The advanced radar for tank level gauging with custody transfer accuracy.

The 971 SmartRadar LTi completes the broad range of Honeywell Enraf level gauges to provide fit for purpose solutions for all level gauging applications in the area of liquid bulk storage. The 971 SmartRadar LTi uses the latest radar technology, supported by Honeywell Enraf’s extensive tank gauging knowledge, to provide the performance required for safe, reliable and efficient level measurement on bulk storage tanks. The SmartRadar LTi complies with all major tank gauging standards including API, ISO and more. The Smart Echo Analysis signal processing results in highly reliable measurement, even under the most difficult conditions. The SmartRadar LTi is capable of providing radar performance with the long-term reliability and stability required from industry standards as set by Honeywell Enraf servo instruments.
# Technical specifications

## Measuring specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0 m to 40 m (0 ft to 131 ft)</td>
</tr>
<tr>
<td>Instrument accuracy</td>
<td>± 1 mm (0.04&quot;)</td>
</tr>
<tr>
<td>Measuring resolution</td>
<td>0.1 mm (0.004&quot;)</td>
</tr>
</tbody>
</table>

## Principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring principle</td>
<td>FMCW Synthesized Pulse Reflectometer</td>
</tr>
<tr>
<td>Signal processing</td>
<td>Advanced Digital Signal Processing (ADSP)</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>X-band (9.5 GHz to 10.6 GHz) (FCC: 9.5 GHz to 10.5 GHz)</td>
</tr>
</tbody>
</table>

## Mechanical

<table>
<thead>
<tr>
<th>Dimension</th>
<th>See drawing opposite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>10 kg (22 Lbs) excluding antenna and separator</td>
</tr>
<tr>
<td>Cable entries</td>
<td>3 pcs 3/4&quot; NPT (Pending on regulations Ex-d cable glands must be used)</td>
</tr>
</tbody>
</table>

## Environmental

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-40 °C to +60 °C (-40 °F to +140 °F)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-50 °C to +85 °C (-58 °F to +185 °F)</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 67 according to EN 60529 (NEMA 4)</td>
</tr>
<tr>
<td>Safety</td>
<td>Explosion-proof</td>
</tr>
<tr>
<td></td>
<td>- ATEX II 1/2 G EEx d IIB T4 or EEx de IIB T4 or EEx d [ia/ib] IIB T4 or EEx de [ia/ib] IIB T4</td>
</tr>
<tr>
<td></td>
<td>- Class I, Division 1, Groups B, C and D, acc. to ANSI / NFPA 70 (FM, USA)</td>
</tr>
</tbody>
</table>

## Materials

| Instrument unit housing       | Aluminum alloy EN AC-ALSi7Mg0,3 EN AC-42100 EN1706 (mat. No. 3.2371 DIN1725) |
| Instrument unit finish        | Chromatized according to MIL-C-5541C, coating: polyurethane |
| O-rings: Wetted               | FPM (Viton)                                  |
| Non-wetted                    | NBR (Buna)                                   |

## Electrical

| Power supply                  | 110 V to 240 Vac, autoselect (+10 % to -20 %) 45 / 65 Hz or 24 Vdc to 64 Vdc, autoselect (+10 % to -20 %) |
| Power rating                  | Basic 10 VA, 25 VA max. with options         |

## Transmission

| Type                           | Serial, ASCII coded, Bi-Phase Mark modulated (BPM) |
| Lightening protection         | Full galvanic separation via isolation transformers |
| Protocol                      | Standard Enraf fieldbus (GPU protocol)            |
| Common mode rejection         | >150 dB                                             |
| Cabling                       | Two conductors, twisted pair, $R_{\text{max}} = 200 \Omega / \text{line}$, $C_{\text{max}} = 1 \mu F$, max. Length 10 km |

## Options

| Output                         | For Tank Side Indicator (TSI)                    |

Communication boards

| Output                         | - Standard Modbus or GPU via RS-232C or RS-485 |
|                               | - 4-20 mA with digital communication based on HART® protocol, accuracy analog level signal ± 0.1 %, full scale |
|                               | - Foundation Fieldbus® H1                      |

Input

| Output                         | - VITO probes for average temperature |
|                               | - HART® devices such as pressure transmitters |

Alarm relay output

| Output                         | 2x SPDT, galvanically isolated, $V_{\text{max}} = 50$ Vac or $75$ Vdc, $I_{\text{max}} = 3$ A |

Infrared connector

| Output                         | Serial communication with Portable Enraf Terminal (PET) |

HART® is a trademark of the HART Communications Foundation.  
Foundation Fieldbus® is a trademark of the Fieldbus Foundation.

* Under reference conditions
### Application
- **U**: General purpose
  - Including individual Honeywell Enraf test report according OIML R85

### Data Transmission
- **E**: BPM (Bi-Phase Mark protocol) standard
- **I**: BPM + i.s. output for 977 TSI (Tank Side Indicator)
- **H**: HART and 4-20 mA output + BPM
- **K**: HART and 4-20 mA output, i.s. output for 977 TSI + BPM
- **R**: RS-232C GPU protocol
- **S**: RS-485 GPU protocol
- **T**: RS-232C GPU protocol and i.s. output for 977 TSI
- **U**: RS-485 GPU protocol and i.s. output for 977 TSI
- **V**: RS-232C standard Modbus
- **W**: RS-485 standard Modbus
- **X**: RS-232C standard Modbus and i.s. output for 977 TSI
- **Y**: RS-485 standard Modbus and i.s. output for 977 TSI
- **F**: Foundation Fieldbus + i.s. output for 977 TSI + BPM
- **O**: Foundation Fieldbus + BPM

### Pressure Version
- **A**: Atmospheric
- **M**: Medium pressure 6 bar / 600 kPa (87 psi)
- **H**: High pressure up to 40 bar / 4 MPa (580 psi)

### I/O Options
- **B**: Spot temperature Pt100
- **C**: VITO temperature and/or water probe
- **J**: VITO temperature and/or water probe + HART device(s)
- **U**: Spot temperature Pt100 + HART device(s)
- **Y**: Spot temperature Pt100 + VITO temperature and/or water probe + HART device(s)
- **Z**: None

### Instrument Designation
- **9 7 1**: SmartRadar LiTi

### Safety Approvals
- **A**: ATEX Europe
- **F**: FM/FCC USA

### Alarms
- **W**: With 2x SPDT alarm output
- **Z**: None

### Mains Supply
- **B**: 110 Vac - 240 Vac (+10% / -20%), 45 / 65 Hz
- **D**: 24 Vdc - 64 Vdc (+10% / -20%)

### SmartRadar Antenna's
- **F**: 0 8" PAT, free space
- **H**: 0 4" CONE, still pipe, High Pressure
- **S**: 0 6" PAT, still pipe
- **S**: 0 8" PAT, still pipe
- **S**: 1 10" PAT, still pipe
- **S**: 1 12" PAT, still pipe
- **W**: 0 6" WALP, free space, fixed version

### Stem Length / Installation Specification
- **0 5**: 5 cm (only if Pos. 11=F, S or W)
- **3 0**: 30 cm (only if Pos. 11=F, S or W)
- **5 0**: 50 cm (only if Pos. 11=F, S or W)
- **8 0**: 80 cm (only if Pos. 11=F, S or W)
- **B**: Installation on 6"300 lbs nozzle with 4" Schedule 10 stilling well (only if Pos. 11=H)
- **B**: Installation on 4"300 lbs full bore ball valve (only if Pos. 11=H)
- **N**: Installation on 6"300 lbs nozzle with 4" Schedule 10 stilling well including 1" full bore ball valve (only if Pos. 11=H)
- **N**: Installation on 4"300 lbs Schedule 40 nozzle including 1" full bore ball valve (only if Pos. 11=H)

### IR Connection
- **W**: With IR-connector
- **Z**: Without IR-connector

### Identification Code
- **9 7 1**: Typical identification code
- **Your identification code**
Outputs

Standard: Enraf Bi-Phase Mark communication
Optional: - RS-232C or RS-485 (GPU or Modbus)
  - HART® & 4-20 mA level output
  - Foundation Fieldbus H1

For communication to indicators and systems:
  - Intrinsically-safe channel for the Tank Side Indicator (TSI)
  - alarm outputs

Inputs

- HART® devices
- Spot temperature element
- VITO probes for:
  - average product and gas temperature
  - temperature profiling
  - water bottom measurement

Configuration

- Enraf service tool for use with a PC or laptop using Enraf Bi-Phase Mark communication, RS-232C, RS-485, HART® interface
- Portable Enraf Terminal (PET) using infra-red connector

Display (optional)

- Field Display & Interface (FDI) and Control Panel Indicator (CPI) using Enraf Bi-Phase Mark communication
- Tank Side Indicator (TSI) using intrinsically-safe connection