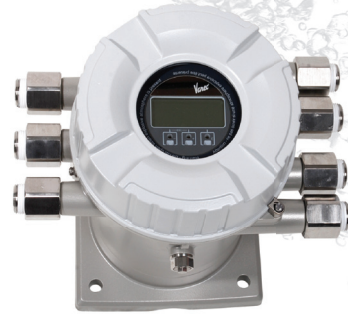# NRF81 Series Tankside Monitor

Fulfills the exacting demands of tank inventory management, inventory control, custody transfer, loss control, and total cost saving.



## Highlights

- SIL2 certified (Min, Max, Continuous level)
- Up to 6 SIL relay outputs
- Wide range of output signals including V1, MODBUS RS-485, HART protocol
- Interfaces to FuelsManager via the 8130 Remote Terminal Unit or 8300 series TankGate
- Integration of HART instrumentation for temperature, water level, pressure, and overfill prevention sensor
- Robust IP66/68, NEMA Type 4x/6P enclosure
- Intrinsically safe power supply and communication for FMR53x radar level devices
- Approved for use in explosion-hazardous areas
- User-friendly operating menu (multi-lingual)
- Provides communication to PLC, DCS, and SCADA systems
- Weights & Measure-approved for use in custody transfer applications

## NRF81 TSM Application

The Tank Side Monitor NRF81 is designed to integrate and collect tank gauging data and provide detailed information for storage and process applications. It can be used with Varec radar tank gauges as well as combined with other HART compatible devices. It fulfills the exacting demands of tank inventory management, inventory control, custody transfer, loss control, total cost saving, and safe operation.



Example Tank Gauging System

## Product Options

### Approvals & Certifications

- FM, CSA, ATEX, IEC Ex

### Output Options

- Single or dual MODBUS RS-485, Ex d HART, Ex i HART, and V1

### Gland Entry

- Metric, NPT, G

### Weight + Measure Approval

- Custody transfer, NMi type approval acc. to OIML R85, API 3.1B, ISO4622, factory calib. certificate
- Custody transfer, PTB type approval, factory calib. certificate
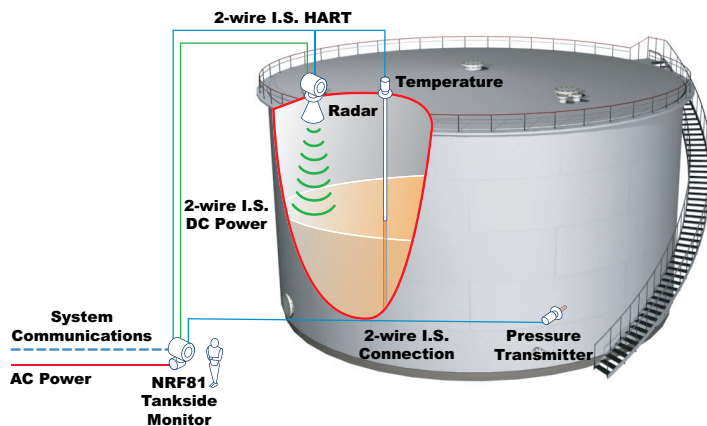
## Operating Principle

The NRF81 TSM is typically installed at the bottom of the tank for ease of access and allows access to all connected tank sensors.

Typical process values measured by the sensors are:

- Level
- Temperature (point and/or average)
- Water level (measured by capacitive probe)
- Hydrostatic pressure (for hydrostatic tank gauging)
- Secondary level value (for critical applications)

The NRF81 TSM collects the measured values and performs serval configurable tank calculations. All measured and calculated values can be displayed at the on-site display. Also, through a field communication protocol, the NRF81 TSM can transfer the values to an inventory control system like FuelsManager.

To enable accurate volume calculation, the NRF81 Tankside Monitor will accept an input from either an average temperature probe 453x ATC series of temperature devices (via twisted pair cables, HART protocol) or via spot temperature element (via 2/3/4-wire RTD signal). Once installed, all calibration and operating functions can be made via both:

- Local display; operation via the local display is possible without opening the device

- Configuration software (e.g., DeviceCare) connected via HART and the service port (CDI)

# Technical Specifications

## Physical

| | |
|---|---|
| Net Weight | 12 kg (26 lbs) for housing plus electronics |
| Enclosure Materials | • Electrical compartment: aluminium (AC 43000 T6) or stainless steel (316L)<br>• Window: glass<br>• Rated IP66/68, NEMA Type 4x/6P enclosure |
| Cable Specifications | Standard device cable for the power line<br><br>**HART communication line:** Standard device cable only if analog, otherwise shielded cable<br><br>**MODBUS communication line:** Shielded cable<br><br>**V1 communication line:** Twisted pair screened or unscreened cable |
| Cable Entry | NPT, Metric, BSP (G) class threads |

## Power

| | |
|---|---|
| Power Requirements | High voltage type: 85 to 264 VAC, 50/ 60 Hz, 28.8 VA<br>Low voltage type: 52 to 75 VAC, 50/60 Hz, 21.6 VA<br>19 to 64 VDC, 13.4 W |
| Safe Electrical Isolation | Bus inputs are electrically isolated from the other electronics |

## Environmental

| | |
|---|---|
| Storage Temperature | -50 to +80° C (-58 to +176° F) |
| Ambient Temperature | • Device: -40 to +60° C (-40 to +140° F)<br>• Display Module: -20 to +70° C (-4 to +158° F) |
| Approvals | FM, ATEX, IEC Ex, or NEPSI |

## Display/Programming

| | |
|---|---|
| Display (LCD) | Four line, white background lighting, switches to red for device errors<br>Language selection: English, German, Japanese |
| Programming | • Local display; operation via the local display is possible without opening the device<br>• Configuration software (e.g. DeviceCare); connected via:<br>– HART<br>– Service port (CDI) with optional Commubox FXA291 |

## Intelligent Functions

- The device has a sealable locking switch according to the Weight & Measure requirements. This switch locks all software parameters related to the measurement. The switching status is indicated on the display and via the communication protocol.

## Inputs and Outputs

| | |
|---|---|
| Primary Outputs | • MODBUS RS485<br>• V1<br>• 4-20mA HART Ex d/XP, RTD input<br>• 4-20mA HART Ex i/IS, RTD input |
| Secondary I/O Analog | • 1 x "Ex d/XP 4-20mA HART + RTD input"<br>• 2 x "Ex d/XP 4-20mA HART + RTD input"<br>• 1 x "Ex i/IS 4-20mA HART+ RTD input"<br>• 2 x "Ex i/IS 4-20mA HART+ RTD input"<br>• 1 x "Ex i/IS 4-20mA HART + RTD input"<br>• 1 x "Ex d/XP 4-20mA HART + RTD input"<br>• None |
| Secondary I/O Exd | • 1 x "2x relay + 2x discrete I/O"<br>• 2 x "2x relay + 2x discrete I/O"<br>• 3 x "2x relay + 2x discrete I/O"<br>• 1x "MODBUS RS485"<br>• 1x "MODBUS RS485", 1 x "2x relay + 2x discrete I/O"<br>• 1x "MODBUS RS485", 2 x "2x relay + 2x discrete I/O"<br>• None |
| HART Ex ia/IS Active Input | The HART Ex ia/IS active input is available by default. It needs not to be chosen explicitly when ordering a device. |