LEVEL SWITCHES FOR LIQUIDS

PRINCIPLE OF OPERATION

Hycontrol's TF Series and MTF Series are simple yet highly effective vibrating level switch devices for liquids. A piezo-electric crystal is used to force a blade to oscillate at its fundamental frequency (also called natural resonance). When the blades come into contact with the process medium the oscillation is dampened; the electronics sense the change in frequency which causes the unit to switch.

The electronic output options allow the user to switch a load on/off or to interface directly with a PLC. The units can be programmed to sense high or low level and failsafe high or low, with adjustable sensitivity to eliminate false switching.

ADVANTAGES OF VIBRATING PROBES

- No mechanical moving parts to wear
- No maintenance required
- Simple to install - no calibration required
- Self-cleaning
- Unaffected by environmental changes
- Unaffected by agitation, bubbles, foam, vibration, or liquid properties
- Quick response with fast-tripping forks

TF & MTF SERIES

As the damping effect (resistance to vibration) of low viscosity liquids is very small, Hycontrol's TF and MTF devices use two relatively wide blades to sense the presence of liquid levels. These blades can be short in length for minimal intrusion into the vessel, or for use in pipes.

The TF and MTF vibrating fork level switches are suitable for level detection of free flowing liquids. The switches can be used to control filling and emptying functions, as well as generating failsafe alarms to provide either overfill or empty tank protection. The probes can be extended up to a length of 3 metres (10 feet).

Plastic coated versions are recommended in aggressive mediums, and highly polished versions are recommended for abrasive mediums. Hygienic connections are also available.

The PNP/NPN transistor output versions can be connected directly to PLC systems or relay units. The TF and MTF vibrating forks are able to fulfil switching tasks of high-current loads with the help of Switching Isolators.

The probes are unaffected by liquid conductivity, dielectric constant, viscosity, pressure or temperature, and can operate in a process temperature of up to 130°C (266 °F).

The HYC-MTF-SI-E EExia Intrinsically Safe Switching Isolator is designed to serve the EExia rated vibrating forks.

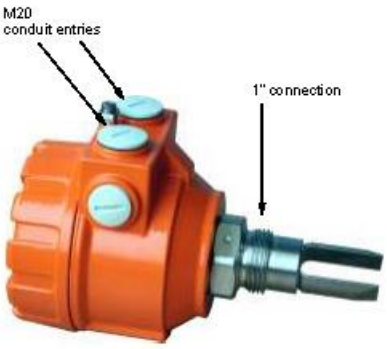
The TF Series for Process Applications

The MTF Low Cost Series

APPLICATIONS FOR LIQUID SWITCHES

- Overfill protection
- High & low level alarms
- Pump protection & control
- Leak detection
- Dry pipe detection
- Hygienic applications
- Wet pipe detection

SWITCHES FOR LIQUID APPLICATIONS



TF SERIES - FOR PROCESS PLANTS

FEATURES

- 1" threaded (BSPP, NPT) connection as standard, extended length options to 3m
- Choice of international flanges and range of hygienic fittings
- Choice of 1 or 2 SPDT relays 250vAC
- ATEX hazardous area approval for explosion proof (EExd) certification pending
- PFA coating option for chemical resistance
- Highly Polished option for hygienic applications
- Continuous operating temperature up to 130°C (266°F) and pressure up to 40 bar (580 psi)

SPECIAL FEATURES

The TF Series has a status indicating red/green LED which can be seen at all times through a lens in the cover. In a high-level application, the LED will illuminate green when the probe is free, and red when the probe is immersed (this function can be reversed for low-level applications).

The LED gives an indication that the switch is functioning correctly and gives a visual indication of the state of the wetside.

A mode switch allows the user to easily select whether the TF Series is to be set to switch from wet to dry (typically low-level alarm) or from dry to wet (typically high-level alarm).

ELECTRONICS

The switch operates on a standard 250vAC 8a SPDT, which provides a relay that changes with liquid presence.

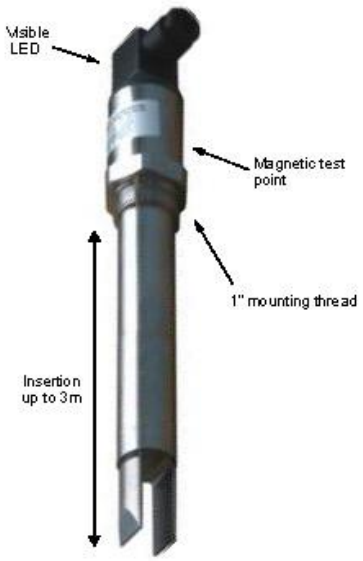
Alternatively the unit can be supplied with two SPDT relays, 1 x 250vAC 8a and 1 x 250vAC 6a. An SPDT relay option with pending ATEX EExd certification is also available.

SHORT FORK TECHNOLOGY

Using Short Fork Technology offers many advantages to the user, enabling the switch to operate in small vessels or pipes with a minimum intrusion profile.

Extensive research has maximised the operational effectiveness of the fork to enable it to operate with aerated liquids and slurries, and to function even when coated with product. In combination with the features and benefits listed above, this makes the TF Series switches an ideal solution for a great many liquid level applications.

SWITCHES FOR LIQUID APPLICATIONS



MTF SERIES LOW COST LEVEL SWITCH

This compact low cost switch has a rugged 316 stainless steel body and forks for use in a wide range of liquids. The MTF Series switches are the simple answer to your level switch needs.

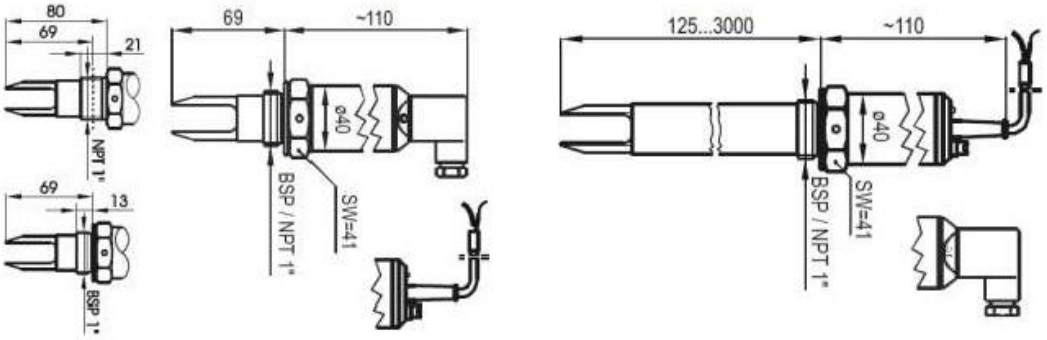
FEATURES

- Low cost
- 1" mounting suitable for pipes or tanks
- Optional hygienic mounting for food industry use
- Small fork size for minimal intrusion into vessel
- Bi-coloured LED shows status of the switch
- 2-wire AC and 3-wire DC versions available
- Magnetic test point

BENEFITS

- Operates on virtually any liquid
- Continuous operating temperature of 130°C (266°F)
- Pressure to 40 bar (580 psi)
- Intrinsically Safe version available for hazardous applications
- Industry standard DIN plug electrical connection for simple installation
- Variety of switching and output options including PNP, DLS etc. (See page 8 for full list of options)
- Solid state PNP output for direct interface to PLCs

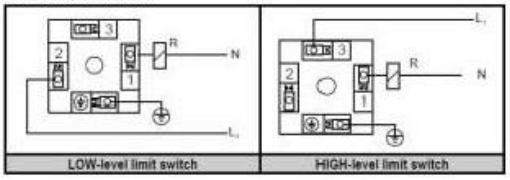
MTF SERIES DIMENSIONS



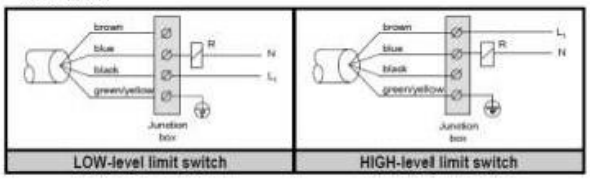
MTF ELECTRICAL CONNECTIONS

MTF 2-wire AC version:

With connector



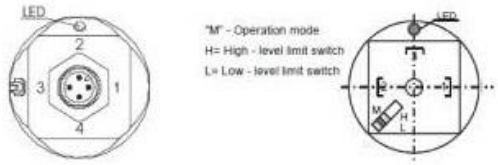
With cable



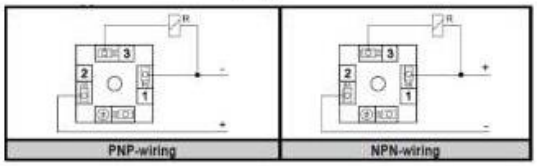
MTF ELECTRICAL CONNECTIONS

MTF 3-wire DC version:

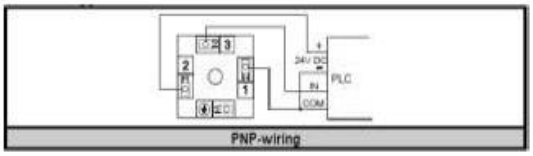
With connector



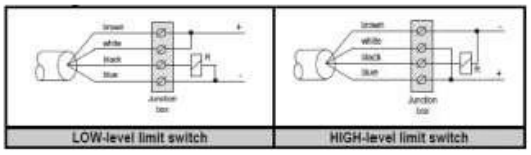
Connector wired for relay application



Connector wired for PLC application



With cable



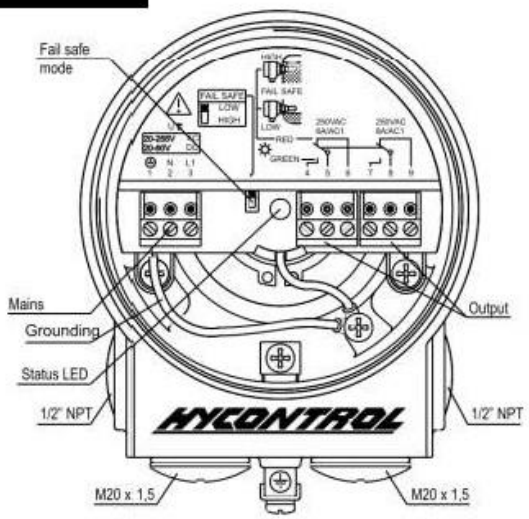
TF SERIES INFORMATION

TF Series connections:

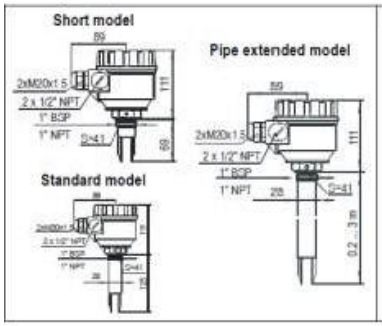
Unscrew the housing cover to reveal the device's controls and connections, as illustrated on the right.

Use 6-12mm outer diameter cables and tighten cable glands as well as housing cover after installation to ensure IP67 sealing.

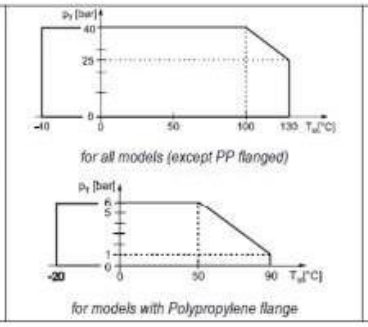
Use outside or inside grounding screw terminal for grounding the unit. Common cables must not be used for AC and DC voltage, as well as for low and mains voltage.



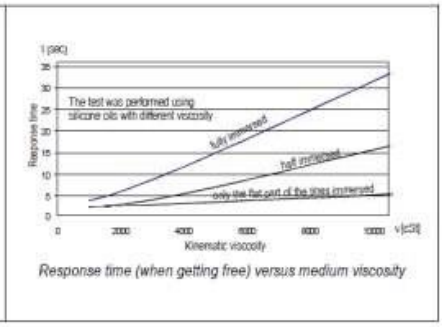
Dimensions



Derating Diagrams



Response Time - Medium Viscosity



TF & MTF SERIES TECHNICAL DATA

	MTF SERIES	TF SERIES
Insertion length	69-3000mm (2.7" – 120")	
Material of wetted parts	DIN 1.4571 (316 Ti) / PFA coating	
Process connection	1" BSPP / NPT as standard, various larger connections available	
Medium temperature	-40°C ... +130°C (-40°F ... +266°F)	
Ambient temperature	-40°C ... +70°C (-40°F ... +158°F) M12 connector: -25°C ... +70°C (-13°F ... +158°F)	-30°C ... +70°C (-22°F ... +158°F)
Medium pressure	Max. 4 MPa (40 bar g / 580 psi g)	
Medium density	> 0.7 kg/dm³ (700 oz/ft3)	
Medium viscosity	=10000 mm²/s (cSt) (0.1 ft²/s)	
Power supply	2-wire DC: 15-29vDC 2-wire AC: 20-255vAC 3-wire DC: 12-55vDC	20-255vAC or 20-60vDC
Power consumption	AC: depending on load DC: < 0.6 W	AC: 1.2-17 VA DC: <3 W
Housing material	DIN 1.4571 (316 Ti)	Epoxy-coated aluminium
Electrical connection	Connector, or 3m/10ft cable (30m/100ft maximum) 2 x 0.5mm² I(AWG20) 4 x 0.75mm² (AWG18) 5 x 0.5mm² (AWG20)	2 x M2021.5 cable gland for Ø6-12mm (0.25 ... 0.5") cable, terminal, for 0.5-1.5mm² (AWG20 ... AWG15) wire cross section
Electrical protection	AC version: Class I. DC version: Class III.	Class I.
Ingress protection	DIN connector type: IP65 M12 con. Type: IP67 Cable Type: IP68	IP67

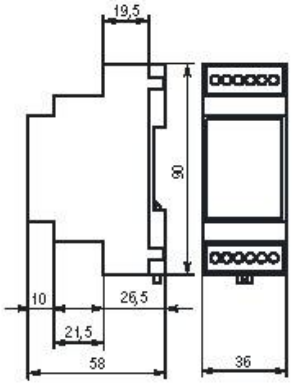
SWITCHING ISOLATOR FOR MTF SERIES

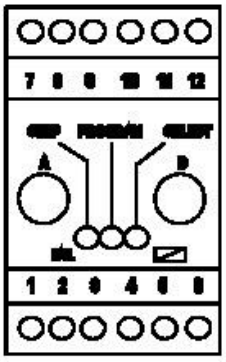
The HYC-PKK-312- series switching isolators are 4-20mA current-controlled devices which switch at a set current depending on the limit, switching difference or window comparator modes selected by programming. They are suitable for powering Hycontrol's MTF Series 2-wire (4-20mA) transducers.

Fault condition monitoring can be switched on or off and the relay can be energised or de-energised when detecting failure as required. Failure may be represented by discontinuity of cable/lower value fault current or short circuit/upper value fault current. The HYC-PKK-312-8 unit is pre-set to monitor current levels of the DC powered, 2-wire EExia MTF probe both in dampened and vibrating modes as well as to control relay output. This isolator must be used in EExia applications.

SWITCHING ISOLATOR DIMENSIONS

Isolator should be mounted on a DIN EN 50022-35 rail.





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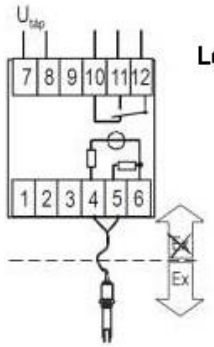
ISOLATOR TECHNICAL DATA

HYC-PKK-312-	1	2	3	4	8
Power / Ex	230vAC	110vAC	24vAC	24vAC/DC	24vDC ATEX EExia IIC
Consumption	<2.7VA			<2.5W	<2.5 VA <2.5W
Switching level	Two values in the range of 1 … 22mA				10.5mA; 12.5mA
IS maximum values	-				U_i <28.4V; I_i <80mA; P_i <0,6W; L_i <4mH; C_i <50nF
Output load capability	U_o = 30V I_{MAX} = 70mA U_{OUTmin} = 16V			U_o?= 24V I_{MAX} = 80mA U_{OUTmin} = 23V	-
Ambient temperature	-25°C … +55°C (-13°F … +131°F)				
Nominal input current range	1 … 22 mA				
Accuracy of switch / threshold level	± 0.1mA				
Discontinuity threshold	3.7mA				
Short circuit threshold	22mA				
Input impedance	10 ohms				
Input overload capability	Maximum 100mA (permanent)				
Damping	0,1s; 1s; 2s; 5s selectable				
Relay output	1 piece SPDT				
Relay rating	250vAC, 8A, AC1				
Relay insulation strength	4000V 50Hz				
Relay electrical / mechanical lifetime	10_5 / 2 x 10_5 switching				
Electrical connection	Maximum 2.5mm² twisted / 4mm² single cable				
Ingress protection	IP20				
Mass	~0.21kg				

ISOLATOR WIRING & SET UP



Left: Wiring for Ex MTF switch

Below: LED output from power up

After 3 s from power up the unit begins to work with the signals as per table of WORKING STATUS.

WORKING STATUS		
LED	**Indication**	**Interpretation**
(SELECT)	GREEN	Relay energised R=1
	RED	Relay de-energised R=0
FAIL (STEP)	SIMULTANOUS RED BLINKING OF BOTH LED	Memory failure, Relay state sustained
	GREEN	No cable fault/No fault current. No cable monitoring
	RED	Cable fault, or: fault current

TF SERIES ORDER CODE

HYCTF- [ ] [ ] [ ] [ ] [ ] [ ]

Code	Type
0	Short Probe 69mm
1	Standard Probe 125mm
2	Extended Probe 0.2m ~ 3.0m

Code	Probe Material & Finish
A	Polished 316 Stainless Steel
B	Highly Polished 316 Stainless Steel
C	PFA Coated 316 Stainless Steel

Code	Process Connection Standard
A	1" BSPP
B	1" NPT
C	1.5" Triclamp (ISO2852)
D	2" Triclamp (ISO2852)
E	DN40 Pipe Coupling (DIN11851)
F	DN50 Pipe Coupling (DIN11851)
G	DN50 PN40/25 Screwed On Stainless Steel Flange
H	DN50 PN40/25 Screwed On PFA Coated Stainless Steel Flange
I	DN50 PN16 Screwed On PP Flange 6 Bar Max -20°C~+90°C
J	2" ANSI RF 150/300/600 Screwed On Stainless Steel Flange
K	2" ANSI RF 150/300/600 Screwed On PFA Coated Stainless Steel Flange
L	2" ANSI FF Screwed On PP Flange 6 Bar Max -20°C~+90°C
M	JIS 40K 50A Screwed On Stainless Steel Flange
N	JIS 40K 50A Screwed On PFA Coated Stainless Steel Flange
O	JIS 10K 50A Screwed On PP Flange 6 Bar Max -20°C~+90°C

Code	Housing
A	IP66 Aluminium Housing 2 x M20 & 0.5"NPT Electrical Entry

Code	Output
A	SPDT Relay 250vAC 8A
B	2 x SPDT Relays - 1 x 250vAC 8A 1 x 250vAC 6A
C	EExd SPDT Relay 250vAC 8A (Pending)

Code	Extended Probe Length
XXXX	Without
0200	200mm – Then increments of 100mm up to 3m
3000	3000mm – Maximum length

MTF SERIES ORDER CODE

HYCMTF- [ ] [ ] [ ] [ ] [ ] [ ] *

Code	Type
0	Short Probe 69mm
1	Standard Probe 125mm
2	Extended Probe 0.2m
3	Extended Probe 0.3m ~ 3.0m

Code	Probe Material & Finish
A	Polished 316 Stainless Steel
B	Highly Polished 316 Stainless Steel
C	PFA Coated 316 Stainless Steel

Code	Process Connection Standard
A	1" BSPP
B	1" NPT
C	1.5" Triclamp (ISO2852)
D	2" Triclamp (ISO2852)
E	DN40 Pipe Coupling (DIN11851)
F	DN50 Pipe Coupling (DIN11851)
G	DN50 PN40/25 Screwed On Stainless Steel Flange
H	DN50 PN40/25 Screwed On PFA Coated Stainless Steel Flange
J	DN50 PN16 Screwed On PP Flange 6 Bar Max -20°C~+90°C
K	2" ANSI RF 150/300/600 Screwed On Stainless Steel Flange
L	2" ANSI RF 150/300/600 Screwed On PFA Coated Stainless Steel Flange
M	2" ANSI FF Screwed On PP Flange 6 Bar Max -20°C~+90°C
N	JIS 40K 50A Screwed On Stainless Steel Flange
P	JIS 10K 50A Screwed On PFA Coated Stainless Steel Flange
R	JIS 10K 50A Screwed On PP Flange 6 Bar Max -20°C~+90°C

Code	Output & Approval
A	2 Wire AC DIN Connector (DLS)
B	2 Wire AC 3m Cable (DLS)
C	3 Wire DC DIN Connector (PNP)
D	3 Wire DC 3m Cable (PNP)
E	2 Wire DC DIN Connector (9/14mA)
F	2 Wire DC 3m Cable (9/14mA)
G	2 Wire Ex ia DIN Connector *(Must be used with isolating barrier)*
H	2 Wire Ex ia 3m Cable *(Must be used with isolating barrier)*
J	2 Wire DC M12 Connector (9/14mA)
K	2 Wire Ex ia M12 Connector *(Must be used with isolating barrier)*
L	3 Wire DC M12 Connector (PNP)

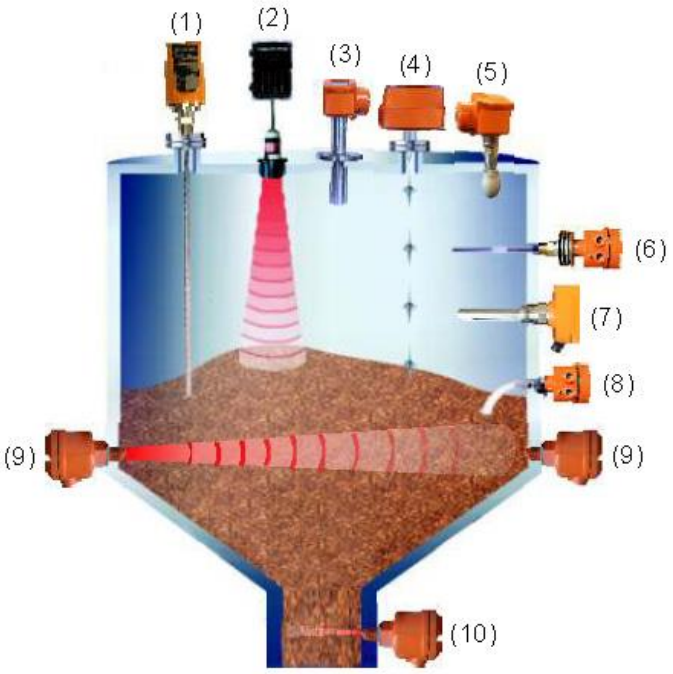
Code	Electrical Connection Cable Length
03	3m Standard – Then increments of 1m up to 30m
30	30m – Maximum Length

Code	Probe Length
0069	69mm
0125	125mm
0200	200mm – Then increments of 100mm up to 3m
3000	3000mm – Maximum length

*** NB - Order code for an Ex version should end in Ex**

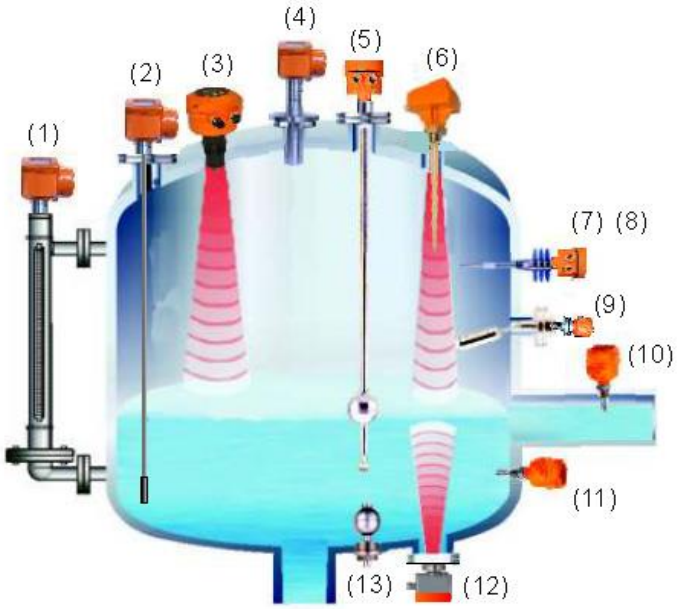
Product Range For Solids :-

(1) TDR Radar For Solids
(2) Ultrasonic, 'Through Air'
(2) 2 Wire Ultrasonic Transmitter
(3) FMCW 2 Wire Radar
(4) Continuous 'Servo' Level Indicator
(5) FMCW 2 Wire Radar
(6) Capacitance Level Switch
(7) Vibrating Probe Level Switch
(8) Rotating Paddle Level switch
(9) Microwave Level Switch
(10) Doppler Flow Switch



Product Range For Liquids :-

(1) By-Pass Level Indicator With Radar
(2) TDR Radar For Liquids
(3) 2 Wire Ultrasonic Transmitter
(4) FMCW 'Horn' Radar 2 Wire
(5) Magnetic Float Switches
(6) FMCW 2 Wire Radar
(7) Capacitance Level Switch
(8) RF Admittance Level Switch
(9) Side Mounting 316 SS Float Switch
(10) Tuning Fork Level Switch
(11) Tuning Fork Level Switch
(12) Ultrasonics 'Through Wall'
(13) Mini Magnetic Float Level Switch



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