



TIME DOMAIN REFLECTOMETRY (TDR)

WHY TDR TECHNOLOGY FOR LEVEL MEASUREMENT?

INSENSITIVE TO CHANGES IN

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

THE ADVANTAGES ARE

- ◆ Measuring ranges up to 40m
- ◆ Versatile technology for Liquids, Slurries, Pastes and Solids.
- ◆ Display of Level, Distance or Volume
- ◆ Interface detection on liquids (eg, oil on water).
- ◆ 2 wire loop powered 24vdc or 4 wire 110/230vac
- ◆ Hazardous area EExd and EExia
- ◆ HART, Profibus (PA) and Foundation Fieldbus
- ◆ Suitable for narrow tanks with minimum fixed beam diameter.
- ◆ Unaffected by dust during fill or empty conditions.
- ◆ Immune to fill noise on solid products such as stone.
- ◆ Simple to install and retrofit with wide range of process connections
- ◆ Suitable for corrosive and acidic atmospheres
- ◆ High temperature and pressure options are available
- ◆ Remote or local programming and configuration
- ◆ Suitable for detecting levels through surface foam
- ◆ Sealed Flange system maintains system integrity

SUITABLE FOR ALL INDUSTRIES

- ◆ Petrochemical
- ◆ Food
- ◆ Chemical
- ◆ Paint
- ◆ Water & Waste
- ◆ Cement
- ◆ Asphalt
- ◆ Minerals
- ◆ Power Generation
- ◆ Steel
- ◆ Quarrying
- ◆ Powder

TDR FOR A VARIETY OF APPLICATIONS

- ◆ Level Measurement
- ◆ Volume Measurement
- ◆ Interface Measurement
- ◆ Distance Measurement

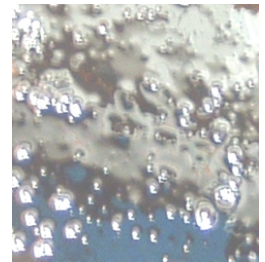
COST EFFECTIVE REPLACEMENT FOR

- ◆ Capacitance transmitters
- ◆ Hydrostatic transmitters
- ◆ Differential pressure transmitters
- ◆ Displacers

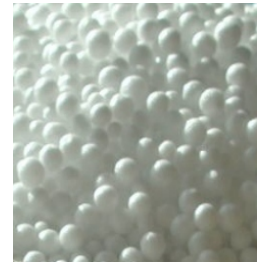
MANUFACTURED TO ISO9001-2000 Q.M.S.



Various units on final assembly and ready to go for test. The quality of all Hycontrol products is strictly monitored to conform with our strict ISO quality requirements.



Acids



Plastics



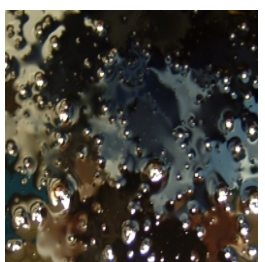
Grain



Powders



Flakes



Oils

REFLEX VF SERIES TWO WIRE TDR

The Reflex VF Series range of TDR products is ideal for the measurement of liquids, powders and granules to a range of 35m. Unaffected by pressure, temperature, viscosity, vacuum, foam, dust, changes in dielectric constant or coating of the probe, the VF Series can measure virtually any product in either Direct or TBF mode utilising any one of its seven probe types.

COST EFFECTIVE TDR WITH DISPLAY

Reflex VF2 TDR

- ◆ HART protocol standard
- ◆ Multiple probe options
- ◆ Accuracy +/- 10mm (Opt. +/- 3mm)
- ◆ DPR (Dynamic Parasite Rejection)
- ◆ Remote display options up to 100m
- ◆ Range- 40m (solids) and 20m (liquids)
- ◆ 12 - 30V DC Two Wire
- ◆ Pressure up to 40bar
- ◆ ATEX EExia/Exd Flameproof
- ◆ Flange temperature from -50°C to 300°C



GENERAL PURPOSE TDR

Reflex VF03 TDR

- ◆ 24m measuring range
- ◆ 24V DC loop powered
- ◆ 4/20mA Output
- ◆ HART protocol standard
- ◆ Multiple probe options
- ◆ ATEX Eexia intrinsically
- ◆ Flange temperature up to 200°C
- ◆ Pressure up to 40 Bar
- ◆ 316 stainless steel probe
- ◆ FEP coating options
- ◆ Liquids and Solids
- ◆ Accuracy +/- 5mm



HIGH ACCURACY TDR

Reflex VF7 TDR

- ◆ 35m measuring range
- ◆ E24V DC 2 wire Loop Powered
- ◆ 4/20mA Output
- ◆ HART protocol options
- ◆ Flange temperature up to 250°C
- ◆ Pressure up to 40 Bar
- ◆ Wide range of Process connections
- ◆ Liquids and Solids measurement
- ◆ Low interface measurement
- ◆ Wide range of Process connections
- ◆ Minimal blanking zone
- ◆ High accuracy of +/- 3mm

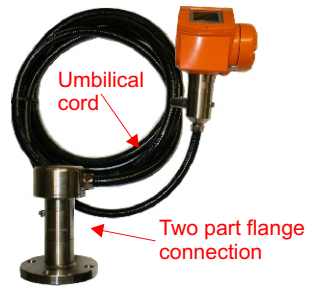


OPERATING PRINCIPLE

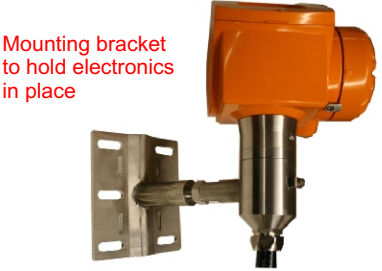
Pulses of low power microwaves are sent along conductors. At the point where the waves meet the product surface, they are reflected by the product. The intensity of the reflection depends on the dielectric constant of the product. The higher the dielectric constant, the stronger the reflection will be, e.g. up to 80% reflection for water. The instrument measures the time between emission and reception which is proportional to the distance. TDR guided radar can be used in two different modes :

- a) Level Measurement & b) Interface measurement

REMOTE ELECTRONICS / HOUSING OPTION FOR VF7

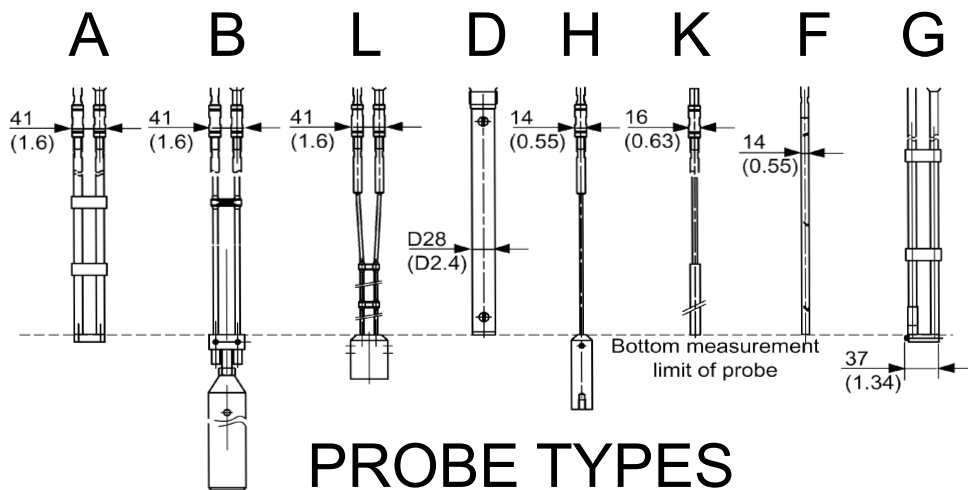


The remote housing option is useful for displaying the contents of the vessel at ground level or for demanding applications where the electronics are best kept away from the tank. An example of this is in Nuclear applications where the electronics can be detached from the mechanical probe and placed outside of the high radiation area. Also applies where there is high vibration in the tank.



TDR PRODUCT SELECTOR

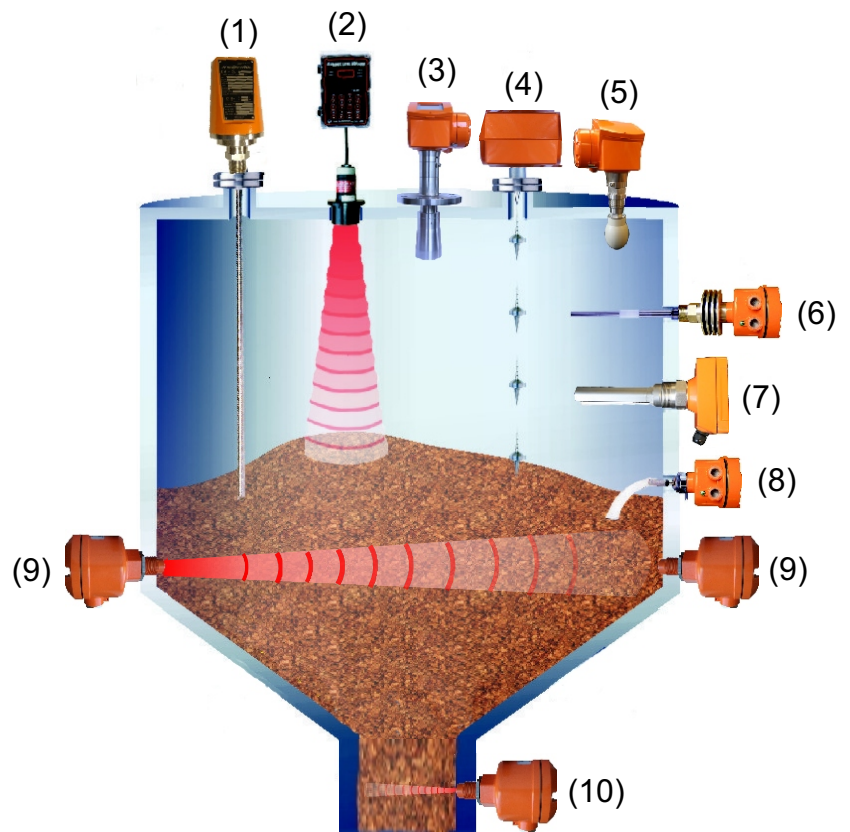
| MODEL | VF2 | VF03 | VF7 |
|-----------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|
| Probe Type | A, B, D, F, H, L, K | F, H, D, L, K | A, D, F, G, H, K |
| Process Connection (inch) | ½" | 1" | ½" |
| Maximum Range (m) | 40 | 24 | 35 |
| Weight Without Probe | 1.6Kg | 2Kg | 3.3Kg |
| Probe Materials | | | |
| F = 1 Rod | AISI 316L, Hastelloy C-22 | AISI 316L | AISI 316L, Hastelloy C-22 |
| B/E = 2 or 1 flexible cable | AISI 316L, Hastelloy C-22 | AISI 316L, FEP coated AISI 316 | AISI 316L, Hastelloy C-22 |
| C = Coaxial | AISI 316L, Hastelloy C-22 | AISI 316L | AISI 316L, Hastelloy C-22 |
| Product Measured | Liquids | Liquids | Liquids |
| | Solids | Solids | Solids |
| Measurement Principle | Level | Level | Level |
| | Distance | Distance | Distance |
| | Volume | Volume | Volume |
| | - | - | Interface |
| Materials of Construction | | | |
| Housing | Aluminium with Orange epoxy housing | Aluminium with Orange epoxy housing | Aluminium with Orange epoxy housing |
| Wetted Parts | Stainless Steel 316L / Hastelloy C-22 | Stainless Steel 316L / 316, PTFE | Stainless Steel 316L / Hastelloy C-22 |
| Gaskets | Viton, optional Kalrez 4079 | Viton, optional Kalrez 4079 | Viton, optional Kalrez 4079 |
| Operating. Mode | Direct/TBF | Direct | Direct/TBF |
| Accuracy +/- mm (Liquids) | 3mm | 5mm | 3mm |
| Accuracy +/- mm Solids | 20mm | 20mm | 20mm |
| Minimum Dielectric (Single Probe) | 1.6 | 2.1 | 1.4 |
| Minimum Dielectric TBF Mode | 1.1 | n/a | 1.1 |
| Minimum Dielectric (Coaxial) | 1.6 | 1.4 | 1.4 |
| Repeatability | 1mm | 2mm | 1mm |
| Max Pressure (bar) | 40 | 40 | 300 |
| Maximum Temperature Flange(C) | -50°C to +300°C | -30 to +90°C Std 200°C Optional | -40°C to +200°C |
| Maximum Temperature Product(C) | -50 to +150°C | -50 to +600°C | -40°C to +85°C |
| Ambient Temperature | | | |
| Standard | -40°C to +80°C | -30 to +55°C | -40°C to +80°C |
| Ex Version | -40°C to +60°C | -20 to +55°C | -40°C to +60°C |
| Power Supply 24V DC | Yes | Yes | Yes |
| 2-Wire Device | Yes | Yes | Yes |
| Output (4-20mA) | Yes | Yes | Yes*2 |
| Protection Category | IP66/67 | IP66/67 | IP66/67 |
| HART | Yes | Yes | Yes |
| PACTWARE | Yes | No | Yes |
| Profibus PA | No | No | No |
| Fieldbus | No | No | No |
| ATEX EExia | Yes | Yes | Yes |
| ATEX EExd | Yes | No | Yes |
| EMC | Yes | Yes | Yes |
| HMI | Yes | No | Yes |



HYCONTROL LEVEL TECHNOLOGIES

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

