product catalogue

KUSHAL®

FLOW METERS

Flow Meters for Commercial & Industrial Applications

KUSHAL®
FLOW METERS

Electromagnetic Flow Meter K-01

SALIENT FEATURES

- Suitable for conductive liquid
- Absolutely maintenance free.
- Full bore type.
- Local Indication through LCD.
- Simple & cost effective construction.
- Outstanding accuracy.
- Flow measurement in forward & reverse direction on demand.
- Empty pipe indication on demand.
- Material options depending upon process data.
- Universal power supply.
- Communication port on demand.

DESCRIPTION

K-01 are micro-controller full bore type electromagnetic flow transmitter specially used for various industrial applications. These flow transmitters accurately measures the flow rate of conductive liquids of slurries in closed pipes. Due to simple & rigid design, the flow transmitter in an obstruction less & maintenance free instrument in place of conventional mechanical flow measuring device. The use of 'Pulsed DC' technology offers highest ability & better measuring accuracy in the form of electrical signal 4-20 mA DC linearly proportional to volumetric flow. The instrument is based on Faraday's law of electro-magnetic field generates a voltage that is proportional to the flow velocity. Corresponding electrical output is provided with respect to measuring voltage.

TECHNICAL SPECIFICATIONS

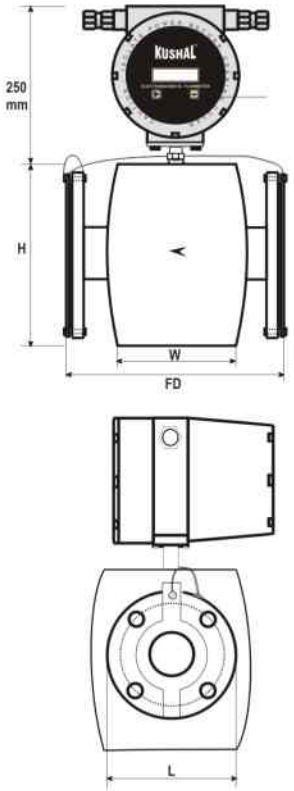
Media	:	Liquid (Conductive)
Conductivity	:	> 5µs/cm
Viscosity	:	200 cp max
Line Size	:	15 NB to 600 NB
Excitation	:	Pulsed DC Coil
Type of output	:	1) 40 to 20 mA DC, Isolated 2) Pulse
Display	:	16x2 LCD - 4 digit for Flow Rate & 8 digit for Totalised Flow
Calibration	:	As per requirement (Factory Calibrated)
Accuracy	:	+/- 0.5% F.S. (For 20 to 100% Flow)
Linerity	:	+/- 0.5%
Repeatability	:	+/- 1%
Process Temp.	:	70°C Rubber/150°C PTFE
Communication Port	:	On Demand

Process Pressure	:	10 kg/cm² max
Material of construction	:	Lining - Rubber / PTFE (Teflon) Flange - CS / MS / SS Electrode -SS 316L / Hastalloy C / Platinum Coil Housing - MS / SS304
Power Supply	:	1) 24 V DC, External 2) 90-250 V AC, 50 Hz
Power Construction	:	< 10VA
Isolation	:	1.4 KV between Input, Output & Power Supply
Response Time	:	< 100mSec
Temperature Coeffecient	:	+/- 0.1 % per OC
Transmitter Enclosure	:	Flame proof, IP-65, IIA, IIB CMRI certified
Process Connection	:	ASA 150 flanged \, as per table B 16.5
Mounting	:	In Line (Horizontal OR Vertical)
Operating Conditions	:	Temperature 0 to 55°C Humidity 5 to 95% on condensing

KUSHAL® FLOW METERS

Electromagnetic Flow Meter K-01

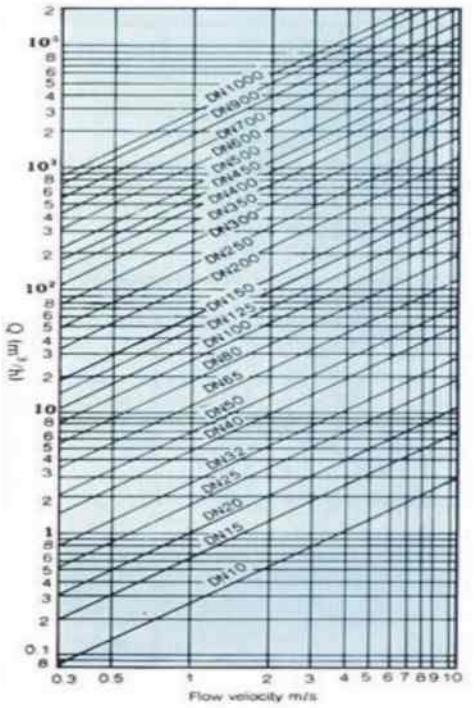
DIMENSIONAL DETAILS



Master Size	L (mm)	W (mm)	H (mm)	FD (mm)	Flow Range	
					Velocity=1 m/s)	Velocity=6 m/s)
15 NB	150	100	180	200	0.64	3.82
20 NB	150	100	180	200	1.13	6.78
25 NB	150	100	180	200	1.77	10.6
32 NB	180	100	210	200	2.90	17.4
40 NB	180	100	210	200	4.52	27.14
50 NB	180	100	210	200	7.07	42.41
65 NB	185	100	220	200	11.95	71.68
80 NB	207	100	240	200	18.10	108.87
100 NB	250	150	274	250	28.27	169.65
125 NB	280	175	300	250	44.18	365.07
150 NB	320	175	330	300	63.62	381.7
200 NB	380	175	390	350	113.09	678.58
250 NB	420	244	440	450	176.7	1060.3
300 NB	520	250	520	500	254.46	1526.8
350 NB	520	250	520	550	346.35	2078.2
400 NB	520	250	520	600	452.38	2714.3
450 NB	627	623	632	698	572.54	3435.3
500 NB	679	623	686	768	706.84	4241.2
600 NB	770	818	772	918	1017.84	6107.04

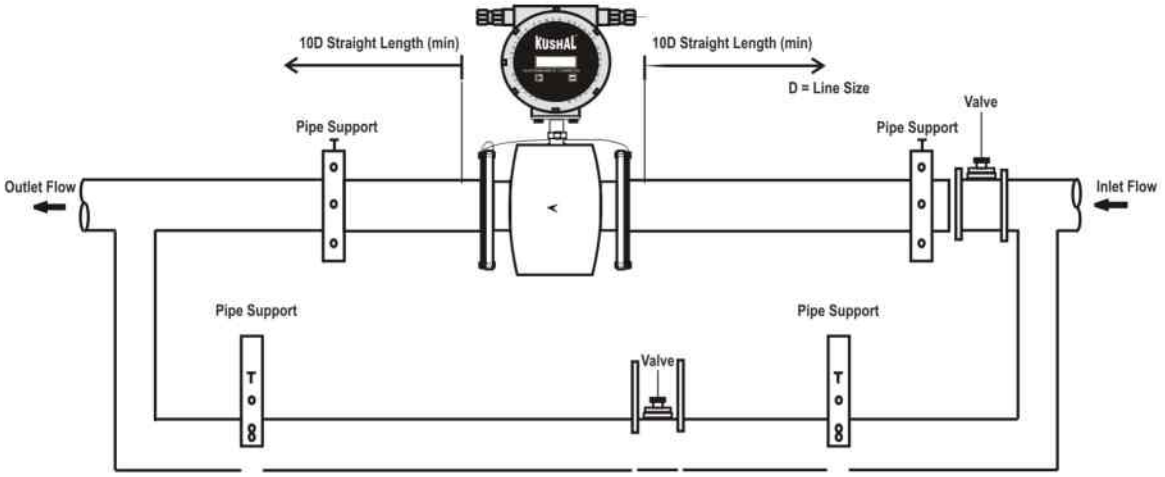
All dimensions are indicative dimensions.

FLOW NOMOGRAPH



Flow meter should be selected with the help of Nomograph
Recommended Full Scale Velocity
2 to 3 m/s for homogeneous media
3 to 5 m/s for non viscous media with solid contents

INSTALLATION DRAWING



AVAILABLE LINING IN P.T.F.E & HARD RUBBER LINING

KUSHAL®
FLOW METERS

Turbine Flow Meter K-02

SALIENT FEATURES

- 2 wire system.
- Simple & cost effective construction.
- Provides wide flow ranges.
- Local display as 8x1 LCD.
- Outstanding accuracy for clean & pressure.
- Easy maintenance.
- Flame-proof, IP-65, IIA, IIB CMRI certificate housing.

DESCRIPTION

K-02 are 2 wire turbine flow transmitter specially used for various industrial applications. The flowing media engages a vaned rotor causing to rotate at an angular velocity proportional to flow rate. The pick up coil senses the spinning motion of the pipe and converts it into a pulsating electrical signal. Summation of the pulsating electrical signal is directly related to the total flow. The frequency is linearly proportional to flow rate is converted to electrical signal 4-20 mA

TECHNICAL SPECIFICATIONS

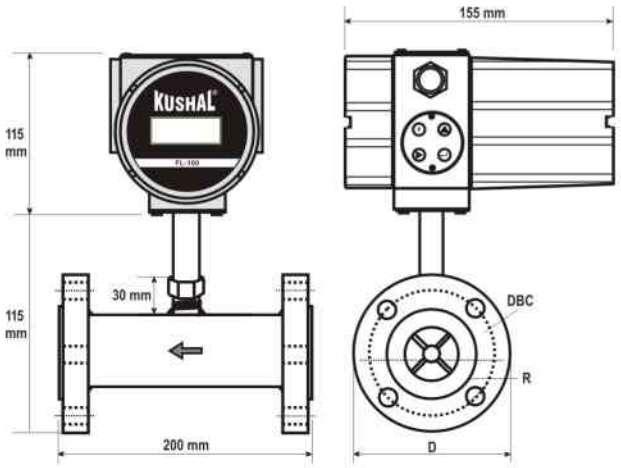
Media	:	Liquid (Clear)
Viscosity	:	100 cp max
Line Size	:	15 NB to 150 NB
Display	:	8x1 LCD - 4 digit for Flow Rate & 8 digit for totalised Flow (flow rate & totalised flow will be visisble through toggle key
Transmitter Electronic	:	1) Integral 2) Remote
Remote Electronic Cable	:	25 mtr max
Type of Output	:	1) 4 to 20 mA DC 2) Pulse - 30mA Peak-Peak 3) Open Collector output
Calibration Range	:	As per requirement (Factory Calibrated)
Accuracy	:	+/- 1% F.S. (For 20 to 100% Flow)
Linerity	:	+/- 1%
Repeatability	:	+/- 1%
Process Temp.	:	0 to 180°C max
Pressure Drop	:	Appox 0.28 kg/cm² to max. flow
Turn Down Ratio	:	10:1 to 100:1

Material of Construction	:	Bearing - Tungsten Carbide Sleeve V Jewel Rotor - SS 410 17.4 PH Shaft - Tungsten Carbide Body Support Flange SS
Power Supply	:	1) 24 V DC, External
Power Consumption	:	< 1 VA
Response Time	:	< 100mSec
Temperature Coefficients	:	+/- 0.1 % per OC
Transmitter Enclosure	:	Flame proof, IP-65, IIA, IIB CMRI certified
Process Connection	:	ANSI 150 RF flanged \, as per table B 16.5 BSP (M) Threaded (Upto 50 NB only) SS Tri-Clover (upto 50 NB only)
Mounting	:	In Line (Horizontal OR Vertical)
Operating Conditions	:	Temperature 0 to 55°C Humidity 5 to 95% on condensing

KUSHAL®
FLOW METERS

Turbine Flow Meter K-02

DIMENSIONAL DETAILS

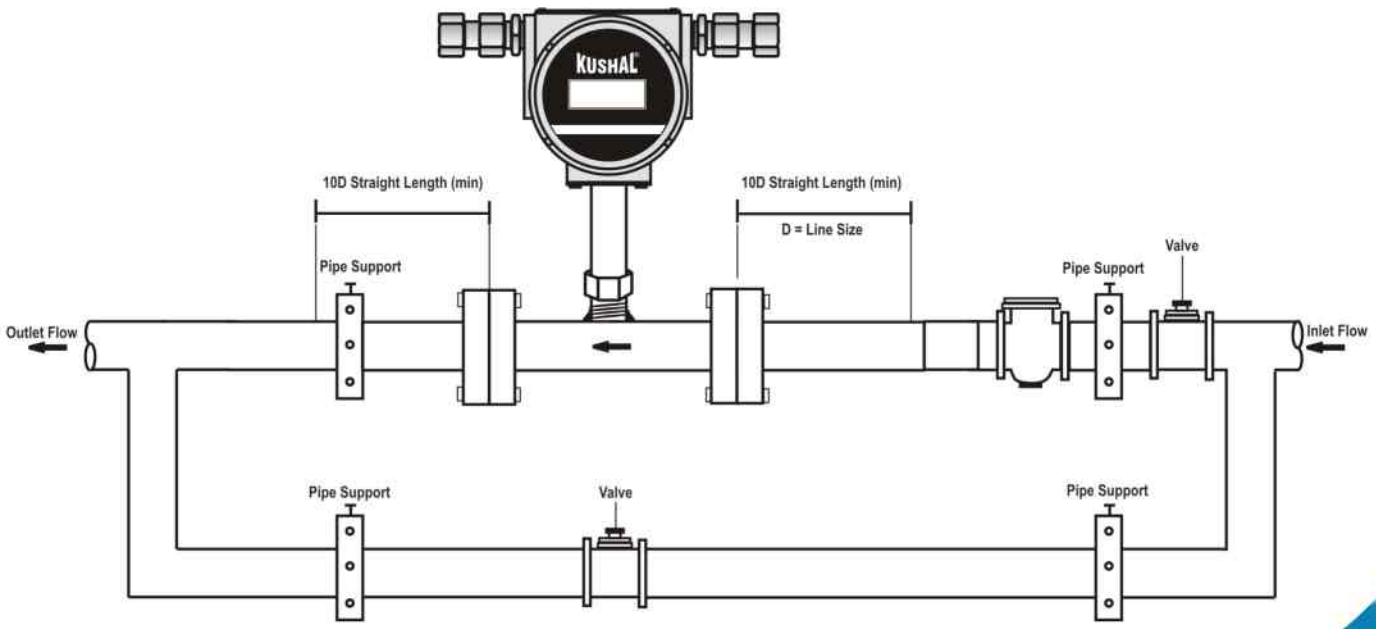


LINE SIZE SELECTOR CHART WITH RESPECT TO FLOW RANGE

Master Size	Flow Range		Flange Details ANSI 150 (B 16.5)				
	m/hr	LPM	D	C	R	DBC	d
15 NB	0.4 to 4.0	6.6 to 66.6	88.9	11.2	35.1	60.5	15.8
20 NB	0.8 to 8.0	13.3 to 133.3	98.6	12.7	42.9	69.9	15.8
25 NB	1.6 to 16.0	26.6 to 266.6	108.0	14.2	50.8	79.3	15.8
40 NB	3.4 to 34.0	56.6 to 566.6	127.0	17.5	73.2	98.6	15.8
50 NB	6.8 to 68.0	113.0 to 1133.0	152.4	19.1	90.2	120.7	15.8
80 NB	13.5 to 135.0	225.0 to 2250.0	190.5	23.9	127.0	152.4	19.1
100 NB	27.0 to 270.0	450.0 to 4500.0	228.6	23.9	157.2	190.5	19.1
150 NB	55.0 to 550.0	916.0 to 9166.00	279.4	25.4	215.9	241.3	22.4

D : OD of Flange R : Dia of Raised Face
No. of Holes : 4 for ½" to 3" and 8 for 4" to 6"
C : Thickness of Flange DBC : Dia of Bolt Circle d : Size of Holes

INSTALLATION DRAWING



KUSHAL®
FLOW METERS

Battery Powered Electromagnetic Meter K-03

Provide wide flow ranges

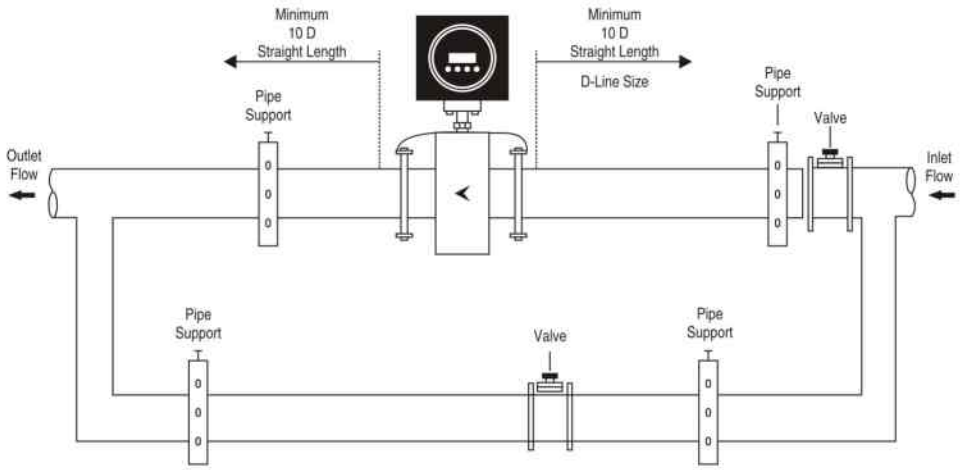
- Outstanding accuracy.
- Operate over wide range of temperature & pressure
- Easy maintenance as no moving parts.
- Pulsed DC coil excitation
- Flame proof, IP-65, IIB CMRI CERTIFIED HOUSING

FLOW RANGE

FLOW RANGE	MINIMUM FLOW	MAXIMUM FLOW
40 mm	0m³/hr	15m³/hr
50 mm	0m³/hr	15³/hr
80mm	0m³/hr	45³/hr
100 mm	0m³/hr	57³/hr
150 mm	0m³/hr	150³/hr

FEATURE

1. MT Pipe Indication : When empty pipe is detected MT Pipe message is Displayed on LCD display for 2 seconds, periodically.
2. Low Battery Indication : When approximately 85% of battery power detected consumed. Red LED on keypad starts blinking.
3. Over Range Display : When Flow Rate or Totaliser value is beyond Limit, OVER message is displayed.
4. Reverse Flow Indication : Reverse Flow is indicated by R with flow value on Display. When Flow is reverse direction totaliser Value is not update.
5. Auto LCD Display : After 10 minutes, from last key board operation.
6. Data Storage : Totaliser is saved at 11.30 p.m. everyday in to EEPROM.
7. Low Flow Setting : Low Flow value set by user is compared with flow rate found lower than low flow value, totaliser is not updated.
8. Unit Conversion : User can set display unit for flow rate & totaliser as per requirement.
9. Communication (Optional) : KUSHAL Brand comes with one RS232 port.



KUSHAL®
FLOW METERS

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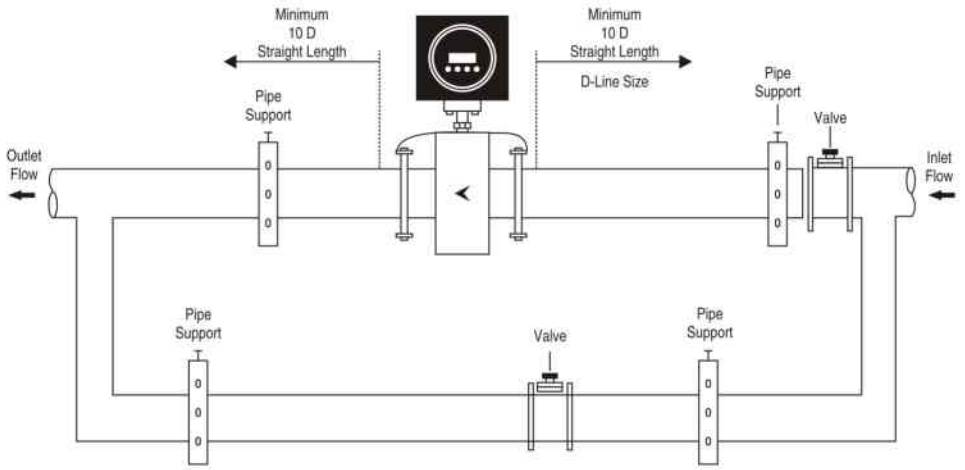


KUSHAL®
FLOW METERS

Insertion Type Electro Magnetic Flow Transmitter K-04

SALIENT FEATURES

- Insertion Type
- Simple & Cost effective construction
- Provide wide flow range.
- Outstanding accuracy.
- Operates over wide range of temperature & pressure
- Easy maintance as no moving parts
- Pulsed DC coil excitation
- Flame-proof, IP-65, IIA, IIB CMRI Certified housing.

DESCRIPTION

K-04 are Insertion type electromagnetic flow transmitter specaillay used for various industrial appliication. Three flow transmitters accurately measures to flow rate of conductive liquids & slurries in closed pipes. Due to simple & rigid design the flow transmitter is an obstruction less & maintenance free instruction in place of conventional mechanical flow measuring device. The use of Pulsed DC techonology offers highest ability & better measuring accuracy in the form of electrical signal 4-20 mA DC linearly proportional to volumetric flow. The instrument is based on FRADAY's law of electromagnetic induction. A magnetic field is generate a voltage that is proportional to the velocity. Corresponding electrical output is provided with respect to measuring voltage.

TECHNICAL SPECIFICATIONS

Media	:	Liquid (Clear)
Viscosity	:	200 cp max
Line Size	:	100 NB to 2000 NB
Excitation	:	Pulsed DC coil
Type of Outputs	:	4 to 20 mA DC
Calibration Range	:	As per requirement (Factory Calibrated)
Accuracy	:	+/-0.5% F.S.
Linearity	:	+/-0.5%
Repeatability	:	+/- 1%
Process Temperature	:	150°C max
Process Pressure	:	10kg/cm²max

Material of construction	:	Electrode SS316, Retractable Assembly
		MS /SS, Wetted Parts - SS316
Power Supply	:	1) 230 V AC, 50hz +/- 10%
		2) 24 V DC, External
Power Consumption	:	< 10VA
Response Time	:	< 100m Sec
Temperature Coefficient	:	Flame proof, IP-65, IIA, IIB CMRI certified
Process Connections	:	ASA 150, 2" Flanged
Mounting	:	Insertion Type
Operating Conditions	:	Temperature 0 to 55°C
		Humidity 5 to 55% non condensing

KUSHAL®
FLOW METERS

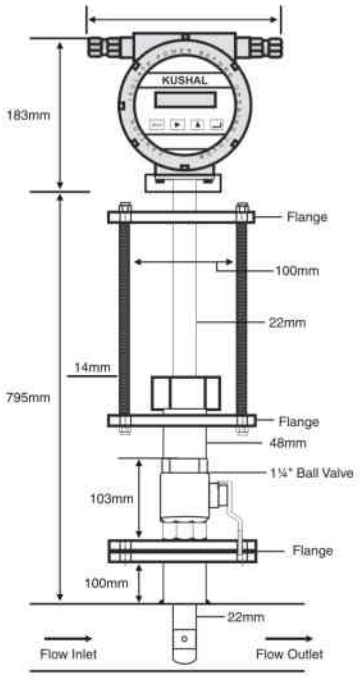
Insertion Type Electro Magnetic Flow Transmitter K-04

Flow range with respect to line size (For Velocity 1 m/s)

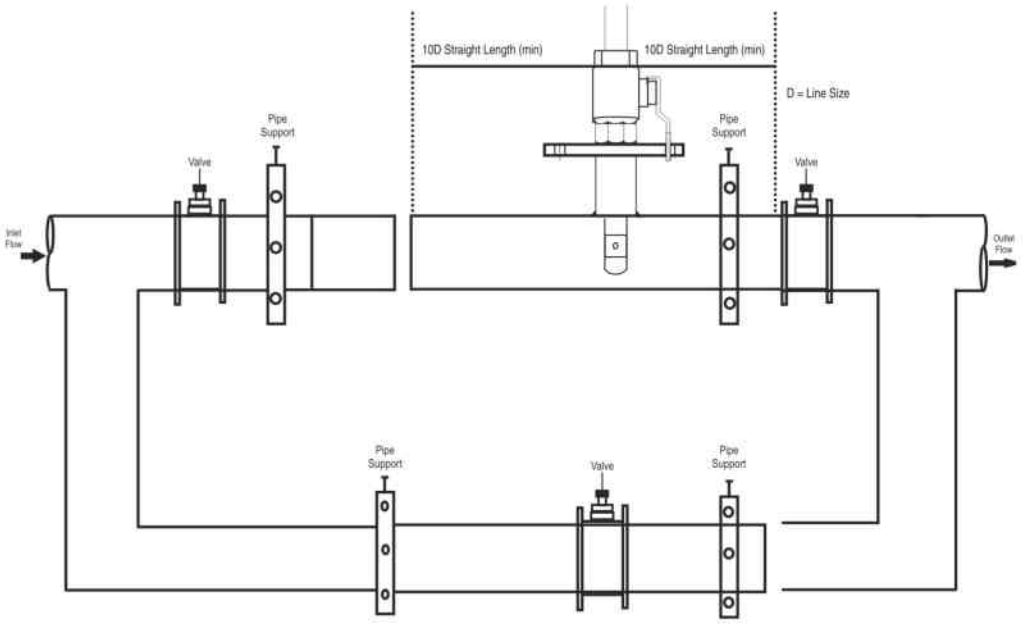
Line Size (mm)	Flow (m^3/hr)	Flow (MLD)	Flow (ft^3/sec)
200	113.10	2.714	1.109
250	176.71	4.241	1.734
300	254.47	6.107	2.496
350	346.36	8.313	3.398
400	452.39	10.857	4.438
500	706.86	16.965	6.934
600	1017.88	14.429	9.985
700	1385.44	33.250	13.251

Line Size (mm)	Flow (m^3/hr)	Flow (MLD)	Flow (ft^3/sec)
800	1809.56	43.429	17.751
900	2290.22	54.965	22.466
1000	2827.43	67.858	27.736
1200	4071.50	97.716	39.940
1400	5541.76	133.002	54.363
1600	7238.22	173.717	71.004
1800	9160.88	219.861	89.865
2000	11309.72	271.433	110.944

ASSEMBLY VIEW



MOUNTING DETAILS



Flow Meters recommended for :

Refineries, Sugar Mills, Oil Petro Chemicals, Textile Mills,
ETP Plant, Papermill, Boiler, Milk Plant, Diesel & Vegetable Oil etc.

KUSHAL®
FLOW METERS

Oil Flow Meter K-05

SALIENT FEATURES

- Simple & cost effective construction.
- Local Display & 8x1 LCD
- Outstanding Accuracy for clean and low velocity application
- Operates over wide ranges of temperature & pressure
- Easy maintenance
- Flame proof IP-68 on demand
- Battery Operated

DESCRIPTION

K-05 flow meters has a unique construction with a special material used for the measuring chamber. Latest electronics technologies are used through out with a multifunction all electronic register. A magnetic element picks up magnetic fields created by magnets embedded in one of the oval rotors in the measuring chamber. By the design, highly sensitive and reliable un-factored and factored pulses are obtained.

TECHNICAL SPECIFICATIONS

Media	:	Oil
Line Size	:	20NB to 50NB
Display	:	8x1 LCD (Flow rate, totaliser, totaliser re-setable)
Transmitter	:	Integral
Type of O/P	:	Pulse
Calibration range	:	As per chart
Accuracy	:	+/- 0.2%
Process Temp	:	Max 120°C
MOC	:	Cast Iron
Power Supply	:	Battery operated (7year battery backup)
Flange	:	ANSI 150
Mounting	:	In line (Horizontal or Vertical)
Operating Temp	:	0 to 55°C

Material of construction	:	Electrode SS316, Retractable Assembly MS /SS, Wetted Parts - SS316
Power Supply	:	1) 230 V AC, 50hz +/- 10% 2) 24 V DC, External
Power Consumption	:	< 10VA
Response Time	:	< 100m Sec
Temperature Coefficient	:	Flame proof, IP-65, IIA, IIB CMRI certified
Process Connections	:	ASA 150, 2" Flanged
Mounting	:	Horizontal / Vertical
Operating Conditions	:	Temperature 0 to 55°C Humidity 5 to 55% non condensing

KUSHAL®
FLOW METERS

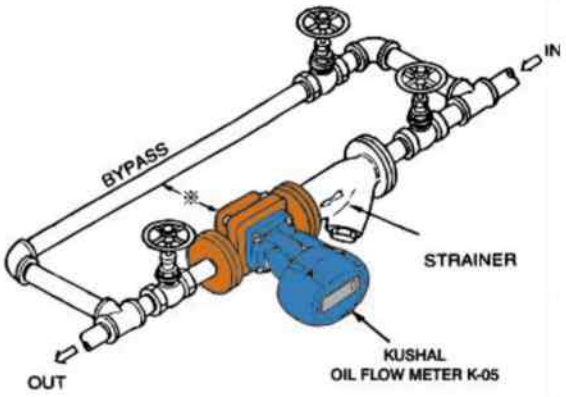
Oil Flow Meter K-05

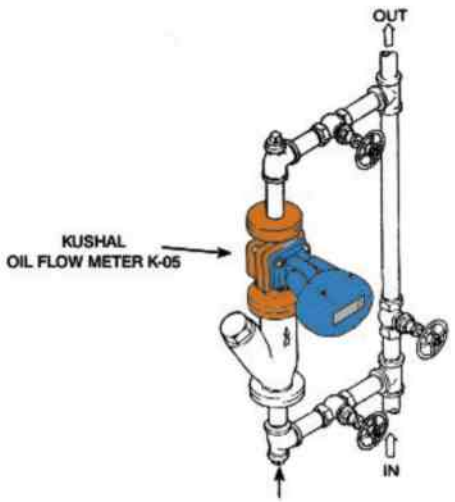
FLOW RANGE

Nominal Dia mm	Oil Service L/H		
	KEROSENE	LIGHT OIL	HEAVY OIL
20	10 to 800	7 to 800	5 to 800
25	300 to 3000	150 to 3800	80 to 3800
40	600 to 5000	300 to 6400	150 to 6400
50	2000 to 20000	1400 to 24000	900 to 24000

Horizontal Line
Standard piping

Marked is the space required for disassembly and inspection secure at least 600 mm





Vertical Line

Install in the bypass side to prevent scales falling from top of the piping assembly

KUSHAL®
FLOW METERS

Capacitance Level Transmitter K-06

SALIENT FEATURES

- 2 wire system.
- Continuous 4 - 20 mA DC output.
- Simple, low cost & reliable.
- Trouble free operation for conductive / non conductive liquids, slurries.
- Flame-proof, IP-65, IIA, IIB, CMRI Certified housing.

DESCRIPTION

K-06 is capacitance type level transmitters. The probe is based on properties of capacitor. Vessel wall & probe forms two electrodes. If vessel is of non conductive material, the probe will be double rod type. The distance between electrode & surface area of electrodes remain unchanged. The variable is the depth of the material being measured which represents the dielectric constant between two electrodes. Air & vacuum have relative dielectric constant as 1 & that of liquids, it is greater than 1. The capacitance of the capacitor therefore depends on how much material lies between the probe & vessel wall i.e. whether the probe is covered with or free from material. The capacitor changes with change in level of the material & provides corresponding 4-20 mA DC continuous output.

TECHNICAL SPECIFICATIONS

Probe Length	:	1) upto 2 mtr. - Rod type 2) From 6 mtr. to 15 mtr. - Rope type
Type of Output	:	1) 4 to 20 mA DC, 2 wire 2) 0 - 5 V DC
Accuracy	:	+/- 1% F. S.
Linearity	:	+/- 1%
Process Temperature	:	100°C max
Process Pressure	:	10 kg/cm2 max
Probe MOC	:	SS 316
Power Supply	:	24 V DC, External
Power Consumption	:	< 6 VA
Response Time	:	< 1000 mSec
Temperature Coefficient	:	+/- 0.1% per 0C
Transmitter Enclosure	:	Flame-proof, IP-65, IIA, IIB, CMRI Certified
Process Connections	:	1) 1" BSP Threaded 2) 1" ASA 150, Flanged
Mounting	:	Top of the tank
Operating Conditions	:	Temperature 0 to 55°C Humidity 5 to 95% non condensing

OPTIONAL

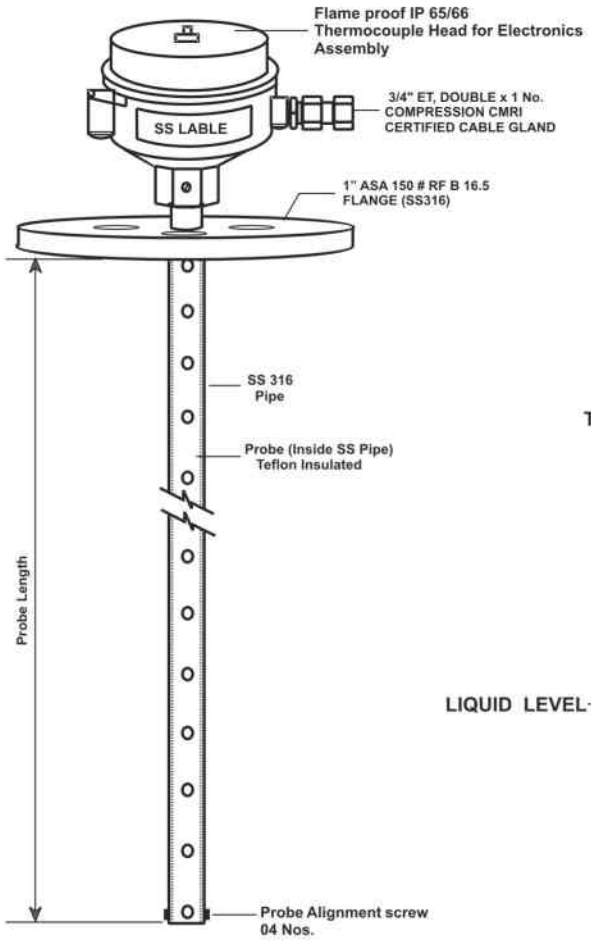
Local Display	:	8 x 1 LCD (4 digit indication for Level)

NOTE : Process temperature & pressure exceeding specified limits, kindly consult with factory

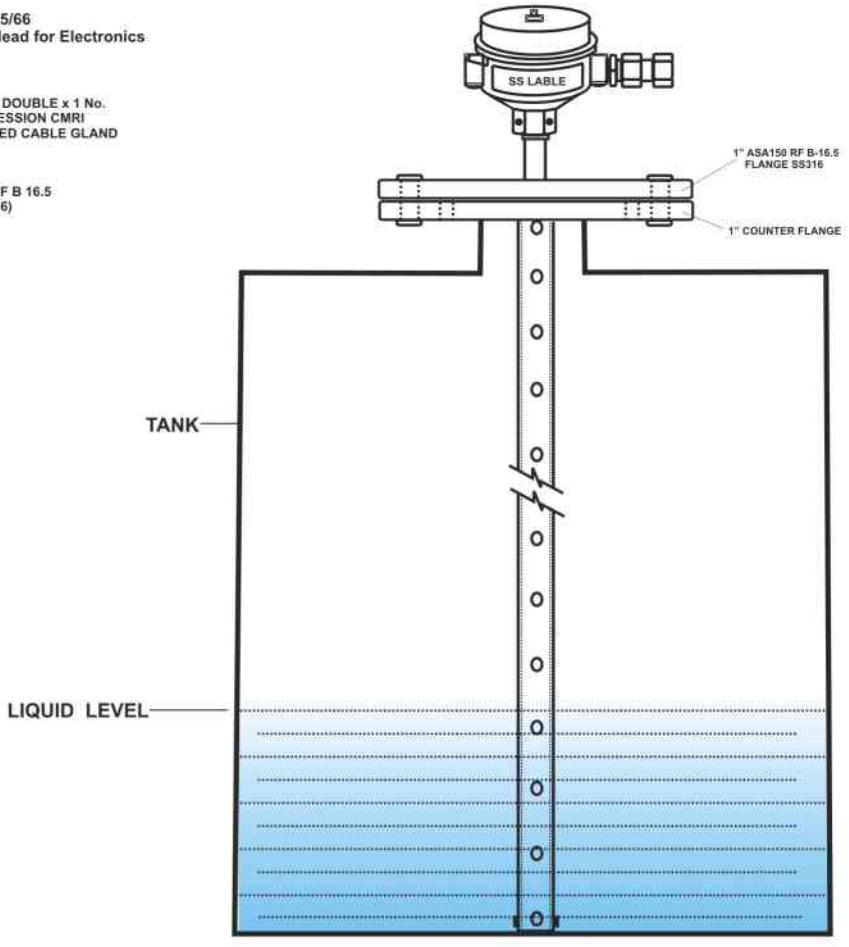
KUSHAL® FLOW METERS

Capacitance Level Transmitter K-06

DIMENSIONAL DETAILS



MOUNTING DETAILS



KUSHAL®
FLOW METERS

Flow Indicator Totaliser K-07

Microcontroller Based with LED

SALIENT FEATURES

- Indication through LED
- Input selectable as linear / square root / 10 point linearisation table.
- Normal / Batch mode for operation.
- Averaging of inputs for turbulent flow.
- Programmable low flow cut-off.
- Software calibration.

DESCRIPTION

K-07 Flow Indicator Totaliser is micro-controller based flow indicator totaliser designed for various industrial applications. These can be used for indication & totalisation of flow. The input can be processed linearly or square rooted or with 10 point linearisation table in case of nonlinear flow as per requirement. The built-in battery back-up is provided for the memory to avoid loss of data in case of power failure. The micro-controller based design provides full flexibility for flow metering applications.

TECHNICAL SPECIFICATIONS

Operating Modes	:	Normal / Batch
Input	:	Linear / Square Rooted / 10 Point Linearisation Table 1) Current (4-20 mA) 2) Voltage (1-5 V / 0-5 V) 3) Frequency (0-10 Khz)
Display	:	8 x 2 LED consists of 4 digit for Flow Rate Indication & 8 digit for Totalised Flow
Range	:	Programmable (0 to 9999)
Accuracy	:	Better than + 0.25% of F. S.
Open Sensor Indication	:	Provided
Power Supply	:	1) 24 V DC, External 2) 90 - 250 V AC, 50 Hz
Power Consumption	:	Less than 10 VA
Temperature Drift	:	< 0.01% of F. S. per 0C change
Response Time	:	< 100 mSec
Isolation	:	1.4 KV between Input, Output & Power Supply
Enclosure	:	1) DIN Std 2) Weather-proof, IP-65 3) Flame-proof, IP-65, IIA, IIB CMRI Certified
Dimensions	:	1) 144 (H) x 72 (W) x 250 (D) in mm approx. for DIN std. enclosure 2) 96 (H) x 96 (W) X 250 (D) in mm approx. for DIN std. enclosure
Mounting	:	Flush of the Panel for DIN std. & wall mount for WP/FLP enclosure
Weight	:	2 kg (Approx.)
Operating Conditions	:	Temperature 0 to 55°C Humidity 5 to 95% non condensing

OPTIONAL

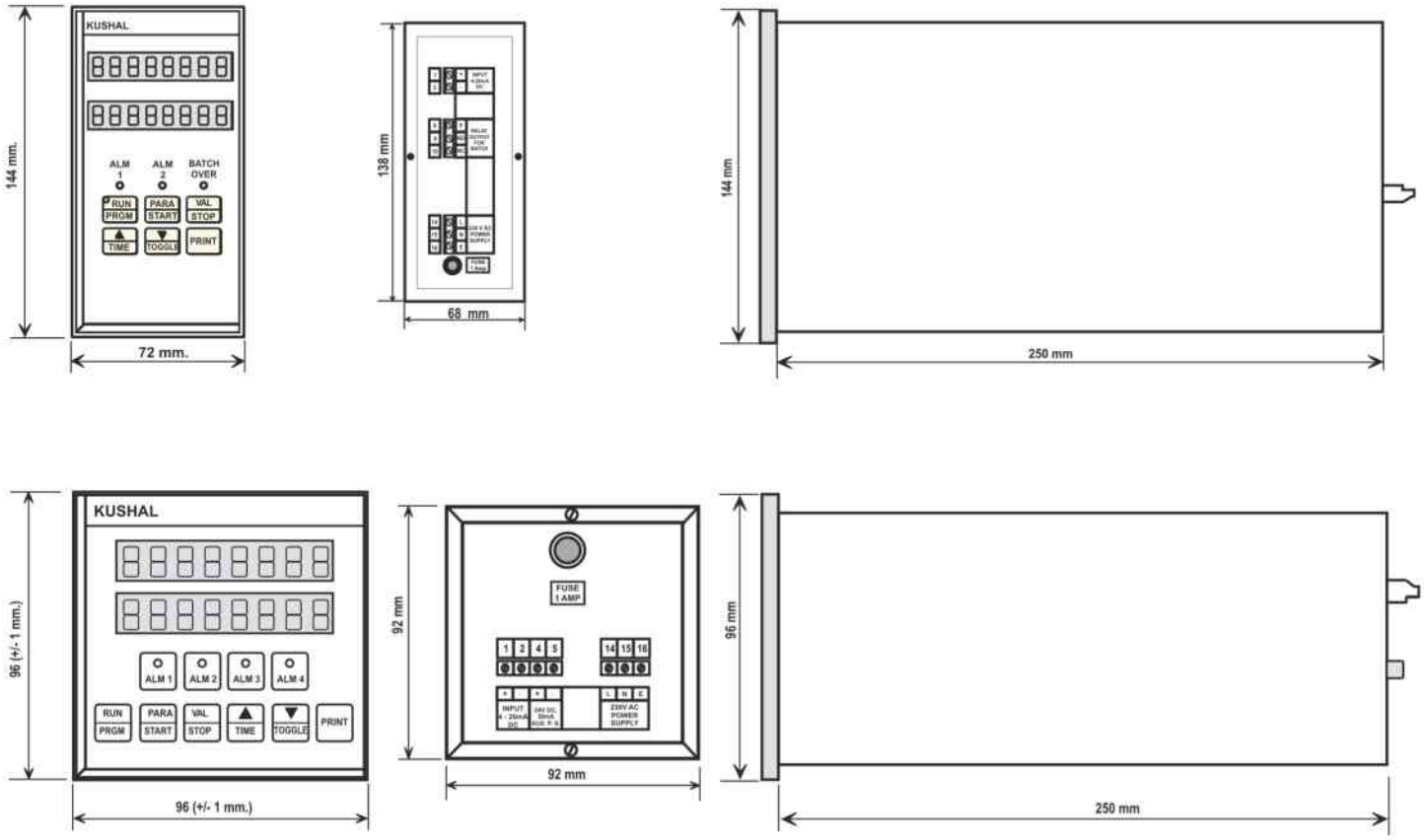
Transmitter Supply	:	24 V DC, 30 mA
Retransmission Output	:	4 - 20 mA / 0-5 V, Isolated
Alarm Output	:	Potential free Relay Contact - 2 nos. (1 c/o, 1 Amp. @ 230 V AC) Configurable for High, Low & Batch
Communication Port	:	RS 485 / RS 232 supporting MODBUS RTU protocol

KUSHAL®
FLOW METERS

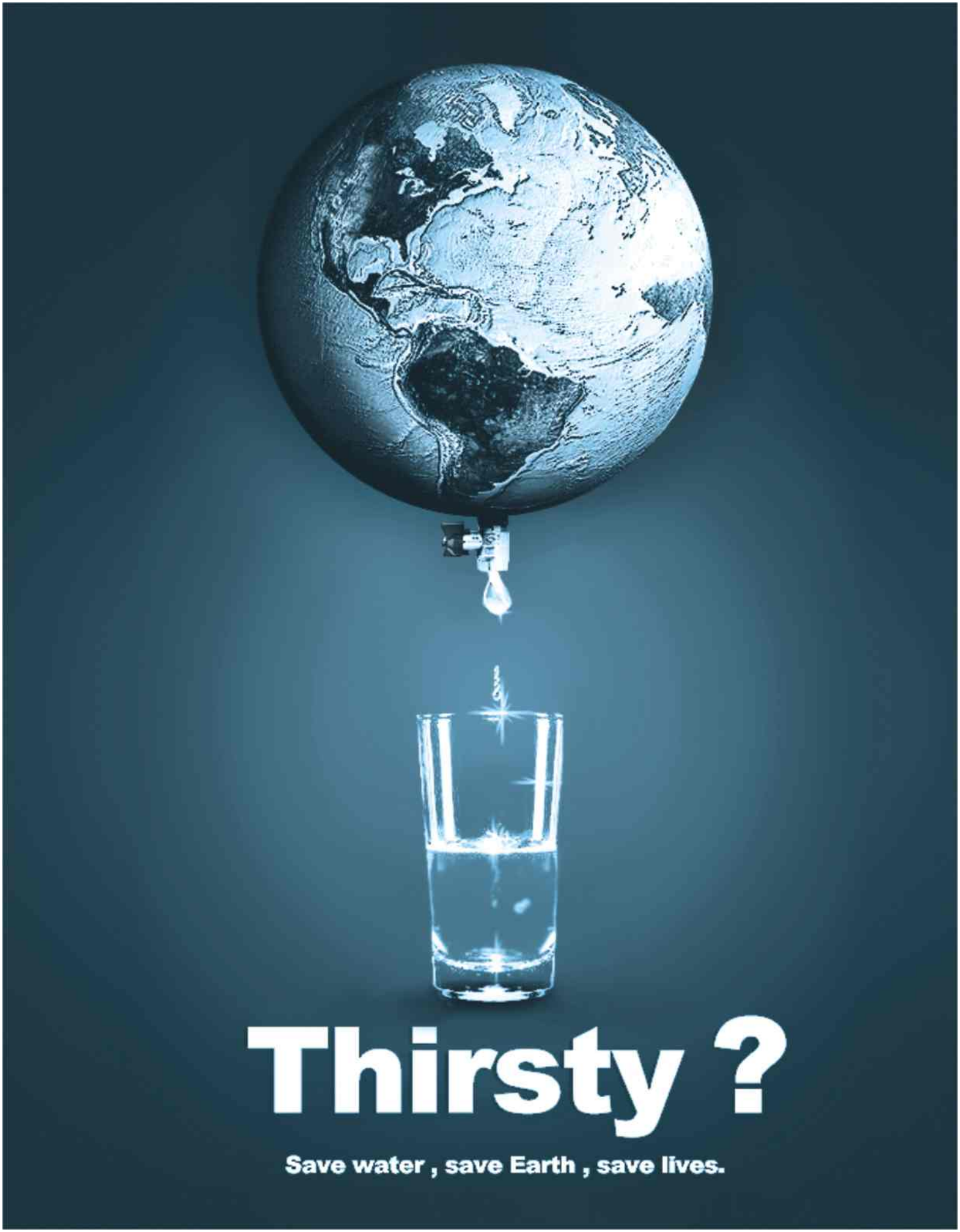
Flow Indicator Totaliser K-07

Microcontroller Based with LED

DIMENSIONAL DETAILS



FLAME PROOF ENCLOSURE


Thirsty ?
Save water , save Earth , save lives.