

**HYCONTROL**  
LEVEL MEASUREMENT SOLUTIONS



**VIBRATING LEVEL SWITCHES  
FOR LIQUIDS**

# LEVEL SWITCHES FOR LIQUIDS

Operators require reliable point level switching in liquid processes the world over. **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 VIBRATING PROBES

As the damping effect (resistance to vibration) of low-viscosity liquids is very low, 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. The switches can be used to control filling and emptying functions, as well as providing failsafe alarms for either overflow 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 media, and highly polished versions are recommended for abrasive media. 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 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 in a process temperature of up to 130°C (266°F).

Additionally, the HYC-MTF-SI-E EExia intrinsically safe switching isolator is available, designed for use with EExia-rated vibrating forks.

The TF Series for process applications

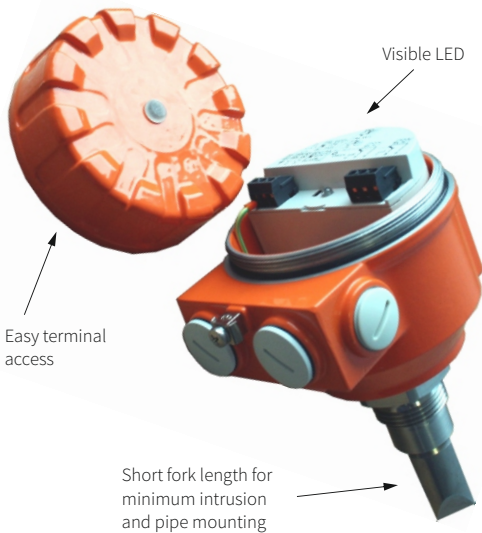


The MTF Series low-cost probe

## APPLICATIONS FOR LIQUID SWITCHES

- ◆ **Overfill 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
- ◆ 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)

## 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 the probe is immersed. For low-level applications, this function can also be reversed.

The LED indicates not only that the switch is functioning correctly, but also 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 for a low-level alarm) or from dry to wet (typically for a high-level alarm).

## ELECTRONICS

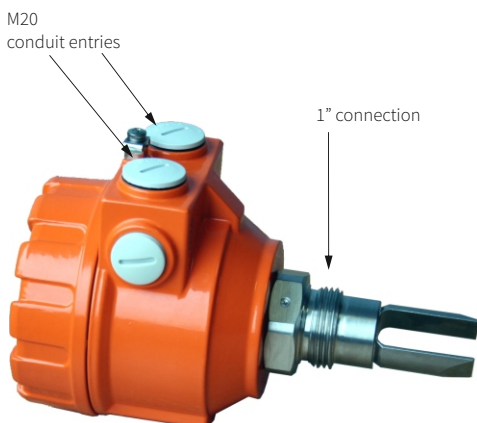
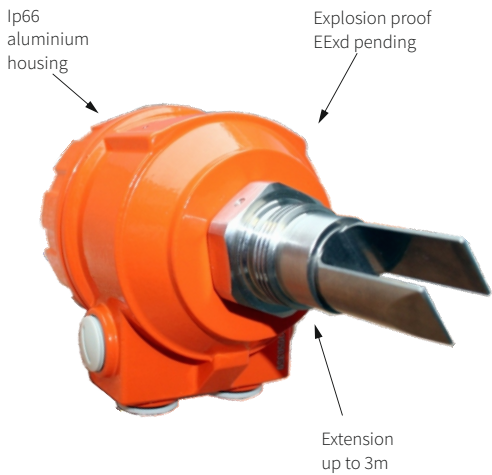
The switch operates on a standard 250 V AC 8a SPDT, which provides a relay that changes with liquid presence.

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

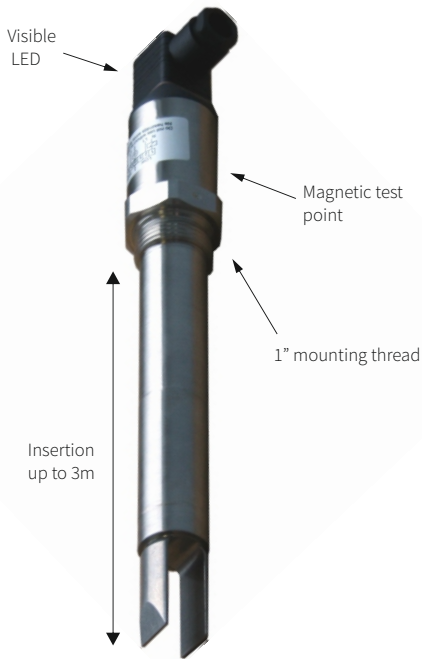
## SHORT FORK TECHNOLOGY

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, enabling 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.



# 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.

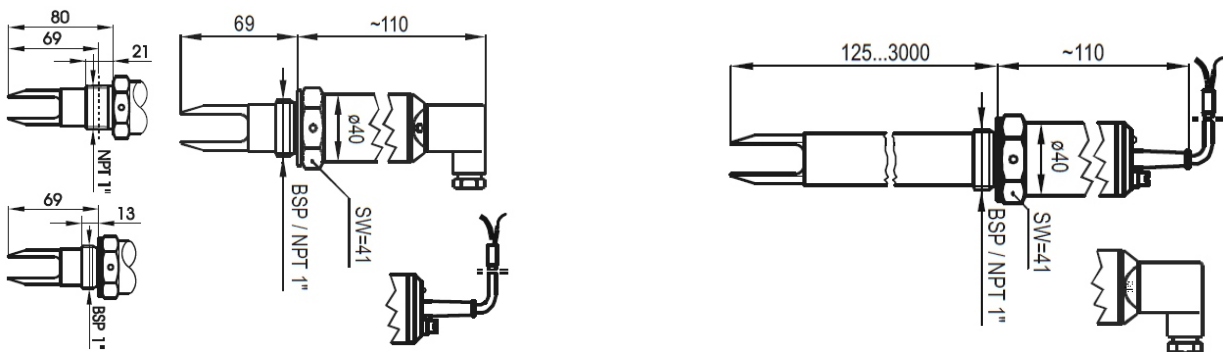
## BENEFITS

- ◆ 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 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**

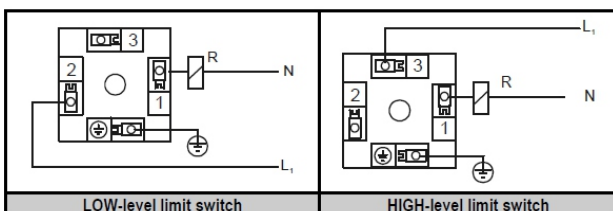
## MTF SERIES DIMENSIONS



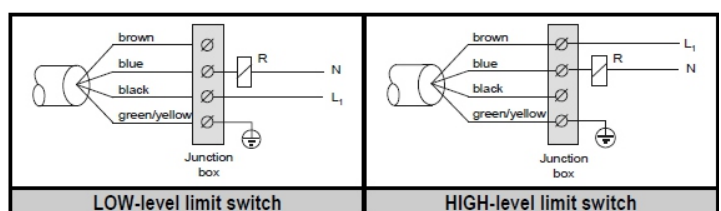
## MTF SERIES ELECTRICAL CONNECTIONS

MTF 2-wire AC version:

With connector



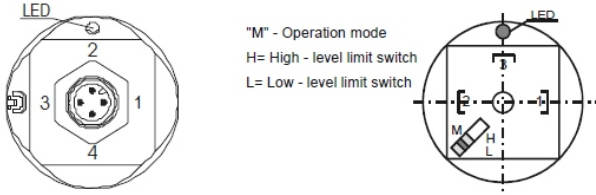
With cable



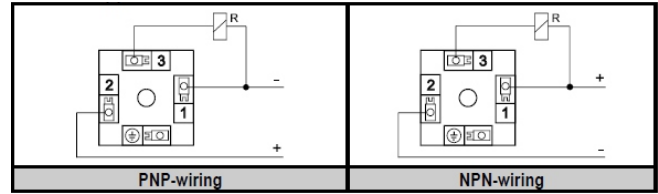
# MTF SERIES ELECTRICAL CONNECTIONS (CONTINUED)

MTF 3-wire DC version:

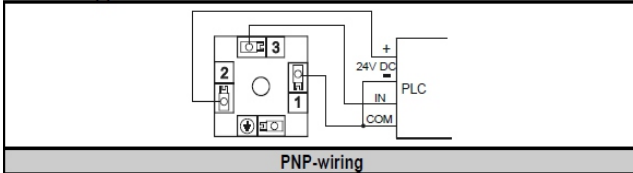
With connector



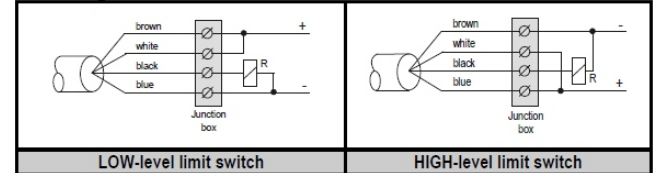
Connector wired for relay application



Connector wired for PLC application



With cable

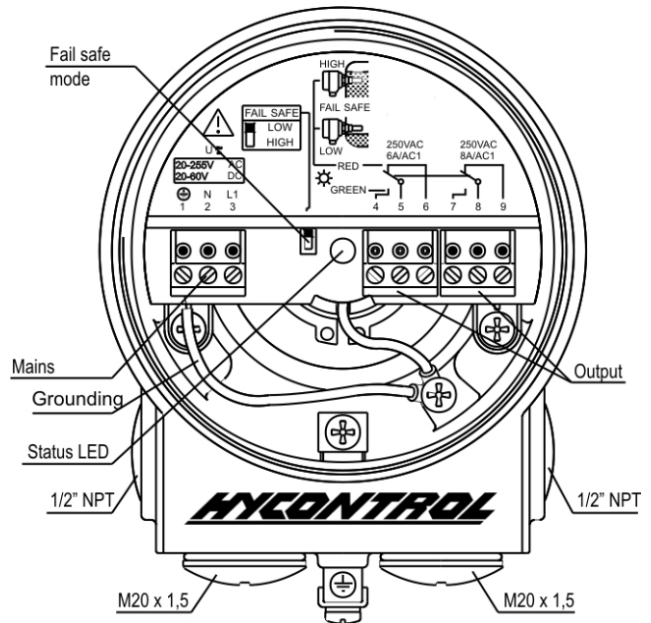


## TF SERIES CONNECTIONS AND INFORMATION

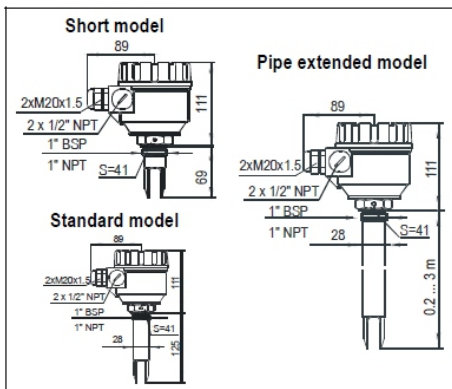
The TF Series vibrating probes are designed for easy wiring and fast installations. Unscrew the top housing cover to reveal the device's controls and connections, **as illustrated on the right.**

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

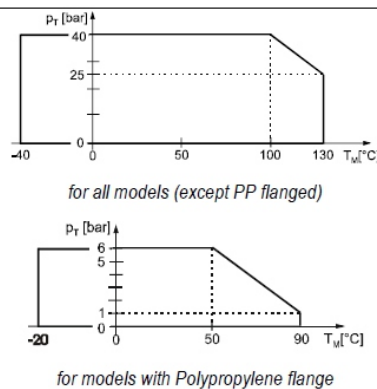
Use either the outside or inside grounding screw terminal for grounding the unit. Common cables must not be used for AC and DC voltage, as well as for low and mains voltage.



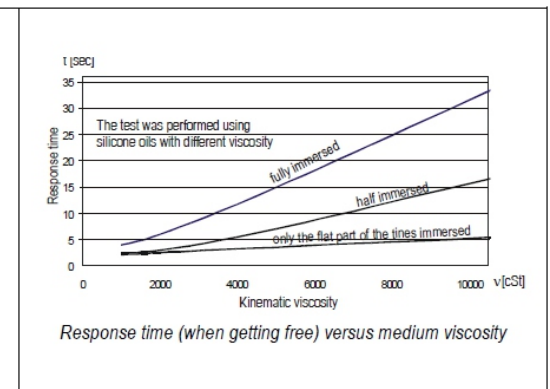
Dimensions



Derating diagrams



Response time - medium viscosity



# TF & MTF SERIES TECHNICAL DATA

	MTF SERIES	TF SERIES
Insertion length	69-3000 mm (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	-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 <sup>3</sup> (700 oz/ft <sup>3</sup> )	
Medium viscosity	=10000 mm <sup>2</sup> /s (cSt) (0.1 ft <sup>2</sup> /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 <sup>2</sup> I(AWG20) 4 x 0.75 mm <sup>2</sup> (AWG18) 5 x 0.5 mm <sup>2</sup> (AWG20)	2 x M2021.5 cable gland for Ø6-12 mm (0.25 ... 0.5") cable, terminal, for 0.5-1.5mm <sup>2</sup> (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

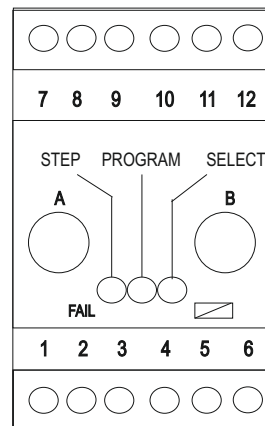
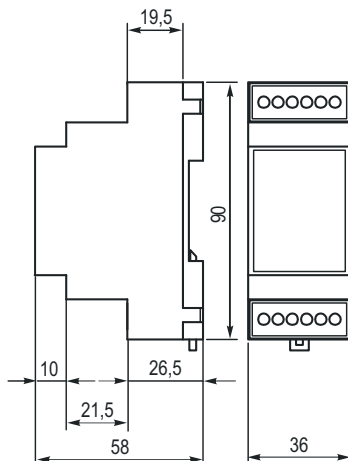
The HYC-PKK-312- series switching isolators are 4-20 mA current-controlled devices which switch at a set current depending on the limit, switching difference or window comparator modes selected by programming. They are suitable for powering Hycontrol's MTF Series 2-wire (4-20 mA) transducers.

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 a 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 HYCMTF 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.

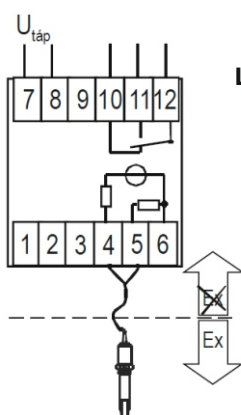




# ISOLATOR TECHNICAL DATA


HYC-PKK-312-	1	2	3	4	8
Power / Ex	230 V AC	110 V AC	24 V AC	24 V AC/DC	24 V DC ATEX EExia IIC 
Consumption	<2.7 VA			<2.5 W	<2.5 VA <2.5 W
Switching level	Two values in the range of 1 ... 22 mA				10.5 mA; 12.5 mA
IS maximum values	-				U.<28.4 V; I.<80 mA; P.<0,6 W; L.<4 mH; C.<50 nF
Output load capability	U. = 30 V I <sub>MAX</sub> = 70 mA U <sub>OUT.min</sub> = 16 V			U <sub>?=</sub> 24 V I <sub>MAX</sub> = 80 mA U <sub>OUT.min</sub> = 23 V	-
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 (permanent)				
Damping	0,1 s; 1 s; 2 s; 5 s selectable				
Relay output	1 piece SPDT				
Relay rating	250 V AC, 8 A, AC 1				
Relay insulation strength	4000 V 50 Hz				
Relay electrical / mechanical lifetime	105/ 2 x 106 switching				
Electrical connection	Maximum 2.5 mm <sup>2</sup> twisted / 4 mm <sup>2</sup> single cable				
Ingress protection	IP20				
Mass	~0.21 kg				

## ISOLATOR WIRING AND SET-UP



**Left:** Wiring for Ex MTF switch

**Below:** LED output from power up

WORKING STATUS		
LED	Indication	Interpretation
 (SELECT)	GREEN	Relay energised R=1
	RED	Relay de-energised R=0
	SIMULTANEOUS 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

# ORDER CODES

## TF SERIES ORDER CODE

<b>HYCTF-</b>								
<b>Code</b>	<b>Type</b>							
0	Short Probe 69mm							
1	Standard Probe 125mm							
2	Extended Probe 0.2m ~ 3.0m							
<b>Code</b>	<b>Probe Material &amp; Finish</b>							
A	Polished 316 Stainless Steel							
B	Highly Polished 316 Stainless Steel							
C	PFA Coated 316 Stainless Steel							
<b>Code</b>	<b>Extended Probe Length</b>							
XXXX	Without							
0200	200mm – Then increments of 100mm up to 3m							
3000	3000mm – Maximum length							
<b>Code</b>	<b>Output</b>							
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)							
<b>Code</b>	<b>Housing</b>							
A	IP66 Aluminium Housing 2 x M20 & 0.5"NPT Electrical Entry							
<b>Code</b>	<b>Process Connection Standard</b>							
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							

## MTF SERIES ORDER CODE

<b>HYCMTF-</b>									*
<b>Code</b>	<b>Type</b>								
0	Short Probe 69mm								
1	Standard Probe 125mm								
2	Extended Probe 0.2m								
3	Extended Probe 0.3m ~ 3.0m								
<b>Code</b>	<b>Probe Material &amp; Finish</b>								
A	Polished 316 Stainless Steel								
B	Highly Polished 316 Stainless Steel								
C	PFA Coated 316 Stainless Steel								
<b>Code</b>	<b>Probe Length</b>								
0069	69mm								
0125	125mm								
0200	200mm – Then increments of 100mm up to 3m								
3000	3000mm – Maximum length								
<b>Code</b>	<b>Electrical Connection Cable Length<sup>1</sup></b>								
03	3m Standard – Then increments of 1m up to 30m								
30	30m – Maximum Length								
XX	No cable fitted								
<sup>1</sup> Maximum 3m for Ex types									
<b>Code</b>	<b>Process Connection Standard</b>								
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								
<b>Code</b>	<b>Output &amp; Approval</b>								
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)								

\* 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 effective solutions for diverse applications across a wide range of industries ranging from quarrying to food; from nuclear power to chemical; and from animal feed to waste recycling. From our manufacturing base in Redditch, Worcestershire, we have been trusted to oversee 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 that are crafted to suit the particular needs of each individual customer.

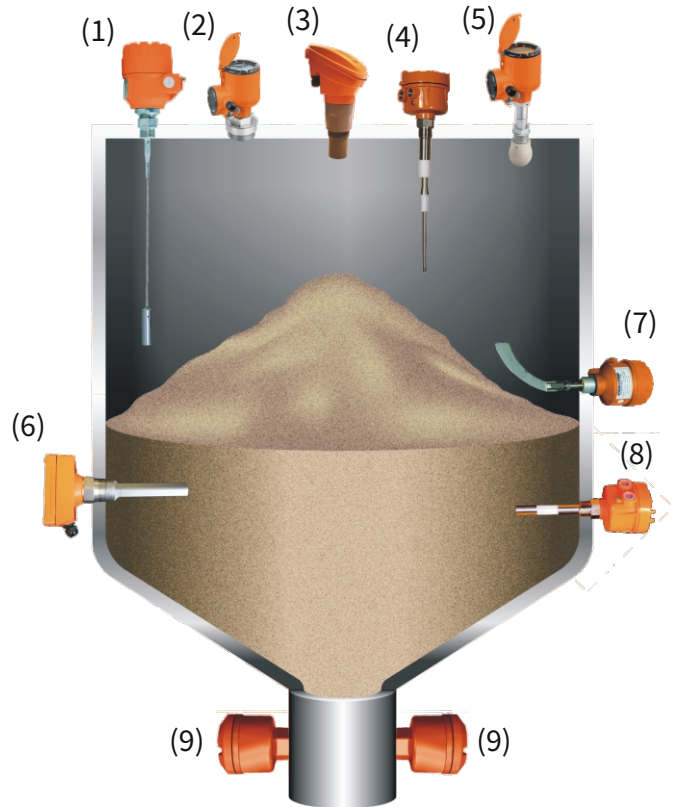
We understand the consequences of inaccurate or unreliable level systems, and therefore each Hycontrol installation is tailored precisely to match your application. Our goal is simple: to provide the best-engineered solution - *without compromise*.

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 for solids
- (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 for liquids
- (7) Capacitance level switch
- (8) RF admittance level switch
- (9) Tuning fork vibrating level switch

