



VIBRATING LEVEL SWITCHES FOR LIQUIDS



HYCONTROL

LEVEL SWITCHES FOR LIQUIDS

Operators require reliable point level switching in liquid processes the world over. **Hycontrol's TF and MTF Series** are simple yet highly effective vibrating level switch devices for liquids. A piezo-electric crystal forces a blade to oscillate at its fundamental frequency (natural resonance). When the blades come into contact with the process medium, it dampens the oscillation; 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 interface directly with a PLC. In addition, the units can be programmed to sense high or low levels 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 Vibrating Probes

The damping effect (resistance to vibration) of low-viscosity liquids is low. To compensate for this, Hycontrol's TF and MTF devices use two relatively wide vibrating blades to detect the presence of liquid levels. The blades can be very short, allowing minimal intrusion into the vessel or for use in pipes.

Both TF and MTF vibrating fork level switches are suitable for point level detection of free-flowing liquids. In addition, the switches can control filling and emptying functions and provide failsafe alarms for either overflow or empty tank protection. The probes can be extended up to a length of 3 metres (10 feet).

Hucontrol recommends plastic coated versions in aggressive media and highly polished versions for abrasive media. Hygienic connections are also available.

Users can connect the PNP/NPN transistor output versions directly to PLC systems or relay units. In addition, the TF and MTF vibrating forks can fulfil switching tasks of high-current loads with the help of switching isolators.

These probes are unaffected by factors such as liquid conductivity, dielectric constant, viscosity, pressure or temperature. They can operate at a process temperature of up to 130 °C (266 °F).

Additionally, the HYC-PKK-312-8Ex Ex ia intrinsically safe switching isolator is available, designed for use with MTF Series Ex ia-rated vibrating forks.



Applications for Liquid Switches

- ◆ **Overflow protection**
- ◆ **High- & low-level alarms**
- ◆ **Pump protection and control**
- ◆ **Leak detection**
- ◆ **Dry pipe detection**
- ◆ **Hygienic applications**
- ◆ **Wet pipe detection**

TF SERIES - FOR PROCESS PLANTS

- ◆ **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 250 VAC**
- ◆ **Plastic (ECTFE/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)**

Features and Benefits

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 immersed. For low-level applications, users can also reverse this function.

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

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

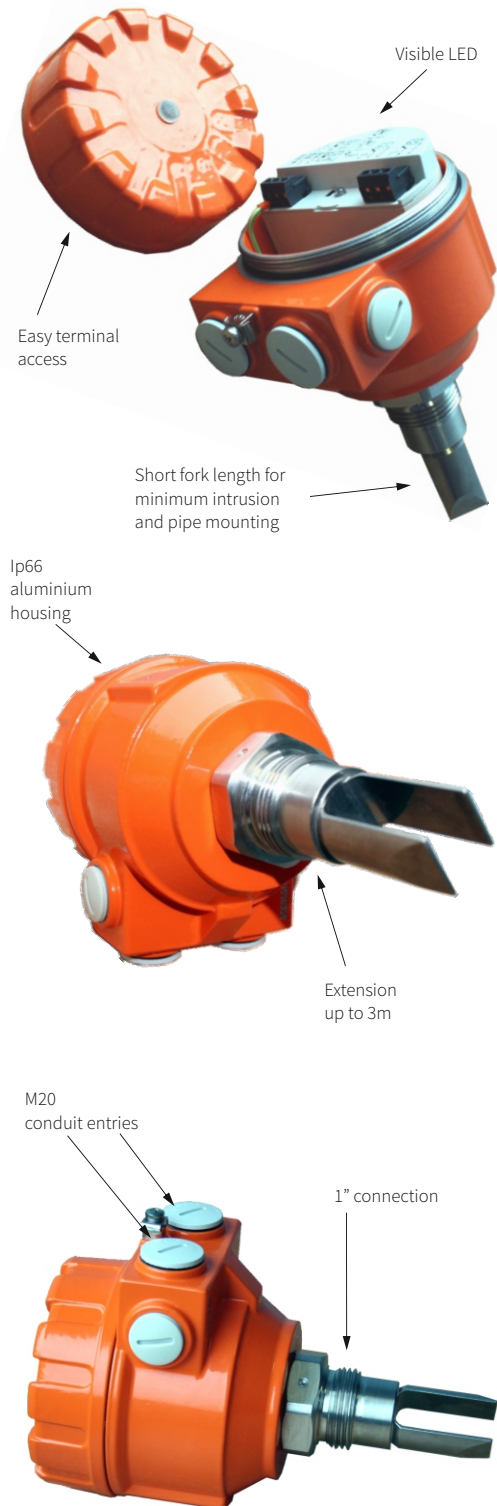
Electronics

The switch operates on a standard 250 V AC 8A SPDT, which provides a relay that changes with liquid presence. Alternatively, the unit can be supplied with two SPDT relays, 1 x 250 V AC 8A and 1 x 250 V AC 6A.

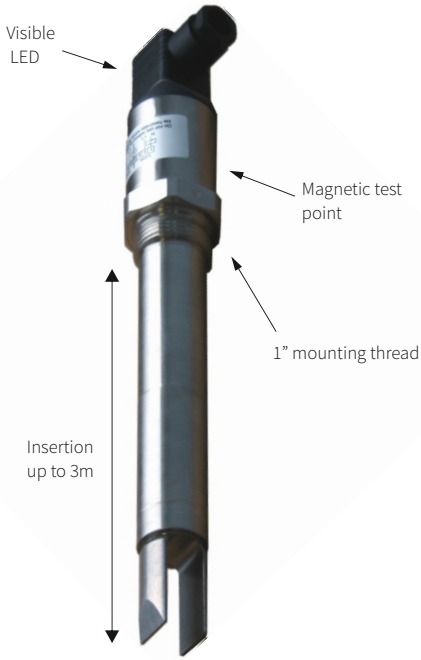
Short Fork Technology

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, enabling it to operate with aerated liquids and slurries and to function even when coated with the product. In combination with the features and benefits listed above, this makes the TF Series switches an ideal solution for many liquid level 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. MTF Series switches are the simple answer to your level switch needs.

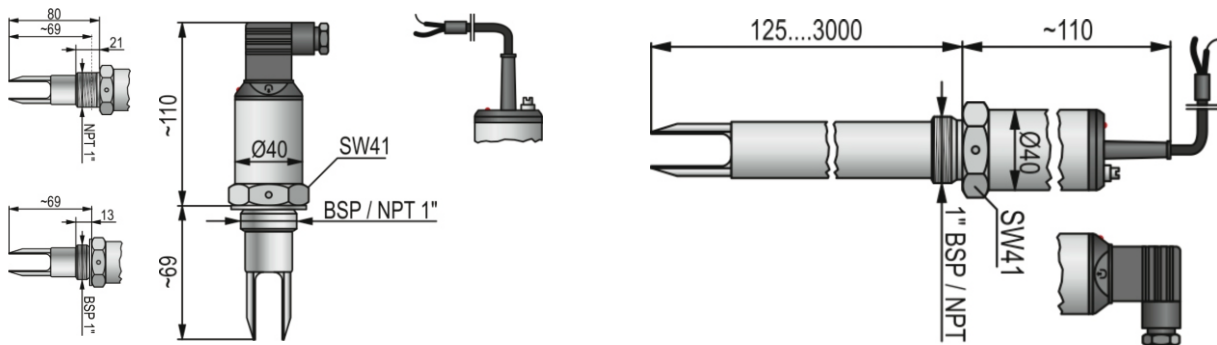
Benefits

- ◆ 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 a full list of options)
- ◆ Solid-state PNP output for direct interface to PLCs

Product Features

- ◆ Low cost
- ◆ 1" mounting suitable for pipes or tanks
- ◆ Magnetic test point
- ◆ 2-wire DC, 2-wire AC and 3-wire DC versions available
- ◆ Optional hygienic mounting for food industry use
- ◆ Small fork size for minimal intrusion into vessel
- ◆ Bi-coloured LED shows status of the switch
- ◆ Plastic (ECTFE/PCA) coating option for chemical resistance
- ◆ ATEX versions available

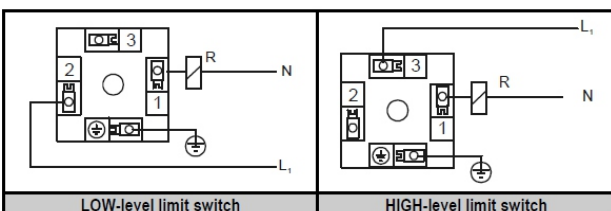
MTF Series Dimensions



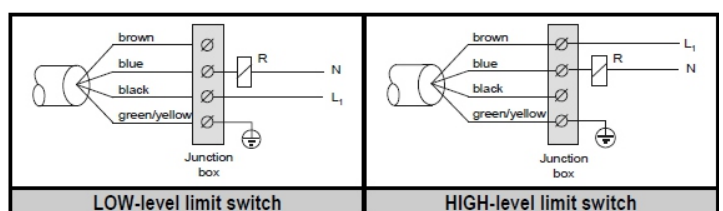
MTF Series Electrical Connections

MTF 2-wire AC version:

With connector



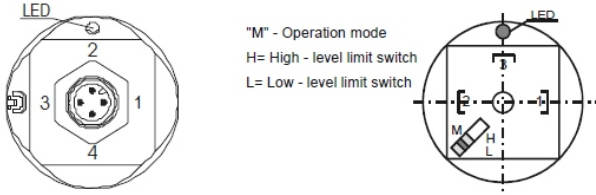
With cable



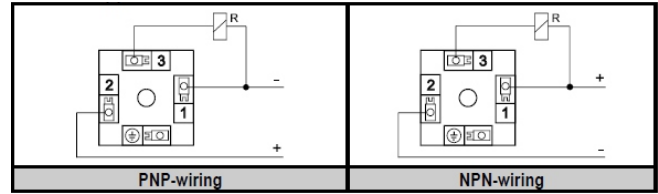
MTF SERIES ELECTRICAL CONNECTIONS (CONTINUED)

MTF 3-wire DC version:

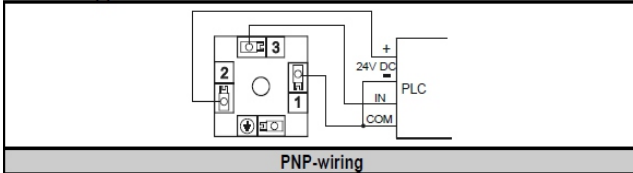
With connector



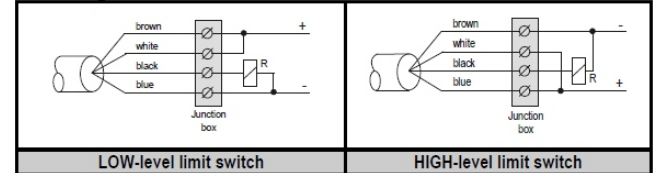
Connector wired for relay application



Connector wired for PLC application



With cable

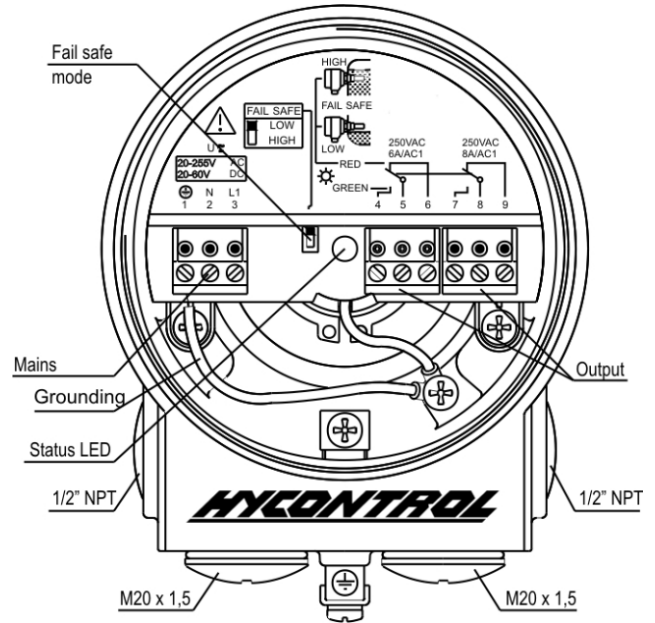


TF Series Connections and Information

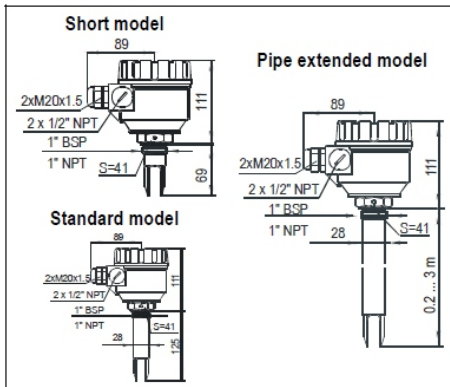
The TF Series vibrating probes are designed for easy wiring and fast installations. First, unscrew the top housing cover to reveal the device's controls and connections, **as illustrated in the diagram on the right.**

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

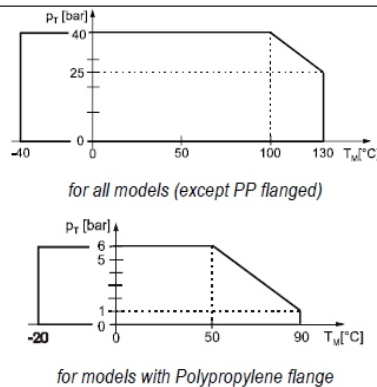
Use either the outside or inside grounding screw terminal for grounding the unit. You must not use common cables for AC and DC voltage, as well as for low and mains voltage.



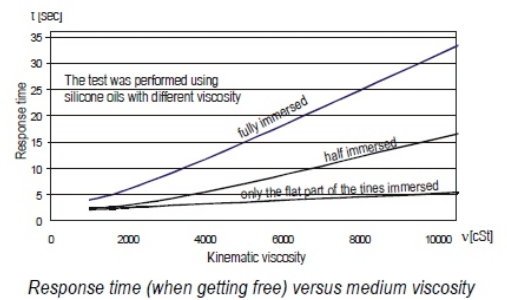
Dimensions



Derating diagrams





Response time - medium viscosity



TF & MTF SERIES TECHNICAL DATA

	MTF SERIES	TF SERIES
Insertion length	69-3000 mm (2.7" - 120")	
Material of wetted parts	DIN 1.4571 (316 Ti) / Plastic (ECTFE/PCA) coating	
Process connection	1" BSPP / NPT as standard, various larger connections available	
Medium temperature	-40°C ... +130°C (-40°F ... +266 °F)	
Ambient temperature	-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/dm ³ (700 oz/ft ³)	
Medium viscosity	≤10000 mm ² /s (cSt) (0.1 ft ² /s)	
Power supply	2-wire DC: 15 -29 V DC 2-wire AC: 20 -255 V AC 3-wire DC: 12 -55 V DC	20-255 V AC or 20 -60 V DC
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 3 m/10 ft cable (30 m/100 ft maximum) 2 x 0.5 mm ² (AWG20) 4 x 0.75 mm ² (AWG18) 5 x 0.5 mm ² (AWG20)	2 x M2021.5 cable gland for Ø6 -12 mm (0.25 ... 0.5") cable, terminal, for 0.5 -1.5mm ² (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 - Technical Data

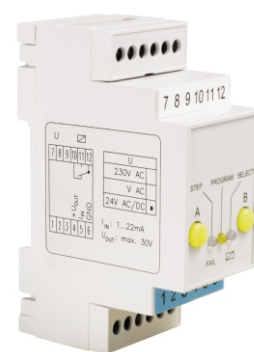
	HYC-PKK-312-8Ex
Power / Ex	24 V DC ATEX  
Consumption	<2.5 VA <2.5 W
Switching level	10.5 mA; 12.5 mA
IS maximum values	U _o = 28.4 V; I _o = 80 mA; P _o = 0,6 W; L _o = 4 mH; C _o = 50 nF
Output load capability	-
Ambient temperature	-25°C ... +55°C (-13°F ... +131°F)
Nominal input current range	1 ... 22 mA
Accuracy of switch / threshold level	± 0.1 mA
Discontinuity threshold	3.7 mA
Short circuit threshold	22 mA
Input impedance	10 ohms
Input overload capability	Maximum 100 mA (continuous)
Damping	0.1s; 1s; 2s; 5s selectable
Relay output	1 piece SPDT
Relay rating	250 V AC, 8A, AC 1
Relay insulation strength	4000V 50Hz
Relay electrical / mechanical lifetime	10 ⁵ / 2 x 10 ⁶ switching
Electrical connection	Maximum 2.5 mm ² twisted / 4 mm ² single cable
Ingress protection	IP20
Mass	≈0.21 kg



SWITCHING ISOLATOR FOR MTF SERIES

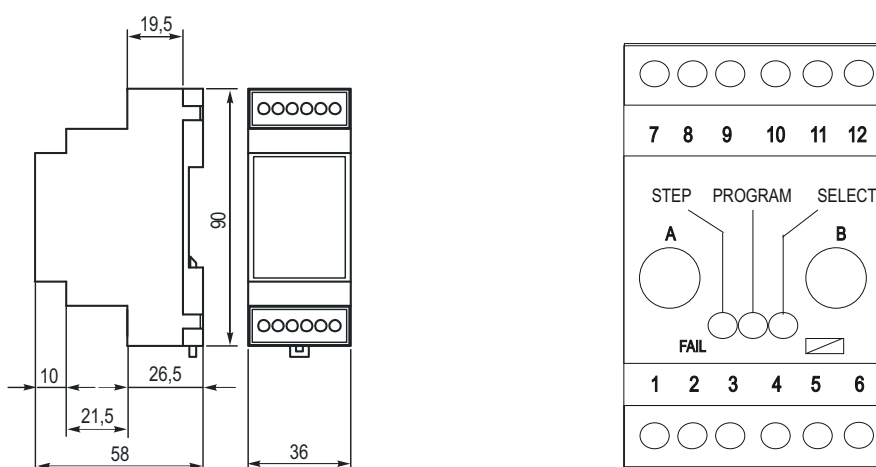
The HYC-PKK-312- series switching isolators are 4-20 mA current-controlled devices that change at a set current depending on the limit, switching difference or window comparator modes selected by programming. They are suitable for powering Hycontrol's MTF Series 2-wire (4-20 mA) transducers.

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

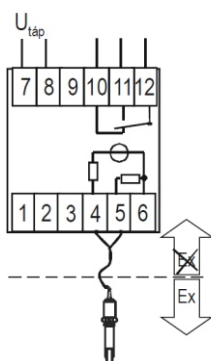


Switching Isolator Dimensions

Mount the isolator on a DIN EN 50022-35 rail.



Isolator Wiring and Set-Up



Left: Wiring for Ex MTF switch

Right: LED output from power up

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

Ex Markings

TYPE	HYCMTF -***G*****Ex, HYCMTF -***K*****Ex	HYCMTF -***H*****Ex
Ex marking (ATEX) (HYCMTF -*A***** Ex, HYCMTF -*B***** Ex)	II 1 G Ex ia IIC T6...T4 Ga	
Ex marking (ATEX) (HYCMTF -*D***** Ex)	II 1 G Ex ia IIB T6...T4 Ga	
Intrinsically safe data (Ex ia IIB and Ex ia IIC)	U _i = 29V; I _i = 100mA; P _i = 1.4W; C _i = 7nF; L _i = 0mH	U _i = 29V; I _i = 100mA; P _i = 1.4W; C _i = 15nF; L _i = 0mH

Please note: Ex ia MTF vibrating probes should be powered using the HYC-PKK-312-8Ex switching isolator.



ORDER CODES

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						
D	Plastic (ECTFE/PFA) Coated 316 Stainless Steel						
Code	Extended Probe Length						
XXXX	Without						
0200	200mm – Then increments of 100mm up to 3m						
3000	3000mm – Maximum length						
Code	Output						
A	SPDT Relay 250vAC 8A						
B	2 x SPDT Relays - 1 x 250vAC 8A 1 x 250vAC 6A						
Code	Housing						
A	IP66 Aluminium Housing 2 x M20 & 0.5"NPT Electrical Entry						
Code	Process Connection Standard	Code	Process Connection Standard				
A	1" BSPP	H	DN50 PN40/25 Screwed-On PFA Coated Stainless Steel Flange				
B	1" NPT	I	DN50 PN16 Screwed-On PP Flange 6 Bar Max -20°C~+90°C				
S	1½" BSPP (G 1½)	J	2" ANSI RF 150/300/600 Screwed On Stainless Steel Flange				
T	1½" NPT	K	2" ANSI RF 150/300/600 Screwed On PFA Coated Stainless Steel Flange				
C	1.5" Triclamp (ISO2852)	L	2" ANSI FF Screwed-On PP Flange 6 Bar Max -20°C~+90°C				
D	2" Triclamp (ISO2852)	M	JIS 40K 50A Screwed-On Stainless Steel Flange				
E	DN40 Pipe Coupling (DIN11851)	N	JIS 40K 50A Screwed-On PFA Coated Stainless Steel Flange				
F	DN50 Pipe Coupling (DIN11851)	O	JIS 10K 50A Screwed-On PP Flange 6 Bar Max -20°C~+90°C				
G	DN50 PN40/25 Screwed-On Stainless Steel Flange						

TF 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							
D	Plastic (ECTFE/PFA) Coated 316 Stainless Steel							
Code	Probe Length							
0069	69mm							
0125	125mm							
0200	200mm – Then increments of 100mm up to 3m							
3000	3000mm – Maximum length							
Code	Electrical Connection Cable Length¹							
03	3m Standard – Then increments of 1m up to 30m							
30	30m – Maximum Length							
XX	No cable fitted							
¹ Maximum 3m for Ex types								
Code	Process Connection Standard	Code	Output & Approval					
A	1" BSPP (G 1)	A	2 Wire AC DIN Connector (DLS)					
B	1" NPT	B	2 Wire AC 3m Cable (DLS)					
S	1½" BSPP (G 1½)	C	3 Wire DC DIN Connector (PNP)					
T	1½" NPT	D	3 Wire DC 3m Cable (PNP)					
C	1.5" Triclamp (ISO2852)	E	2 Wire DC DIN Connector (9/14mA)					
D	2" Triclamp (ISO2852)	F	2 Wire DC 3m Cable (9/14mA)					
E	DN40 Pipe Coupling (DIN11851)	G	2 Wire ATEX Ex ia DIN Connector (<i>Must be used with isolating barrier</i>)					
F	DN50 Pipe Coupling (DIN11851)	H	2 Wire ATEX Ex ia 3m Cable (<i>Must be used with isolating barrier</i>)					
G	DN50 PN40/25 Screwed On Stainless Steel Flange	J	2 Wire DC M12 Connector (9/14mA)					
H	DN50 PN40/25 Screwed On PFA Coated Stainless Steel Flange	K	2 Wire ATEX Ex ia M12 Connector (<i>Must be used with isolating barrier</i>)					
J	DN50 PN16 Screwed On PP Flange 6 Bar Max -20°C~+90°C	L	3 Wire DC M12 Connector (PNP)					
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							

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



HYCONTROL - THE COMPLETE LEVEL SOLUTION

Hycontrol has been at the forefront of level control and measurement technology for over thirty-five years, providing practical solutions for diverse applications across many industries ranging from quarrying to food, nuclear power to chemicals, and animal feed to waste recycling. From our manufacturing base in Redditch, Worcestershire, we have overseen thousands of applications across the UK and around the world.

At Hycontrol, we pride ourselves on providing a 'complete solution' service to our UK customers. We provide a turnkey solution for level equipment requirements, with the experience and skill to design, manufacture, install, and maintain bespoke measurement and control systems crafted to suit each customer's particular needs.

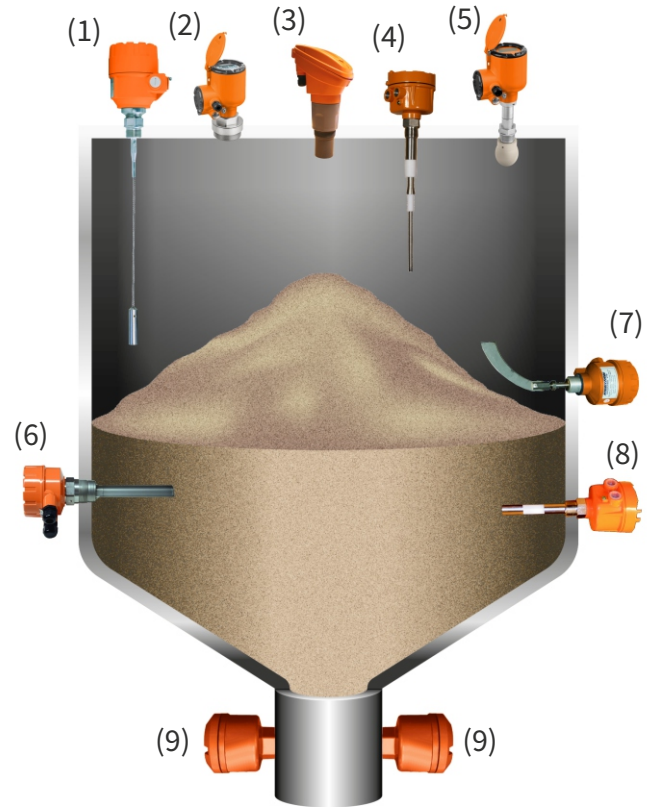
We understand the consequences of inaccurate or unreliable level systems. Therefore each Hycontrol installation is tailored precisely to match your application. Our goal is simple: to provide the best-engineered solution - without compromise.

With one of the widest ranges of level measurement technologies on the market, including award-winning silo pressure safety systems and a patented range of foam detection and control equipment, backed up by a team of highly experienced engineers and technicians, Hycontrol is a leading force in the manufacture and supply of advanced level solutions.



Product Range for Solids:

- (1) TDR radar
- (2) 80 GHz FMCW radar
- (3) 2-wire ultrasonic transmitter
- (4) RF admittance level switch
- (5) 24 GHz FMCW radar
- (6) Vibrating level probe
- (7) Rotary paddle switch
- (8) Capacitance level switch
- (9) Microwave flow & blockage switch



Product Range for Liquids:

- (1) Bypass level indicator
- (2) 80 GHz FMCW radar
- (3) Foam control system
- (4) 24 GHz FMCW radar
- (5) 2-wire ultrasonic transmitter
- (6) TDR radar
- (7) Capacitance level switch
- (8) RF admittance level switch
- (9) Tuning fork vibrating level switch

