



**VF05 TDR  
LEVEL GAUGE**



**HYCONTROL**

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# WHY USE TDR FOR LEVEL MEASUREMENT?

## UNAFFECTED BY CHANGES IN

- ◆ Dielectric
- ◆ Pressure
- ◆ Vacuum
- ◆ Humidity
- ◆ Dust
- ◆ Viscosity
- ◆ Temperature
- ◆ Foam

## Vf05 TDR'S KEY FEATURES INCLUDE

- ◆ Measuring range of up to 30 m (100 ft) with a wide selection of probe types
- ◆ Versatile technology for liquids, slurries, pastes and powders
- ◆ Measures level, distance or volume
- ◆ Two-wire loop powered 24VDC
- ◆ Compact, durable design suitable for tough industrial environments
- ◆ Convenient, portable plug-in display and programming unit
- ◆ HART Protocol for ease of system compatibility
- ◆ EX hazardous area options available\*
- ◆ Suitable for narrow tanks or side-mounted bypass chambers
- ◆ Simple to install and retrofit with a wide selection of process connections
- ◆ Coated cables suitable for corrosive and acidic atmospheres
- ◆ High-temperature options available
- ◆ Remote or local programming and configuration for maximum ease of use

## APPLICATIONS IN MOST INDUSTRIES

- ◆ Petrochemical
- ◆ Food
- ◆ Water & Waste
- ◆ Cement
- ◆ Asphalt
- ◆ Power Generation
- ◆ Metals
- ◆ Chemicals
- ◆ Process
- ◆ Quarrying
- ◆ Animal Feed
- ◆ Milling

## EFFECTIVE REPLACEMENT FOR

- ◆ Capacitance transmitters
- ◆ Ultrasonics
- ◆ Differential pressure transmitters
- ◆ Radar transmitters
- ◆ Displacers
- ◆ Float transmitters
- ◆ Hydrostatic transmitters
- ◆ Capacitance transmitters

## MANUFACTURED TO ISO9001 Q.M.S.

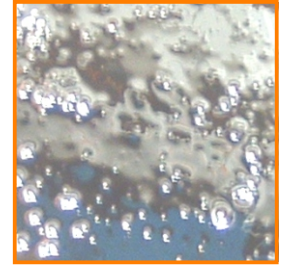


*The standard of all Hycontrol products is strictly monitored to conform to all ISO quality requirements.*

*This ensures we meet the needs of customers as well as statutory and regulatory requirements.*



*\* ATEX/UKEX approvals pending*



Acids



Grains



Plastics



Flakes



Powders



Oils

# VF05 SERIES TDR

Hycontrol's VF05 guided wave radar transmitter offers users a practical solution for measuring liquids, pastes, slurries and powdered products. The robust, compact design and removable programmable display make it an ideal choice for various industrial-level control applications.

The VF05 utilises the **Time Domain Reflectometry (TDR)** measuring principle to determine distance, level or volume accurately. During operation, the probe transmits micro-pulses along a cable or a rod at close to the speed of light. When these pulses hit the surface of the medium, it reflects them to the electronic module. As both level and distance are directly proportional to the flight time, this makes TDR a highly accurate measurement principle.

With EX options\* and HART connectivity, the Hycontrol VF05 offers an ideal solution for various level requirements.

- ◆ Aluminium or Stainless Steel housing
- ◆ Measuring range up to 30 m (98 ft)
- ◆ Accuracy of +/- 5 mm
- ◆ Rod, cable and coaxial probes
- ◆ Removable, plug-in programmable display
- ◆ EX options for hazardous areas\*
- ◆ 4~20 mA & HART output
- ◆ Maximum temp. 200°C
- ◆ Maximum pressure 40 bar
- ◆ Variety of process connections
- ◆ Simple programming
- ◆ 2-wire loop powered

## PROGRAMMING THE VF05

A core feature of the VF05 TDR unit is the option to use the **VGF-DISPLAY removable programming and display unit** (illustrated below). The unit connects to the top of the TDR unit, allowing programming via touch buttons and the LCD screen. A simple menu system allows for fast programming and simple commissioning. In addition, the portable nature of the VGF-DISPLAY unit provides a cost-saving for users purchasing and installing multiple probes. With only one display unit, the user can programme any number of installed VF05 units, with output information being fed back to the site PLC or a panel via the 4-20 mA or HART outputs. Alternatively, operators can use a HART programmer or HYVIEW PC software for remote computer control, downloaded free from [hycontrol.com](http://hycontrol.com).

The default display shows the primary measured value, from which the output current is calculated. Besides the numerical display, there is a bar graph on the right representing the current output value. Programming is conducted via a text-based menu, navigated with the unit's four buttons.



\* ATEX/UKEX approvals pending



# TECHNICAL DATA

		With aluminum housing VF05□□-7□□-4, 5, 6, 8	With stainless steel housing VF05□□-9□□-4, 5, 6, 8
Input data	Measured values	Distance between reference point and plane of reflection (material surface); derived values: level, volume or weight	
	Measuring range	Varies with probe and measured medium (refer to technical data and probes table)	
Probe types		Coaxial, dual cable, cable, dual rod, and rod probes	
Housing		Cast aluminum with epoxy finish	Stainless steel
Process temperature		-30...+200 °C (-22...+392 °F)	
Process pressure		-1...40 bar (-0.1...4 MPa [-14...580 psig])	
Ambient temperature		-30...+60 °C (-22...+140 °F), with display: -20...+60 °C (-4...+140 °F)	
Seal		FPM (Viton®), for high temperatures, optional FFKM Perfluoroelastomer (Kalrez® 6375), EPDM	
Ingress protection		IP67	
Supply voltage		13...36 V DC, nominal 24 V DC, built-in transient overvoltage protection	
Output data	Output signal	Analog: 4...20 mA; (3.9...20.5 mA) passive output; error signal 3.8 or 22 mA	
		BUS: serial, HART® interface, termination resistor maximum 750 Ω	
		Display: VGF-DISPLAY LCD dot-matrix	
Accuracy <sup>(1)</sup>		Liquids: ±5 mm (±0.2"). If probe length is ≥ 10 m (L ≥ 33 feet); ±0.05% of probe length	
		Solids: ±20 mm (±0.8"). If probe length is ≥ 10 m (L ≥ 33 feet); ±0.2% of probe length	
Wiring		2× M20x1.5 metal cable gland; cable diameter: Ø7...13 mm (Ø0.3...0.5"), or M20x1.5 plastic cable gland; cable diameter: Ø6...12 mm (Ø0.23...0.47") maximum wire cross section: 0.5...1.5 mm <sup>2</sup> (AWG20...AWG15) (shielded cable recommended) + internal thread 2× ½" NPT for the cable's damping tube	
Electrical protection		Class III	
Weight (housing)		2.2 kg (4.9 lbs)	3.9 kg (8.6 lbs)

(1) With ideal reflective surfaces and constant temperatures.

## EX CERTIFICATION INFORMATION

EX licensing currently in progress.



# TECHNICAL DATA - PROBES

Type	VF05□K-□□□□-□ VF05□L-□□□□-□ VF05□V-□□□□-□ VF05□W-□□□□-□	VF05□R-□□□□-□ VF05□P-□□□□-□	VF05□S-□□□□-□ VF05□Z-□□□□-□	VF05□N-□□□□-□ VF05□J-□□□□-□	VF05□T-□□□□-□ VF05□U-□□□□-□	VF05□D-□□□□-□ VF05□E-□□□□-□	VF05□A-□□□□-□ VF05□B-□□□□-□ VF05□C-□□□□-□ VF05□H-□□□□-□
Version	4 mm cable (0.15")	Rod		8 mm cable (0.3")	4mm dual cable (0.15")	Dual rod	Coaxial
Max. measuring range	30 m (100 feet)	3 m (10 feet)	6 m (20 feet)	30 m (100 feet)		3 m (10 feet)	6 m (20 feet)
Min. measuring range $\epsilon_r = 80 / 2.4$	0.25 m / 0.35 m (0.8 feet / 1.2 feet)				0.15 m / 0.3 m (0.5 feet / 1 feet)		0 m (0 feet)
Min. distance to objects	Ø600 mm (Ø2 feet)				Ø200 mm (Ø 0.65 feet)		Ø0 mm (0 feet)
Minimum $\epsilon_r$ of medium	2.1				1.8		1.4
Process connection	1" BSP	1" BSP	1½" BSP				1" BSP
	1" NPT						1" NPT
	1½" BSP	1½" NPT				1½" BSP	
	1½" NPT					1½" NPT	
Material of probe	316 (1.4401)	316Ti (1.4571)		316 (1.4401)		316Ti (1.4571)	
Nominal probe diameter	4 mm (0.15")	8 mm (0.3")	14 mm (0.55")	8 mm (0.3")	4 mm (0.15")	8 mm (0.3")	28 mm (1.1")
Weight	0.12 kg/m (0.08 lb/feet)	0.4 kg/m (0.25 lb/feet)	1.2 kg/m (0.8 lb/feet)	0.4 kg/m (0.25 lb/feet)	0.24 kg/m (0.16 lb/feet)	0.8 kg/m (0.5 lb/feet)	1.3 kg/m (0.85 lb/feet)
Separator material	-				PFA, welded onto cable	PTFE-GF25 if length is >1.5 m (5 feet)	PTFE, if length is >1.5 m (5 feet)
Tensioning weight size	Ø25 x 100 mm (Ø1 x 4")	-		Ø40 x 260 mm (Ø1.5 x 10")	Ø40 x 80 mm (Ø1.5 x 3")	-	
Tensioning weight material	316Ti (1.4571)	-		316Ti (1.4571)	316Ti (1.4571)	-	

## DIMENSIONS

VF05TK-□□□□-□ VF05TL-□□□□-□ VF05TV-□□□□-□ VF05TW-□□□□-□	VF05TR-□□□□-□ VF05TP-□□□□-□	VF05TS-□□□□-□ VF05TZ-□□□□-□	VF05TN-□□□□-□ VF05TJ-□□□□-□	VF05TT-□□□□-□ VF05TU-□□□□-□	VF05TD-□□□□-□ VF05TE-□□□□-□	VF05TA-□□□□-□ VF05TB-□□□□-□ VF05TC-□□□□-□ VF05TH-□□□□-□

# TECHNICAL DATA - COATED PROBES

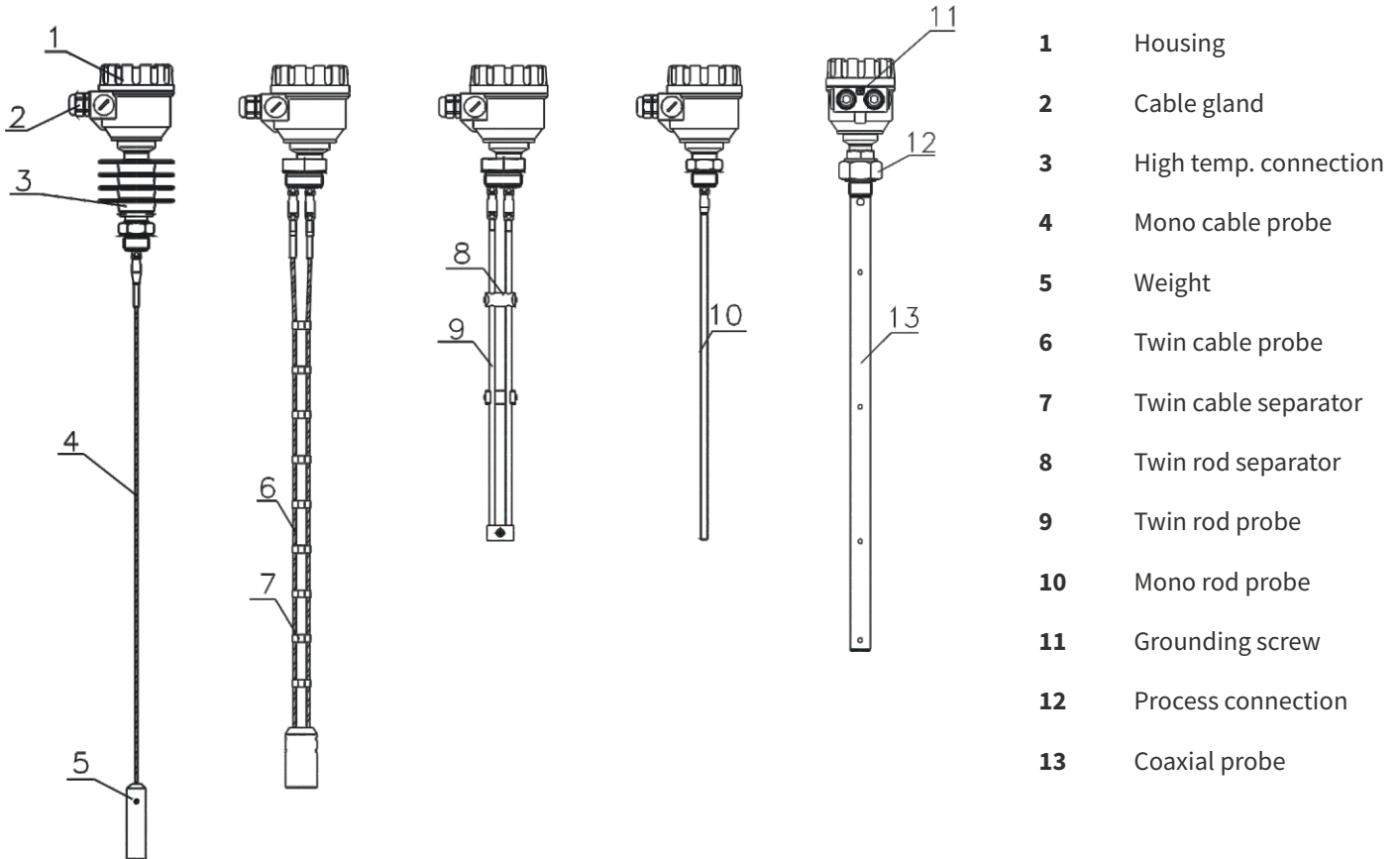
Type	VF05□F-□□□□-□ VF05□G-□□□□-□	VF05TX-□□□□-□	VF05TY-□□□□-□	VF05TM-□□□□-□	VF05TQ-□□□□-□	VF05TI-□□□□-□
Version	4 mm (0.15") FEP-coated cable			4 mm (0.15") fully FEP-coated cable	Fully PFA-coated rod	Fully PP-coated rod
Maximum measuring range	30 m (100 feet)				3 m (10 feet)	
Minimal measuring range $\epsilon_r = 80 / 2,4$	0.25 m / 0.35 m (0.8 feet / 1.2 feet)					
Free space requirement	$\varnothing 600$ mm ( $\varnothing 2$ feet)					
Minimal $\epsilon_r$ of medium	2.1					
Process connection	1" BSP 1" NPT	DN 40 Triclamp	DN 40 Milch	DN 50		
Material of probe	316 (1.4401) / FEP				316Ti (1.4571) / PFA	316Ti (1.4571) / PP
Nominal diameter of probe	6 mm (0.23")				12 mm (0.5")	16 mm (0.62")
Mass	0.16 kg/m (0.1 lb/feet)				0.5 kg/m (0.33 lb/feet)	0.6 kg/m (0.4 lb/feet)
Coating of tension weight	-			PFA		PP
Tensioning weight dimensions	$\varnothing 25 \times 100$ mm ( $\varnothing 1 \times 4$ ")				-	
Material of tensioning weight	316Ti (1.4571)				-	
Maximum medium temperature	+150 °C (+302 °F)					+60 °C (+140 °F)

## DIMENSIONS

VF05TF-□□□□-□ VF05TG-□□□□-□	VF05TX-□□□□-□	VF05TY-□□□□-□	VF05TM-□□□□-□	VF05TQ-□□□□-□	VF05TI-□□□□-□

# SELECTING THE RIGHT PROBE

Probe Type	Maximum Measuring Range	Dead Zone (unmeasurable area) Upper (T)/Lower (B)		Process Connection	ε <sub>r</sub> Minimum
		ε <sub>r</sub> = 80	ε <sub>r</sub> = 2.4		
Mono cable Ø 4 mm (0.15")	30 m (1181")	250 mm / 20 mm (9.84" / 0.75")	350 mm / 100 mm (13.8" / 4")	1", 1½"	2.1
Mono cable Ø 8 mm (0.3")	3 m (118")			1½"	
Mono rod Ø 8 mm (0.3")	6 m (236")			1"	
Mono/segmented rod Ø 14 mm (0.55")	30 m (1181")	150 mm / 20 mm (6" / 0.75")	300 mm / 100 mm (12" / 4")	1½"	1.8
Twin cable Ø 4 mm (0.15")	3 m (118")				
Twin rod Ø 8 mm (0.3")	6 m (236")	0 / 10 mm (0 / 0.4")	0 / 100 mm (0 / 4")	1", 1½"	1.4
Coaxial pipe Ø 28 mm (1.1")	30 m (1181")	250 mm / 20 mm (9.84" / 0.75")	350 mm / 100 mm (13.8" / 4")	1", 1½" TriClamp, DN40 MILCH, DN50	2.4
Coated cable Ø 6 mm (0.23")	3 m (118")			DN50	
Coated rod Ø 12 mm / 16 mm (0.45" / 0.65")					



- 1 Housing
- 2 Cable gland
- 3 High temp. connection
- 4 Mono cable probe
- 5 Weight
- 6 Twin cable probe
- 7 Twin cable separator
- 8 Twin rod separator
- 9 Twin rod probe
- 10 Mono rod probe
- 11 Grounding screw
- 12 Process connection
- 13 Coaxial probe

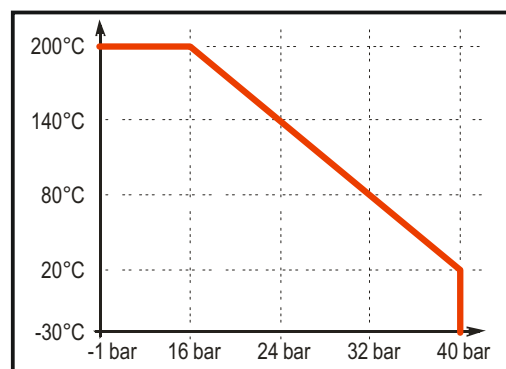
# ORDER CODES

VF05  -  -  -  -  -  2-wire guided microwave level transmitter

Version / Temperature	Code	Probe / Process connection	Code	Housing	Code	Product length (x 10m)	Code	Product length (x 1m)	Code	Probe length (x 0.1m)	Code	Output	Code	
Transmitter	T	Coaxial	1" BSP	Aluminum	7	0 m	0	0 m	0	0 m	0	4...20 mA + HART	4	
High-temperature transmitter	H		1" NPT											B
Transmitter + display	B		1½" BSP											C
High-temperature transmitter + display	P	Rod	1½" NPT	Stainless steel	9	10 m	1	1 m	1	0.1 m	1			
			1" BSP			R	20 m	2	2 m	2	0.2 m	2		
			1" NPT			P	30 m	3	3 m	3	0.3 m	3		
			1½" BSP					4 m	4	0.4 m	4			
			1½" NPT					5 m	5	0.5 m	5			
		Dual rod	1½" NPT					6 m	6	0.6 m	6			
		4 mm cable	1" BSP					7 m	7	0.7 m	7			
			1" NPT	L					8 m	8	0.8 m	8		
			1½" BSP	V					9 m	9	0.9 m	9		
		8 mm cable	1½" NPT											
			1" BSP	K										
			1" NPT	L										
		4 mm dual cable	1½" BSP											
			1½" NPT	J										
			1" BSP	T										
		4 mm FEP-coated cable	1" NPT											
			1" NPT	U										
			DN40 TriClamp	F										
		Fully PFA-coated rod / DN50	DN40 TriClamp											
			DN40 Milch	G										
			1" BSP	X										
		4 mm fully FEPcoated cable / DN50	1" NPT											
			1" NPT	Y										
			1" NPT	Z										
		Fully PP-coated rod / DN50	Q											
		Fully PFA-coated rod / 1½" TriClamp	M											
			I											
			O											

## MEDIA TEMPERATURE TABLE & PRESSURE DIAGRAM

Type	Flange Temperature
Base model	-30...+90 °C ( -22...+194 °F)
High-temperature HH <input type="checkbox"/> or HP <input type="checkbox"/> transmitter	-30...+200 °C ( -22...+392 °F)



## DISPLAY UNIT TECHNICAL DATA

<b>Display</b>	64x128 Dot-matrix LCD, glyphs, units and bar graph
<b>Ambient temperature</b>	-20°C...+60°C (-4°F...+140°F)
<b>Housing material</b>	PBT fiberglass, plastic (DuPont®)





# 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.

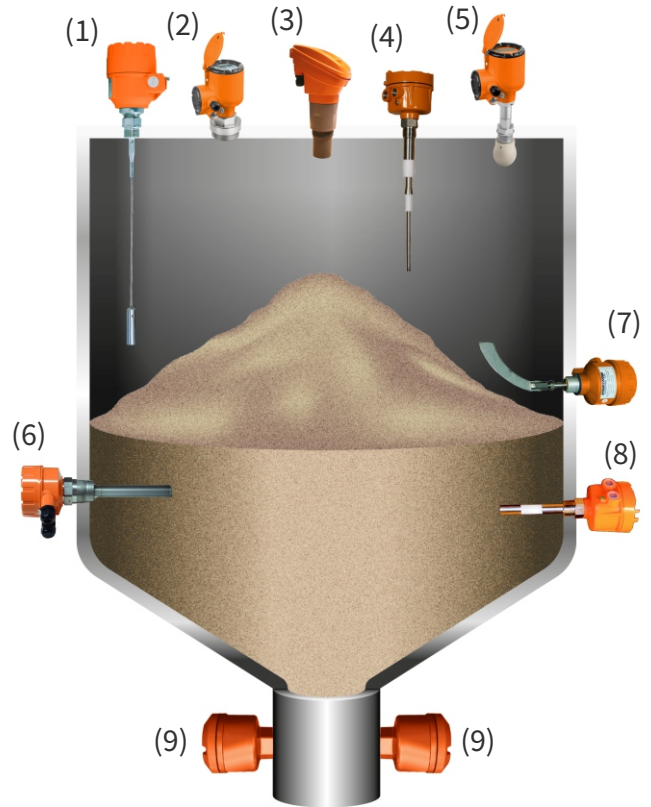
We understand the consequences of inaccurate or unreliable level systems. Therefore each Hycontrol installation is tailored precisely to match your application. Our goal is simple: to provide the best-engineered solution - without compromise.

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 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

