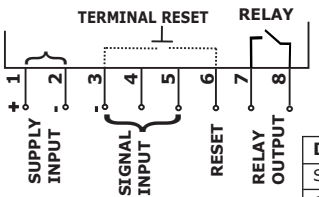
FEATURES :

- 7 Digit LCD with green backlight.
- Input signal frequency range from 0.01 Hz to 20 KHz.
- Totalizer range from 0.0001 to 9999999.
- Rate indication range from 0.01 to 999999.
- Prescaling & Postscaling facility for Rate & Totalizer indication.
- Alarm setting facility for Rate/Totalizer values.
- MODBUS Communication RS485.
- Password protection for Device setting.
- Compact size with panel mounting facility.

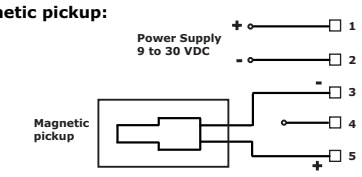
CONNECTION DIAGRAM:



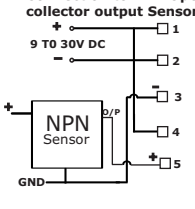
Description	Terminal
Supply	1(+ve) - 2(-ve)
Common -ve for signal	3(-ve)
Common for signal input	4(Refer input signal connection
+ve for signal	5(+ve)
Terminal Reset	Short 3 - 6
Relay Output	7(NO) - 8(Pole)

Connection for different types of Input Signal:

Magnetic pickup:



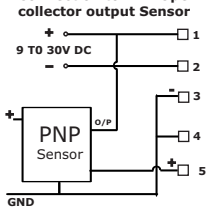
Connection to NPN Open collector output Sensor



Connect VCC to 4, Signal +ve to 5, GND to 3

Operates with Transistor ON Totalizer will increment for object present to absent.

Connection to PNP Open collector output Sensor



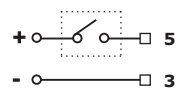
Short 3 & 4,Connect signal +ve to 5 & GND to 3

Operates with Transistor ON Totalizer will increment for object absent to present.

Signal sensing from Switch/Relay contacts:

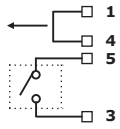
1) 'NO' Contact

Series Mode



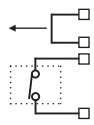
Device gets high signal when Switch is closed.

Parallel Mode



Device gets low signal when Switch is closed.

2) 'NC' Contact

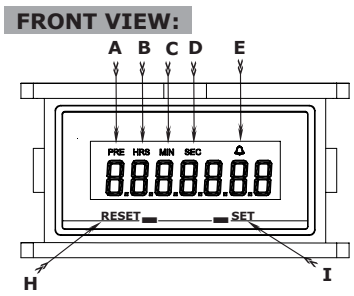


Device gets high signal when Switch operates(opens).

Note - It is recommended to select 50Hz mode for using the device with Switch/Relay contact as sensor.

*** Communication RS485**

FRONT VIEW:



A - Prescaler
B - Rate per Hour
C - Rate per Minute
D - Rate per Second
E - Alarm
H - RESET(RST) key
I - SET key

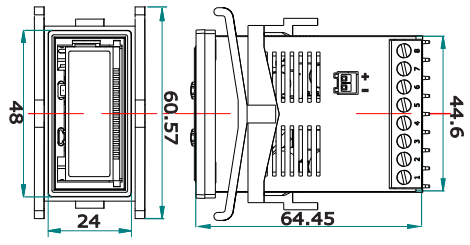
KEY FUNCTIONS :

	In Edit Mode	In Run Mode
SET Key	To Save or Shift to next digit.	To toggle display from Rate to Totalizer and vice versa. To ACK output in Latch.
RESET Key	To Edit Parameter value	To reset the counts if Front Reset is enabled.

SYMBOL MEANING :

Symbol	Meaning
🔔	ON - Alarm Enabled Blink - Alarm value reached.
PRE	Symbol ON when prescaler value configured to other than 0001.000

Overall Product Dimensions & Mounting Details (in mm)

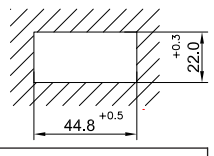


TERMINAL DETAILS :

Ø3.5 mm	0.40 N. m (3.5 Lb.in) Terminal screw - M2.5
	1X0.3 to 2.5 mm² Solid Wire
AWG	22 to 14

PANEL CUTOUT:

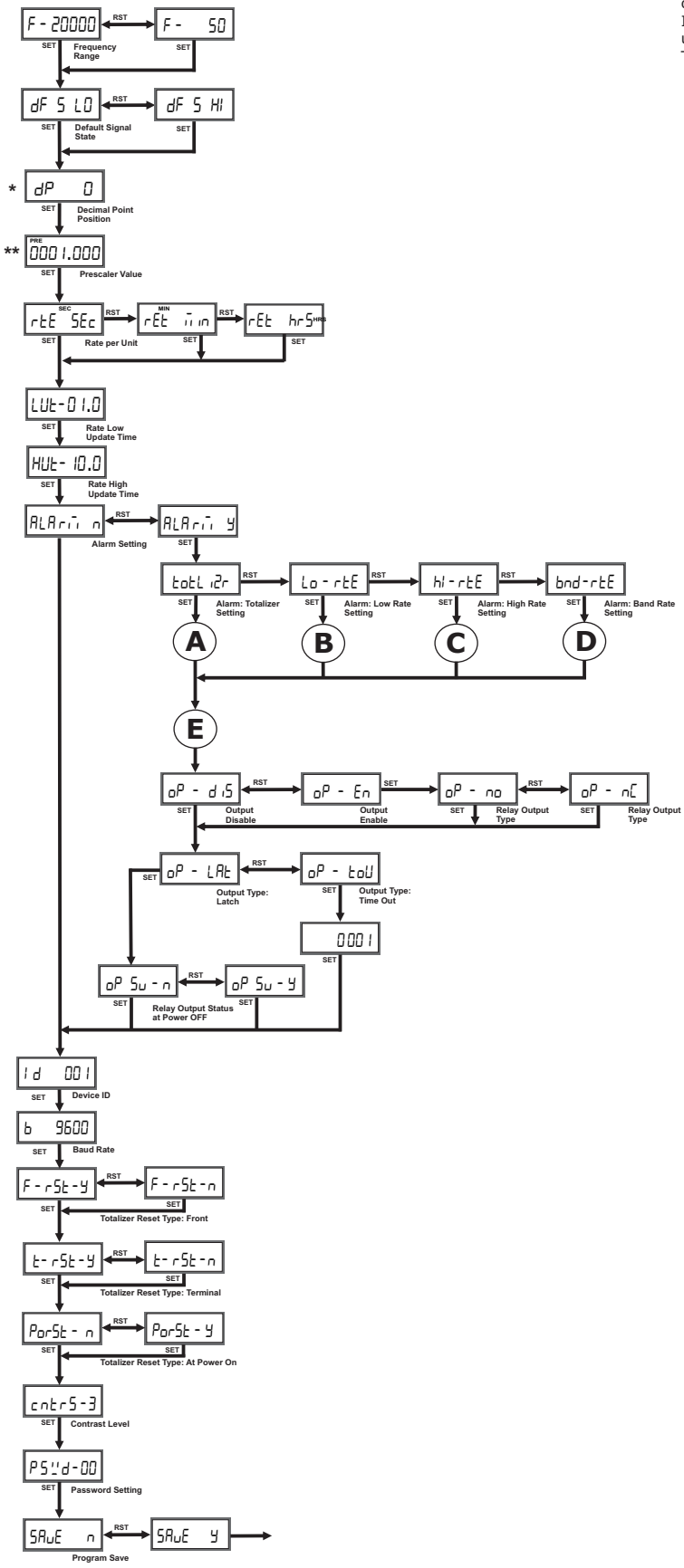
22.0 mm X 44.8 mm



Optional Accessory: ZF1907P: This is the Adapter plate suitable for mounting the Rate Indicator/Totalizer in panel cutout of 50mm x 25mm with counter sunk M4 screw fitting with vertical center to center distance of 38.2mm.

To enter in "Edit" mode, Press 'SET' & 'RESET' key simultaneously for approx 3 sec. Product Firmware version will display followed Password screen will be displayed, if password is enabled.
Kindly refer the following flow for editing the parameters of the device.

Programming Flow :-



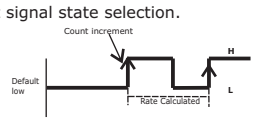
1. Input Signal Frequency Range selection :-

User has to select appropriate input signal frequency range as per requirement, for accurate indication of Rate & Totalizer:
50 Hz: For signal frequencies above 0.01Hz and below 50 Hz, it is advisable to select this range, for better noise immunity, because the hardware filter is enabled in this range.
20kHz: For signal frequencies above 0.01 Hz & below 20 KHz, "20 kHz" range has to be selected. Hardware filter is disabled in this range.

2. Default Signal state selection: This is default signal state selection screen for counting the pulses and rate calculation.

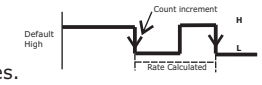
2.1 Default signal state LOW **(**dF 5 LO**)** - LOW Default signal state selection.

"Default LOW" state is selected: Totalizer will increment at Low to High of signal.
Rate will be calculated for rising to rising edges.



2.2 Default signal state HIGH **(**dF 5 HI **)** - LOW Default signal state selection.

"Default HIGH" state is selected: Totalizer will increment at High to Low of signal.
Rate will be calculated for falling to falling edges.



*3. Decimal point selection :- User can select decimal point position up to 4. It is applicable for Rate as well as Totalizer.

**4. Prescaler selection :- Value before decimal point is considered as prescaler & value after decimal point is considered as Postscaler.

Prescaler means no. of pulses required to increment display value by 1.
e.g. Prescaler value 100 means increment the totaliser value by 1 after 100 input signal pulses.

Postscaler means reciprocal of given entered value.
e.g. Postscaler 0000.100 means multiply by 100.

5. Rating Time selection :- It is per unit which is settable by user as Sec, Min, Hour

e.g. If prescaler value is 0001.000 and input signal is 50 Hz then,

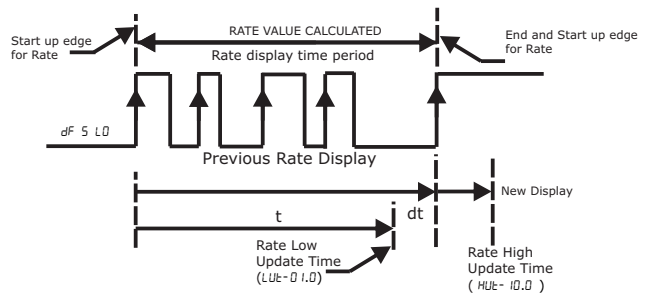
Rate per	Display value
Sec	50 (50x1)
Min	3000 (50x60)
Hrs	180000 (50x3600)

5.1. **Rate Low Update Time**(LUt-01.0) **:-** Minimum time to calculate and display Rate value. For values 0.1sec and 0.2sec display updates correctly but unsteady.

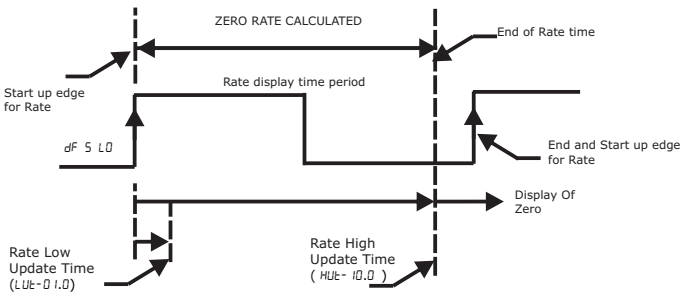
5.2. **Rate High Update Time**(hUt- 10.0) **:-** Maximum time to calculate and display Rate value. After this timeout value rate will be displayed as zero.
NOTE : High update time > Low updated time.
(High update time is always greater than Low update time)

Rate Calculation :

Rate indicator device should calculate the rate by summing number of falling / rising edges depending upon the selection of "Default Signal Level".
For E.g. Considering default signal state : LOW (dF 5 LO)
Rate Low Update time (LUt-01.0) : 1Sec
Rate High Update time(HUt- 10.0) : 10 Sec
Rate calculation starts on the first rising edge and all rising edges are accumulating time towards Low update time value (1sec) .When the time reaches the Low Update Time value, after that one more rising edge is required to display the rate value.
If a rising edge occurs before the High Update Time value is reached, the Rate display will update to the new value and the next sample period will start on the same edge.
Then total rate will be calculated by total number of rising edge in time period of (t+dt).



If rising edge will occur after reaching "Rate High Update Time"value, then the Rate Value will be display to zero.



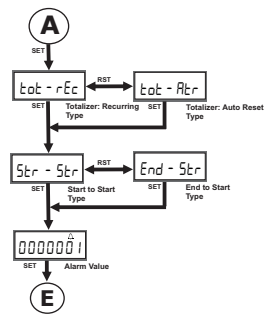
6. Alarm Functionality :-

NOTE:
On Alarm value entry screen for totalizer or rate, alarm symbol will appear on screen, and if Prescaler is not equal to 1 then PRE symbol will also appear. Also alarm value should be non zero. Zero will not be accepted. It will start blinking first digit again if all digits are zero.

Alarm-N (ALArM-n): Alarm Disabled:Alarm value can not be set. Output relay will not becomes ON.
Alarm-Y (ALArM-Y): Alarm Enabled: Alarm value can be set. Output relay will become ON as per setting done.

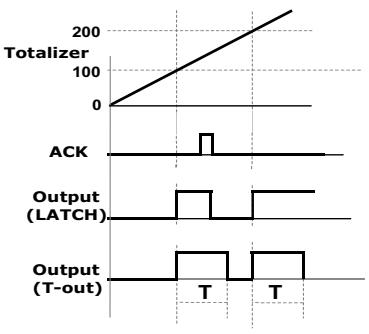
7. Totalizer Alarm Functionality(totL izr):- There are two types of Totalizer Alarms

7.1) tot-rEc - Recurring Type. 7.2) tot-Atr - Auto reset Type.



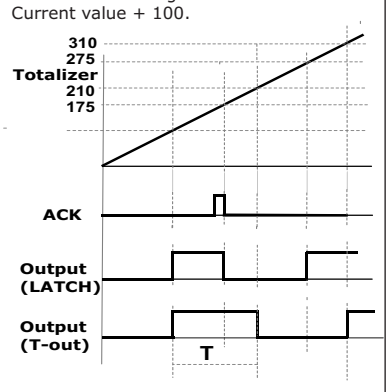
7.1 Recurring type Alarm: Totalizer count will not reset at the alarm activation or deactivation. Types of recurring type alarm is 7.1.1) start to start & 7.1.2) end to star type

7.1.1 **Start to Start type**(Str-Str):
If the alarm value is 100 then output will activate at 100. After acknowledged by pressing SET key for 2sec(for Latch type). or after time out (for Time out type) output will deactivate & again activate after every 100 counts.
i.e 200,300,400 so on.



Recurring start to start

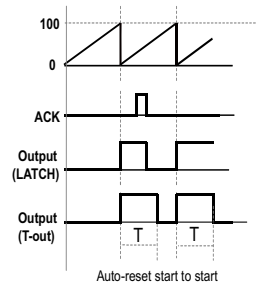
7.1.2 **End to Start type**(End-Str):
If the alarm value is 100 then output will activate at 100. after acknowledged by pressing SET key for 2sec(for Latch type) or after time out (for Time out type) output will deactivate & again activates after Current value + 100.



Recurring end to start

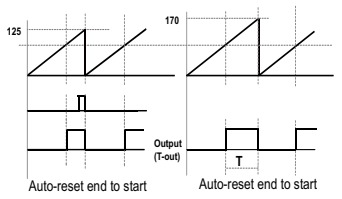
7.2. Auto reset type Totalizer(tot-Atr): Count will reset depending on the setting of start to start or end to start type

7.2.1 **Start to Start type**(Str-Str):
If the alarm value is 100 then output will activate at 100 & totalizer value reset to zero. And acknowledged by pressing SET key for 2sec (for Latch type). or after timeout(for Time out type) output will deactivate & again activate at 100.



Auto-reset start to start

7.2.2 **End to Start type**(End-Str):
If the Alarm value is 100 then at 100 output will activate and after giving ACK (for Latch type) OR after timeout over(timeout type) output will deactivate and totalizer will reset to 0.



Auto-reset end to start

Auto-reset end to start

8. Rate Alarm Functionality:

There are three alarm type for rate :
1) Low rate, 2) High rate, 3) Band rate

- **On Delay** (tOn0000)**:** It is conformation time to register Rate Alarm & make output ON.

-**Timeout:** It is time in seconds required for confirm rate value to deactivate output. if rate crosses the alarm set value, output will activated when rate comes within limit then output deactivate after set value.

-**Standby feature**: This feature is applicable to low rate alarm and band rate alarm with 'A' < 'b'

--**Standby - Yes(**Stby-Y**)**: It disables 'Low Rate Alarm' output at power-ON, It Enables Low Rate Alarm functionality when Rate value crosses the set point.

--**Standby- No(**Stby-n**)**: Low Rate Alarm functionality enabled at Power ON.

Product Specifications :

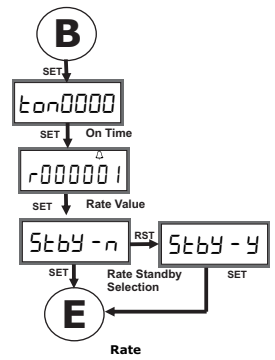
Supply Characteristics :				
Supply Voltage Range (Un)	9 to 30 VDC			
Power Consumption	1.5 W			
I/P Signal Characteristics :				
Signal Voltage Range	3 to 30 VDC			
Input Signal Frequency Range	Range 1 : 0.01Hz to 50 Hz Range 2 : 0.01Hz to 20KHz			
Output Characteristics :				
Output type	Relay: 1 C/O, Contact Rating:5 A(Res.) @250 VAC/30VDC Contact Material: Ag Alloy			
Functional Characteristics :				
Display	7 digit LCD, 6.5mm Height, 12 O' Clock, Transmissive with green backlight			
Rate Display	6 digit Display			
Totalizer Display	7 digit Display			
Number of keys	2 (SET key & RST key)			
Reset function	Reset type	Terminal	Front	Auto Reset
	Time(minimum)	80 ms	3 Sec	-
Rate Accuracy	+/-0.01%			
Totalizer Accuracy	100 %			
Decimal Point Position(max.)	4			
Pre-scaler	4 digits before decimal point & 3 digits after decimal point.			
Minimum Pulse Width for Input Signal	<50Hz	>8 mSec High >5 mSec Low		
	20kHz	25 µSec(50% Duty cycle)		
Environmental Characteristics :				
Operating Temperature	-10° C to +55° C			
Storage Temperature	-10° C to +60° C			
Humidity	5 to 95% Rh (Without condensation)			
Maximum Operating Altitude	2000 m			
Pollution Degree	II			
Degree of Protection	Front side : Ip40; Terminals: Ip20, Housing: IP30			
Enclosure material	UL 94 V0 Plastic			
Casing color	Black			
Other Characteristics :				
Mounting	Flush mounting on panel cut-out			
Panel Cut-out	22mm X 44.8mm			
Weight (Packed)	64 gm			
Operating Position	Horizontal			
Termination wire Sizes	Wire size : 22-14 AWG, 0.3-2.5 mm			

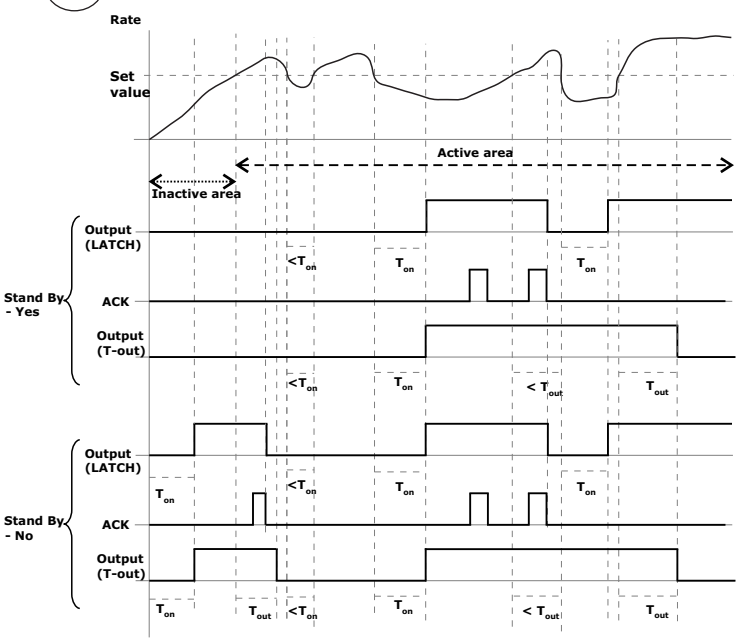
EMI/EMC Compliance:		
ESD	IEC 61000-4-2	Ed. 2.0 (2008-12) Level II
Radiated Susceptibility	IEC 61000-4-3	Ed. 3.2 (2010-04) Level III
Electrical Fast Transients(Supply)	IEC 61000-4-4 Class B	Ed. 3.0 (2012-04) Level III
Electrical Fast Transients(Signal)	IEC 61000-4-4 Class B	Ed. 3.0 (2012-04) Level III
Surge (Supply)	IEC 61000-4-5	Ed. 2.0 (2005-11) Level III
Conducted Susceptibility(Supply)	IEC 61000-4-6 Class A	Ed. 4.0 (2013-10) Level III
Power Frequency Magnetic Field	IEC 61000-4-8	Ed. 2.0 (2009-09) Class 4
Voltage Dips	IEC 61000-4-29	Ed. 1.0 (2000-08) Class B
Conducted Emission	CISPR 11	Ed. 5.1 (2010-05) Class A
Radiated Emission	CISPR 11	Ed. 5.1 (2010-05) Class A
Safety Compliance:		
Test Voltage (All terminal to housing)	IEC 60947-5-1	Ed. 3.1 (2009-07) 2 kV
Single fault	IEC 61010-1	Ed. 3.0 (2010-06)
Leakage Current	UL 508	Ed. 17 (1999-01) <3.5 mA
Environmental Compliance :		
Cold Heat	IEC 60068-2-1	Ed. 6.0 (2007-03)
Dry Heat	IEC 60068-2-2	Ed. 5.0 (2007-07)
Vibration	IEC 60068-2-6	Ed. 7.0 (2007-12) 5 g
Repetitive Shock	IEC 60068-2-27	Ed. 4.0 (2008-02) 40 g,6ms
Non-repetitive Shock	IEC 60068-2-27	Ed. 4.0 (2008-02) 30 g, 15ms

Functional Parameters:

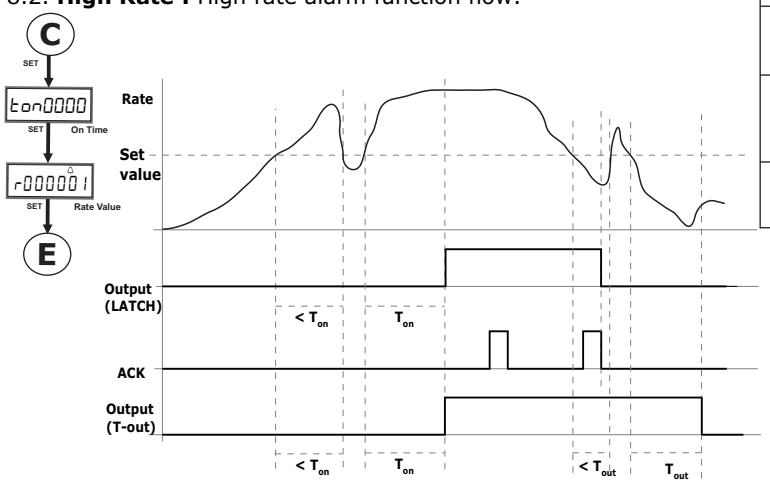
Parameter	Description	Default
Product Version:		
PS'd-00	password (01 to 99)	-
F-20000	20 kHz frequency	F-20000
F- 50	50 Hz frequency	
Default Signal Selection:		
dF S LO	Default signal Low	dF S LO
dF S HI	Default signal High	
Decimal Point Menu:		
dP 0	Up to Four Digit(0,1,2,3,4)	dP 0
Prescaler Menu:		
000 1.000	Value before decimal point is considered as prescaler & value after decimal point is considered as Postscaler.	000 1.000
Rate per Unit Menu:		
rtE SEC	Rate per Second	rtE SEC
rtE ni n	Rate per Minute	
rtE hrS	Rate per Hour	
Rate update time:		
LUt-0 1.0	Low update time 0.1 to 99.8 sec	LUt-0 1.0
HUt- 10.0	Low update time 0.2 to 99.9 sec	HUt- 10.0
Alarm Menu:		
ALArn n	Alarm No	ALArn n
ALArn Y	Alarm Yes	
totL i2r	Totalizer	totL i2r
Lo - rtE	Low Rate	
HI - rtE	High Rate	
bnd - rtE	Band Rate	
Totalizer Menu:		
tot - rEc	Totalizer Recurring	tot - rEc
tot - Atr	Totalizer Auto Reset	
Str - Str	Start to Start	Str - Str
End - Str	End to Start	
000000 1	Alarm value for Totalizer	000000 1
Low Rate Menu:		
ton 0000	Output On Delay Time	0000
r000001	Alarm value for Rate	r000001
StbY - n	Stand by No	StbY - n
StbY - Y	Stand by Yes	
High Rate Menu:		
ton 0000	Output On Delay Time	0000
r000001	Alarm value for Rate	r000001
Band Rate Menu:		
ton 0000	Output On Delay Time	0000
A000001	Alarm value for Band Rate 'A'	A000001
b000002	Alarm value for Band Rate 'b'	b000002
StbY - n	Stand by No	StbY - n
StbY - Y	Stand by Yes	
Output Menu:		
oP - diS	Output Disable	oP - diS
oP - En	Output Enable	
oP no	Output Logic NO	oP no
oP nc	Output Logic NC	
oP - LAt	Output Latch	oP - LAt
oP - toU	Output Timeout	
000 1	Output Timeout value entry	000 1
oPSu - Y	Output save at Power fail	oPSu - n
oPSu - n	Output not save at Power fail	
MODBUS Menu:		
id 001	Device ID settable from 1 to 247	id 001
b 9600	Baud rate:2400,4800,9600,19200	b 9600
Reset Menu:		
F rSt - Y	Front Reset Yes	F rSt - Y
F rSt - n	Front Reset No	
t rSt - Y	Terminal Reset Yes	t rSt - Y
t rSt - n	Terminal Reset No	
PorSt - n	Power On Reset - No	PorSt - n
PorSt - Y	Power On Reset - Yes	
cntrSt 3	Contrast Level (0,1,2,3,4,5,6,7)	3
SAvE n	Program Save No	SAvE n
SAvE Y	Program Save Yes	

8.1. **Low rate :** Low rate alarm function flow:





8.2. **High Rate :** High rate alarm function flow:

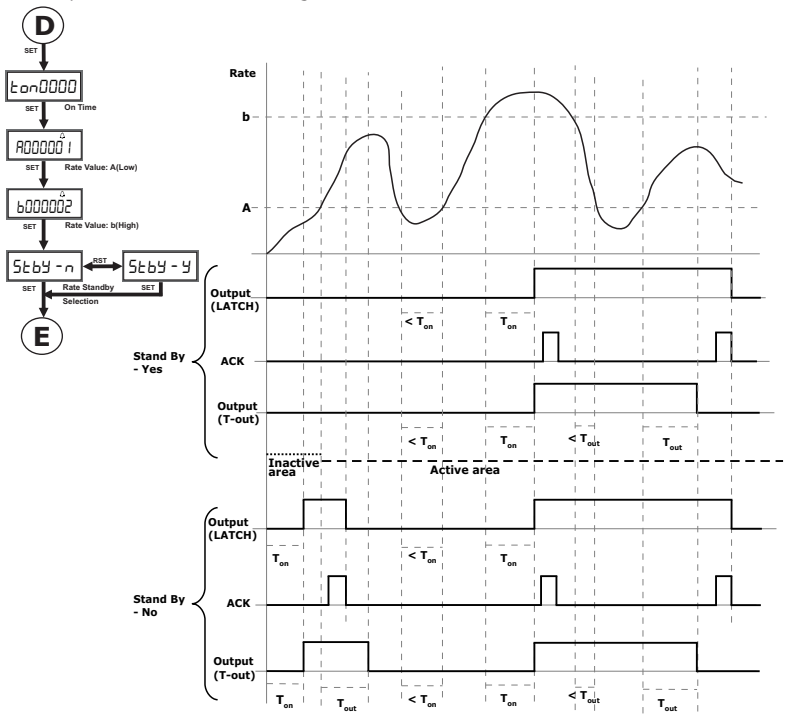


8.3. **Band Rate :** Band rate alarm function flow:

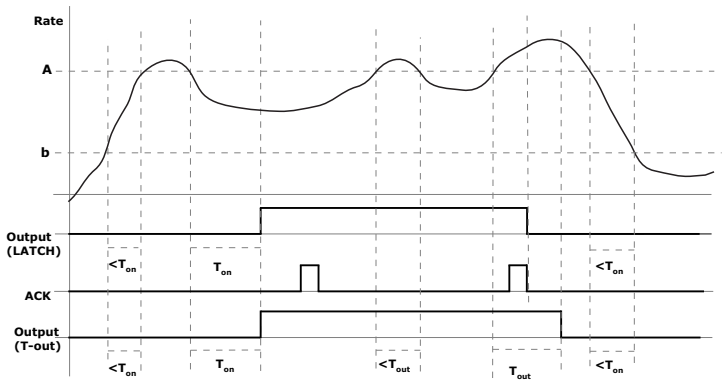
'A'(A) : Set value 1 (low rate value)
'b'(b) : Set value 2 (high rate value)

Note :
1. 'A' should be non-zero.
2. 'b' should be non-zero.
3. Both values should be unequal.

a. CASE 1 : 'A'<'b' :
Output will activate when rate goes below 'A' OR above 'b'.



b. CASE 2 : 'A'>'b'
Output will activate when rate goes below 'A' and above 'b'.



9. **Output Disable/Enable (oP-diS/oP-En) :-** Using this setting output can be made either enabled Or disabled.
When output is **Enable** then the output will activate and alarm symbol will blink.
Output Enable: oP - no and oP - nc applicable for output enable.
If select oP - no it turns 'ON' output when activated & 'OFF' when deactivated.
If select oP - nc it turns 'OFF' output when activated & 'ON' when deactivated.
When output is **Disable** then the output will be OFF and alarm symbol will blink.

10. **Output type :-** this allows to select the output reset type,

10.1 **Latch(oP -LAt):**
Output Latch means, once alarm value reaches, Output becomes ON & remains ON until it gets acknowledged by pressing SET key minimum for 3 sec.
10.1.1 **Output Save**: oP SU - n & oP SU - Y This parameter is applicable to Latch type only.
If SU - Y is selected then, output status will be saved at power fail.
If SU - n is selected then, output status will not be saved at power fail.

10.2 **Time out(oP-toU):**
When output turns ON it remains ON up to timeout value in seconds. Timeout value for Rate 0 to 9999 seconds and for Totalizer 1 to 9999 seconds.

11. Communication Interface:

Interface - RS485
Protocol - MODBUS Slave
Slave ID - 1 to 247 Selectable
Baud Rate - 2400, 4800, 9600, 19200 bps. Selectable
Data size - 8
Parity - None
Stop Bit - 1
Supported function code - Read Input Resister FC 04;
Write Multiple Holding Resister FC 16
Read Multiple Holding Resister FC 03

11.1. MODBUS Address:

11.1.1. **Input Resister:**

Resister Name	address start	address end	Operation Type	Range Min	Range Max
Totalizer Integer value	30001 (Lower word)	30002 (Higher word)	Read	0	9999999
Totalizer Fractional value. Indicated Value on MODBUS as per decimal point position on device.	30003 (Lower word)	30004 (Higher word)	Read	0	9999
Rate (without decimal point)	30005 (Lower word)	30006 (Higher word)	Read	0	999999
Decimal point position 0-no decimal,1-one decimal 2-two decimal,3-three decimal 4-four decimal	30007	30007	Read	0	4

11.1.2. **Holding Resister table:**

Resister Name	address start	address end	Operation Type	Range Min	Range Max	Block size
Decimal point position 0-no decimal,1-one decimal 2-two decimal,3-three decimal 4-four decimal	40001	40001	Read/ Write	0	4	14
Alarm Y/N (0 - No, 1 - Yes)	40002	40002	Read/ Write	0	1	
Alarm type (0 - Totalizer, 1 - Low rate, 2 - High rate, 3 - Band rate	40003	40003	Read/ Write	0	3	
Alarm value 1 (no decimal) (Totalizer, low rate, high rate, band rate-A low)	40004 (Lower word)	40005 (Higher word)	Read/ Write	1	999999 (rate) 9999999 (totalizer)	
Alarm value 2 (no decimal) (band rate-B high)	40006 (Lower word)	40007 (Higher word)	Read/ Write	1	999999	

Note: Query of Function code No. 16 (Write Multiple Holding Resister), user has to write all 7 resisters in single query.

11.1.3 **Exception Reply:** An exception reply is given when query received, but can not satisfied expected query. The response containing exception code indicate the cause as below,

1) Illegal Function code **01**
2) Illegal data address **02**
3) Illegal data value field **03**
4) Slave device busy **06**

Slave Number	Byte 0
Function code with most assign bit set to 1	Byte 1
Execution code	Byte 2
CRC LSB	Byte 3
CRC MSB	Byte 4

12. Reset Types :-

12.1 **Front reset(F-rSt-n/F-rSt-Y)** allows user to reset Count by pressing RST key for 2 sec.
12.2 **Terminal reset(t-rSt-n/F-rSt-Y)** allows user to reset Count by shorting reset terminal to ground for minimum 80 mS.
12.3 **Power ON reset:** PorSt n - Count retains at power ON. PorSt Y - Count resets at power ON.

13. Contrast control(cntrSt 3) :-

Set contrast level of LCD from 0 to 7.

14. Password entry/change (PS'd - 00) :-

Password is required for editing the parameter. User can set password value in between 01 to 99. To enter into the edit mode, press SET & RST key simultaneously for 2 sec, then password screen will appear only if enabled where user has to enter the password for edit setting.
00 – Password Disabled
01- 99 – Password Enabled
72 - Master Password
Save :- Confirmation to save edited parameter.
SAvE Y - Saves the edited parameter in Non Volatile Memory.
SAvE n - Do not save edited parameters in Memory.

Over range & roll over condition :-
*In run mode, when input signal is greater than 25 KHz OR display rate value is greater than 6 digits then "Our rn9" will display on Screen.
*In run mode, if Totalizer display is rolles over then "roL Our" message will flash on display for 500msec after every 5 seconds.

Typical Examples:

1) Motor speed indication requirement in RPM:
Data: Digital tacho-generator gives **36 pulses** per revolution (say).
Requirement: "Rate" display should show **RPM** reading.
"Totalizer" display should shows no. of rotations.

Setting:
Frequency - F - 20000
Decimal point selection - dP 0
Prescaler - 0036.000
Rate per unit time - rtE ni n
Alarm - Y
Band rate - Y
Hysteresys value - ton 0005
Band rate A(low rate) - A0000400
Band rate b(high rate) - b000 1200
Output Disable - oP diS
Time out - 00 10
Device ID - 001
Baudrate - 9600
Front reset - Y
terminal reset - Y
Power on reset - n
Contrast - 3
Pass word - 00
save - Y

Here **36 pulses** of input signal is equal to one revolution of motor.
Display will show rate in **RPM** and totalizer displays number of revolution on display.
Also, Output will be ON if rate remains low below 400 OR remains high above 1200 for minimum 5 seconds and after that if for continuous 10sec rate is greater than 400 and less than 1200 then output will **come OFF**.

2) To Display total length of rope in **feet** & rate of rope delivered in feet **per sec**.
Data: The sensor generates one pulse per revolution of rotating wheel on which the rope is getting delivered. Circumference of wheel is 2 feet.
So, 1 pulse corresponds to 2 feet. So,
Prescaler = 1 pulse/2 feet = 0.500

Setting:
Frequency - F - 20000
Decimal point selection - dP 0
Prescaler - 0000.500
Rate per unit time - rtE SEc
Alarm - Y
Totalizer -
Start to start type - Str - Str
Alarm value - 0000010
Output Disable - oP diS
Time out - 0005, Device ID - 001, Baud rate - 9600
Front reset - Y
terminal reset - Y
Power on reset - n
Contrast - 3
Pass word - 00
save - Y

As per above setting Output relay become ON after every 10 feet of rope passed i.e. 10, 20 , 30, and so on for 5 sec.

3) If the user wants to display 1.00 for 3 pulses, then prescaler should be 3.000 & rate per second to be selected.
If user wants to display 0.99 for 3 pulses then prescaler should be 3/0.99=3.030.