

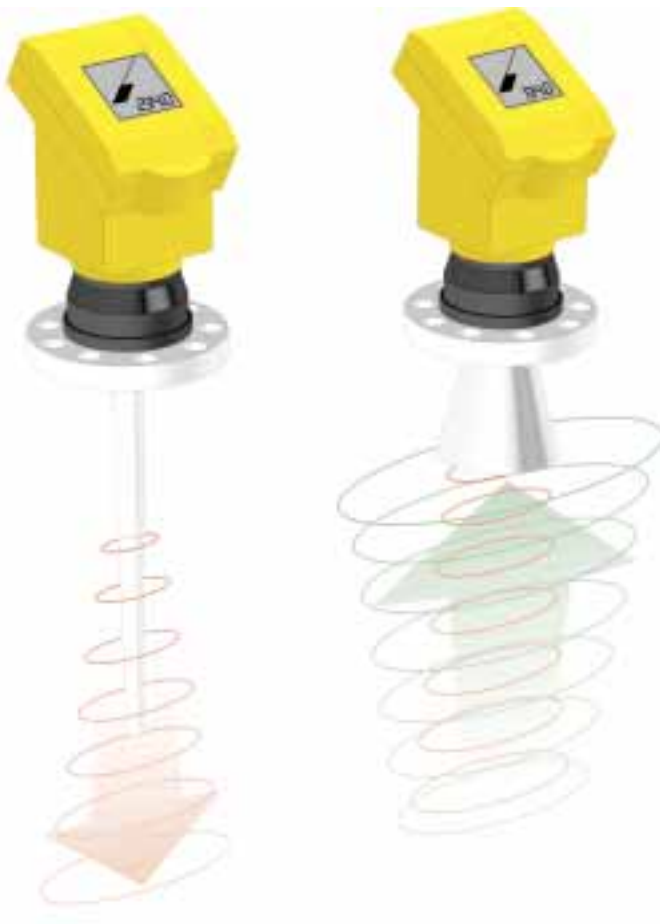
# OHMART VEGA



**VEGAPULS**  
Pulse Radar

Ohmart/VEGA is proud to offer the most complete line of radar gauges on the market. Keeping with the philosophy of "Total Level Measurement", Ohmart/VEGA can offer the right radar solution for every application. The first to introduce two-wire, loop powered radar, Ohmart/VEGA now offers the Puls 40 and Puls 50 series of loop powered gauges. The Puls 40 is a high frequency radar able to use small process connections. The Puls 50 uses larger antennas, and operates at a lower frequency. The Puls 56 HT is a high temperature, high pressure unit. The PULS 81 is a 4-wire device designed for the most difficult process conditions.

This family of gauges provides the ability to make the best use of radar technology, and allows Ohmart/VEGA to excel in providing customers with optimal solutions for their level and specialty measurement applications.



*Microwave pulse  
signal transmitted to  
product surface.*

*Reflected pulse  
signal returned from  
product surface  
to sensor antenna.*

## Principle of Operation

### Pulse

The sensor transmits energy in the form of microwave pulses. These pulses are directed toward a specific target that reflects the energy back to an antenna.

### Target

The amount of energy that returns to the antenna depends on the reflective properties of the material being measured. Reflectivity can be determined by examining two characteristics: conductivity and dielectric constant (DK).

### Return to the Antenna

The transit time of the microwave pulse that returns to the antenna is measured and used to calculate the distance to the target.

### Reflectivity

Conductive products such as water and acids are very reflective and can be measured regardless of the DK value. For non-conductive materials, the DK value alone determines the reflectivity. Materials with a low DK absorb a large portion of the microwaves transmitted by the radar sensor, thus reducing the energy reflected back to the antenna.

- **2-Wire/Loop Powered Available**

VEGAPULS 40/50 series instruments can be loop powered, reducing the costs for new installations. The existing wiring can be used when replacing older technology.

- **Top Mounting**

Mounting a radar gauge does not create any openings below the liquid level that could possibly become leak paths.

- **Microwaves Can Travel in Any Medium**

Since microwaves are electromagnetic waves, they are medium independent (e.g., sound waves use air to propagate) and are not affected by:

- vessel pressure fluctuations
- vacuum
- gas composition
- temperature

- **Part 15 FCC Approval**

VEGAPULS radar devices comply with FCC Part 15 regulations; no documentation or registration is required.

- **Variety of Process Connections Available**

1½" NPT thread up to 10" ANSI flanges are available.

- **Materials Measured**

VEGAPULS Series radar gauges can be used to measure both liquids and solids. With the exception of nuclear gauging, pulse radar can be successfully applied to make more level measurements than any other technology.

- **Low Maintenance**

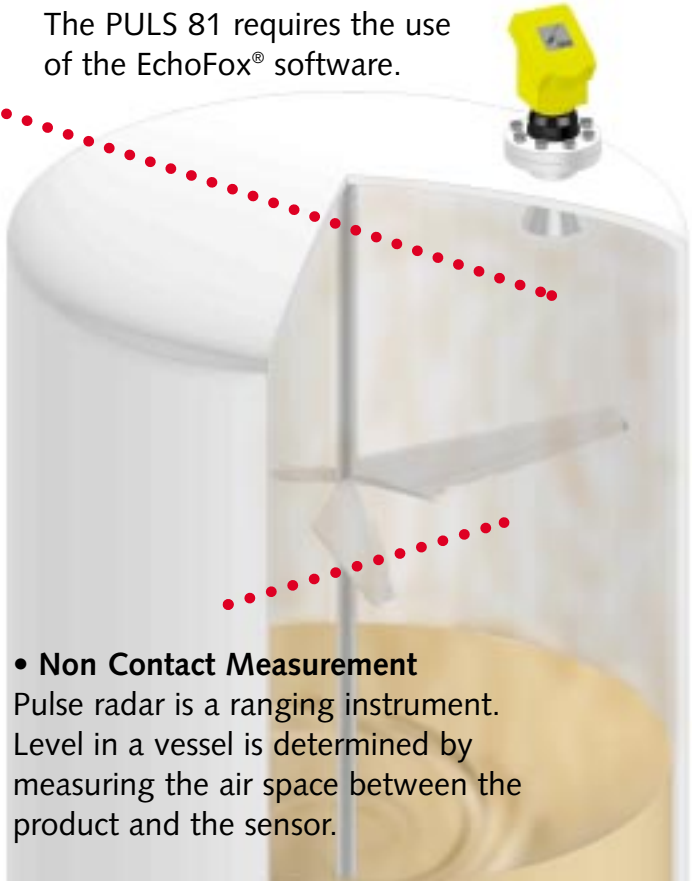
With no moving parts, there is usually no required regular maintenance.

- **Ease of Calibration**

VEGA radar can be programmed via one of three methods:

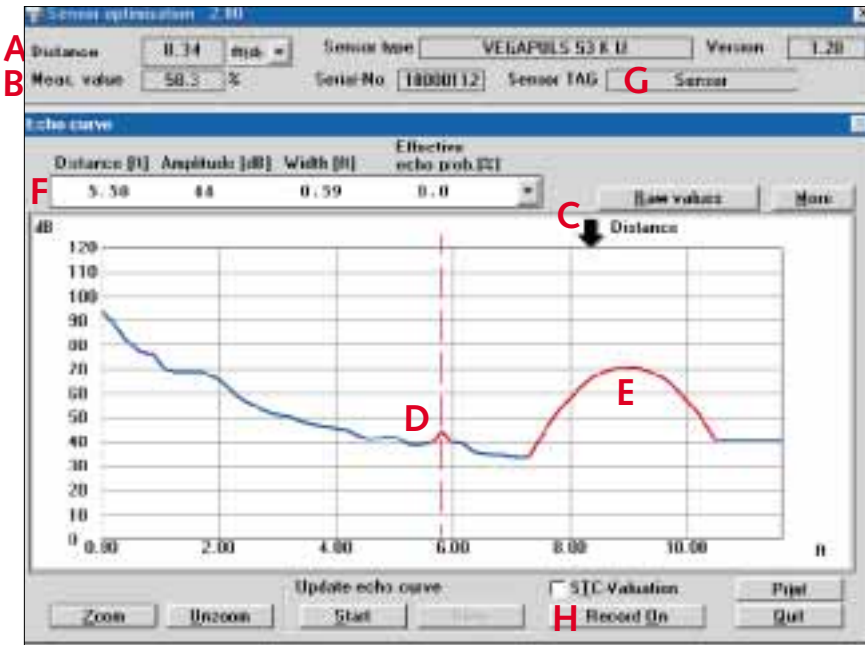
- VVO Echofox® software for a PC
- Minicom adjustment module
- HART® 275 Handheld calibration device

The PULS 81 requires the use of the EchoFox® software.



- **Non Contact Measurement**

Pulse radar is a ranging instrument. Level in a vessel is determined by measuring the air space between the product and the sensor.



- A Distance of product surface from the radar gauge.
- B Percent of calibrated span.
- C Arrow indicating the current signal being tracked.
- D Signal from vessel obstruction (e.g., agitator blade).
- E Signal from product surface being measured.
- F Information pertaining to signal referenced to movable red dotted line.
- G User's sensor tag number.
- H Activates recorder used to store signal information over time.

## VVO Software with EchoFox®

VVO software with EchoFox® is the PC based interface to the radar that allows the user to communicate with each gauge from anywhere along the 4 to 20 mA line. This software can also be used to program other VEGA instruments.

## Advanced Windows® based Programming

VVO software with EchoFox® can be installed on a PC that runs Windows® 3.1 or higher. The EchoFox® software in the head of each instrument is object oriented and sections of it can be turned on or off depending on the application.

## Upgrading Software

EchoFox® is stored in the head of the radar on a 'flash' EE-prom, which allows any software upgrades to be made over the 4 to 20 mA line from a PC.

## Calibration Backup, Reload & Transfer

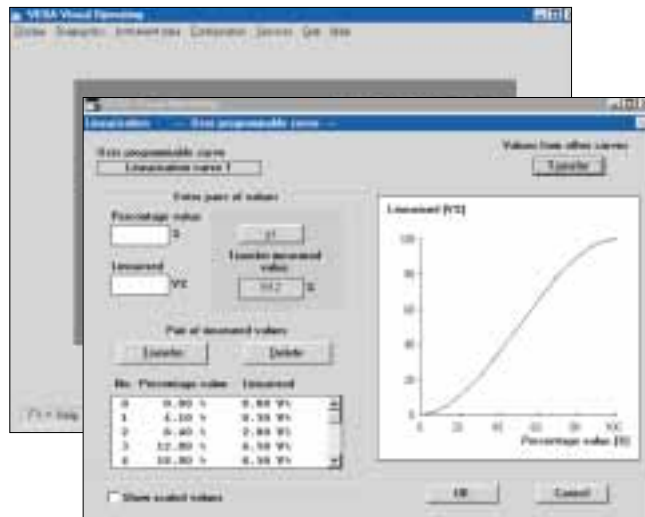
All calibration and programming can be saved to a disk or printed on a report. It can then be downloaded to a new or replacement radar unit.

## 'See What the Gauge Sees'

The Echo Curve screen allows the user to "see what the gauge sees". The user can then make programming adjustments that will help the gauge make decisions about which echo to track.

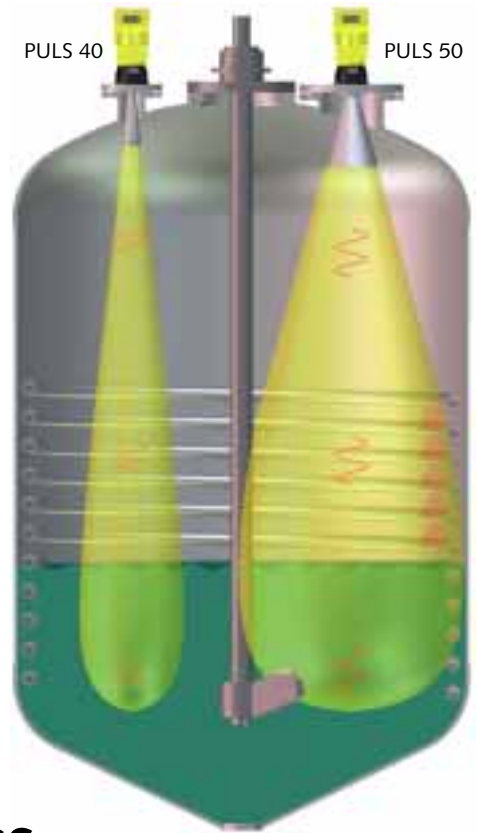
## False Echo Learn

EchoFox® can learn the characteristics of echoes that reflect off structures in the vessel. These echoes are then disregarded when determining the true echo.



## The Effect of Frequency

The VEGAPULS family of radar gauges from Ohmart/VEGA includes devices that operate at different frequencies. The frequency that should be used depends on the application. The PULS 50/80 series uses a low 6.3 GHz frequency. The PULS 40 series operates at 26 GHz. These frequencies influence the size of the antenna on the gauge, and the angle of the radar beam. The higher frequency has a smaller antenna and a tighter beam angle. The lower frequency of the PULS 50/80 uses a larger antenna and has a wider beam angle. The ability to offer both frequencies enables Ohmart/VEGA to provide the right gauge for every application.



## COMPARISON OF CHARACTERISTICS

<u>Features &amp; Applications</u>	<u>PULS 40 Series (26 GHz)</u>	<u>PULS 50 Series (6.3 GHz)</u>
Beam angle	Narrow	Wide
Sensitivity to build-up	High	Low
Products with a low dielectric constant	Ideal reflection	Limited reflection
Dry product applications	Not possible	Possible
Tall & narrow vessels	Ideal	Limited
Horizontal cylindrical tanks	Ideal	Limited
Stilling well measurements	Suitable for 3/4" or larger	Suitable for 2" or larger
Process vessels	Limited	Ideal
High-temperature applications	302° F (max. temp.)	752° F (max. temp.)
Foam	Not possible	Possible
Sensitivity to agitation	Medium	Low

### Liquid Gas Measurement

The low dielectric constant (DK) of liquid gases often means they must be measured by using a stilling well. The stilling well focuses the radar signal, allowing it to see a good reflection from a low DK material.

### Small Size Vessels

The small antenna of the PULS 40 series and the absence of a near zone make radar the ideal choice for small vessels. The antenna will not intrude into the vessel, which leaves more room for the process material.

### Measurement Through Plastic Vessels

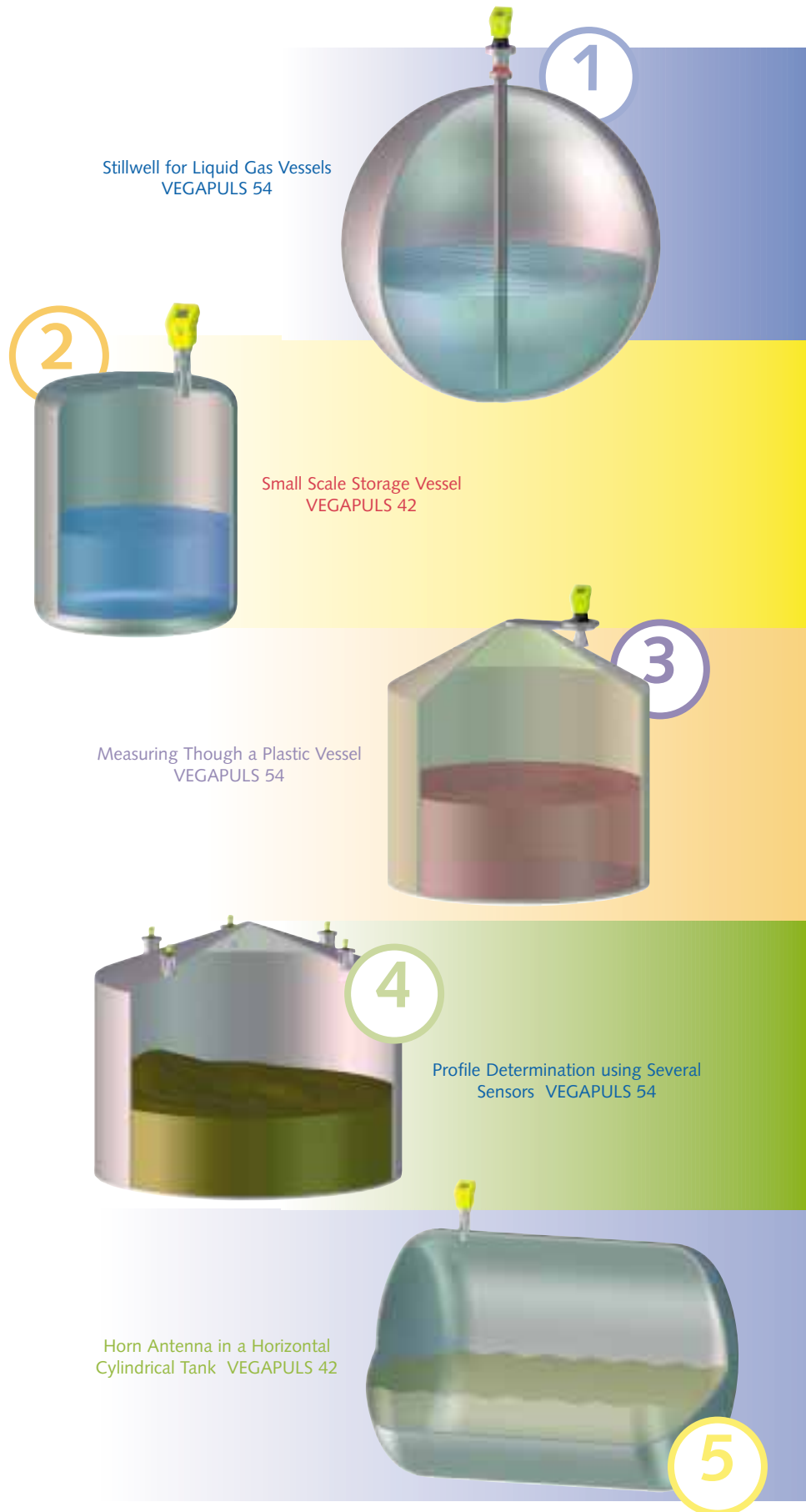
The low dielectric constant of non-conductive materials such as plastic and fiberglass allows the radar to measure level from outside the vessel. This allows vessels with corrosive products such as Hydrofluoric Acid to be measured non-invasively.

### Bulk Solids

Solids silos can be measured with one or several radar gauges. One gauge controls level, while several can provide a profile of the product. This can assist in measuring when angles are created from the fill and empty process.

### All Shapes of Vessels

Radar is a technology that can be used in vessels of many different sizes and shapes. Top-down mounting ensures ease of installation, and the non-contact technology allows for use even with vessel obstructions.



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Rod Antenna in a Horizontal Tank  
VEGAPULS 53

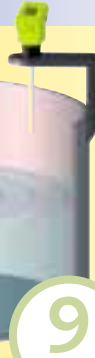
### Aggressive Products

Ideally suited to aggressive products such as acids and caustics, the PULS 53 can be provided with all wetted parts made of Teflon. This chemical resistance, and the gauge's ability not to be affected by vapors or fumes, make radar measurement ideal.

### Open Container Measurement

The lightweight design of the PULS 40/50 series makes simple bracket mounting possible for measurement of open container level.

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Rod Antenna in an Open  
Air Vessel VEGAPULS 51

### Distillation Columns

Radar mounts easily on external chambers or bridle pipes, and provides an ideal replacement for displacers or floats. A variety of connection concepts allows for the use of existing wiring.

External Chamber of a Distillation  
Column VEGAPULS 54

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Vessel with a Small Aperture  
VEGAPULS 42

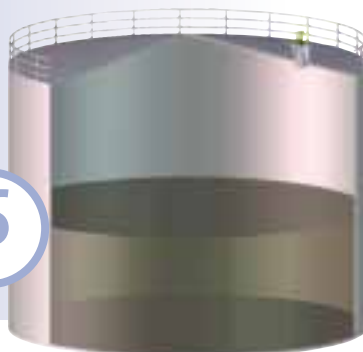


### Small Process Connections

The PULS 40 series is ideally suited for existing vessels with small process connections. Available in 1 1/2" NPT, the 40 series uses a high frequency to provide a focused microwave beam.

Horn Antenna in Bulk Tank  
VEGAPULS 44

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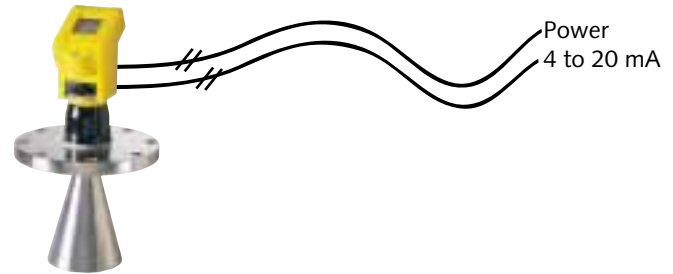


### Bulk Storage Tanks

The large, still surface of a storage vessel provides a simple measurement for radar. With no moving parts, the radar gauge is very low maintenance, and provides high accuracy.

### Four-Wire VEGAPULS 40/50 Configuration

20-72 VDC or 20-150 VAC power used with independent 4 to 20 mA output. Approved for Division 2 areas only.



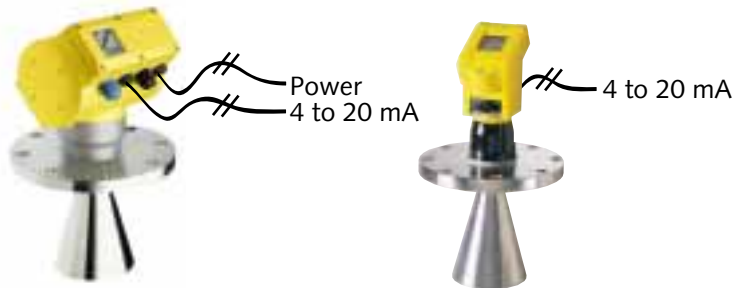
### Explosion Proof Options

#### • Four-Wire VEGAPULS 81

20-36 VDC or 90-250 VAC power used with independent 4 to 20 mA output. Approved for Division 1 areas.

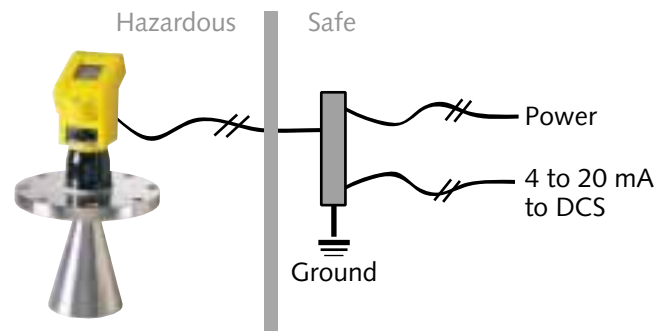
#### • Loop Powered/2-wire Explosion Proof

20-36 VDC power and 4 to 20 mA signal carried by 2-wire loop with a NEMA 4/7 housing. Available with the VEGAPULS 40/50 series only. Approved for Division 1 areas.



### Loop Powered/2-wire I.S. Non-incendive

14-36 VDC power and 4 to 20 mA signal carried by 2-wire loop. Available with the VEGAPULS 40/50 series only. Approved for Division 1 areas with a barrier, Division 2 areas without a barrier.

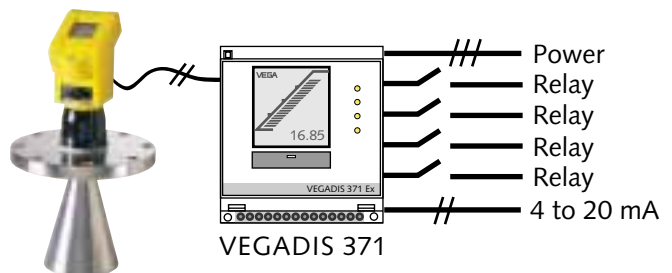


### Profibus

Sensor available with Profibus PA output from the head of the unit. Conforms to IEC 1158-2. 32 instruments per segment, 9-32 VDC, 31, 250k baud.

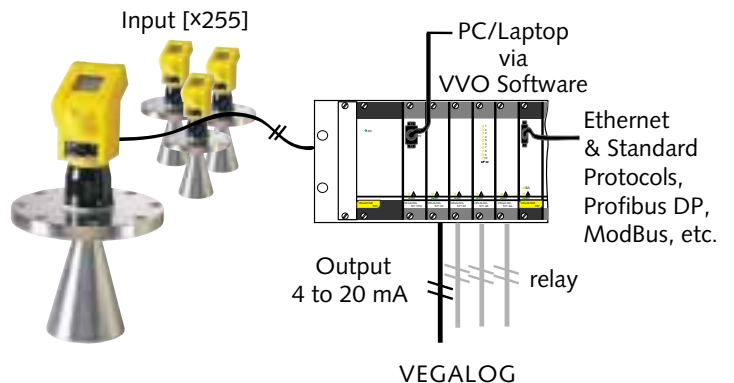
### VEGADIS 371

The VEGADIS 371 is supplied with an AC or DC voltage and in turn can supply 24 VDC to a loop powered device. It can accept either active or passive mA inputs. The VEGADIS 371 retransmits the 4 to 20 mA signal, provides a 4 digit liquid crystal display, and has up to 4 relay outputs.



### BUS Communication Using VEGALOG

Power and signal are both carried over a single 2-wire line from the VEGALOG. A single VEGALOG system is able to connect to 255 instruments (radar, ultrasonic and others) on multiple loops. The VEGALOG provides serial communication in a variety of protocols or multiple 4 to 20 mA outputs.



## Minicom

Minicom™ Module for 40/50 series with push-button LCD allows menu driven programming at the head of any 40/50 series instrument. A single Minicom™ module is removable and can be used on multiple instruments. Module can be mounted directly on the instrument or in the VEGADIS 50 remote display.



## Programming /Display Options



### Integral or Remote Display

VEGAPULS radar gauges are available with a 4 digit liquid crystal display that can be either integral or remote. VEGADIS 50 can be located up to 80 feet from the radar electronics and does not require independent power.



### PC/Laptop with EchoFox®

A PC with VVO EchoFox® software and VEGA-CONNECT offers the most advanced method of programming. This method is required when dealing with difficult or complex installations. The calibration and programming can be done from anywhere along the 4 to 20 mA line or at the head of the instrument. VVO EchoFox® software is required to program the VEGAPULS 81.



### HART® Hand Held Terminal

Any VEGAPULS 40/50 series radar can be programmed via a HART® Hand Held Terminal #275. No special Device Description (DD) is required.

- All PULS 40/50 series gauges are fully HART® compatible including AMS and Multidrop capability.

**VEGAPULS 40/50**

With its lower cost, 2-wire operation and compact design, the VEGAPULS Series 40/50 allows proven radar level technology to replace many existing level systems and provide significant benefits.

**DP Cells****Radar eliminates valve manifolds**

- No multiple leak paths below liquid surface.

**Radar eliminates remote seals with fill fluids**

- No leak paths at diaphragm below liquid surface.
- No constant recalibration due to diaphragm fatigue.
- Greater reliability while lowering maintenance associated with remote seals.

**Radar has no error in level output due to specific gravity shifts or temperature shifts**

**RF Capacitance & Admittance****Radar has no contacting element**

- Eliminates fouling of probe.
- Eliminates errors from viscous and adhesive build-up.

**Radar has no errors due to dielectric constant shift**

**Radar calibration does not require actual level change in vessel**

**Ultrasonic Transmitters****Radar has no errors due to:**

- Gas and vapors from liquid.
- Vacuum and pressure shifts.
- Temperature changes and gradients.

**Radar has no near zone (unsensed area) in front of sensor**

- Able to measure level to the end of instrument.

**Radar has higher temperature rating than ultrasonics**

**Radar has no problems in measurement due to air turbulence, dust and filling noise**

**Magnetostrictive & other float gauges****Non contact**

- Eliminates corrosion of contacting elements.
- Able to install in agitated services without any anchoring of an intrusive element.

**No moving parts**

- No float mechanism to wear or bind.

**Ease of installation (especially taller vessels)**

- No long element to lower through vessel top.

## VEGAPULS 42

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*Stainless Steel Mounting Boss*



## VEGAPULS 45

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*Stainless Steel Mounting Boss  
ANSI Flange Mounting*



## VEGAPULS 51/52

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*Standard Rod  
Kynar Mounting Boss*



## VEGAPULS 44

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*ANSI Flange Mounting*



### PULS 42

**Mounting:** 1 1/2" NPT 316 L StSt

**Antenna:** 1 1/2" StSt horn

**Operating Temperature:**  
-40°F to 302°F [-40°C to 150°C]

**Maximum Vessel Pressure:** 232psi

**Maximum Nozzle Height:**  
Consult Factory

### PULS 44

**Mounting:** ANSI 2", 3", 4", 6"  
150# StSt Flange

**Antenna:** StSt Cone Antenna 2", 3" & 4"  
**Operating Temperature:** -40°F to 302°F  
[-40°C to 150°C]

**Maximum Vessel Pressure:** 580psi  
**Maximum Nozzle Height:** Consult  
Factory

### PULS 45

**Mounting:** 1 1/2" NPT, 2", 3", 4", 6"  
150# StSt flange

**Antenna:** Integral stilling well antenna  
**Operating Temperature:** -40°F to 302°F  
[-40°C to 150°C]

**Maximum Vessel Pressure:** 580psi  
**Maximum Length:** 13 feet

### PULS 51/52

**Mounting:** 1 1/2" NPT made of  
PVDF Kynar

**Antenna:** Polypropylene rod antenna  
(PULS 51), Teflon rod antenna (PULS 52)

**Operating Temperature:** -40°F to 176°F  
[-40°C to 80°C] (PULS 51)  
-40°F to 266°F  
[-40°C to 130°C] (PULS 52)

**Maximum Vessel Pressure:** 45psi  
**Maximum Nozzle Height:** 2" [50mm]

## VEGAPULS 51/52

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

**Extended Rod**  
*Stainless Steel Mounting Boss*



### **PULS 51/52**

**Mounting:** 1 1/2" NPT 316 L StSt

**Antenna:** Polyphenylene Sulfide (Ryton) rod antenna (PULS 51), Teflon rod antenna (PULS 52)

**Operating Temperature:** -40°F to 302°F  
[-40°C to 150°C] (PULS 52)

-40°F to 248°F [-40°C to 120°C] (PULS 51)

**Maximum Vessel Pressure:** 232 psi

**Maximum Nozzle Height:** 4" or 10"  
[100mm or 250mm]

## VEGAPULS 53

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*ANSI Flange  
Mounting*



### **PULS 53**

**Mounting:** 150# ANSI StSt Flange  
(all wetted parts Teflon)

**Antenna:** Teflon rod antenna

**Operating Temperature:** -40°F to 302°F  
[-40°C to 150°C]

**Maximum Vessel Pressure:** 232 psi

**Maximum Nozzle Height:** 4" or 10"  
[100mm or 250mm]

*Sanitary-Clamp  
Mounting*



### **PULS 53 (Sanitary)**

**Mounting:** 2", 3" or 4" Sanitary Clamp  
(all wetted parts Teflon)

**Antenna:** Teflon rod antenna

**Operating Temperature:** -40°F to 266°F  
[-40°C to 130°C]

**Maximum Vessel Pressure:** 45 psi

**Maximum Nozzle Height:** 2" [50mm]

## VEGAPULS 54

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*Glass-Lined  
Horn*

*ANSI Flange  
Horn*



### PULS 54

**Mounting:** 150# ANSI StSt Flange standard  
Viton, Kalrez or Graphite sealing system.

**Antenna:** Horn made of 316 Ti StSt  
(glass lined optional)

**Operating Temperature:** -40° to 302°F  
[-40°C to 150°C]

**Maximum Vessel Pressure:** Dependent on  
flange rating

**Maximum Nozzle Height:** 8" [203mm]  
standard, extensions possible

## VEGAPULS 56 HT

NEMA 4X Valox housing or  
NEMA 7, 4X Aluminum housing

*ANSI Flange  
Mounting*



### PULS 56

**Mounting:** 150#, 300# & 600# ANSI StSt  
flange with Graphite sealing system.

**Antenna:** Horn made of 316 Ti StSt

**Operating Temperature:** -40°F to 662°F  
[-40°C to 350°C]

**Maximum Vessel Pressure:** 966 psi (higher  
pressure optional)

**Maximum Nozzle Height:** 8" [203mm]  
standard, extensions possible

## VEGAPULS 81 Ex

NEMA 7, 4X

*ANSI Flange  
Mounting*



### PULS 81

**Mounting:** 150# ANSI StSt flange standard

**Antenna:** Horn made of 316 Ti StSt  
Rod antennas made of PTFE variant Hostafion  
for 4" or 10" nozzle heights.

**Operating Temperature:** -40°F to 302°F  
[-40°C to 150°C]

**Maximum Vessel Pressure:** Dependent on  
flange rating

**Maximum Nozzle Height:** 8" [203mm] standard,  
extensions possible on horn version

## RADAR = RELIABILITY

Environmental Influence					
	Temperature	Pressure	Vapor mist	Density of vessel contents	Turbulence
Differential pressure transmitters	Highly dependent	Dependent	No influence	Highly dependent	Practically no influence
Displacers	Dependent	Slightly dependent	No influence	Dependent	Little influence due to guide tube
Floats	No influence	Slightly dependent	No influence	Dependent	Little influence due to standpipe
<b>Radar</b>	<b>No influence</b>	<b>Slightly dependent</b>	<b>No influence</b>	<b>No influence</b>	<b>Little influence</b>

Nuclear • Radar • Ultrasonic • Hydrostatic • Vibration • Nuclear Interface • RF Capacitance • Weigh Scale • Density

