

MOHR™ EFP-IL

Guided Ultra-Wideband (UWB) Radar Tank Level Indicator (TLI) System

Next-generation liquid level measurement system designed for nuclear applications



EFP-IL panel-mount 1-channel liquid level signal processor.

MOHR EFP Series Guided UWB Radar sensors utilize MOHR's Electric Field Perturbation technology and are the industry's most accurate liquid level / TLI sensors. With thousands of hours of reactor system operation, EFP Series instruments are ideal for nuclear tank level monitoring applications.

Features and Benefits

Unmatched Precision and Accuracy

EFP signal processors offer precision and accuracy of approximately 0.1 mm (0.004 in.) and 1 mm (0.04 in.), respectively. Real-world TLI system accuracy, taking probe surface tension effects into account, is better than ± 12.5 mm (0.5 in.) for many industrial applications.

Measure Multiphase Flow Conditions

Characterize frothing / boiling environments that can fool legacy TDR / guided-radar systems. Optionally integrate true volumetric void fraction measurement for real-time estimation of total coolant inventory and enthalpy.

Rugged Performance For Any Environment

Wall-mount instrument with NEMA 4X enclosure designed to meet stringent MIL-SPEC high-impact shock, vibration, environmental, and EMC requirements.

EFP System Key Features

- Industry's most accurate liquid level measurements
- System designed specifically for nuclear applications
- Characterize boiling / frothing environments
- Electronics can be >300 m (1000 ft.) from probe
- In-situ instrument calibration
- Inline probe signal-path integrity monitoring
- Ideal for use with MOHR SFP-1 spent fuel pool probe



EFP-IL real-time level history graph with level alarms.

Intuitive, Informative Interface

- Graphical user interface reports instantaneous level in units of length and/or calibrated volume.
- Level history graph lets the operator quickly evaluate recent trends in tank level and compare to level alarm settings.

Multiple Interface and Configuration Options

- Ethernet, USB, and 4-20 mA communications
- Remote monitoring and configuration over Ethernet
- Single and dual channel configurations
- Optional military-grade level alarm relays

MOHR SFP-1 Spent Fuel Pool Probe Assembly

- Configurable lengths of 1.5 - 10+ m (5 - 32+ ft.)
- MIL-SPEC hardened to withstand accident conditions
- >20 y life at 210°C (410°F) using standard materials
- Excellent long-term radiation resistance
- EFP-IL/HL interconnect cable >300 m (1000 ft.)
- Sensitivity of ± 2.5 mm (0.1 in.) at 300 m (typ.)
- Accuracy of ± 50 mm (~2 in.) at 300 m (est.)
- Compatible with EFP system in-situ calibration

Specifications

Level Measurement System

Advanced liquid level measurement capabilities:

Very low dielectric measurement capability ($\epsilon_r > 1.1$)

Liquid/liquid interface, boiling, and froth detection

Level measurement precision: 0.1 mm (0.004 in.)

Accuracy:

Absolute measurements: 1 mm (0.04 in., max.)*

Real-world accuracy: ~12.5 mm (0.5 in., typ.)**

Response time: ~2 ms (min.)

Level alarms: up to 10 individually-configurable alarms

Level alarm hysteresis: user-configurable

Level display: length or calibrated volume units

Inline TDR signal path integrity verification

Raw backscatter data storage, post-processing capability

* Laboratory setting, excluding surface tension effects.

** Ruggedized probe in industrial setting, including surface tension effects.

Void Fraction Measurement System Option*

Accuracy: 1% (steam-water system, bubbly flow)**

Range: 0-100% void

Resolution: 0.1% void (typ.)

* EFP-IL only. Specialized system hardware/firmware and probe required.

** May vary by application due to flow characteristics and probe geometry.

Connectivity

USB host/client, 10/100 Mb Ethernet, 4-20 mA

Level alarm relays (optional):

2x DPDT 28 VDC/115 VAC 5A relays

MIL-R-83536 military/aerospace qualified

Display

Color LED-BL 4.3 in. (10.9 cm) WQVGA TFT-LCD, > 600 cd/m²

Discrete LED status lights (optional)

Power System

AC Power: 90-264 VAC, 47-63 Hz via MIL-SPEC circular connector

DC Power: 9-36 VDC, ~1.5A @ 24 VDC via MIL-SPEC circular connector

Environmental and Mechanical

Operating / Non-Operating Temp.: -10°C to +55°C / -20°C to +85°C

Dimensions:

1-ch.: 30.5 (H) x 25.4 (W) x 20.3 (L) cm (12.0 x 10.0 x 8.0 in.)

2-ch.: 35.6 (H) x 30.5 (W) x 20.3 (L) cm (14.0 x 12.0 x 8.0 in.)

Weight:

1-ch.: ~8.0 kg (17 lbs.) (est.)

2-ch.: ~13.6 kg (30 lbs.) (est.)

NEMA 4X 304 SS enclosure with ANSI 61 gray powder coat (optional)

Designed to meet the following standards:

MIL-STD-108 Environmental

MIL-STD-901D Shock (High Impact), MIL-STD-167-1 Vibration

MIL-STD-461F EMC, MIL-STD-810G 509 Salt Fog

MIL-STD-810G 511.5 Explosive Atmospheres

Designed to meet requirements for Naval shipboard liquid level indicating equipment pursuant to MIL-L-23886C and ASTM F 2044-00.

Regulatory



Complies with all applicable EU directives, as specified by the Declaration of Conformity supplied with the instrument.

Complies with Canadian ICES-003.

MOHR™

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