



Product sheet

970 SmartRadar ATi storage tank measurement



The high precision radar for custody transfer tank level gauging under W&M regulations

Features

- Highly performing non contact measuring principle
- Superior reliability and long term stability
- Optimized for easy remote service and diagnostics
- Advanced integration via field proven communications
- Modular design to simplify operations
- Complies to all major standards

The new 970 SmartRadar ATi is the superior version completing the Enraf SmartRadar family. This device enhances the range of Enraf level gauges and makes new solutions available for custody transfer tank gauging under Weights and Measures regulations.

The 970 SmartRadar ATi uses state of the art radar technology, supported by Enraf's extensive tank gauging know-how, to provide the performance required for highly accurate level measurement on larger bulk storage tanks.

A next generation of signal generation and processing results in the most reliable measurement possible at this time, even under the most demanding conditions.

The 970 SmartRadar ATi is capable of providing maximum performance with the long-term reliability and stability, required from the industry standards as set by other Enraf radar and servo instruments.

It's modular design grants the efficient use of the SmartRadar ATi together with other members of the Enraf level gauging family, using identical option boards and antennas.

Enraf's own robust and field proven Bi-Phase Mark communication protocol is selected for the standard communication, as being the market standard in field communication in tank terminals. Via the BPM communication protocol, easy integration in Enraf inventory management systems is granted to provide Weights and Measures approved solutions.

Advanced communication and service features even further optimize the operation of this device compared to previous generations.



Measuring specifications

Measuring range	: 0 m to 40 m (0 ft to 131 ft)
Instrument accuracy	: ± 0.4 mm (0.016") *)
Measuring resolution	: 0.1 mm (0.004")

Principles

Measuring principle	: FMCW Synthesized Pulse Reflectometer
Signal processing	: Advanced Digital Signal Processing (ADSP)
Operating frequency	: X-band (9.25 GHz to 10.75 GHz)

Mechanical

Dimensions	: See drawing opposite
Weight	: 10 kg excluding antenna and separator
Cable entries	: 3 pcs 3/4" NPT (Pending on regulations Ex-d cable glands must be used)

Environmental

Ambient temperature	: -40 °C to +60 °C (-40 °F to +140 °F)
Storage temperature	: -50 °C to +85 °C (-58 °F to +185 °F)
Protection class	: IP 67 according to EN 60529 (NEMA 4)
Safety	: Explosion-proof
	- 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
	- Class I, Division 1, Groups B, C and D, acc. to ANSI / NFPA 70 (FM, USA)

Materials

Instrument unit housing	: Aluminum alloy EN AC-AISi7Mg0,3 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)
Lightning protection	: Full galvanic separation via isolation transformers
Protocol	: Standard Enraf fieldbus (GPU protocol)
Common mode rejection	: >150 dB
Cabling	: Two conductors, twisted pair, $R_{max} = 200 \Omega / \text{line}$, $C_{max} = 1 \mu\text{F}$, max. Length 10 km

Options

i.s. output channel	: 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	: - VITO probes for average temperature - HART® devices such as pressure transmitters
Alarm relay output	: 2x SPDT, galvanically isolated, $V_{max} = 50$ Vac or 75 Vdc, $I_{max} = 3$ A
Infrared connector	: 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

Identification code

Pos 1 Application																
U	General purpose															
X	W&M certified															
A	Including individual Enraf test report															
Pos 2 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															
Pos 3 Pressure version																
A	Atmospheric															
M	Medium pressure 6 bar / 600 kPa (87 psi)															
H	High pressure up to 40 bar / 4 MPa (580 psi) (only if Pos. 1=U)															
Pos 4 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 Pt 100 + VITO temperature and/or water probe + HART device(s)															
Z	None															
Pos 5, 6, 7 Instrument designation																
9	7	0	SmartRadar ATi													
Pos 8 Safety approvals																
A	ATEX Europe															
P	FM/FCC USA															
For other approvals please contact your nearest Enraf office																
Pos 9 Alarms																
W	With 2x SPDT alarm output															
Z	None															
Pos 10 Mains supply																
B	110 Vac - 240 Vac (+10% / -20%), 45 / 65 Hz															
D	24 Vdc - 64 Vdc (+10% / -20%)															
Pos 11, 12, 13 SmartRadar antenna's																
F	0	8	8" PAT, free space													
H	0	4	4" CONE, still pipe, High Pressure													
S	0	6	6" PAT, still pipe													
S	0	8	8" PAT, still pipe													
S	1	0	10" PAT, still pipe													
S	1	2	12" PAT, still pipe													
W	0	6	6" WALP, free space, fixed version													
Pos 14, 15 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	1	Installation on 6"300 lbs nozzle with 4" Schedule 10 stilling well (only if Pos. 11=H)														
B	4	Installation on 4"300 lbs full bore ball valve (only if Pos. 11=H)														
N	1	Installation on 6"300 lbs nozzle with 4" Schedule 10 stilling well including 1" full bore ball valve (only if Pos. 11=H)														
N	4	Installation on 4"300 lbs Schedule 40 nozzle including 1" full bore ball valve (only if Pos. 11=H)														
Pos 16 IR connection																
W	With IR-connector															
Z	Without IR-connector															
Typical identification code																
X	E	M	Z	9	7	0	A	Z	B	S	0	8	3	0	W	
										9	7	0				
										Your identification code						

For SmartRadar antennas see also Product sheet "SmartRadar antennas"

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)
 • 2 hard alarm outputs

Inputs

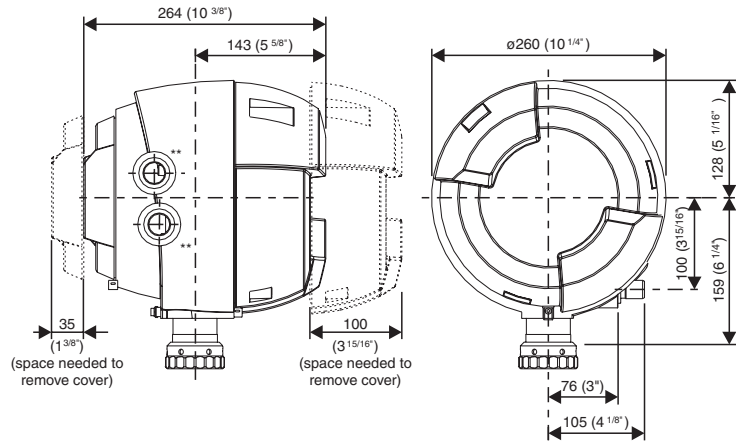
- HART® devices
- Spot temperature element
- VITO probes for:
 - average product and gas temperature
 - temperature profiling
 - water bottom measurement

Configuration

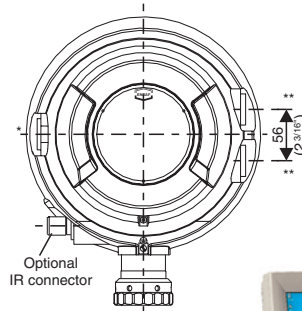
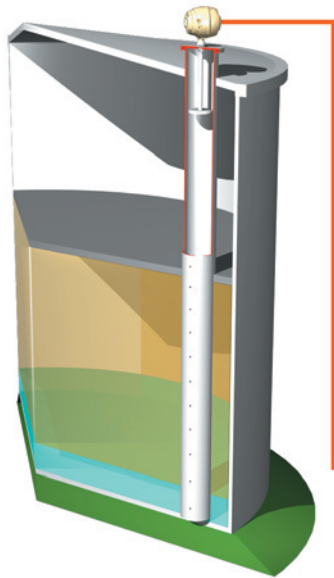
- Enraf service tool for use with a PC or laptop using Enraf Bi-Phase Mark communication, RS-232C, RS-485, HART® interface
- Portable Enraf Terminal (PET) using infra-red connector

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



SmartRadar ATi



Optional IR connector

- * Cable entry 3/4" NPT, Ex-i (1x)
- ** Cable entry 3/4" NPT (2x)



Field interface



Entis system

We at Enraf are committed to excellence.

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