



VG6 & VG7 FMCW RADAR LEVEL GAUGE

WHY RADAR TECHNOLOGY FOR LEVEL MEASUREMENT?

INSENSITIVE TO CHANGES IN

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

THE ADVANTAGES ARE

- ◆ Measuring ranges up to 80m (option for 100m special)
- ◆ 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 ATEX, EExd and EExia
- ◆ HART 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

RADAR FOR A VARIETY OF APPLICATIONS

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

COST EFFECTIVE REPLACEMENT FOR

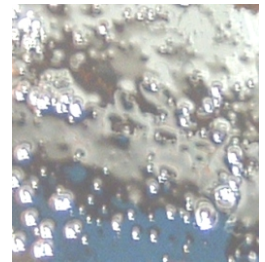
- ◆ Capacitance transmitters
- ◆ Hydrostatic transmitters
- ◆ Differential pressure transmitters
- ◆ Displacers

MANUFACTURED TO ISO9001-2000 Q.M.S.

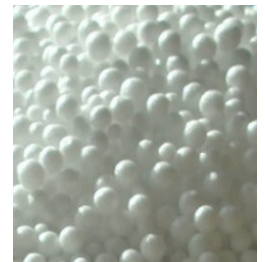


Various units on final assembly and ready to go for test.

The quality of all Hycontrol products is strictly monitored to conform with our strict ISO quality requirements.



Acids



Plastics



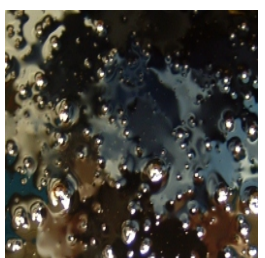
Grain



Powders



Flakes



Oils

REFLEX VG6 & VG7 SERIES FMCW RADAR



A radar signal is generated and transmitted via an antenna mounted on the tank roof which is reflected back by the target surface and received at the antenna.

FMCW: Frequency Modulated Continuous Wave

VG7 radar uses a high frequency signal, nominal 26Ghz which increases linearly during the measurement (frequency sweep) . The signal is emitted, reflected from the target surface and received at a time-delayed frequency.

The difference in this frequency is calculated from the difference between the transmit frequency and the receive frequency. This difference is directly proportional to the distance measured.

Advantages of FMCW principle compared to Pulse Radar:

- ◆ Better reflection separation
- ◆ Reliable noise reduction
- ◆ Smaller beam angle
- ◆ Fewer disturbing reflections
- ◆ Smaller antenna diameter for same measuring range

THE ADVANTAGES OF FMCW RADAR

NON-CONTACT LEVEL MEASUREMENT

SUITABLE FOR AGGRESSIVE MEDIA

MEASURES LIQUIDS, SOLIDS, POWDERS, GRANULES

RANGE UP TO 80 METRES (OPTION FOR 100m)

HIGH ACCURACY OPTIONS AVAILABLE (1mm)

VESSEL MAPPING REMOVES UNWANTED REFLECTIONS

TBF MODE AVAILABLE FOR LOW DIELECTRIC PRODUCTS

UNAFFECTED BY PRESSURE, TEMPERATURE, VISCOSITY, FOAM OR DUST

AVAILABLE WITH HORN WAVEGUIDE OR DROP ANTENNA

ATEX OPTIONS FOR EExia INTRINSICALLY SAFE & EExd FLAMEPROOF HOUSINGS



REFLEX VG6 & VG7 SERIES TWO WIRE FMCW RADAR

The Reflex VG6 & VG7 Series of FMCW Radar are unaffected by pressure, temperature, viscosity, vacuum, foam, dust or changes in dielectric constant. They can measure virtually any product in either Direct or TBF mode utilising either Horn, Wave Guide or Drop antenna.

The unique Tank Bottom Following (TBF) mode in all the VG Series enables products with dielectric constants as low as 1.1 to be measured. For process vessels with complex internal structures the unique Empty Tank Spectrum (ETS) can be utilised to damp out all unwanted reflections from pipes, heating coils and agitators.

Where high precision is required the VG7 can measure to an accuracy of 3mm. For the measurement of solids the VG6 series succeeds where other Radar products have failed. The FMCW VG Series is the answer to your level measuring requirements whether you use the VG6 for solids or VG7 for the more difficult liquid applications.

TWO WIRE FMCW RADAR SOLIDS

VG6 DROP - Range 80m

- ◆ Solids only
- ◆ EExd \ EExia two wire
- ◆ HART
- ◆ Polypropylene antenna
- ◆ Steam & Foam
- ◆ Agitation
- ◆ Temperature up to 200°C
- ◆ Pressure up to 16 Bar
- ◆ Viscose liquids
- ◆ Dielectric greater than 2



VG7 Stainless Steel - Range 80m

- ◆ Liquids and slurries
- ◆ EExd / EExia two wire
- ◆ HART 4-20mA output
- ◆ Dielectric greater than 2
- ◆ Temperature up to 200°C
- ◆ Pressure up to 40 Bar
- ◆ Viscose liquids
- ◆ +/- 3mm Accuracy



HIGH ACCURACY FMCW

VG7 HORN - Range 80m

- ◆ Liquids and slurries
- ◆ EExd / EExia two wire
- ◆ HART 4-20mA output
- ◆ Dielectric greater than 2
- ◆ Temperature up to 200°C
- ◆ Pressure up to 40 Bar
- ◆ Viscose liquids
- ◆ Dielectric greater than 2
- ◆ +/- 3mm Accuracy



VG7 - DROP Chemical Resistant

- ◆ Liquids and slurries
- ◆ EExd / EExia two wire
- ◆ HART 4-20mA output
- ◆ Dielectric greater than 2
- ◆ Viscose liquids
- ◆ +/- 3mm accuracy
- ◆ Temperature up to 150°C
- ◆ Pressure up to 40 Bar



VG7 - Hygienic

- ◆ Liquids and slurries
- ◆ EExd / EExia two wire
- ◆ HART 4-20mA output
- ◆ Dielectric greater than 1.5
- ◆ Viscose liquids
- ◆ +/- 3mm accuracy
- ◆ Temperature up to 150°C
- ◆ Pressure up to 10 Bar

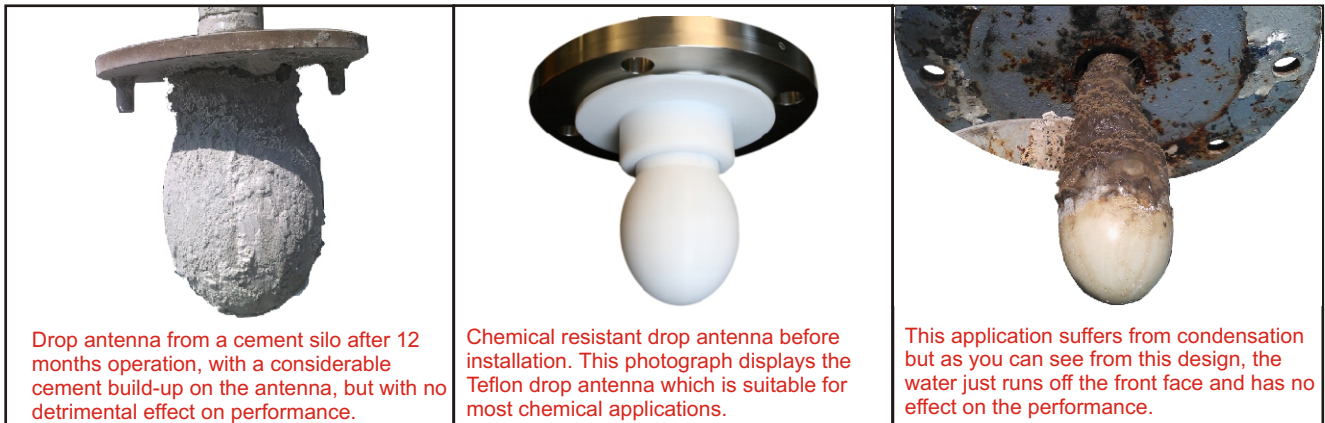


VG7 Metallic Horn - Range 80m

- ◆ Liquids and slurries
- ◆ EExd / EExia two wire
- ◆ HART 4-20mA output
- ◆ Dielectric greater than 1.5
- ◆ Temperature up to 200°C
- ◆ Pressure up to 40 Bar
- ◆ Viscose liquids
- ◆ +/- 3mm Accuracy



DROP ANTENNA UNIQUE DESIGN



The Patented drop antenna is unique in shape and was specifically designed for solids applications, where conventional radar horn designs would fail, due to build up of product inside the horn antenna. The traditional way to remove this problem in dusty environments was to install a special antenna with air purge. This option will constantly blow air into the antenna to keep it clean and keep the unit functioning. However, this is costly to install and run keeping compressors running for long periods resulting in expensive fuel and running costs. To alleviate this problem the drop antenna was conceived to operate in dusty environments without the need for an air purge! This makes the total cost of ownership for a Hycontrol radar, lower than competitors systems.

An additional advantage of this design is that they easily disperse water droplets in high condensation applications making them suitable for use on liquid applications also.

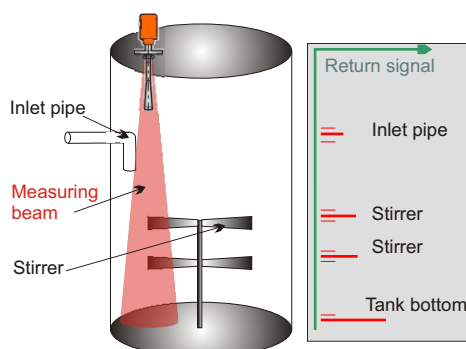
FALSE SIGNAL REJECTION SOFTWARE

Many liquid and slurry applications have rotating stirrers and fused obstructions inside the tank. For example tank support braces, ladders, inlet pipes and heater coils. Under normal monitoring conditions these obstructions can interfere with reliable, repeatable level measurement.

To remove these obstacles from the level measurement information Hycontrol deploy a software routine called **'Empty Tank Spectrum'** or **ETS** for short.

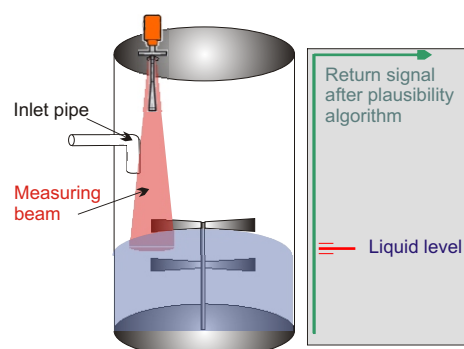
Utilising this software enables accurate and reliable level readings to be taken even on when it shouldn't be possible with a non-contact method of measurement.

A. EMPTY TANK SPECTRUM



The ETS scans the complete vessel for all

B. CORRECTED SPECTRUM



The corrected spectrum differentiates between the true level and spurious signals

This ETS, process is able to scan the tank when the vessel is empty and map all of the return reflections. It is important that the tank is empty or as low a possible when ETS is run, to ensure that all unmarked reflections are recorded. The ETS or "resulting map" removes all the unmarked reflections leaving only the actual level.

SOLID RADAR PRODUCT SPECIFICATION

MODEL	VG6006	VG600G
Maximum Range (m)	80 (depending on DN size)	80 (depending on DN size)
Weight(Kg)	3.3	3.3
Antenna	Horn - 316L Stainless Steel (DN80)	Horn - 316L Stainless Steel (DN100)
Thread	G ½, NPT ½	G ½, NPT ½
Materials of Construction		
Housing	Aluminium or Stainless Steel (1.4404/316L)	Aluminium or Stainless Steel (1.4404/316L)
Wetted Parts	Stainless Steel (1.4404/316L) or Hastelloy C-22	Stainless Steel (1.4404/316L) or Hastelloy C-22
Gaskets	FKM/FPM, Kalrez or EPDM	FKM/FPM, Kalrez or EPDM
Product Measured	-	-
	Solids	Solids
Measurement Principle	Level	Level
	Distance	Distance
	Volume	Volume
Operating. Mode	Direct	Direct
Accuracy +/- mm (Liquids)	-	-
Accuracy +/- mm (Solids)	10mm	10mm
Minimum Dielectric	≥1.5	≥1.5
Repeatability	+/- 5mm	+/- 5mm
Max Pressure (bar)	40	40
Maximum Temperature Flange(?C)	up to 200	up to 200
Ambient Temperature(?C)	-40 to +80	-40 to +80
Power Supply 24V DC	Yes	Yes
2-Wire Device	Yes	Yes
Output (4-20mA)	Yes	Yes
Protection Category	IP66/IP67	IP66/IP67
HART	Yes	Yes
PACTWARE	Yes	Yes
FM or CSA	Yes	Yes
NAMUR	Yes	Yes
ATEX EExia	Yes	Yes
ATEX EExd	Yes	Yes
EMC	Yes	Yes
HMI	Yes	Yes

MODEL	VG600P	VG600S/T
Maximum Range (m)	80 (depending on DN size)	80 (depending on DN size)
Weight(Kg)	3.3	3.3
Antenna	Drop - PTFE	Drop - PP
Thread	G ½, NPT ½	G ½, NPT ½
Materials of Construction		
Housing	Aluminium or Stainless Steel (1.4404/316L)	Aluminium or Stainless Steel (1.4404/316L)
Wetted Parts	PTFE or PP (PTFE or PP flange plate option)	PTFE or PP (PTFE or PP flange plate option)
Gaskets	FKM/FPM, Kalrez or EPDM	FKM/FPM, Kalrez or EPDM
Product Measured	-	-
	Solids	Solids
Measurement Principle	Level	Level
	Distance	Distance
	Volume	Volume
Operating. Mode	Direct	Direct
Accuracy +/- mm (Liquids)	-	-
Accuracy +/- mm (Solids)	10mm	10mm
Minimum Dielectric	≥1.5	≥1.5
Repeatability	+/- 5mm	+/- 5mm
Max Pressure (bar)	40	16
Maximum Temperature Flange(?C)	up to 150	up to 100
Ambient Temperature(?C)	-40 to +80	-40 to +80
Power Supply 24V DC	Yes	Yes
2-Wire Device	Yes	Yes
Output (4-20mA)	Yes	Yes
Protection Category	IP66/IP67	IP66/IP67
HART	Yes	Yes
PACTWARE	Yes	Yes
FM or CSA	Yes	Yes
NAMUR	Yes	Yes
ATEX EExia	Yes	Yes
ATEX EExd	Yes	Yes
EMC	Yes	Yes
HMI	Yes	Yes

LIQUID RADAR PRODUCT SPECIFICATION

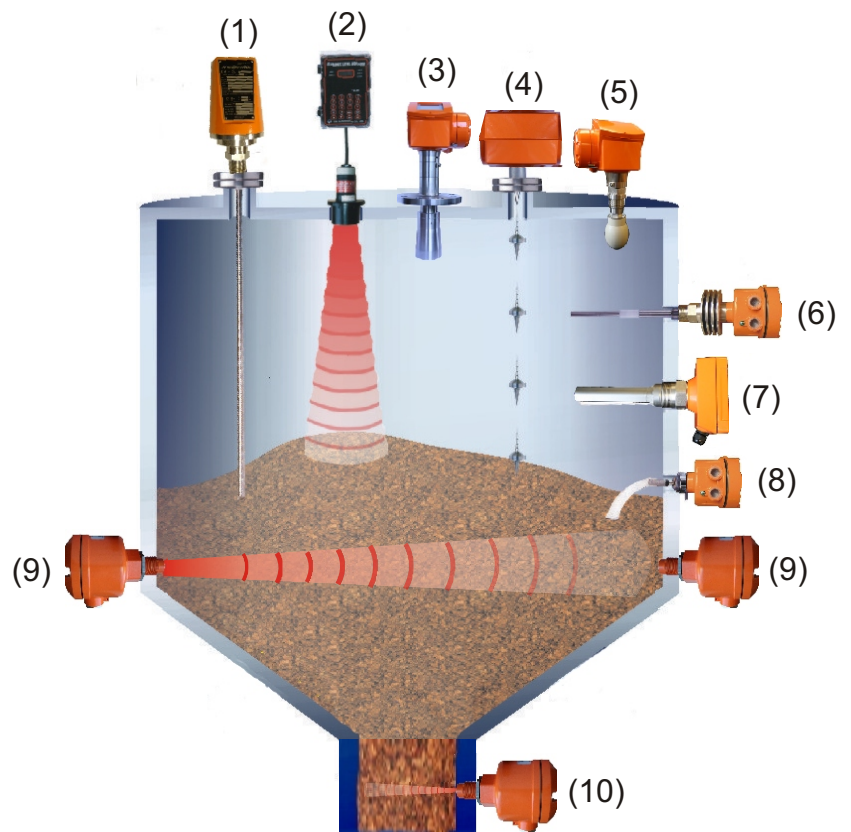
MODEL	VG7003	VG700U
Maximum Range (m)	80	80
Weight(Kg)	3.3	3.3
Antenna	Stainless Steel 316L	Sheet Metal horn
Thread	G 1½; 1½ NPT	G 1½; 1½ NPT
Materials of Construction		
Housing	Aluminium or Stainless Steel (1.4404/316L)	Aluminium or Stainless Steel (1.4404/316L)
Wetted Parts	Stainless Steel 316L	Hastelloy C-22
Gaskets	FKM/FPM, Kalrez or EPDM	FKM/FPM, Kalrez or EPDM
Product Measured	Liquids	Liquids
	Solids	-
Measurement Principle	Level	Level
	Distance	Distance
	Volume	Volume
Operating. Mode	Direct/TDF	Direct/TBF
Accuracy +/- mm (Liquids)	3mm	3mm
Accuracy +/- mm (Solids)	10mm	-
Minimum Dielectric	≥1.5	≥1.5
Repeatability	+/- 1mm	+/- 1mm
Max Pressure (bar)	100	100
Maximum Temperature Flange(?C)	up to 200	up to 200
Ambient Temperature(?C)	-40 to +80	-40 to +80
Power Supply 24V DC	Yes	Yes
2-Wire Device	Yes	Yes
Output (4-20mA)	Yes	Yes
Protection Category	IP66/IP67	IP66/IP67
HART	Yes	Yes
PACTWARE	Yes	Yes
FM or CSA	Yes	Yes
NAMUR	Yes	Yes
ATEX EExia	Yes	Yes
ATEX EExd	Yes	Yes
EMC	Yes	Yes
HMI	Yes	Yes

MODEL	VG700H	VG700P/S
Maximum Range (m)	80	80
Weight(Kg)	3.3	3.3
Antenna	PEEK (hygenic antenna)	Drop antenna - PTFE / PP
Thread	G 1½; 1½ NPT	G 1½; 1½ NPT
Materials of Construction		
Housing	Aluminium or Stainless Steel (1.4404/316L)	Aluminium or Stainless Steel (1.4404/316L)
Wetted Parts	PEEK	PTFE or PP
Gaskets	FKM/FPM, DIN 11851 or EPDM	FKM/FPM, Kalrez or EPDM
Product Measured	Liquids	Liquids
	-	-
Measurement Principle	Level	Level
	Distance	Distance
	Volume	Volume
Operating. Mode	Direct/TBF	Direct/TBF
Accuracy +/- mm (Liquids)	3mm	3mm
Accuracy +/- mm (Solids)	-	-
Minimum Dielectric	≥1.5	≥1.5
Repeatability	+/- 1mm	+/- 1mm
Max Pressure (bar)	10	40 / 16
Maximum Temperature Flange(?C)	up to 150	up to 150 / up to 100
Ambient Temperature(?C)	-40 to +80	-40 to +80
Power Supply 24V DC	Yes	Yes
2-Wire Device	Yes	Yes
Output (4-20mA)	Yes	Yes
Protection Category	IP66/IP67	IP66/IP67
HART	Yes	Yes
PACTWARE	Yes	Yes
FM or CSA	Yes	Yes
NAMUR	Yes	Yes
ATEX EExia	Yes	Yes
ATEX EExd	Yes	Yes
EMC	Yes	Yes
HMI	Yes	Yes

HYCONTROL LEVEL TECHNOLOGIES

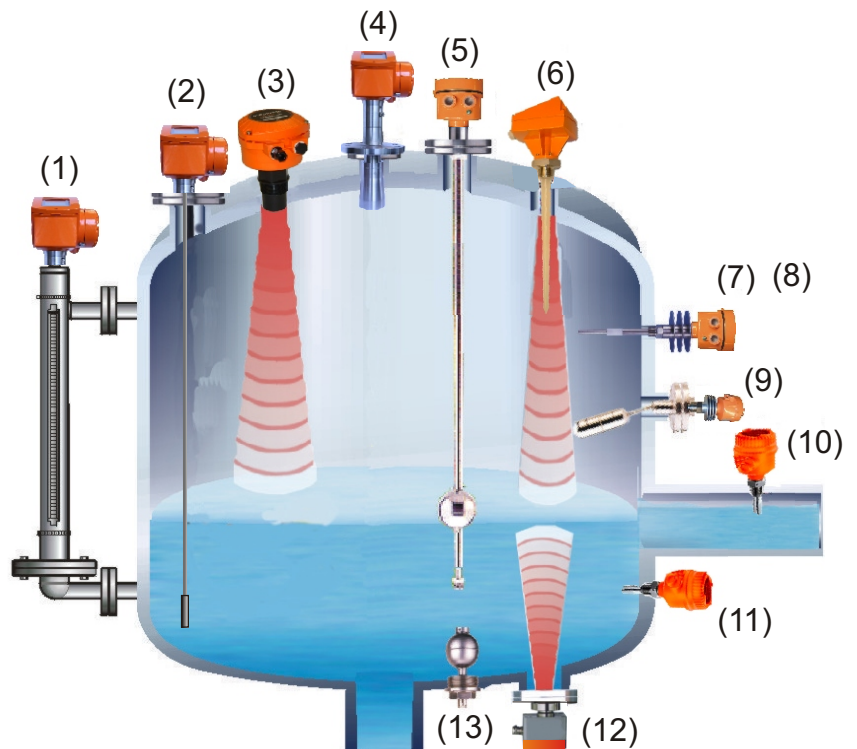
Product Range For Solids :-

- (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



CAT/HC/0010