SPINK CONTROLS®

CE-2424

JAS-ANZ

An ISO 9001:2008
Certified Company

OPERATING MANUAL
FIT

FLOW INDICATOR AND TOTALISER

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READ OPERATING MANUAL CAREFULLY BEFORE INSTALLATION OF THIS UNIT.

Specifications: Standard Features

Input	4 - 20 mA DC Linear or Square root corresponding to flow rate, Factory set.
Display	7 Segment LED, 5 - Digit Flow rate, 8 - Digit Totalizer.
Keyboard	4 Key Tack-tile Keyboard.
Resolution	4 and 1/2 digit for Flow rate.
Accuracy	± 0.3% of FS, ± 1 LSD (Flow) and ± 2 Count (Totalizer).
Totaliser	8 Digit Totalizer for flow.
Scaling	Flow Rate and Totalizer, span and zero are scalable by front keypad.
Data Storage	Totalizer value and set points stored in battery backup RAM.
LED Indications	LED indications for Relays and Serial Communication.
Excitation	24 VDC,100 mA excitation supply for external Flow Transmitter.
Re-transmission (Optional)	True 4 - 20 mA re-transmission output for external indicators / recorders or PLC. Maximum load resistance 500 Ohms.
Remote Reset (Optional)	Remote Totalizer reset facility through potential free switch input.
Alarm Output (Optional)	Relay output for 2 set points on flow rate or one for flow rate and one for totaliser (Batching) relay.
Serial Port (Optional)	RS485 port with MODBUS RTU protocol for on-line communication.
Supply	230 VAC or 110 VAC, ±10 %, Single Phase, 50 Hz. Factory set.
Connections	On Screw Type Connectors.
Cabinet	Panel mounting type. Bezel: 96 x 96mm (H x W) Depth: 120 mm Cutout: 92 x 92 mm (H x W)

System Programming:
System is provided with four keys, PROG, UP, DOWN and ENTR. **Key Operation Flow chart** is as below.

STEP	KEY	OPERATION
1	PROG	Enter & Exit Programming Mode
2	▲ ▼	Scroll Menus or digits or options
3	↵	Select Menu to Modify & Set Parameter value

Display In Program mode:
Menu is displayed on Flow rate display and Parameter value is displayed on Totaliser display.

NOTE:
In Program Mode Totaliser is stopped and there is no control action.
If any key is not accessed in program mode for more than 5 seconds unit EXITS program mode and starts Indication and totaliser.

Setting the Parameter: Follow these steps in each menu.

STEP	KEY	OPERATION
1	↵	Select Menu to Modify System Display old value
2	▲ ▼	Change digits from 0 to 9 or Scroll Option
3	↵	Set digits & go to next digit setting. Press at each digit to keep the value same
4		Follow step 2 & 3 till all the digits are set
5		After this if value is acceptable, system exits that menu. Else it remains in same menu to enter correct value
6	▲ ▼	Scroll menu or go to step 7
7	PROG	Exit Programming and start Indication and Totaliser

MENU Operation

Menu	Activity	Value
1.dP1	Set Decimal point position for Flow rate Indication	1 to 4
2.rSP	Set Flow rate SPAN Corresponding to 20 mA input	6 to 3200
3.dP1	Set Decimal point position for Totaliser Indication	1 to 4
4tSP	Set Totaliser SPAN corresponding to 20mA input	60 to 58000
5.SP1	Set point for Relay 1 on Flow rate	In the range of ZERO & SPAN value
6.SP2 or 6.SPt	Set point for Relay 2 on Flow rate or Totaliser	
7.rSt	Reset Totaliser	----------
8 Stn	Program Station ID of the unit for Serial Communication	01 to 99
9.SbP	Set Baud Rate & Parity for Serial Communication	300 to 38400
10.rb	Flow Rate Base value (ZERO)	0 to SPAN
11.tb	Totaliser Base value (ZERO)	0 to SPAN
12.PAS	Set PASSWORD for Programming	0000 to 9999
13.Cut	Cut off value for Flow rate	0000 to SPAN
14.tst	Test LED Dispaly	----------

Flow Rate Display configuration
1. Decimal Point: DP1
Example: Say Flow Rate value is 10000 then

DP1 set	Display	DP1 set	Display
1	10000	3	100.00
2	1000.0	4	10.000

2. Flow rate calculation as per 'rSP & rb' values
rSP – Flow rate Span & rb – Rate Base

Calculated Displayed Value = [(rSP - rb)* ((Input mA*100) - 400)/1600)] + rb
Example 1: rSP = 3000 and rb = 0000

Input mA	Flow Rate
00.00 to 04.00	0000
8.00	750
12.00	1500
16.00	2250
20.00	3000

Example 2: rSP = 3000 and rb = 1000

Input mA	Flow Rate
00.00 to 04.00	1000
8.00	1500
12.00	2000
16.00	2500
20.00	3000

Totaliser Display configuration
1. Decimal Point : DP2
Example: Say Totaliser value is 10000 then

Input mA	Display	DP2 set	Display
1	10000	3	100.00
2	1000.0	4	10.000

2. Totaliser calculation as per 'tSP & tb' values
tSP – Totaliser Span & tb – Totaliser Base
Calculated Displayed Value = [(tSP - tb)* ((Input mA*100) - 400)/1600)] + tb

Example 1: tSP = 3000 and tb = 0000

Input mA	Totalised Count / hr
00.00 to 04.00	0000
8.00	750
12.00	1500
16.00	2250
20.00	3000

Example 2: tSP = 3000 and tb = 1000

Input mA	Totalised Count / hr
00.00 to 04.00	0000
8.00	750
12.00	1500
16.00	2250
20.00	3000

'CUT' Value implication for Flow rate & Totaliser

Example 1: **CUT = 0000**
rSP = 3000 and rb = 0000
tSP = 3000 and tb = 0000

Input mA	Flow Rate	Totalised Count / hr
00.00 to 04.00	0000	0000
8.00	750	750
12.00	1500	1500
16.00	2250	2250
20.00	3000	3000

Example 2: **CUT = 750**
rSP = 3000 and rb = 0000
tSP = 3000 and tb = 0000

Input mA	Flow Rate	Totalised Count / hr
00.00 to 04.00	0000	0000
8.00	750	750
12.00	1500	1500
16.00	2250	2250
20.00	3000	3000

That means Flow rate displayed is ZERO for flow rate value from 0 to Cut off value. In this range Totaliser does not increment.

RELAY OPERATION:
For Flow rate set point
SP1 (Relay 1) or SP2 (Relay 2). Hysterisys is fixed to 5.
LED indication: R1 – Relay 1 & R2 – Relay 2

Relay & LED Status	Flow Rate Value
ON	=> Set Point + Hysterisys
OFF	=> Set Point

Example: For SP1 = 100 & Hysterisys = 5

Relay & LED Status	Flow Rate Value
ON	=> 105
OFF	=> 100

For Totaliser Batch set point SPt (Relay 2)

Relay 2	Totaliser Value
ON	=> 105
OFF	When RESET from Program menu or External RST input if provided

Totaliser:
There is a 8-digit totaliser **(9, 99, 99,999)** for Counts per Hour. The displayed value depends on the SPAN and decimal point set for the totaliser in the program mode. This count is stored in a battery-backup memory.
When totaliser value crosses 9, 99, 99,999 the totaliser is made ZERO.
Also Totaliser can be made ZERO from RST menu in program mode.

Password Setting:
To set the new value:
Press ENTR key, system asks for OLD password. When all four digits are entered, system checks for correct value, if the value is ok system asks for NEW password. Use above procedure to set new PASSWORD. When user press PROG key system asks for password display shows **P. 0000**
Enter Password you given. If password entered is wrong system displays **P. P-Err**
Press ENTR key to exit and start indication.
Press PROG key again to make new entry for password.
To clear the Password, give **0000** as password. Now system does not ask for password for programming.

NOTE:
User should be aware of the fact that Password should be remembered. Or otherwise the programming of the unit is totally restricted and the unit will function as per the old Password.
If by chance the Password is forgotten then ask authorized person to contact us by written mail or fax. The master pass-code will be informed in the same format to user.

Serial Communication Data
Parity Options:

none	odd	even

MODBUS data structure for serial communication

Address	Data (Read Only)
40001	Flow rate
40002	Totaliser Count 1
40003	Totaliser Count 2
40004	Totaliser Count 3
40005	Actual mA input value

You get value without decimal point.

Totaliser Value Calculation:
Val 1 = Value at 40002 * 1000000
Val 2 = Value at 40003 * 65536
Val 3 = Value at 40004
Totalised Count = Val 1 + Val 2 + Val 3

LED Indication:
Tx: Blinks while unit sends data to Master.
Rx: Blinks when unit receives data from Master. Both LEDs remain OFF when there is no communication.

TEST 7 segments Display:
Menu 14 is used to test 7 segment LED display of Flow rate and Totaliser.
Press ENTR key and all displays start blinking with all segments.
This mode is to be used by authorize service person to detect the faulty display.
Press ENTR key again to exit this menu.

External Reset Facility
User can RESET the Totaliser using external pot ential free contact input. When Contact is closed Totaliser is made ZERO. Refer to wiring diagram given for connections.

Retransmission Output:
4 – 20 mA link output is provided for external Indicator or control purpose. Maximum load resistance is 500 ohms. Remove wire Link given at **RTx Output +/-** terminals and connect external Indicator.
If this link is open and load is not connected at RTx terminals FIT indicates ZERO flow rate.

Power Output:
24 VDC, 100 mA output is made available to use as a supply for the external transmitter if used.

FUSE :
FUSE protection is given for mains supply variations. If you found the FUSE burnt because of high voltage, replace the FUSE by new one.
Fuse rating is 230VAC, 100mA.
After replacing the fuse, if it again burnt out then there is a problem in the system. Do not replace fuse, send system for repairs.

PRECAUTIONS:

1. Give correct supply to the system.
2. Use proper size wire (max. 1.5 mmsq.) for termination.
3. Program system parameters as per process requirements.
4. If you connect the mA input in reverse fashion or when input is below 4 mA system displays Zero value.

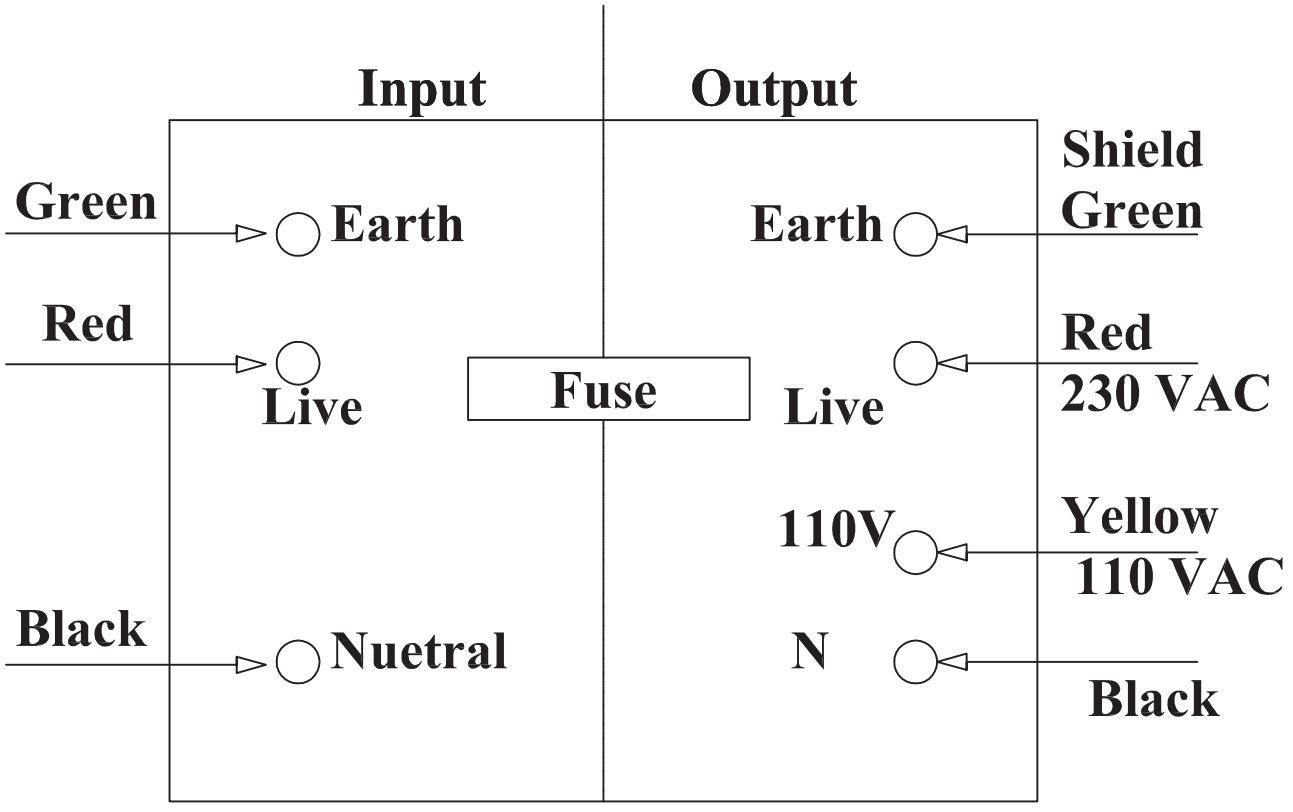
Mains supply connection:

System has option for two input supply connections as 110 VAC or 230 VAC.
As per the requirement only one option is brought on the back connector. Colour code for the supply connections from internal transformer is as shown.

If it is required at site to change the supply type –

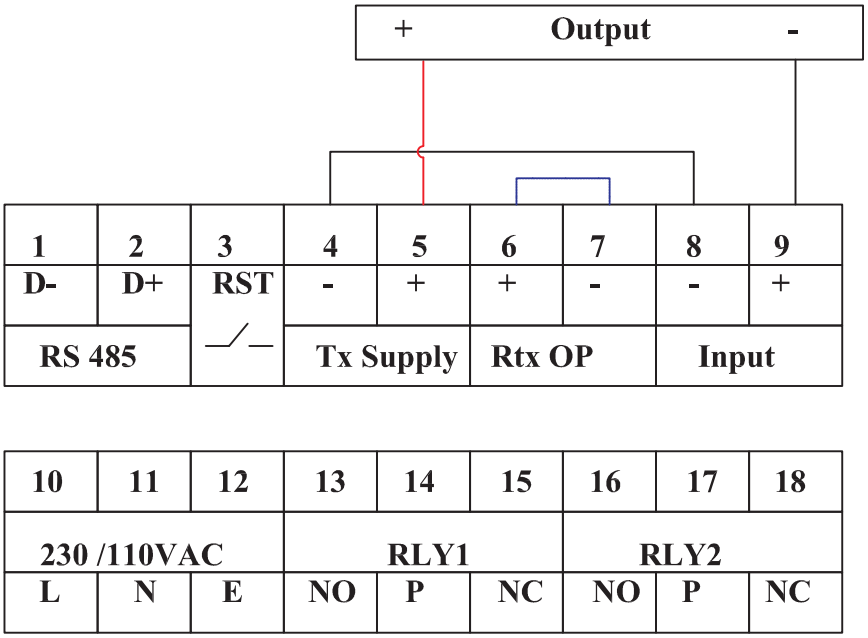
1. Remove Cover of the cabinet.
2. On the Terminal side FUSE PCB is fixed. Interchange the LIVE wire from transformer side as shown in diagram.
3. Fix cover and make changes on external sticker.
4. Now make sure that you are giving correct power to the system as per current changes made.

FUSE PCB WIRING

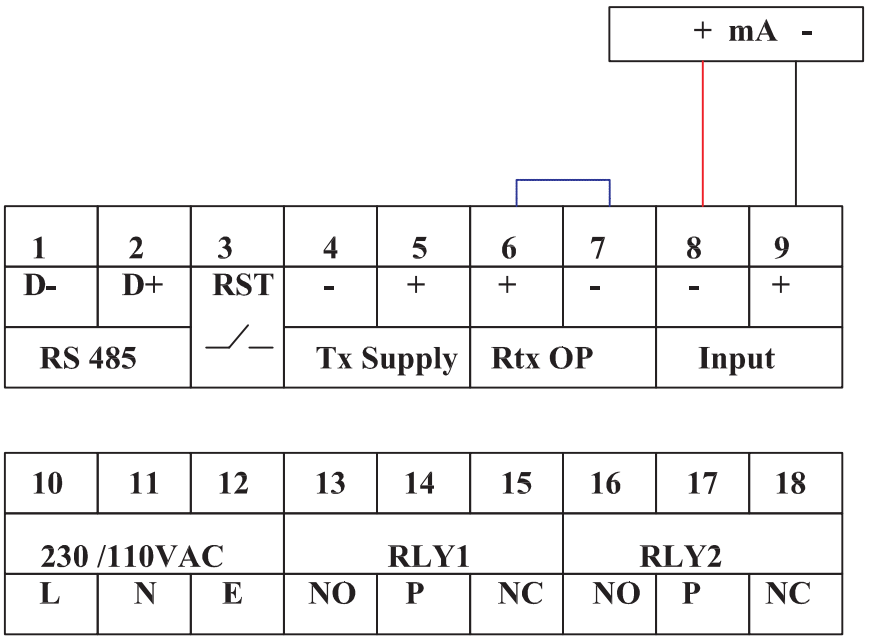


FIT- Standard Connections
RTX- Link will be provided only if ordered. Else not required

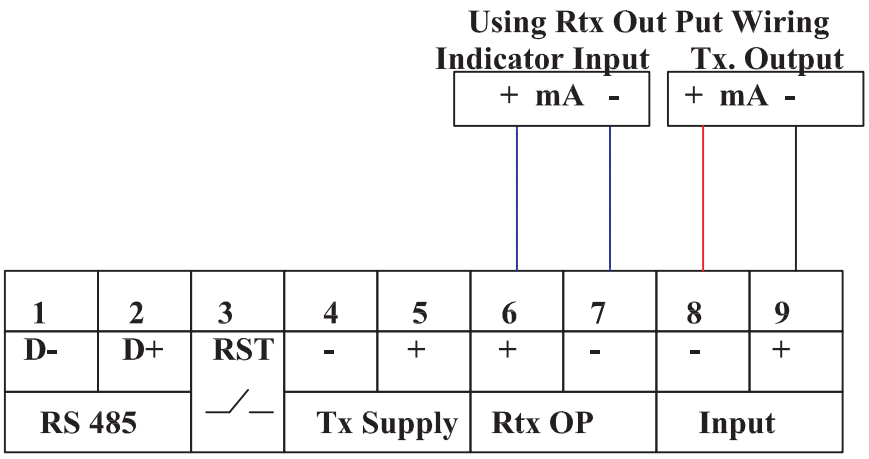
Loop powered transmitter (2 Wire Output)



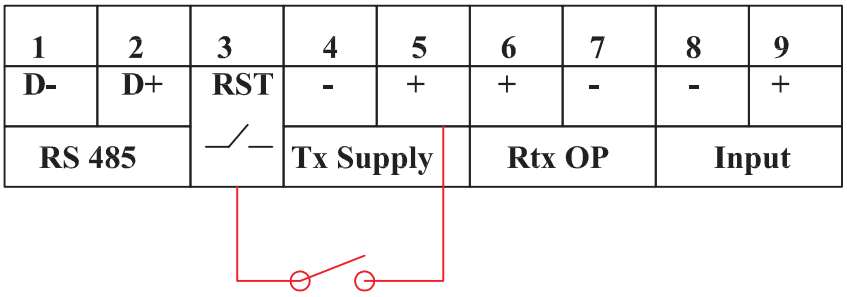
mA Out put Transmitter (Direct 4 wired transmitter)

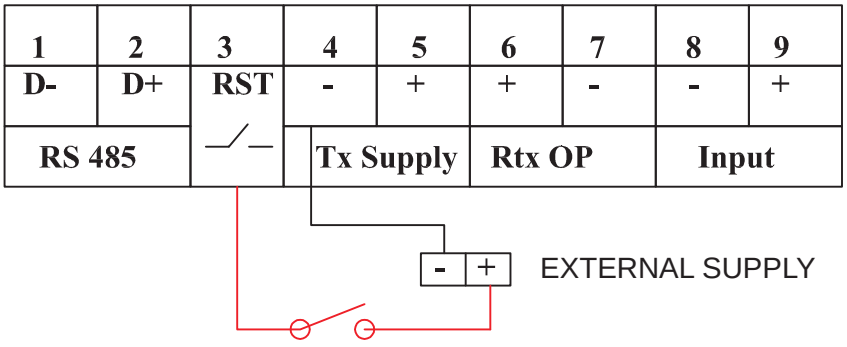


Using Rtx Out Put Wiring

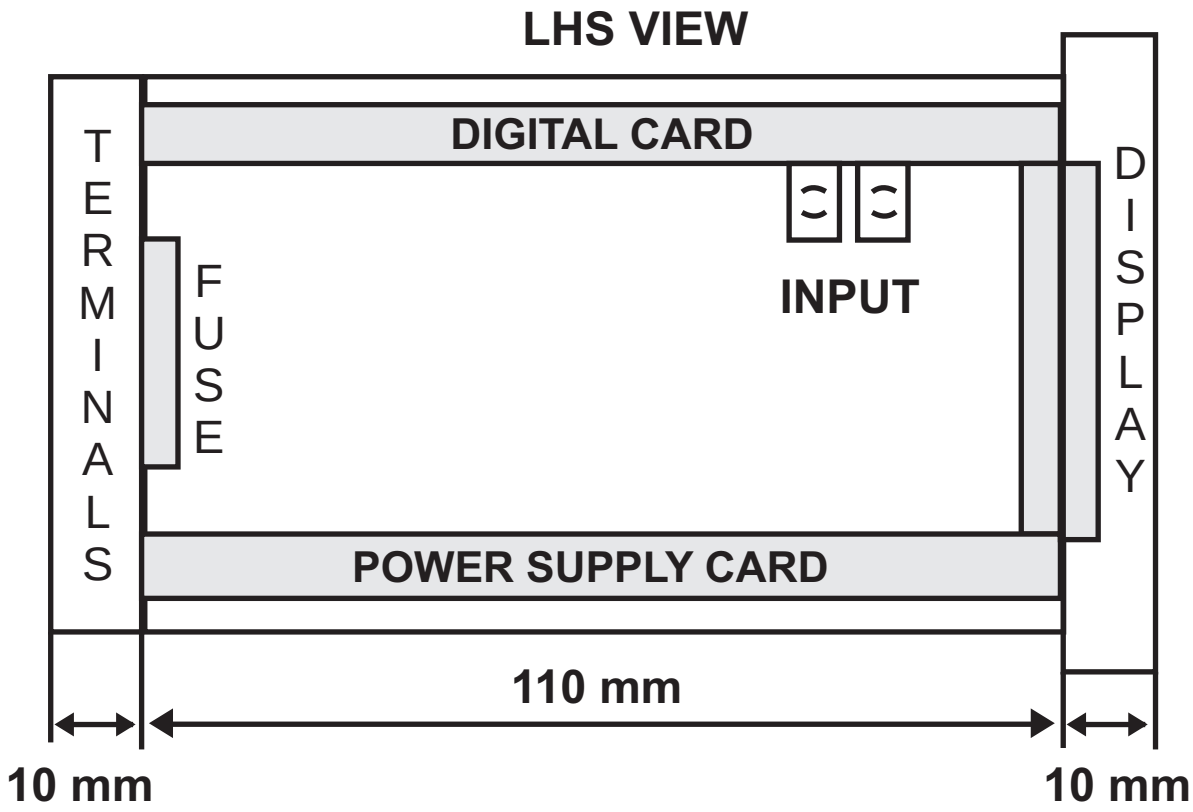


External reset using potential free contact





Internal Assembly



SYSTEM CALIBRATION

1. Give mA input directly to input terminals. Use Standard calibrated source.
2. Program SPAN & ZERO values as required.
3. Give 4.00 mA input and adjust **Z** trim-pot for ZERO reading on Flow rate display.
4. Give 20.00 mA input and adjust **S** trim-pot for SPAN reading on Flow rate display.
5. Follow step 3 & 4 till you get display within accuracy limit. Check display with intermediate mA inputs.
6. **Do not disturb 'Z or S' trim pots on field without calibrated source. Set ZERO / SPAN in program mode to adjust the reading on display.**

MENU 15 -- Set Input type
This option is available only with FIT having Square root input facility.
Here you can set input type as Square root or Normal linear. Display shows **'15.IPt'**
Set the option **Lin or Square** as required.

Square root mA Table

Input Sq.root mA	Output Liner mA Calculated
4.00	4.00
5.00	8.00
6.00	9.65
7.00	10.92
8.00	12.00
9.00	12.94
10.00	13.79
11.00	14.58
12.00	15.31
13.00	16.00
14.00	16.64
15.00	17.26
16.00	17.85
17.00	18.42
18.00	18.96
19.00	19.49
20.00	20.00

Example: Say input given is 8 mA.
So, the Linear value taken by the system after square root extraction is 12 mA from the above table.
Our range is 4 – 20 mA i.e. span of 16 mA.
So actual value for calculation is = 12 - 4 = 8 mA
Now if you set span for Flow rate to 1000, that means 16 mA is resolved in 1000
So for above value Flow rate displayed is = (1000 x 8) / 16 = 500.

Use above method to calculate Flow rate displayed.