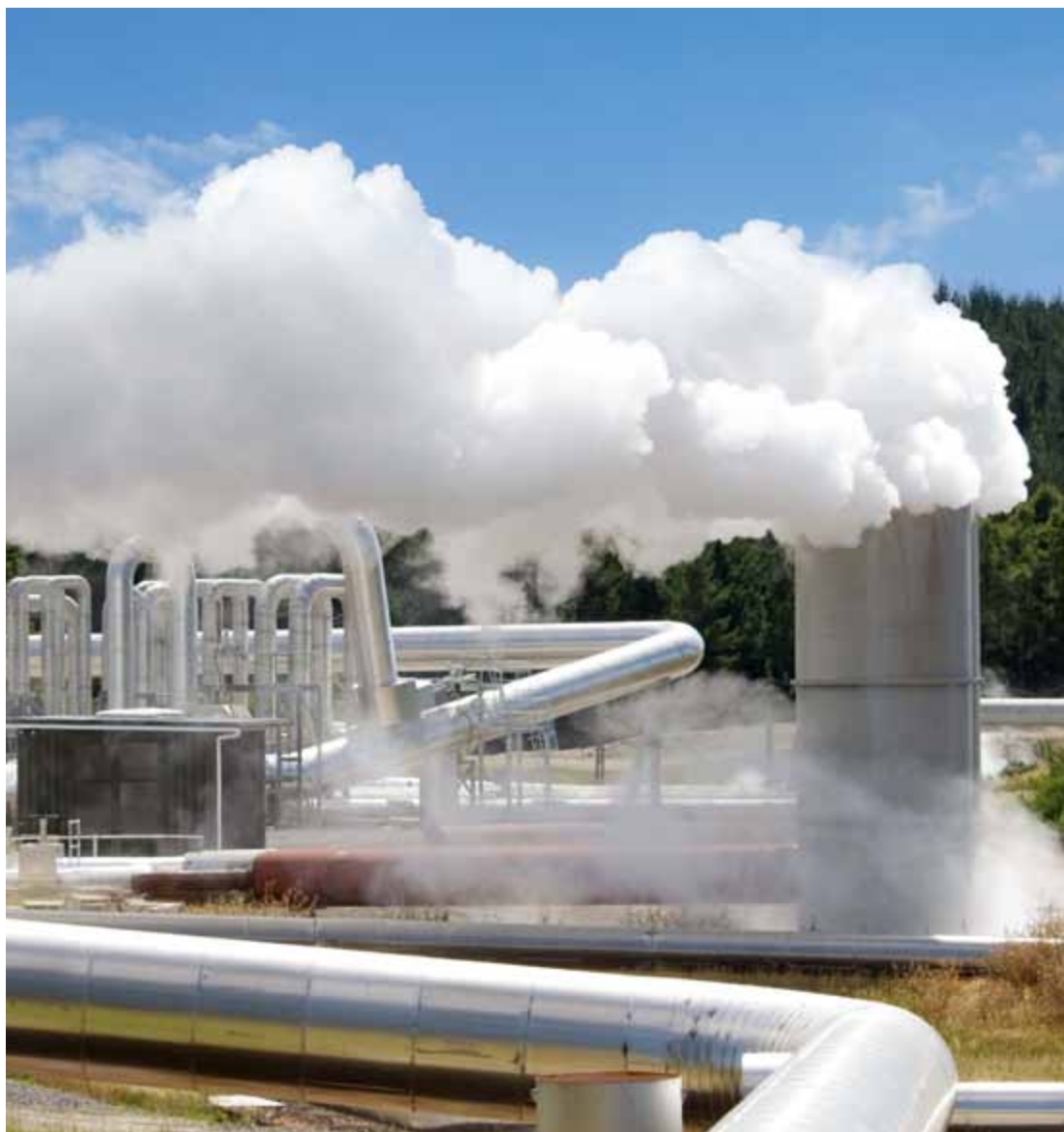


Wet steam measurement with Proline Prowirl F 200

For maximum safety and
energy efficiency in steam
applications



Innovative vortex flow metering

For simultaneous measuring of steam quantity and quality

Are you responsible for the safe and efficient operation of steam plants in your company? If so, you know that wet steam not only poses a potential safety risk, but also contains significantly less energy than saturated steam. This is now a thing of the past because the new Prowirl F 200

vortex flowmeter from Endress+Hauser measures not only the steam quantity but also its quality around the clock. This is unique worldwide and opens up completely new perspectives for the safe and efficient operation of your steam plants.



Your benefits

- A world first: simultaneous measuring of steam quantity, steam quality, condensate quantity, process temperature, heat and energy flow
- Increased operating safety thanks to an automatic wet steam alarm (dryness fraction < 80%)
- Efficient and exact mass measurement of wet steam (80 to 100% dryness fraction) and condensate thanks to a unique correction algorithm
- More accurate steam balancing (mass and energy) for more efficient operating of the system
- Highest resistance to vibration, temperature shock and water hammer
- Tried-and-tested, maintenance-free sensors with over 300 000 installations worldwide
- Exact calculations of heat/energy flow through a multivariable measuring concept and globally accepted standards (IAPWS-IF97/ASME)
- The best long-term stability thanks to a "lifetime" calibration factor (K-factor)
- Seamless system integration via HART, PROFIBUS PA or FOUNDATION fieldbus
- Traceable measuring results due to accredited calibration facilities: SAS (Switzerland), A2LA (USA) and CNAS (China)



Don't give wet steam a chance

For increased operational safety around the clock

Time and time again, insufficient insulation, defective condensate drains, as well as pressure and temperature fluctuations lead to condensation of steam and a subsequent formation of dangerous wet steam. In addition, disruptions in boiler control can cause water to overflow and enter the steam line. The consequences are often severe:

- Low efficiency in energy transfer because wet steam contains less energy than saturated steam
- Formation of dangerous, undesired occurring water hammer
- Severe corrosion due to entrained boiler water and the dissolved salts it contains

But how can wet steam in a pipe be detected in time? Endress+Hauser, in collaboration with the University of Applied Sciences and Arts in Windisch, Switzerland, has found an answer to this question frequently posed by users. With the help of a newly developed steam research rig it is now possible to record continuously the influence of the dryness fraction, or rather of developing condensate, on the signal behavior of the Prowirl F 200 vortex flowme-

ter. The result from many years of research has enabled Endress+Hauser to offer a range of innovative functions for assessing the real existing steam quality in pipes.

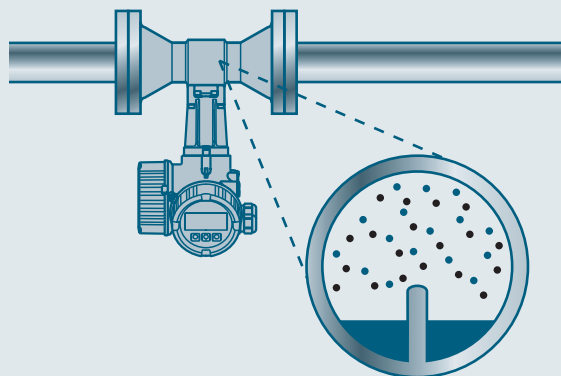
- Permanent measurement of the dryness fraction between 80 to 100% and thus determination of the steam type (wet, saturated or superheated steam)
- Alarm signal for a dryness fraction configurable between 80 and 100%
- Exact mass measurement of the steam and condensate quantity (e.g. in kg/h)

i Our product range also includes measuring devices for water analysis, which allow you to consistently monitor the properties of feed and boiler water, e.g. dissolved oxygen, pH value, lime content and electrical conductivity. The advantage: optimum control of steam generation in a heating boiler, leading to real cost savings through increased efficiency.

Wet steam measurement – View through sight glass



Wet steam occurs through the condensation of steam. First, the condensate flows at the bottom and then smears up the pipe walls, which affects the measuring signal of the Prowirl F 200 vortex flowmeter. This effect can be used to determine steam quality, which can also be outputted as measured variables. It is thus possible to correct the mass and energy of steam whenever necessary.



- 1 100% dryness fraction (saturated steam, $x = 1$)
- 2 90% dryness fraction ($x = 0.9$)
10% condensate (with wavy flow)
- 3 80% dryness fraction ($x = 0.8$) → Alarm
20% condensate (with annular flow) 

Technical data

Prowirl F 200

Device type	Vortex flowmeter in two-wire loop-powered technology. Developed as a volumetric flowmeter conforming to IEC 61508 and suitable for SIL 2/3 applications.
Nominal diameters	– DN 15 to 300 (½ to 12") – DN 25 to 100 (1 to 4") with wet steam detection or wet steam measurement
Process temperature	– Standard: –200 to +400 °C (–328 to +752 °F) – Optional: up to +450 °C (+842 °F) – Wet steam detection/measurement: +100 to +180 °C (+212 to +356 °F)
Process pressure	PN 10 to 40, CI 150 to 300, 10 to 20K
Outputs	– Current outputs – Pulse/frequency/switch output
Inputs	Current input for easy wiring of an external pressure device
Communication	HART, PROFIBUS PA or FOUNDATION Fieldbus
Ex approvals	ATEX, IECEx, cCSAus, NEPSI, INMETRO



Everything from one supplier

							
Registration RSG40	Oil feed Promass 83I	Gas feed t-mass 65F	Condensate Prosonic Flow 92F	Pressure Cerabar M	Temperature Omnigrad TR	Level Levelflex	Controller Liquiline CM442 (pH, conductivity, DO)

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