NMR81 Series Radar Tank Gauges

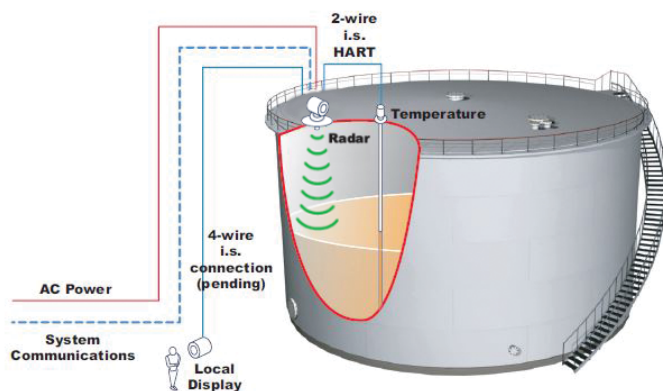Continuous and non-contact precision level measurement with an accuracy rate of ±0.5 mm.

Highlights

- SIL2 and SIL3 certified (Min, Max, Continuous level)
- Up to 6 SIL relay outputs
- Measures liquid level to an accuracy of ±0.5 mm (0.02 in)
- Wetted parts are completely separated from the electronic circuit
- Wide range of output signals including V1, MODBUS RS-485, HART protocol
- Tank top mounting as small as 2"/DN50 flange
- 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
- Suitable for atmospheric and high pressure applications up to 25 bar/2.5 MPa (362 psi)
- Robust IP66/68, NEMA Type 4x/6P enclosure
- Direct connection of spot or average temperature sensor
- Simplified installation and trouble-free operations due to easy connection to major DCS systems via open protocols
- Approved for use in explosion-hazardous areas
- User-friendly operating menu (multi-lingual)
- Weights & Measure-approved for use in custody transfer applications
- Unique drip-off antenna design eliminates measurement error due to condensation build-up.

NMR81 RTG Application

The NMR81 intelligent level radar tank gauge is designed for high accuracy liquid level measurement in storage and process applications. The drip-off lens antenna has an 80 GHz transmitting frequency for custody transfer applications. The NMR81 fulfills the exacting demands of tank inventory management, inventory control, custody transfer, loss control, total cost saving, and safe operation.

Example Tank Gauging System

Technical Specifications

Physical

Net Weight	• Housing with electronics: approx. 12 kg (26 lbs) • Sensor and processor connections: 6 to 36 kg (13 to 80 lb); dependent on the device version

Enclosure Materials	• Housing: Aluminum
	• Antenna and Process Connection:
	  • 316L: Shaft and flange
	  • PTFE: Antenna lens
	  • FKM/HNBR/FFKM: Seal
	• Rated IP66/68, NEMA Type 4x/6P enclosure

Flange Type	• NPS ASME B16.5, 150 lb, 2" to 10" • NPS ASME B16.5, 300 lb, 2" to 6" • PN10/16, DN50 to DN250 • PN25/PN40, DN50 to DN150 • UNI flange DN150/6"/150, max PN1/Cl.14.5/1K, suitable for DN150 PN10/16, NPS 6" Cl.150, 10K 150 • UNI flange DN200/8"/200, max PN1/Cl.14.5/1K, suitable for DN200 PN10/16, NPS 8" Cl.150, 10K 200 • UNI flange DN250/10"/250, max PN1/Cl.14.5/1K, suitable for DN250 PN10/16, NPS 10" Cl.150, 10K 250
Antenna	Lens antenna - 50mm/2", 80mm/3", 100mm/4"
Process Temperature Rating	-40 to +200°C (-40 to +392°F)
Process Pressure Rating	Suitable for atmospheric and high pressure applications from -1 to +16 bar (-14.5 to +232 psi)
Cable Entry	NPT, Metric, BSP (G) class threads

Power

Power Requirements	High voltage type: 85 to 264 VAC, 50/ 60 Hz, 28.8 VA Low voltage type: In preparation
Safe Electrical Isolation	Bus inputs are electrically isolated from the other electronics

Environmental

Ambient Temperature	• Device: -40 to +60°C (-40 to +140°F) • Display Module: -20 to +70°C (-4 to +158°F)
Approvals	FM, ATEX, IEC Ex, EAC

Display/Programming

Display (LCD)	Four line, white background lighting, switches to red for device errors Language selection: English, German, Japanese

Programming	• Local display; operation via the local display is possible without opening the device
	• Configuration software (e.g. DeviceCare); connected via:
	  – HART
	  – Service port (CDI) with optional Commubox FXA291

Intelligent Functions

- Hydrostatic tank shell correction- for depression and distortion
- 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.

Performance

Calibration Range	30 m (98 ft)
Maximum Range	Depending upon configuration choices: 70 m (230 ft) For calibration to regulatory standards: 30 m (98 ft)
Maximum Measured Error	The following values are valid for a measuring distance up to 30 m (100 ft): • Maximum Performance, NMI or PTB type approval - ±0.5 mm (±0.02 in) • Custody transfer type approval according to NMI or PTB - ±1.0 mm (±0.04 in) • Standard version, w/o calibration certificate or with 3-point or 5-point calibration certificate - ±1.0 mm (±0.04 in)
Measured Value Resolution	≤ 0.1 mm (0.004 in)
Hysteresis	0.2 mm (0.008 in)
Repeatability	0.2 mm (0.008 in)
Linearity	Within maximum measured error

Long-Term Drift	Within the specified error of measurement
Influence of Ambient Temperature	Within the specified accuracy according to OIML R85 (2008)
Dielectric Constant	$\varepsilon r \geq 1.4$
Calibration Certificate	• Standard version, 3-point calibration certificate, ±1.0 mm (±0.04 in) • Standard version, 5-point calibration certificate, ±1.0 mm (±0.04 in) • Maximum performance, NMI type approval, - ±0.5 mm (±0.02 in) • Custody transfer, NMI type approval, ±1.0 mm (±0.04 in) • Maximum performance, PTB type approval, - ±0.5 mm (±0.02 in) • Custody transfer, PTB type approval, ±1.0 mm (±0.04 in)

Inputs and Outputs

Primary Outputs	• MODBUS RS485 • V1 • 4-20mA HART Ex d/XP, RTD input • 4-20mA HART Ex i/IS, RTD input
Secondary I/O Analog	• 1 x "Ex d/XP 4-20mA HART + RTD input" • 2 x "Ex d/XP 4-20mA HART + RTD input" • 1 x "Ex i/IS 4-20mA HART+ RTD input" • 2 x "Ex i/IS 4-20mA HART+ RTD input" • 1 x "Ex i/IS 4-20mA HART + RTD input" • 1 x "Ex d/XP 4-20mA HART + RTD input" • None
Secondary I/O Exd	• 1 x "2x relay + 2x discrete I/O" • 2 x "2x relay + 2x discrete I/O" • 3 x "2x relay + 2x discrete I/O" • 1x "MODBUS RS485" • 1x "MODBUS RS485", 1 x "2x relay + 2x discrete I/O" • 1x "MODBUS RS485", 2 x "2x relay + 2x discrete I/O" • 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.

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