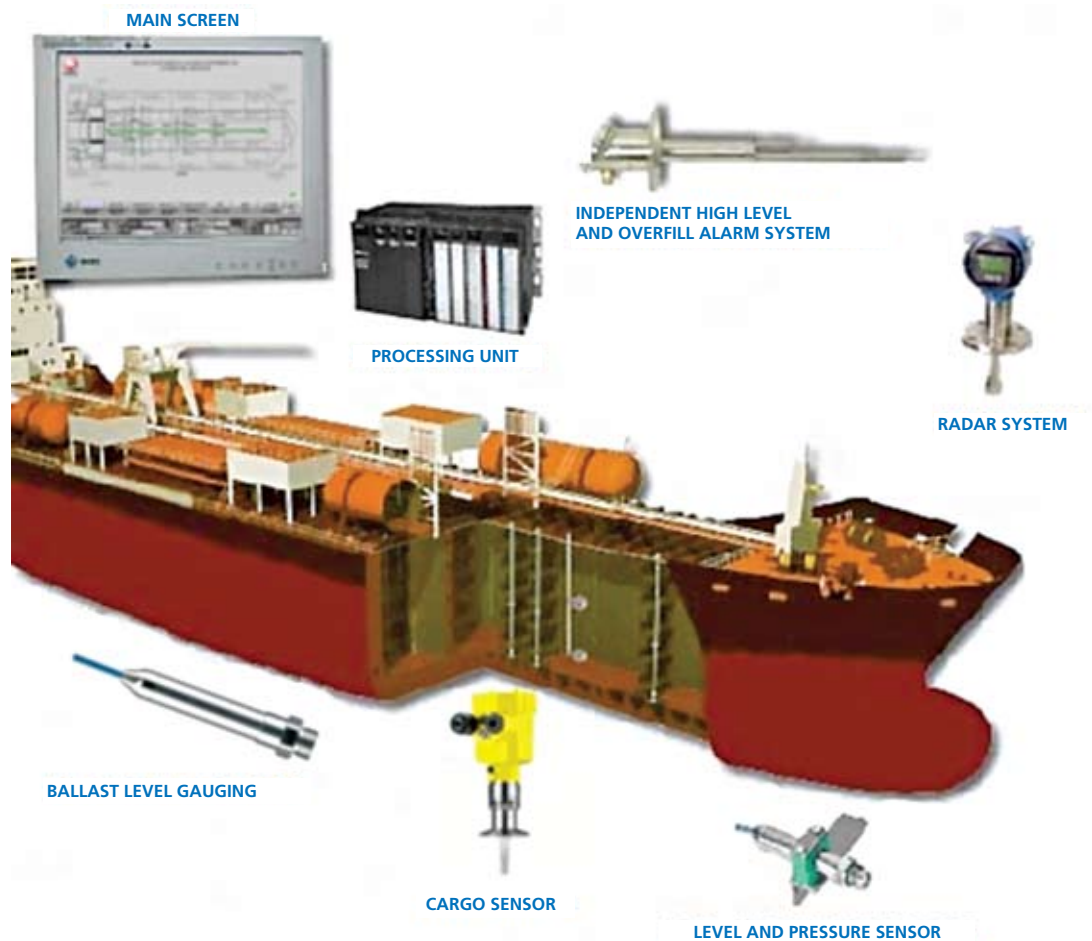


# NORDIC TANK GAUGING SYSTEMS



## OVERVIEW

Nordic Flow Control's Tank Gauging Systems, with their user-friendly operation and displays, are simple to operate and greatly reduce costly training time.

Our Tank Gauging Systems use Windows® based Operating Systems (OS), allowing them to be easily configured and interface with other devices and systems. Information is displayed at a touch of the screen with instantly recognisable icons. They provide gross or net corrected tank volume, product level, water level and temperature information in computer graphics by means of communications protocols such as TCP/IP or Modbus RTU or through the simplest form of analogue meter display.

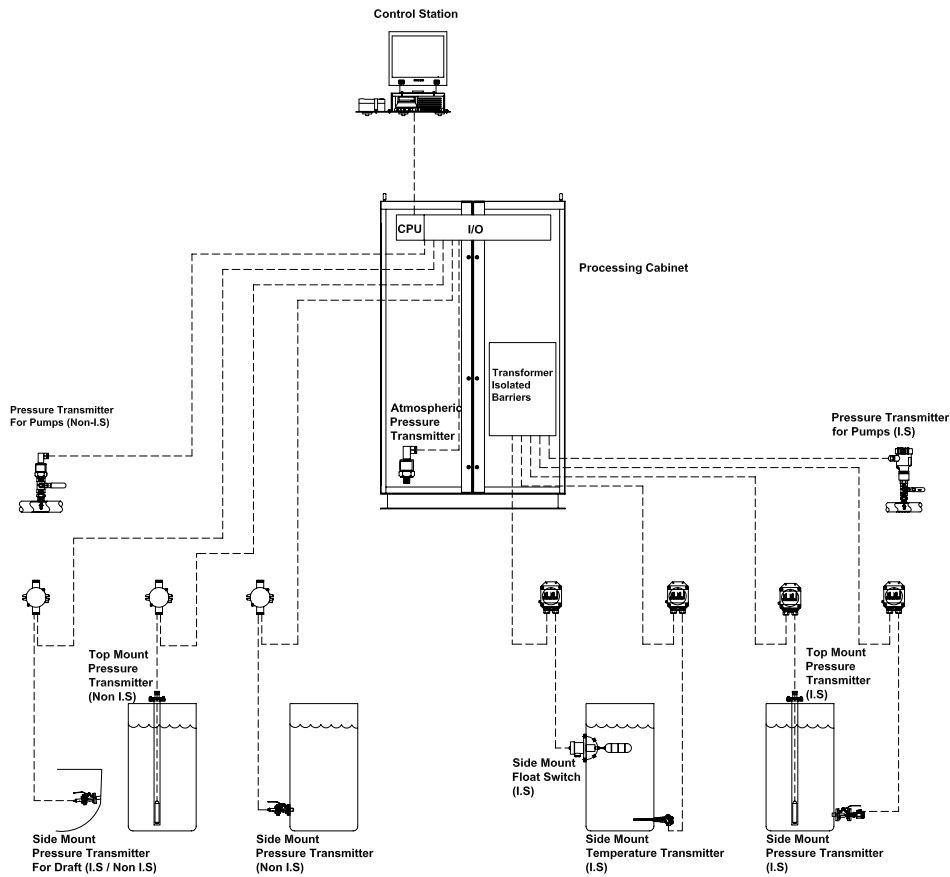
The key to our systems' accuracy is the micro-processing unit, which reads signals and conveys it via OPC or the I/O driver to the SCADA software. The systems also have trim and list corrections for more accurate readings.

All processed information is able to interface with other systems, e.g. Loading Computer Systems, Distribution Control Systems, Alarm Monitoring Systems via Modbus RTU or TCP/IP protocol, thus providing the most accurate inventory management and in-tank detection at all times.

### Benefits

- Reduced training time
- Easily configured to interface with other devices and systems
- Remote monitoring is possible even off-vessel
- Real-time tank gauging information
- Customisable tank gauging solutions

# SYSTEM OVERVIEW



The processing unit serves as the brain for all tank gauging systems. It tabulates information and sends them to requested users such as SCADA workstations, Loading Computer Systems, Distribution Control Systems, Alarm Monitoring Systems and Voyage Data Recorders.

## HYDROSTATIC PRESSURE TRANSMITTER

### Overview

Nordic Flow Control's Electro Pressure Transmitter System uses a transmitter to measure the hydrostatic pressure produced by a column of liquid of a given height in a tank. We offer different mounting positions for the various tanks, and we are able to provide for submerged and non-submerged applications.

The transmitter produces 4 to 20 mA electrical signals proportional to the pressure of the tank's water level. The pressure measured is directly proportional to the level of the liquid in the tank with a specific gravity of the content, and is also equal to the pressure of the liquid column plus the surface pressure.

Surface pressure of liquids in tanks open to the atmosphere is zero and usually negligible. Most pressure sensors liquid is greater than atmospheric pressure, hence a differential pressure sensor can be used and the total pressure will be greater than the head of liquid column. In this case, the pressure acting on the surface is subtracted from the total pressure, leaving only the pressure due to the column of liquid.

### Features

- Signal is processed by the micro-processing unit into useful information
- Information is displayed in the Control Panel using Nordic's software programming
- Trim and list compensation using draught sensors
- Absolute sensor's compensation is done by the Atmosphere Sensor

# SUBMERGED APPLICATIONS

## TECHNICAL SPECIFICATIONS

### Pressure Transmitter

Housing	Stainless Steel
Protection	IP68
Length (Cable)	5 to 15m depending on customer's requirements
Process Connection	DN25 Flange/DN50 (For top mount and top side mount) G1" A (for side mount)
Mounting	Top/Side/Side + Closing Screw
O Ring Material	HPS-Viton
Zero and Span	Integral
Electrical Approval	Intrinsically safe/Non-intrinsically safe
Cable	PU for fuel oil tanks and PE for others
Output	4 to 20 mA
Certification	Marine type approval
Accuracy	0-2% / 0.25%
Application	Ballast, bilge, fuel oil tanks



### Top Mount Pressure Transmitter

Housing	Stainless Steel
Protection	IP68
Length (Cable)	5 to 50m/depending on customer's requirements
Process Connection	DN50 flange with cable gland
Mounting	Top mount
Electrical Approval	Intrinsically safe/Non-intrinsically safe
Electrical Connection	Ø 8mm cable end 2 wire (with filter for gauge type)
Seal	HPS-Viton
Cable	PU for fuel oil tanks and PE for others
Output	4 to 20 mA
Certification	Marine type approval
Accuracy	0.25%
Applications	Fresh water, potable water, fuel oil, bilge, ballast water (c/w sleeve) and sea water (c/w sleeve) tanks



## Submerged Type Transmitter with Rubber Sleeve

Housing	Stainless steel (c/w sleeve for top mount ballast application)
Protection	IP68
Length (Cable)	15m (sub)/5m (dry)/As per customer's requirements
Process connection	PN10 DN50 Flange (for top mount)/ G1" A/1/2" NPT or PN10 DN25 Flange (for side mount)
Mounting	Top/Side/Top-Side mount
O Ring Material	HPS-Viton
Zero and Span	Integral (HART optional)
Electrical Approval	Intrinsically safe/Non-intrinsically safe
Cable	PU for fuel oil tanks and PE for others
Output	4 to 20 mA
Certification	Marine type approval
Accuracy	0.25% (0.1% optional)
Applications	Ballast tanks



## NON-SUBMERGED APPLICATIONS

### TECHNICAL SPECIFICATIONS

<b>Non-Submerged Level/Pressure Transmitter</b>	
Housing	AISI 316L/Aluminium/Plastic PBT
Protection	IP66
Process Connection	Threaded G1/2" A NPT
Mounting	Top/Side mount
Electrical Approval	Intrinsically safe/Non-intrinsically safe
Electrical Connection	Gland M20/IP66
Seal	FPM Viton
Output	4 to 20 mA (HART)
Certification	Marine type approval
Accuracy	0.20%
Accessory (Optional)	Local display/Display unit with range adjustable facility
Applications	Pump pressure, fresh water, sea water, fuel oil tanks

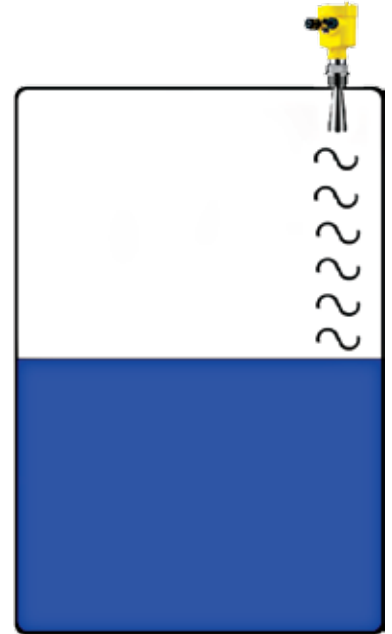


# NON-CONTACT RADAR LEVEL TRANSMITTER

## Overview

Extremely short microwave pulses are emitted by the antenna system to the measured product, reflected by the product surface and received again by the antenna system. They spread with light velocity and the time from emission to reception of the signals is proportional to the level in the vessel. A special time spreading procedure enables reliable and accurate measurement of extremely short time periods. The radar instruments work with low emission power in the K-band frequency range.

The software then detects the level echo reliably out of a number of false echoes and measures it precisely. By simply entering the vessel dimensions, a level-proportional signal can be displayed. Adjustments for emptied and filled vessels are not necessary.



## Features

- Unaffected by Temperature and Pressure

The propagation of microwaves is unaffected by the ambient temperature and pressure. Hence, these radar sensors are ideal for use under extremely difficult process conditions. Pressures from vacuum up to 160 bar and temperatures from -40°C to 200°C are of no problem for radar measurement.

- Unaffected by Product Properties

Fluctuations in product compositions or even complete product changes do not influence the measuring result. A fresh adjustment is not necessary.

- Frequency Ranges for All Applications

K-band sensors operate in a frequency range of more than 20 GHz and very small and compact process fittings can be used. Due to the high signal focusing, a very high level of accuracy from the measuring system can be achieved.

## TECHNICAL SPECIFICATIONS

Housing	Plastic/Aluminium/Stainless Steel
Protection	IP66/IP67/IP68 (0.2 bar)
Process Connection	DN50/DN100 PN16, DIN 24501/316L
Process Fitting	Thread or flange
Process Temperature	-40°C to 200°C
Process Pressure	-1 to 40 bar (-100 to 4,000 kPa)
Mounting	Top/Side mount
Measuring Range	Up to 35m
Electrical Approval	Intrinsically safe/Non-intrinsically safe
Electrical Connection	Gland M20x 1.5
Seal	PTFE/PFA/PVDF encapsulated
Cable	Optional for IP68 version
Output	4 to 20 mA (HART)
Certification	Marine type approval
Accuracy	+/- 3mm
Emitting Frequency	K-band
Accessory (Optional)	Local display
Applications	Cargo tanks, storage and process vessels under arduous process conditions



# GUIDED RADAR LEVEL TRANSMITTER

## Overview

High frequency microwave pulses are coupled on a cable or rod and guided along the probe. The pulses are reflected by the product surface and received by the processing electronics. The computer identifies these level echoes, which are measured, evaluated and converted into level information by the computer software.

Adjustments with the medium are no longer necessary. The sensors are preset to the ordered probe length. The cable and rod versions can be shortened to adapt to individual conditions on site.

## Feature

Unaffected by Dust, Steam and Product Fluctuations

Process conditions such as high dust and noise generation or very steamy atmospheres do not influence measurement accuracy. Strong build-up on the probe or vessel wall does not influence the measurement result.



## TECHNICAL SPECIFICATIONS

Version	Exchangeable cable (Ø 4mm), rod (Ø 6mm)
Housing	Plastic/Aluminium/Stainless Steel
Protection	IP66/IP68
Process Connection	Threaded ANSI 3/4" NPT, 316L
Process Fitting	From G3/4"A
Process Temperature	-40°C to 150°C
Process Pressure	-1 to 40 bar (-100 to 4,000 kPa)
Mounting	Top/Side mount
Measuring Range	Up to 20m
Electrical Approval	Intrinsically safe/Non-intrinsically safe
Electrical Connection	Gland M20x 1.5
Seal	VITON O-Ring
Output	4 to 20 mA
Certification	Marine type approval
Accuracy	+/- 3mm
Emitting Frequency	K-band
Accessory (Optional)	Local display
Applications	Liquids and light weight solids, cargo, fuel oil tanks



# ELECTRO PNEUMATIC BUBBLING TRANSMITTER

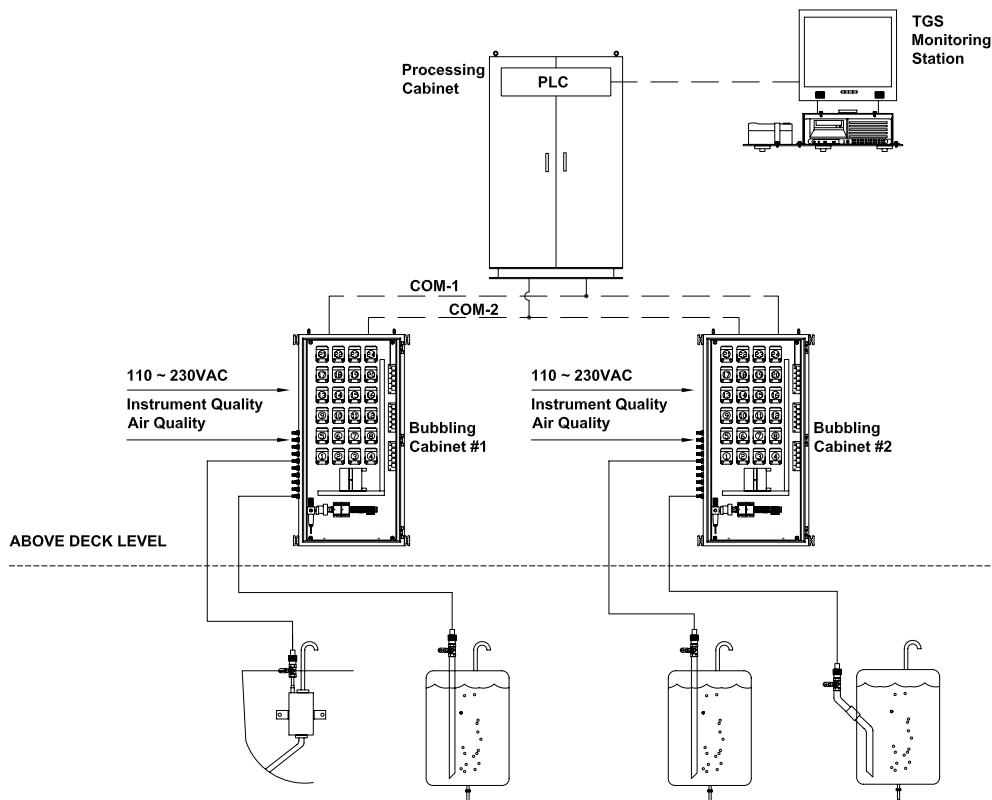
## Overview

The hydrostatic pressure within the tank is measured by inserting a narrow tube into the liquid and applying compressed air to the pipe so that the liquid column in the pipe is pushed down and air bubbles are formed in the liquid. These bubbles give the method its name. The pressure of the air in the pipe is now equal to the pressure of the liquid column and can be measured with a pressure transducer which converts the pressure into an electrical signal. The compressed air can be supplied from the main air utility via a reducing valve or by using a miniature compressor.

## Features

- Additional analogue inputs for auxiliary measurements
- Redundant digital output Modbus protocol
- Low air consumption
- Modular compact cabinet
- Overpressure and water penetration safe
- Approved by numerous major classification bodies
- Suitable for corrosive materials
- Suitable for portable water tank (c/w separator)

## Centralised System



The electro pneumatic level measuring cabinet consists of 8-channel pneumatically independent modules. A microprocessor carries out the data processing, the digital conversion and the management of two redundant digital communication lines RS485/422 are done in Modbus protocol. The cabinet has to be installed above the main deck in safe and protected areas. This cabinet is suited for all types of vessels. The pneumatic separator is used for potable and drinking water tanks to isolate the bubbling air in contact with the medium.

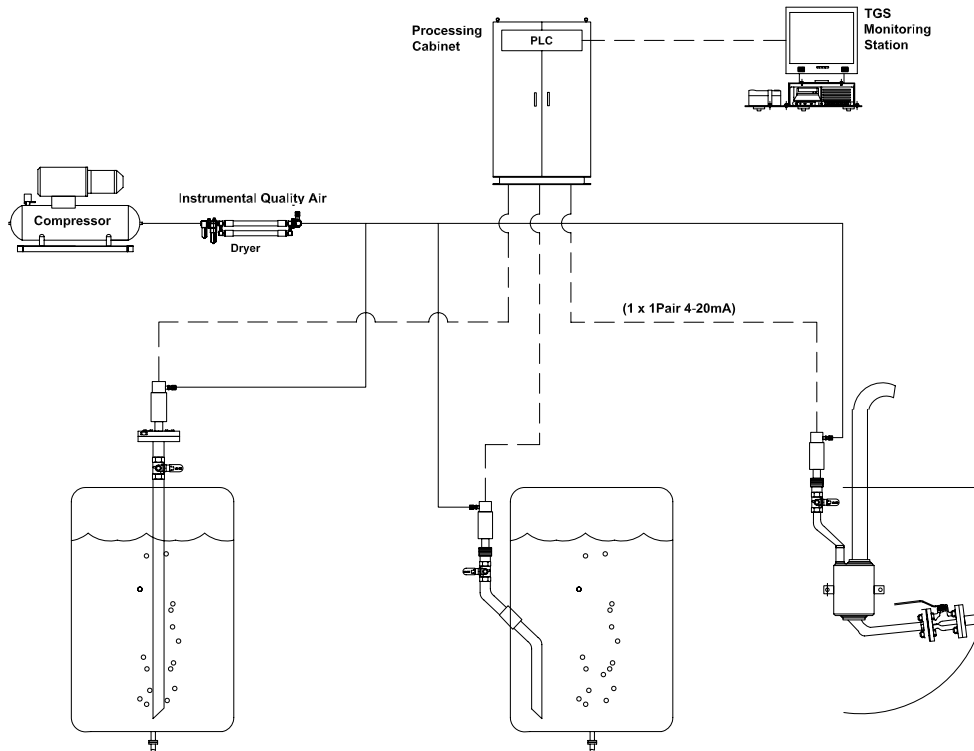
The centralised system is suitable for installation in hazardous areas.



# Decentralised System

The Decentralised System is designed for measuring the level of all types of liquid products in all kinds of tanks such as ballast tanks, service tanks, and others from the hydrostatic pressure of an airflow bubbling through a pipe which reaches the bottom of the tank. This pressure is transmitted to an electronic conditioner including a pressure sensor, providing an electrical analogue output signal.

This system is more cost efficient for smaller vessels and is designed to avoid common malfunctions such as lack of air pressure supply or overpressure.



## TECHNICAL SPECIFICATIONS

	Centralised System	Decentralised System
Channel Number	Max 24 per cabinet	Individual
Communication	Two redundant RS485/422 ports	4 to 20 mA
Pneumatic Connections	Copper pipes OD 8mm	Copper pipes OD 8mm
Accuracy	0.3%	0.3%
Electrical Power Supply	230/115V AC	12 to 28V DC
Electrical Consumption	0.5 VA per channel	0.5 VA
Air Supply	Max 6 bar	Nominal 6 bar
Installation Environment	Safe and protected area	Safe and protected area
Air Consumption	10 l/h per Channel	10 l/h, Regulated
Cabinet Protection	IP65	IP66/67
Operating and Storage Temperature	0°C to 70°C	Nominal -40°C to 85°C
Temperature Compensation Range	0°C to 70°C	0°C to 70°C
Temperature Drift	<0.015%/°C within the compensation range	<0.015%/°C within the compensation range
Optional Applications	Analogue input card	
	Service tanks, ballasts and drafts	

# JUNCTION BOX

We offer two types of junction boxes, the Ventilated Junction Box, and the Non-Ventilated Junction Box.

## Ventilated Junction Box



## TECHNICAL SPECIFICATIONS

Housing Material	Plastic PBT
Ground Terminal	316Ti/316L
Weight (Approx)	0.5 kg
Ambient Temperature	-40°C to 85°C
Storage and Transport Temperature	-40°C to 85°C
Cable Gland	2 x cable entry M20x1.5 (cable Ø 5 to 9mm)
Screw Terminals	For wire cross-section up to 2.5mm <sup>2</sup>
Electrical Protective Measures	IP65/EEX1a II CT6
Over Voltage Category	III
Protection Class	III
Optional	Can be used for open deck installation with additional protection cover
Marine Type Approval	GL, LRS, ABS, CCS, RINA, DNV
ATEX	For connection to pressure transmitters with ATEX certificate

## Non-Ventilated Junction Box



## TECHNICAL SPECIFICATIONS

Housing Material	Brass
Ground Terminal	Brass/Stainless Steel
Weight (Approx)	0.6kg
Ambient Temperature	-40°C to 85°C
Storage and Transport Temperature	-40°C to 85°C
Cable Gland	2x Cable Entry 3/4" (cable Ø 5 to 8mm)
Screw Terminals	For wire cross-section up to 2.5mm <sup>2</sup>
Electrical Protective Measures	IP56
Over Voltage Category	III
Application	Absolute type, pressure transmitter, radar transmitter, temperature transmitter etc
Protection Class	III

