

Saab TankRadar® PRO Steel & Hot

Radar level gauges for metallurgic high temperature applications



Saab TankRadar Pro Steel and Saab TankRadar Pro Hot are non-contacting radar level gauges suitable for the metallurgical industry and its harsh environment. Pro Steel & Pro Hot solve several level measuring problems and are a key to high quality production because of high performance, non-maintenance operation and total reliability.

Saab Rosemount Tank Control has twenty years of experience of radar gauging in the steel and iron industry and the equipment has been continuously developed to suit the market.

Now with Pro Steel & Pro Hot the gauges are even more reliable due to the very high signal to noise ratio and the specialized antennas.

Suitable for

High temperature iron and steel applications such as:

- Blast furnaces
- Torpedo cars
- Open ladles
- Converters
- Rotary coolers
- Oil fuel tanks
- Smelteries, liquid metal vessels



Features

- High accuracy level measurement based on radar
- No moving parts and no contact with the product
- No regular maintenance
- Highest reliability
- Insensitive to heat and dust
- Ensures safety
- Handles difficult process conditions due to ultra-high sensitivity and unique signal processing features
- Specialized antennas with effective cooling and purging devices suitable for high temperatures
- No recalibration
- Interactive setup with Windows based PC software or via local display with keyboard
- Analog 4-20 mA superimposed with HART, and digital Profibus DP, FOUNDATION Fieldbus or TRL/2 bus outputs

Pro Steel & Pro Hot

Pro Steel has a special design extended cone antenna, a cooling and cleaning device and a more robust wave guide connection. It is fully loaded with all of Pro's digital signal processing software modules and has an optional housing for cooling and protection. Pro Steel manages very long measuring ranges, very high temperatures, is suitable for both normal operation and furnace charging/emptying and is resistant to "dirty" environment.



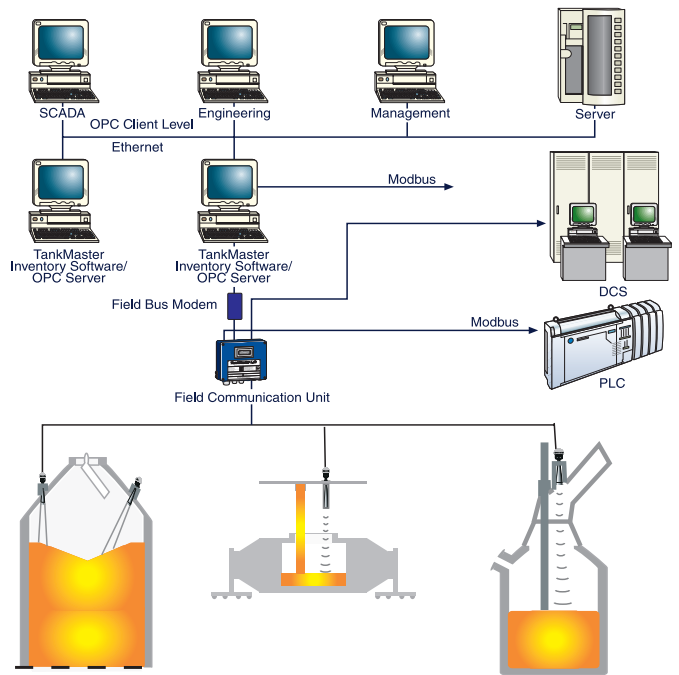
Pro Hot has a shorter cone antenna with purging, the Pro's standard wave-guide connection and digital signal processing using FFT and the software modules Echofixer and optional FHAST. It is less superior than Pro Steel during charging and has a shorter measuring range but is the answer for "low cost" but still reliable measurement suitable for normal operation. Pro Hot is the best alternative compared to other "cheap" gauges. For more information see the specifications on next page.

System integration

TankRadar Pro can be equipped with a number of different output alternatives: analog 4-20 mA HART, Foundation Fieldbus (FF), Profibus DP or Saab's Modbus based TRL/2 field bus. The analog outputs are either passive for connection to powered cables or active providing signal power for display units etc. Analog outputs can also be specified to be intrinsically safe.

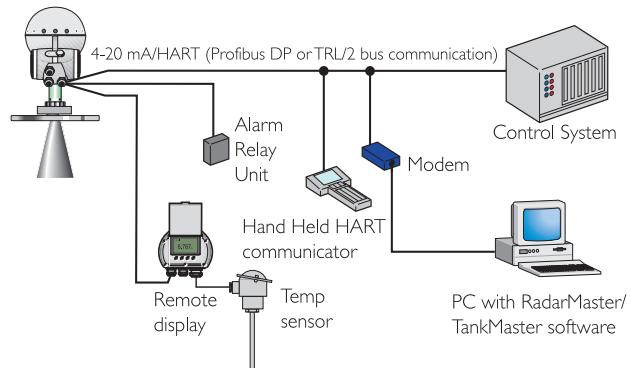
When using the digital TRL/2 bus outputs, up to 12-15 gauges can be connected to each two-wire field bus, maintaining a high data updating speed. Each field bus is connected to a Field Communication Unit (FCU) that handles up to four field

buses with data from a maximum of 32 gauges. Several FCUs can be installed to handle a large number of gauges. From the FCU, data can be transmitted on RS232/485 or TRL/2 bus formats to host computers (DCS, PC or PLC). Pro gauges with TRL/2 bus outputs can also be connected to the TankMaster operator software providing an OPC server that can be linked to the plant network.



Data are displayed on the optional 2210 Display Unit mounted on the gauge or separately. Via the separately mounted display, up to six temperature sensors can be connected.

Configuration can be done on a HART communicator, 2210 Display Unit or on a PC using the Windows based RadarMaster software package. RadarMaster includes advanced graphics software tools, including FFT disturbance echo tracking.



Tankradar Pro can also be connected to the FF bus among any other type of instrument. Up to 16 Pro gauges can be connected to each FF segment. Pro can be configured from any FF host system.

Specifications

General	
Operating principle	10 GHz FMCW radar
Microwave output power	Max: 1.0 mW
Internal calibration	Integrated digital reference for automatic compensation of radar sweep.
Temperature measurement	1-3 spot elements, PT100 or CUI100, or 6 spot elements with common return. Input accuracy $\pm 0.5^{\circ}\text{C}$ ($\pm 0.9^{\circ}\text{F}$).

Display / Configuration	
Display (factory mounted on gauge)	Protection class IP67. With weather/dirt protection cover. 6-digit graphical LCD display 128 x 64 pixels with 4 control soft-keys and text 7 lines with 16 characters/line for display and configuration
Display (mounted separately)	Same as above, mounted in separate enclosure, Protection class IP67 Max cable length, display - radar gauge: 50 m (165 ft) Cable type: 4 wire shielded instrument cable, min 0.5mm ² , (AWG 20) Optional: Temperature measurement 1-3 spot elements PT100 or CUI100 (see above)
HART device	Rosemount hand-held communicator RS275. Rosemount Asset Management Solutions™ AMS software.
FOUNDATION Fieldbus	DeltaV.
PC/remote configuration	RadarMaster, powerful Windows based configuration software. RadarSetup, Windows based configuration software. WinSetup, setup software for terminals and refineries.

Electric		
Power supply	Ultra wide 24–240 V DC or AC 0-60 Hz	
Power consumption	Maximum 10 W, nominal 5 W	
Outputs	Primary output (for level, volume etc)	Alt. 1: HART + 4–20 mA current loop (IS option) Alt. 2: Saab TRL/2 Bus (FSK with Modbus protocol) Alt. 3: Profibus DP Alt. 4: FOUNDATION Fieldbus (IS option)
	Secondary output (Optional, for volume, signal quality, temperature etc.)	Analog 4–20 mA current loop, active or passive. Optional: IS version.
Analog output characteristics	Type	Analog 4–20 mA Current Loop, active (with) or passive (without loop supply).

Measuring performance	
Instrument accuracy	± 5 mm (± 0.2 ") with FFAST; ± 10 mm (± 0.4 ") without FFAST
Resolution	1 mm (0.04")
Repeatability	± 1 mm (± 0.04 ")
Update time	100 mS
Ex approval transmitter head	CENELEC: EEx de [ib/ia] IIC T6 FM: Explosion proof Class I, Div. I & 2, Groups A, B, C and D. CSA: EEx de IIC T6 FTZU: EEx de ib IIC T6 GOST: EEx de ib IIC T4 SEV: EEx de [ib] IIC T6

Antennas	Pro Hot	Pro Steel
Antennas	8" and 10" cone, length 0.37 resp 0.48 m (1.21 resp. 1.57 ft)	12" cone, length 1.5 m (4.9 ft)
Measuring range		
Blast furnace, converter, torpedo car	10-20 m (33-66 ft)	30 m (98 ft)
Other, depending on application	Up to 50 m (164 ft)	Up to 60 m (197 ft)
Temperature at antenna	-40 to 400°C (-40 to 752°F) for Stainless Steel 316L	-40 to 400°C (-40 to 752°F) for Stainless Steel 316L, depending on material up to 1000°C (1832°F)
Antenna material exposed to vessel	Stainless Steel 316L sealing: Quartz	Alt. 1: Stainless Steel 316L Alt. 2: Inconell Alt. 3: Titanium gr.2
Cooling and Cleaning	Device for purging, air or N ₂ integrated with flange and antenna	Device for purging, air or N ₂
Housing	Standard	Optional cooling/protection housing for transmitter head and antenna
Flange	Optional ANSI and DIN standard	Customer supply

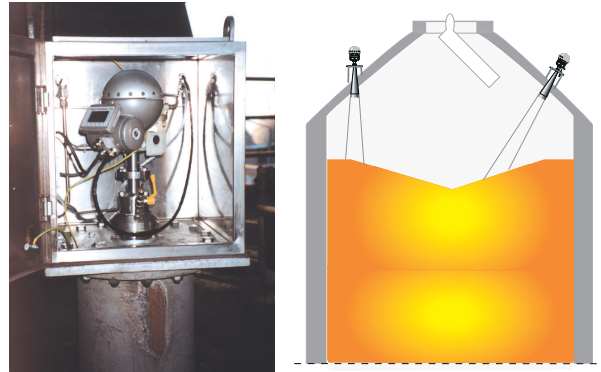
Transmitter head	Pro Hot	Pro Steel
Wave guide connection	Standard	Special design, more robust and resistant to dirt
Signal processing	Digital signal processing using FFT, Echofixer and optional FFAST	Digital signal processing using FFT, Echofixer, FFAST and MET

Application examples

Blast furnaces - Stockline detectors

The use of non-contact and maintenance free level measuring equipment in the blast furnace is essential to ensure the correct level for loading material at all times.

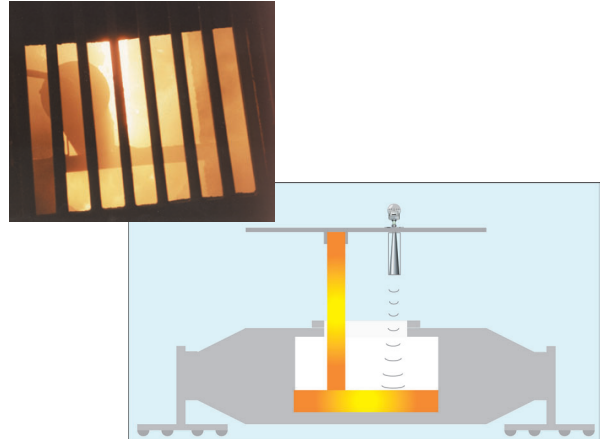
The furnaces can be equipped with either one or several transmitters. Pro Steel and Pro Hot are suitable for both "Bell-Top" and "Rotating Chute" blast furnaces and is not affected by the chute.



Torpedo cars - Automation of filling

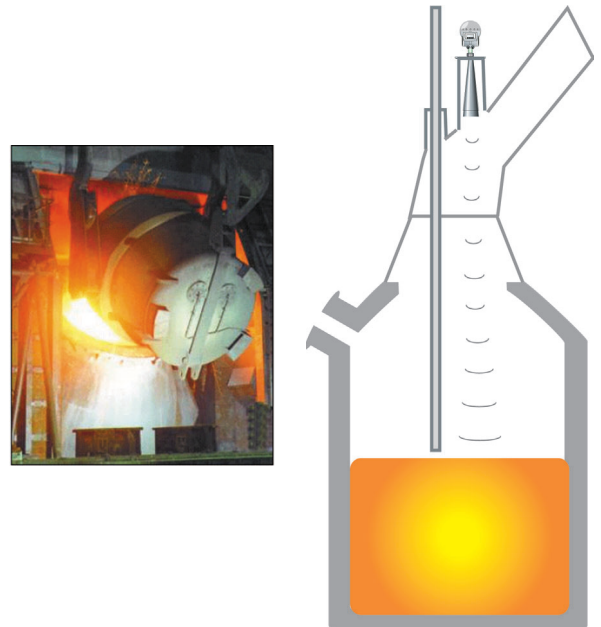
The installation of Pro Steel or Pro Hot for the measurement of the iron level in torpedo cars during filling, optimizes the use of the torpedo car fleet. It reduces the number of overfilled or underfilled transports to a minimum.

If the level values are sent for example to a DCS system the filling of the cars can be controlled and optimized. The data can also be displayed on an optional 2210 Display Unit mounted on the gauge or separately.



BOF or LD converters - Improved lance positioning

Pro Steel installed for bath level measuring in a Basic Oxygen Furnace or LD converter results in improved process control. The exact level is determined by sending the microwaves down to the surface, where they are reflected back to the transmitter. The transmitter can be mounted as fixed or mechanically movable to a measuring position. It takes less than 10 seconds to set an accurate reading even if mounted movable. Data about level position ensures optimal positioning of the oxygen lance, and gives more information about estimated blowing time. High temperatures, smoke and dust do not affect the function.



References

EKO Stahl -Germany, Cockerill-Sambre -Belgium, SOLLAC - France, ILVA -Italy, SSAB -Sweden, Iscor -South Africa, AÇOMINAS -Brazil, US Steel -USA, POSCO -Korea, BHP Steel -Australia, CORUS -UK, Voest Alpine -Austria, etc.

Quality and environmental system certified by DNV - ISO 9001 - ISO 14001

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