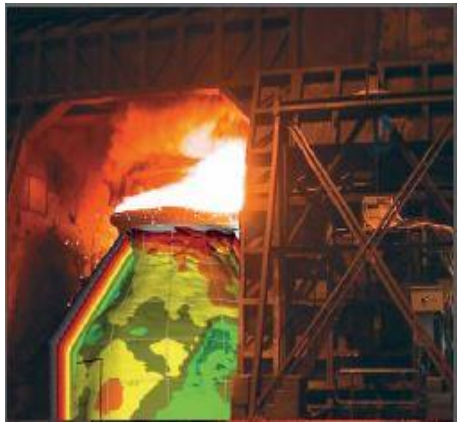
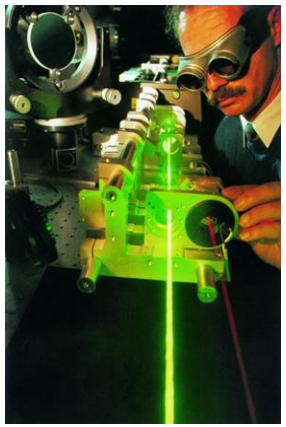



FERROTRON FT-Level*Net*

Radar-based bath level measurement



FT-Level*N*et Radar Measurement System

- FT-Level*N*et system overview and system components
- FT-Level*N*et Evaluation and control unit (AWE)
- FT-Level*N*et sensor variants with water cooling
- FT-Level*N*et sensor DW01 with mechanical holding and adjustment device
- FT-Level*N*et sensor variants with air cooling
- FT-Level*N*et sensor variants convection cooling
- FT-Level*N*et single system/multi system
- Options of FT-Level*N*et
- Combination of different FT-Level*N*et sensors
- Applications
- Summary

Measuring System FT-Level*N*et - Overview

FT-Level*N*et designed for distance measurement in hot areas to measure Freeboard or Bathlevel:

- in Metallurgical Production Plants (Iron, Steel, Aluminum, Copper, Lead)
  - Torpedo-Ladles at Blast Furnace
  - BOF Converter in Steelplants
  - Steel-Casting Ladle in Steelplants
  - Iron Ladles in Foundries
  - Metallurgical Furnaces

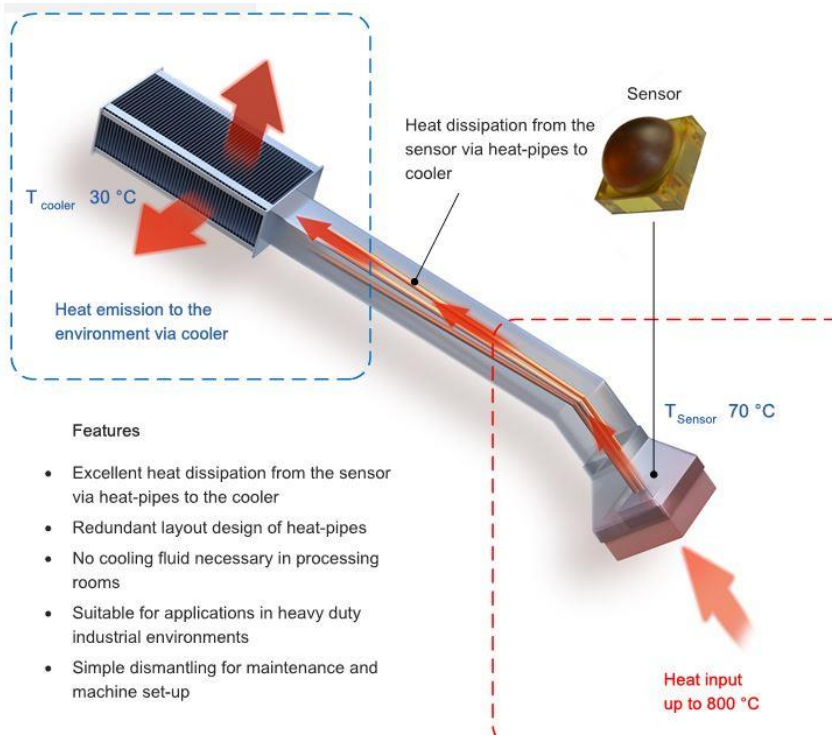
- in Glass Furnaces
  - Glass Level measurement is one of the most important parameter in Glass Furnace control for
  - optimized batch charging strategy
  - stable charging process and glass flow
  - to control furnace energy consumption

*) frequency modulated continuous wave
**) “Heat Pipes”

Measuring System FT-Level*Net* - Technology

FT-Level*Net* is a non-contact, “Time-of-flight” (ToF) measuring system based on a non-guided 60GHz FMCW*-Radar with

- measuring distances (static) from 0.10m up to 20m (others on request)
- accuracy up to ± 0.1mm
- narrow antenna alignment and a beam angle of 6°
- patented passive HP**-cooling system without any additional cooling media or active cooling systems via air resp. water cooling



*) frequency modulated continuous wave
**) “Heat Pipes”

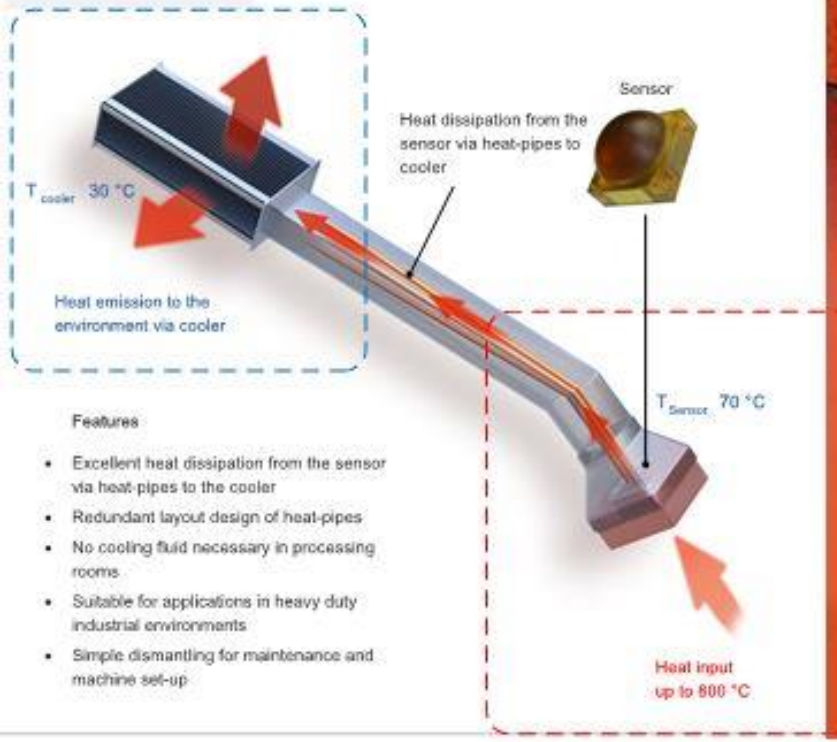
Patented, passively cooled sensor system for high temperatures

- HP cooling system

SCS
Sensor Cooling System

The new reliable high performance cooling

Ferrotron present an innovative "Sensor Cooling System" which enables the cooling of off-the-shelf proximity sensors and analog positon encoders with the most varied features so that they can be used in environments up to 800 °C depending on the version. In such extreme heavy duty environments, the function of the sensor must be guaranteed.
This is achieved through the use of a specially developed and released for patent cooler which operates according to the principle of a two-chamber heat exchanger, whereby the heat input to the sensor is conducted via heat-pipes to a cooler in the environment outside the heat source.



Features

- Excellent heat dissipation from the sensor via heat-pipes to the cooler
- Redundant layout design of heat-pipes
- No cooling fluid necessary in processing rooms
- Suitable for applications in heavy duty industrial environments
- Simple dismantling for maintenance and machine set-up

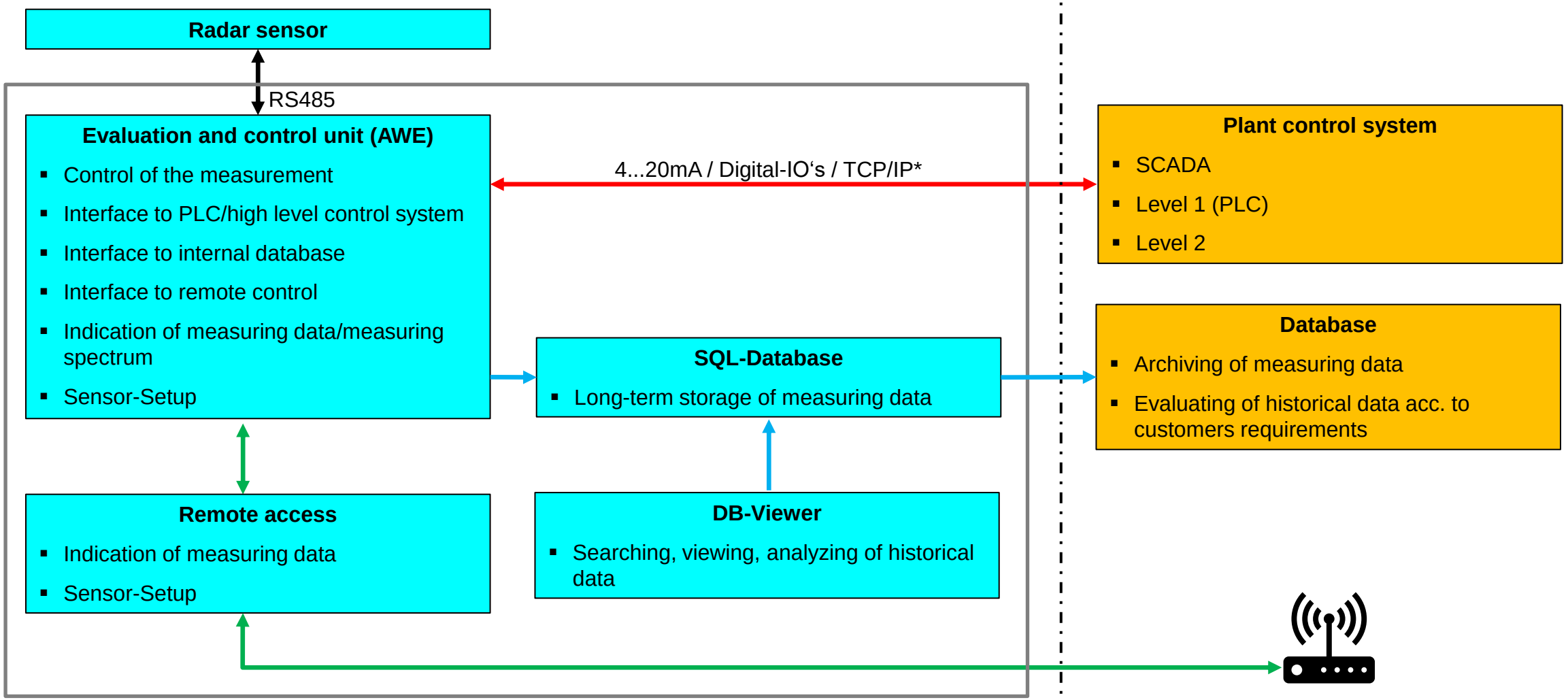
PASSIVELY COOLED HIGH TEMPERATURE SENSOR SYSTEMS

Measuring System FT-Level*Net* - Advantages to other Systems

- Advantages of the FT-Level*Net* Radar measurement system compared to conventional level measurement systems
  - contactless, TOF*-measuring
  - no moving parts
  - reliable high precision measurement (± 0.10mm in a measuring range between 0.75m - ~ 2.0m)
  - easy-to-use mechanical device designed for high temperature environment
  - simple commissioning and adjustment in a very short time
  - only minor maintenance required
  - Radar is resistant to aggressive dust, gas and smoke
  - no significant measurement errors due to bubbles in the melt
  - Radar penetrates insulation material so that measuring openings can be thermally insulated and the measuring sensor is not exposed to direct radiant heat
  - Radar sensors are unaffected by temperature, pressure or vacuum and provide accurate measurements in all environmental conditions
  - Radar sensors are insensitive to contamination and do not need to be cleaned
  - in case of HP**- or air-cooled system, no cooling water close to the process

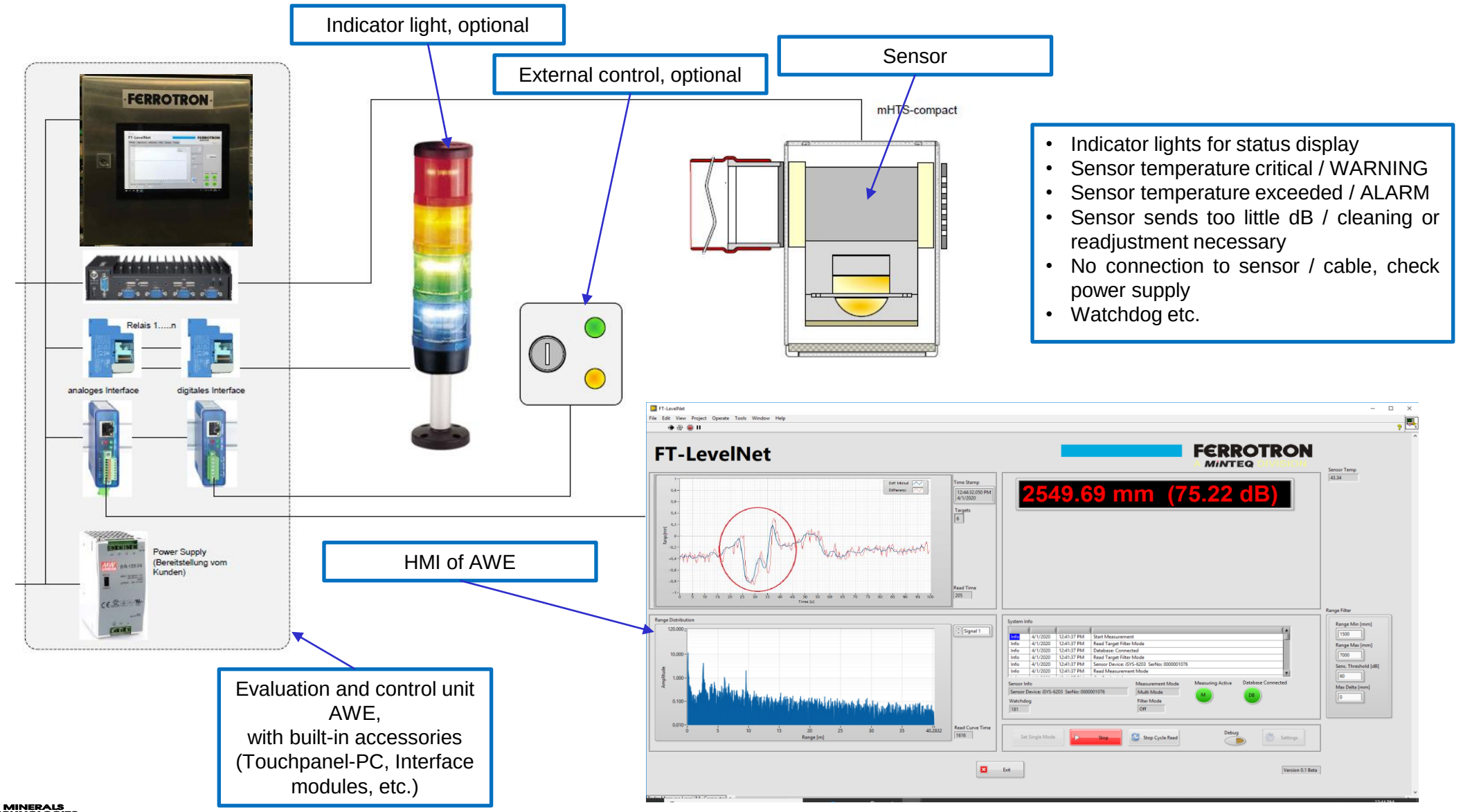
*) “Time-of-flight“
**) “Heat Pipes“

Measuring System FT-Level*Net* - System Overview



*) future option

Measuring System FT-Level*Net* - System Components

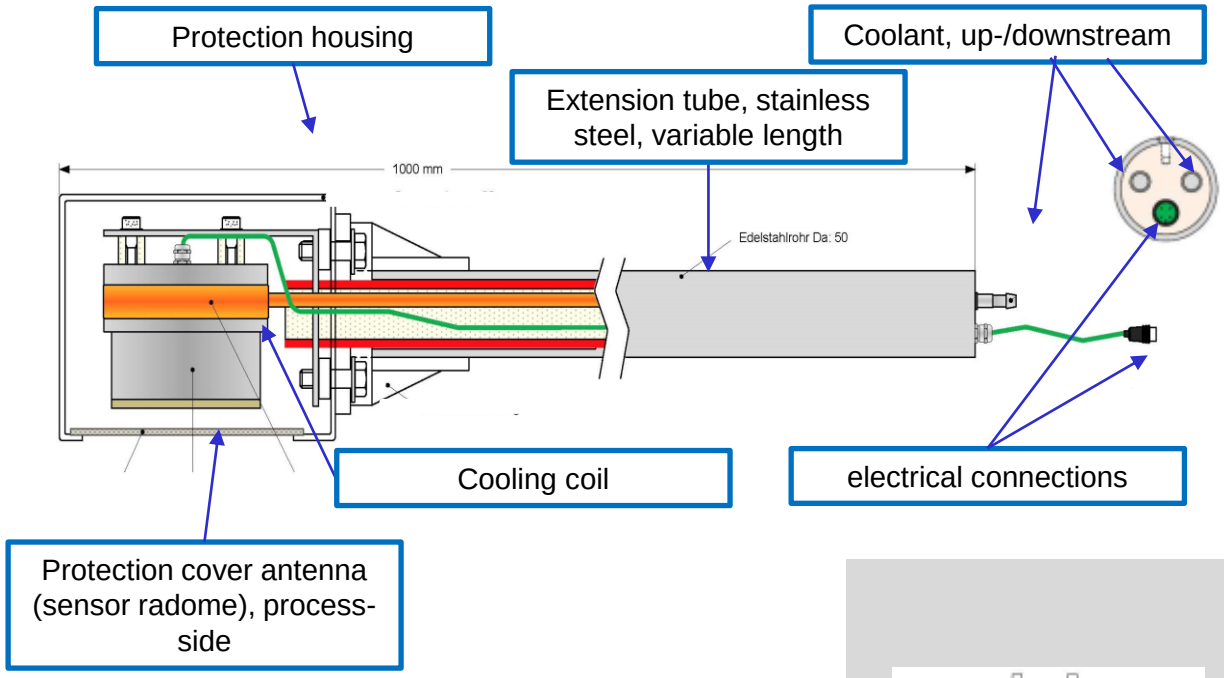


- Indicator lights for status display
- Sensor temperature critical / WARNING
- Sensor temperature exceeded / ALARM
- Sensor sends too little dB / cleaning or readjustment necessary
- No connection to sensor / cable, check power supply
- Watchdog etc.

Measuring System FT-Level*N*et Evaluation and control unit (AWE)

- compact panel housing, stainless steel type
- fanless, state-of-the-art Industrial-Touch-Panel-PC or equivalent, mainly consisting of:
  - Quad core CPU, e.g. Intel Pentium, or equivalent
  - ≥ 4GB RAM
  - 10.1”-TFT touch screen or equivalent, touch pad, keyboard
  - robust bezel ≥ IP65
  - 2 Ethernet ports
  - Hard disk (SSD)
- completely wired-up to terminal strips resp. connectors
- Operating system: Windows 10 English/German
- Application software: FT-Level*N*et-Firmware
- Backup software: Acronis True Image (or equivalent), for back-up and recovery
- Power supply: 110/230VAC, 50/60Hz

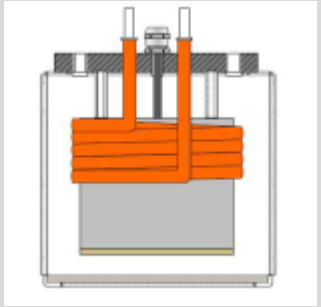
Measuring System FT-Level*N*et - Sensor Variants with Coolant



Sensor DW01

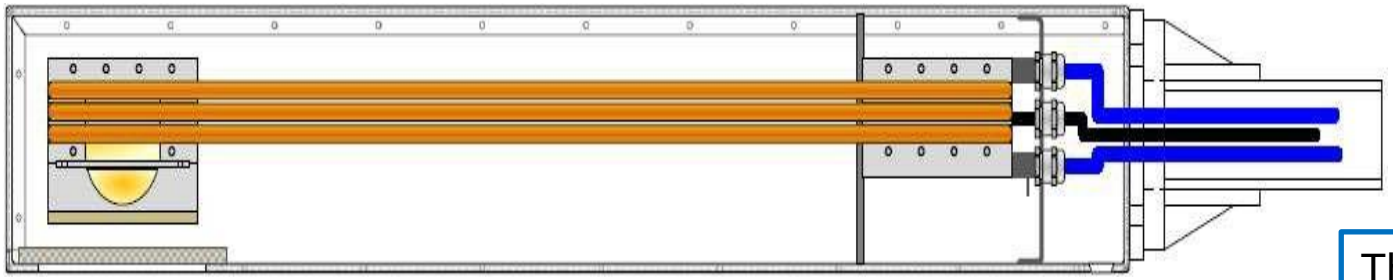
- robust sensor with laterally offset of water connections and sensor and a high standard against leakage at the hose connection including cooling water supply line
- water connections with plugs
- water connectors dislocated from the measuring opening
- the sensor can be easily integrated into standard mounting frames and easily exchanged

Sensor DW01 Compact



- robust, compact sensor, designed for installation in racks/consoles
- water and sensor connections are arranged close to the sensor and the measuring opening
- potential hazard of leakages close to the process, i.e. potential risk of ingress of cooling water into the process
- simple, low-cost sensor variant

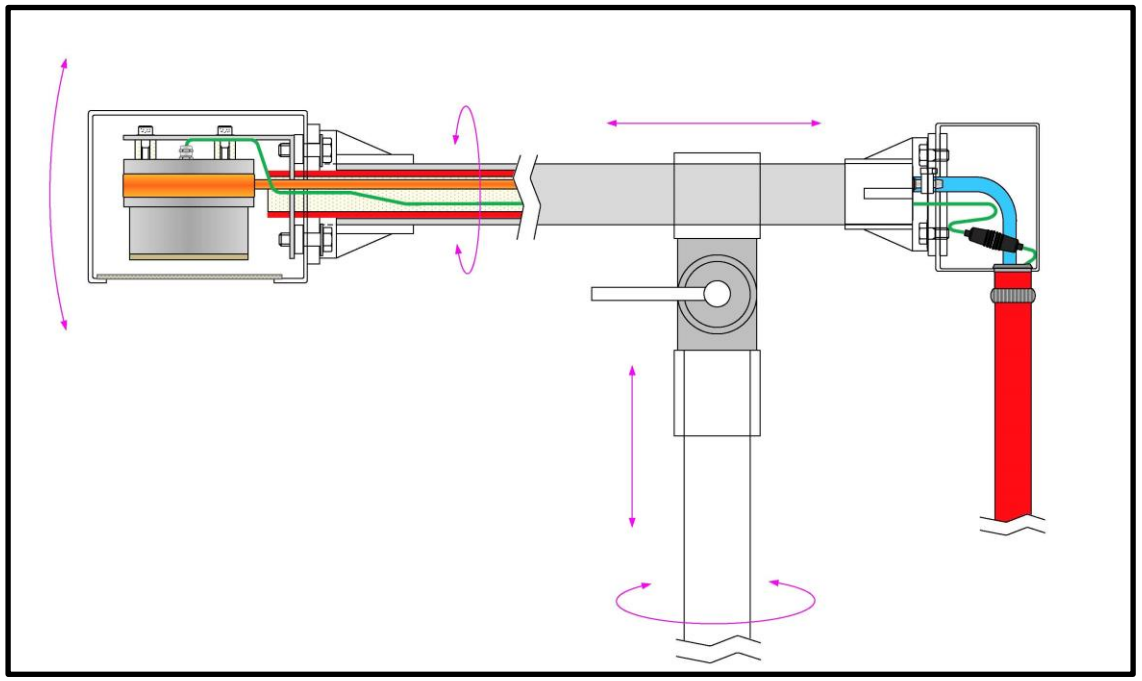
Measuring System FT-Level*Net* - Sensor Variants with Coolant



The robust mechanics allow easy adjustment of the sensor, supported by HMI of FT-Level*Net*

Sensor HP02

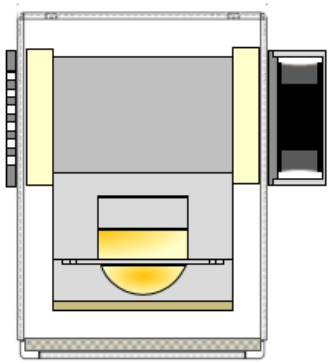
- Sensor is being cooled via “Heat Pipes”, water cooling is led to the outside
- Sensor for increased safety requirements, to protect against explosions due to possible contamination by cooling water, e.g. Mg-Al melts
- in order to guarantee the high safety standard, the construction and implementation of the sensor in the system is very complex
- system should only be used in case of high security requirements



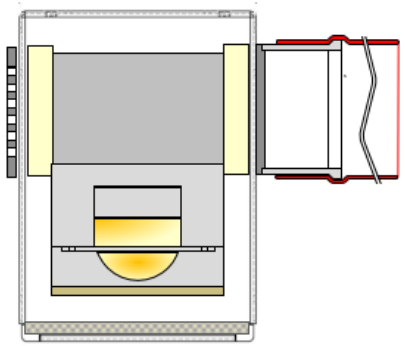
Measuring System FT-Level*Net* - Sensor Variants with Air Cooling

Sensor with air cooling

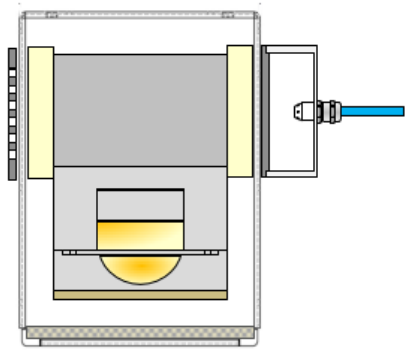
- Design: Ventilation flange with fan cooling



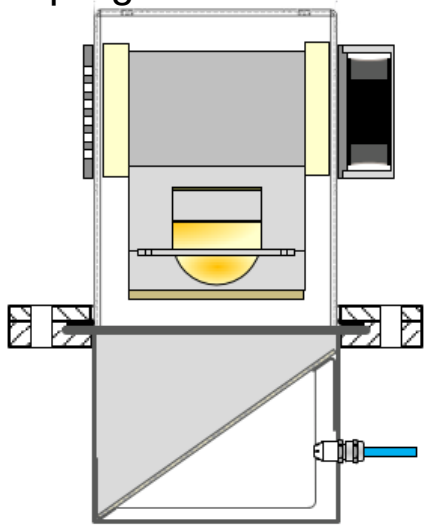
- Design: Ventilation flange with suction hose



- Design: Ventilation flange for compressed air cooling, alternatively inert gas (e.g. N2. Ar)

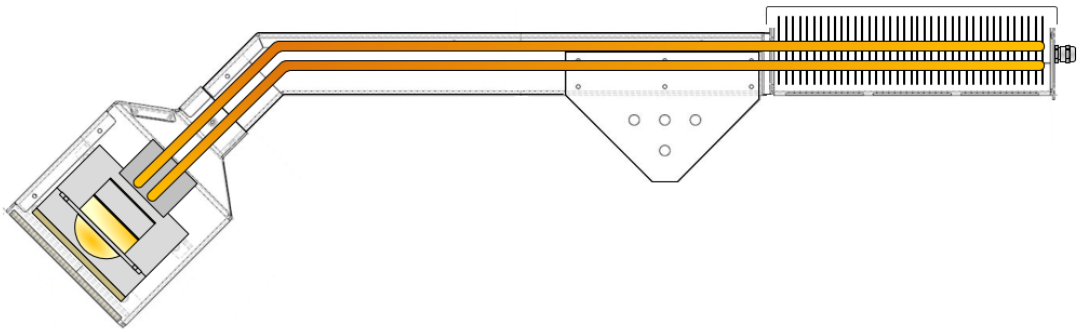


- Design: Ventilation flange with fan cooling and process-side protective cover with purge air connector

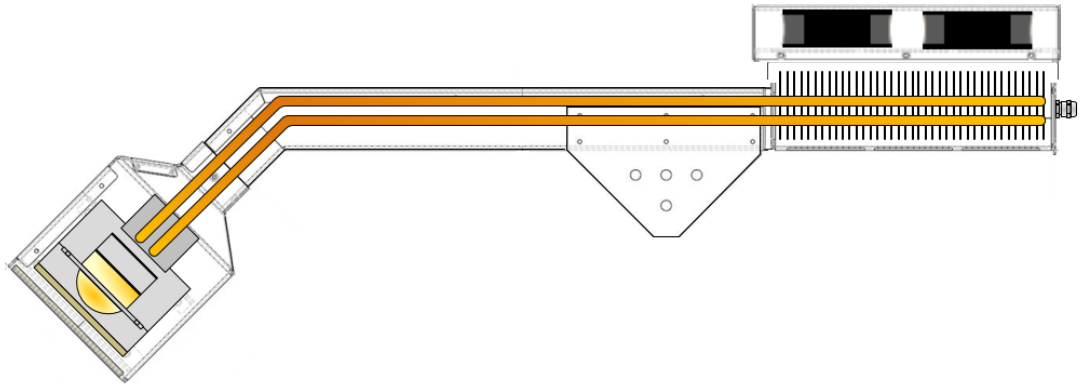


Measuring System FT-Level*Net* - Sensor Variants with Convection

Sensor with convection cooling via “Heat Pipes”



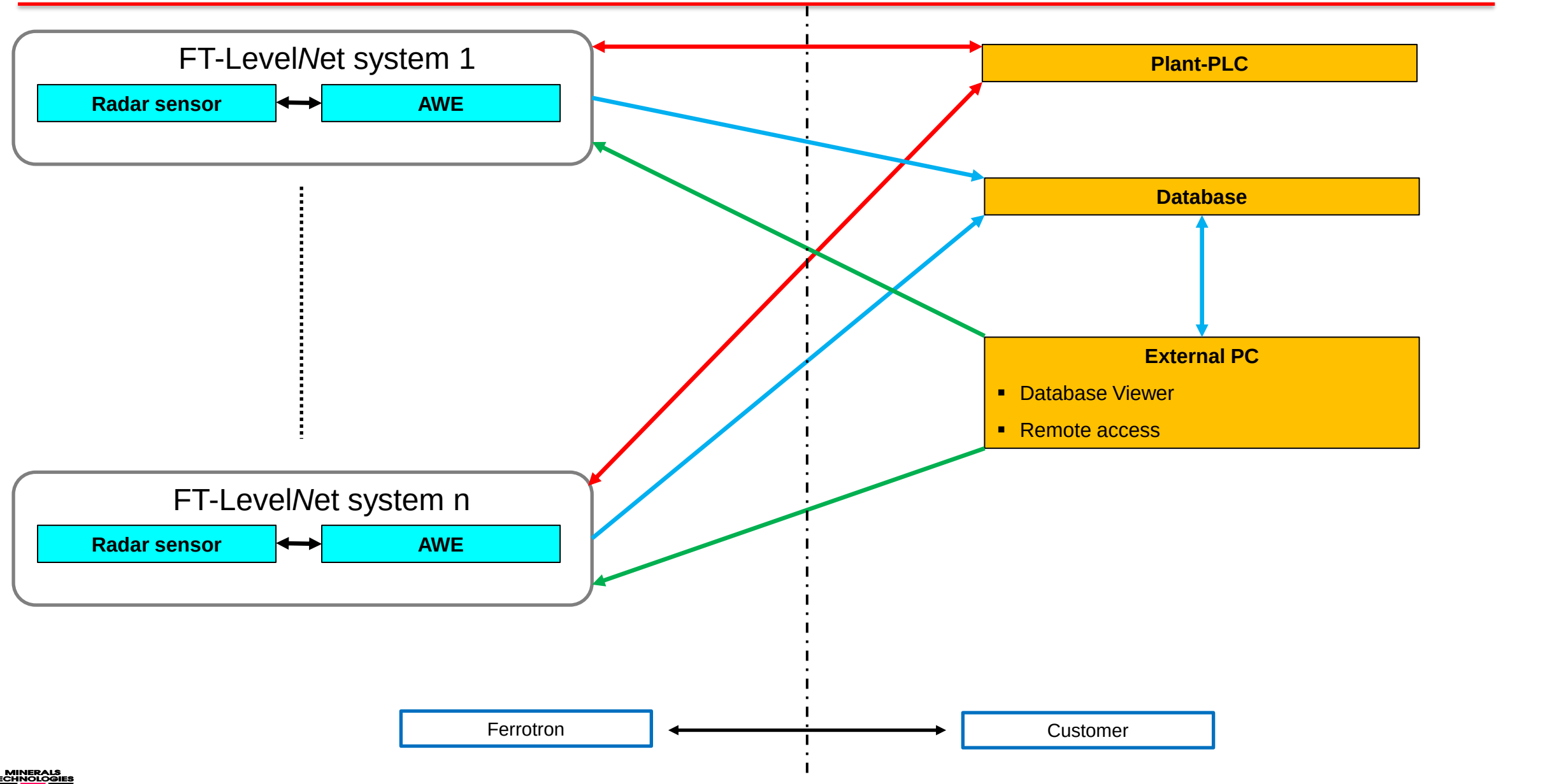
- Design: HP*-convection cooling, natural convection



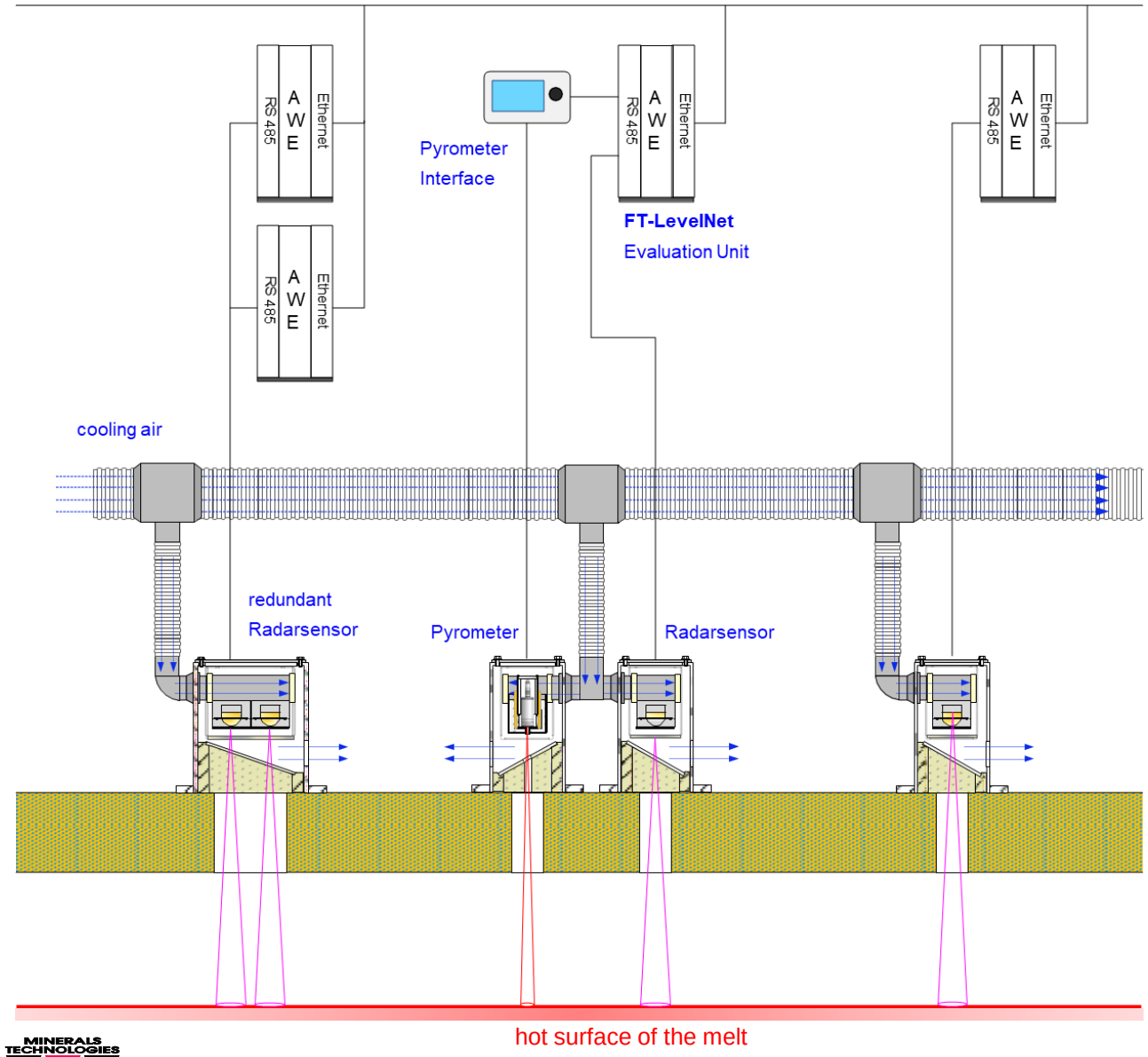
- Design: HP*-convection cooling, forced convection via fans

*) “Heat Pipes“

Measuring System FT-Level*Net* - Single System/Multi System



Measuring System FT-LevelNet - Combination of Different Sensors



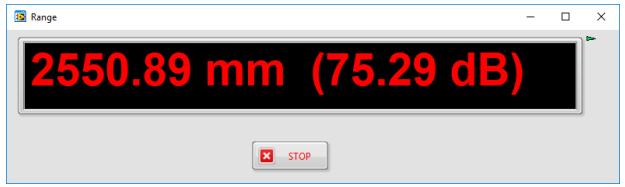
Due to the "smart" design of the compact sensors and their optimal, patented cooling system, complex sensor systems can be installed in high-temperature areas which are difficult to access, which could not be implemented with the previously available "bulky" radiometric, optical and based measuring systems.

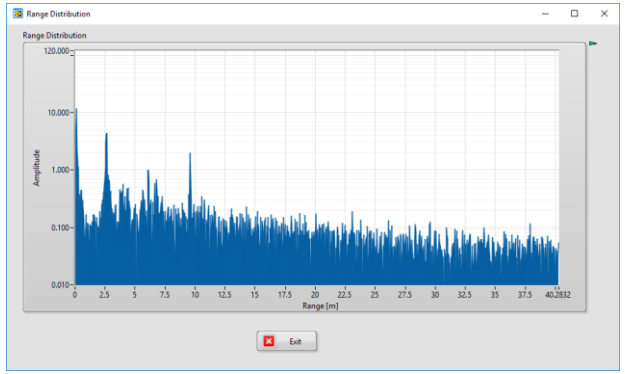
Another advantage is the combination of cooled pyrometers and radar sensors. Measurement errors in the temperature can be compensated for by precisely recording the water level directly next to the pyrometer's measuring point. The Evaluation and Control Unit (AWE) combines all signals and determines the correct temperature

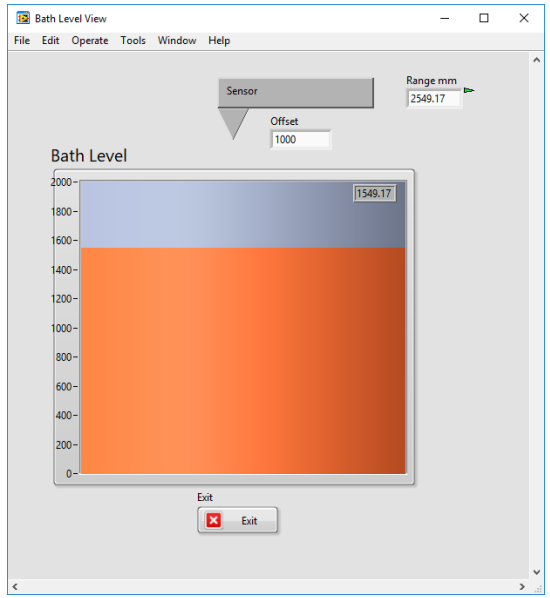
Measuring System FT-Level*Net* - Options

- Custom designed views to display
  - Level
  - Process data
  - distance
  - Spectra analysis
  - Alerts

  (run on all devices in the same network)
- Win10-Tablets-PC to display the views and control the measuring system via remote control
- Central computer for merging the data from several measuring stations
- Maintenance contract for the measuring systems
- Engineering/Design, commissioning and service by Ferrotron

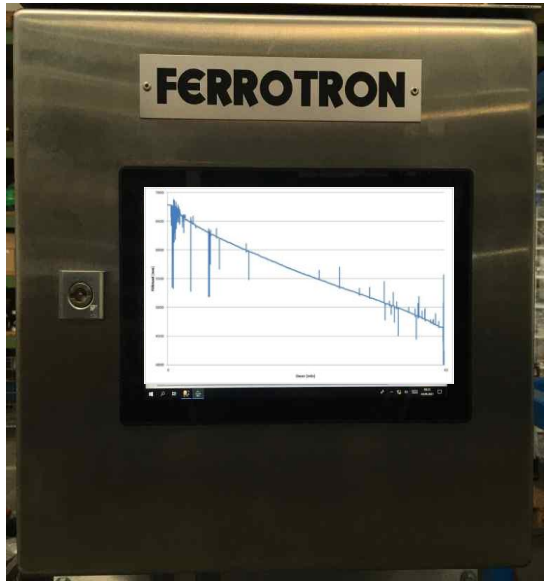


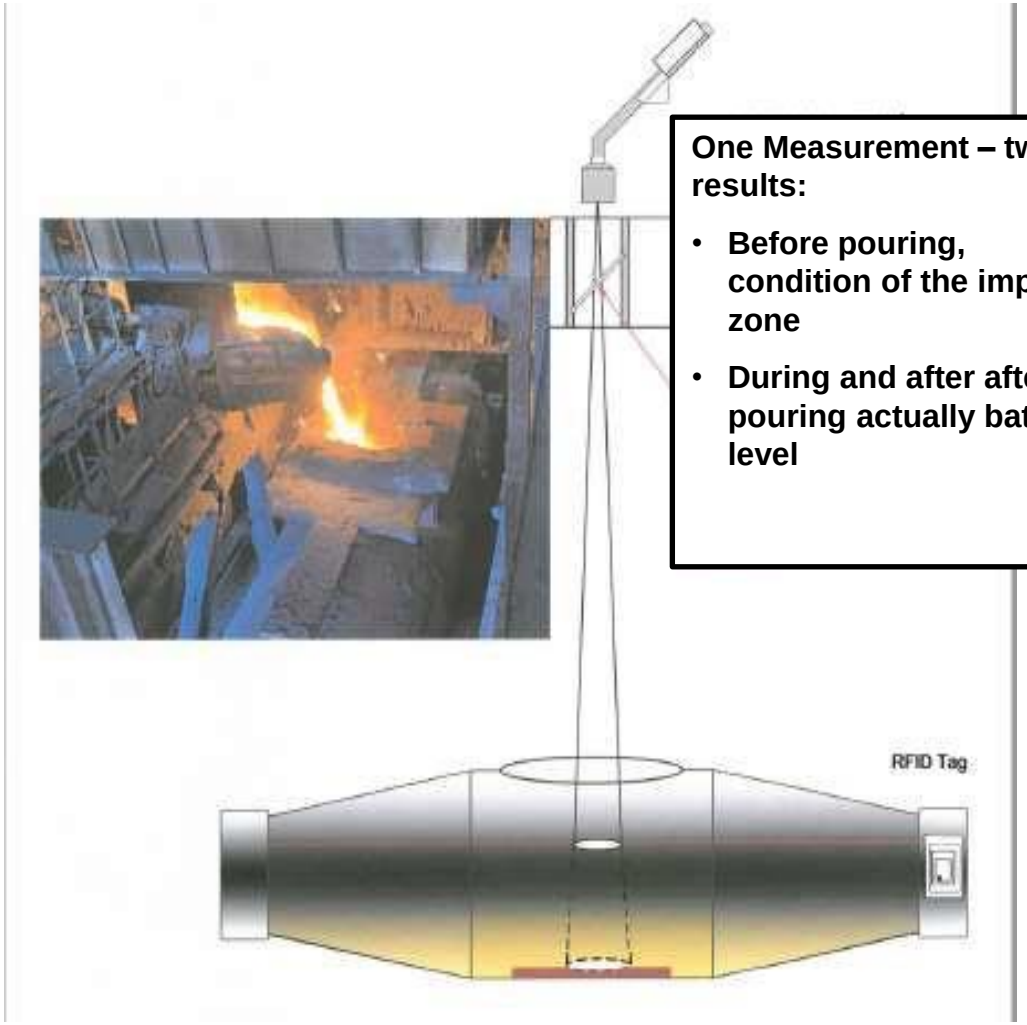




Application: Level Determination during Pouring liquid Iron at he Blast Furnace

Measuring System FT-Level*Net* mounted above the Torpedo Ladle car.
The radar level measuring system measures the liquid metal level in a torpedo ladle. The signal generated is used to control the furnace charge. The operator is able to safely control the pig iron level during the discharge of liquid iron when tapping the furnace.





One Measurement – two results:

- **Before pouring, condition of the impact zone**
- **During and after after pouring actually bath level**

Application: Process-Optimization in Glass-Production by means of bath level measurement

- Glass level measurement is one of the most important parameter in glass furnace control for Production quality and efficiency as well as furnace energy consumption are highly impacted by glass level control
  - optimized batch charging strategy
  - stable charging process and glass flow

Summary of Measurement System FT-Level*N*et

- High availability of the FT-Level*N*et measuring system due to:
  - use of modern radar technology with patented cooling guarantees a long service life with maximum reliability
  - easy application to customer-specific systems through FT-Level*N*et and modular sensor system
  - simple commissioning and adjustment in a very short time
  - maintenance contract and remote maintenance possible
  - Radar penetrates insulation material so that measuring openings can be thermally insulated and the measuring sensor is not exposed to direct radiant heat, dust and smoke
  - Radar sensors are unaffected by temperature, pressure or vacuum and provide accurate measurements in all environmental conditions

- Extension of the plant
  - the expansion and integration of additional measuring systems is easy to implement due to the modular structure of the measuring system
  - Sensor kit with several variants adapted to the desired installation and environment
  - Integration Industry 4.0 with modular infrastructure
  - Software packages for various applications on request