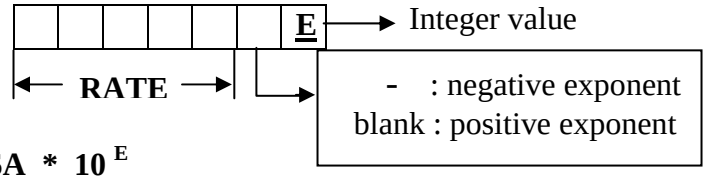
BI-STABLE MODE: In this mode, whenever the number of pulses counted equals the set point, the relays operate (depending on RLY ON /OFF MODE) and remain in that changed state irrespective of programmed pulse time. Relays will go to their initial state only by reset.

RELAY 3 OPERATION:

RELAY3 / SET3 working is programmable for COUNTER/ TOTALISER/ BATCH/ RPM mode. The parameter selected with ‘ SEt3 ’ decides RELAY3/SET3 operation.

RATE DISPLAY:

Rate display is used to indicate the rate at which the scaled output is extracted in the desired engineering units e.g. To indicate the rate at which cloth(output) is taken in Centimeters/meters/kilo meters.This rate can be programmed to indicate rate/minute(RM) or rate/hour(RH).



RATE = MANTISSA * 10 ^{E}

OVERRUN / NON OVERRUN MODE:

OVERRUN: In overrun mode, the counter continues counting, after the SET1 value has been crossed.

NON-OVERRUN: In non-overrun mode, the counter stops counting, after the SET1 value is reached and restarts counting after reset only.

FRONTPANEL RESET:

Frontpanel reset is provided with enable / disable facility. '**FPr YS' enables frontpanel reset** and **'FPr NO' disables frontpanel reset.**

RPM DISPAY:

PRiCO can display the speed at which shaft is rotating in RPM range between 10 rpm to 360000 rpm and provides relay action for same. For this the number of pulses (N) that corresponds to 1 rotation should be entered as "FLAG". If relay 3 / Set 3 is programmed for speed (SP) operation, Relay 3 goes ON if the displayed RPM value is greater than Set 3 value, else remains OFF.

RESETTING PROCEDURE:

a)REMOTE / BACKPANEL / ELECTRICAL RESET : A remote pushbutton switch (Potential free contact) can be connected between terminals 1 and 6 to provide remote reset. The parameter selected during backpanel reset (bPr) gets reset whenever this pushbutton is operated.

b)RESET THROUGH PROGRAMMING MODE : rSOP 0 to rSOP 7 can be used to reset the desired values through program configuration. The parameter selected and acknowledged gets reset immediately.

c)MANUAL / FRONTPANEL RESET : This reset can be used to reset **COUNT** only if it is enabled during parameter configuration. Increment (^) key is used to reset. **Pressing this key for 4 seconds resets COUNT**.

SET ALL DEFAULT INITILIZATIONS:

To set the default values of all parameters, **select ' SdF 12'** during program configuration and **press ACK key.**

NOISE REJECTION:

In some applications, proximity sensors pick up high frequency noise from nearby switching circuits like AC / DC drives. These get counted by counters which then show erroneous count / rate reading. To prevent this, put **dip-switch 3 on backpanel to ON position.** This will filter out undesired spurious pulses by limiting the input frequency to **35 Hz.**

LOW FREQUENCY APPLICATION (upto 35 hz):

Whenever the switching devices like limit switches or micro switches are used to give input pulses to the counter, **dip-switch 3 on backpanel should be put to ON position**; since this is a low frequency application. Micro-switch should be connected between GND(pin2) and count input i.e. CNT1/CNT2 (pin 3 or pin 4).

OVERFLOW / UNDERFLOW INDICATION:

Whenever COUNT / TOTAL **overflows**, **" O "** appears at the **leftmost display**.

Whenever COUNT **underflows**, **" - "** appears at the **leftmost display.**

In either of the cases, the relays restore their status that was prior to overflow / underflow condition and the counting continues with six digit display.

PROGRAM CONFIGURATION (i.e. PARAMETER SETTING)

A) Check **Dip-switch 1** setting. Dip-switch should be in **ON** position.

B) Press **"MENU" key to enter password mode.**

PASS 00 Will appear on display.

Password is "14." Enter this password using increment (^) key and shift (<) key

Press acknowledge key "ACK " after entering password, **" PGM " led will get ON**, **indicating that user has entered programming mode**.

Now program the configuration setting as given below
After entering programming mode :

1)

rESLn will appear on display for 1 second.

rESLn indicates resolution display.

Default setting-	0000000	least count =1 max display= 9999999
Press < key	000000.0	least count = 0.1 max display= 999999.9
Press < key	00000.00	least count = 0.01 max display= 99999.99
Press < key	0000.000	least count = 0.001 max display= 9999.999
Press < key	000.0000	least count = 0.0001 max display= 999.9999
Press < key	00.00000	least count = 0.00001 max display= 99.99999
Press < key	0.000000	least count = 0.000001 max display= 9.999999

2)

a) Press ACK key to enter **Scale factor.**

Here SCALE represents the values that '**X'** can take

SCALE	will appear on display for 1 second.

Default setting ↓ **(Note: ↓ indicates blinking digit)**

1.000000

" X " can be set to any desired value between

0.000001 to 9.999999

The blinking digit increments by one for every press of ^ key and rolls over from 9 to 0.

The blinking digit shifts left for every press of < key.

b) Press ACK to enter **Exponent setting**

Here EPn represents the exponent i.e. '**Y'**

Default setting	↓	
	EPn 0	
Press ^ key	EPn 0	exponent = 0 .i.e.Y=1
Press ^ key	EPn 1	exponent = 1 .i.e.Y=10
Press ^ key	EPn 2	exponent = 2 .i.e.Y=100
Press ^ key	EPn -1	exponent = -1.i.e.Y=0.1
Press ^ key	EPn -2	exponent = -2.i.e.Y=0.01
Press ^ key	EPn -3	exponent = -3.i.e.Y=0.001
Press ^ key	EPn -4	exponent = -4..e.Y=0.0001
Press ^ key	EPn -5	exponent = -5.i.e.Y=0.00001

3) Press ACK to enter **Counting mode** setting.

Default setting	↓ dir UP	Up direction
Press ^ key	dir dn	Down direction
Press ^ key	dir qd	Quadrature mode
Press ^ key	dir bI	Bi-directional mode

4)Press ACK to program **Reset selection** .This feature can be used only in quadrature mode and bi-directional mode.

Default setting	rSt 00	Reset COUNT to 0
press ^ key	rSt Pr	Reset COUNT to PRESET (i.e. set point 1)

5)Press ACK to select **Relay operating mode.**

Default setting	rLy On	Relay ON mode
Press ^ key	rLy OF	Relay OFF mode

6)Press ACK to select **Pulse Time Operation.**

Default setting	PtO No	Bi-stable mode.
Press ^ key	PtO tr	Time pulse repeat mode (counts during Relay activation time.)
Press ^ key	PtO Ar	Auto-reset mode (stops counting during Relay activation time.)

7)Press ACK to select **Relay 3 operation.**

Default setting	SEt3 tL	Relay 3 / Set 3 for TOTALISER
Press ^ key	SEt3 bn	Relay 3 / Set 3 for BATCH
Press ^ key	SEt3 SP	Relay 3 / Set 3 for speed in RPM
Press ^ key	SEt3 Ct	Relay 3 / Set 3 for COUNTER

8) Press ACK to select **Rate display.**

Default setting	rAtE rM	To display RATE per minute
Press ^ key	rAtE rH	To display RATE per hour

9) Press ACK to select **Overrun mode/ Non overrun mode.**

Default setting	OUr Or	Over run mode
Press ^ key	OUr nO	Non over run mode

10) Press ACK to select **Front panel reset.**

Default setting	FPr YS	Front panel reset enable
Press ^ key	FPr nO	Front panel reset disable

11) Press ACK to select **Flag selection for RPM.**

Default setting	FLAg 01	1 pulse corresponds to 1 rotation for RPM .

The flag value can be set to any value between 01 upto 99.
e.g. If a tooth wheel which gives 99 pulses per rotation through a sensor, then since 99 pulses correspond to 1 rotation; 99 has to be entered to get correct RPM reading.

12) Press ACK to select **Backpanel Reset combination (Remote / Electrical reset.)**

Default setting	bPr 0	No action
Press ^ key	bPr 1	Reset COUNT
Press ^ key	bPr 2	Reset TOTAL
Press ^ key	bPr 3	Reset BATCH
Press ^ key	bPr 4	Reset COUNT and TOTAL
Press ^ key	bPr 5	Reset COUNT and BATCH
Press ^ key	bPr 6	Reset TOTAL and BATCH
Press ^ key	bPr 7	Reset COUNT , TOTAL , BATCH

13) Press ACK to select **Reset through programming mode.**

Default setting	rSOP 0	No action
Press ^ key	rSOP 1	Reset COUNT
Press ^ key	rSOP 2	Reset TOTAL
Press ^ key	rSOP 3	Reset BATCH
Press ^ key	rSOP 4	Reset COUNT and TOTAL
Press ^ key	rSOP 5	Reset COUNT and BATCH
Press ^ key	rSOP 6	Reset TOTAL and BATCH
Press ^ key	rSOP 7	Reset COUNT , TOTAL , BATCH

14) Press ACK to select **Set all Default initializations.**

Default setting	SdF 0	No action **(To unlock 'SdF 1' to 'SdF 11')**
Press ^ key	SdF 1	Lock SET POINTS
Press ^ key	SdF 2	Lock COUNTER DISPLAY
Press ^ key	SdF 3	Lock TOTALISER DISPLAY
Press ^ key	SdF 4	Lock BATCH DISPLAY
Press ^ key	SdF 5	Lock RATE DISPLAY
Press ^ key	SdF 6	Lock RPM DISPLAY
Press ^ key	SdF 7	Lock SET POINTS and COUNTER DISPLAY
Press ^ key	SdF 8	Lock SET POINTS and TOTALISER DISPLAY
Press ^ key	SdF 9	Lock SET POINTS and BATCH DISPLAY
Press ^ key	SdF 10	Lock SET POINTS and RATE DISPLAY
Press ^ key	SdF 11	Lock SET POINTS and RPM DISPLAY
Press ^ key	SdF 12	**Set all parameters to their Default values.**

Note : Parameter entry takes place only at the press of 'ACK' key.

C) After configuration setting,to quit program configuration press MENU key once.

At any moment of time if user wants to escape from program configuration, press 'MENU' key once.

' PGM ' led will go off indicating your exit from programming mode.

D) To avoid in-adverted change in configured parameters, put **dip-switch 1** on backpanel to **OFF** position. Now user is in **VIEW MODE** and can **only "view"** the configured parameters. However, user **cannot change the configured parameters** even if the user knows the password. **To quit from this VIEW mode and return to original** display mode press MENU key once.