

**Case study: Calenberger brewery - instrumentation for craft brewers**
**FOOD**


## The perfect instrumentation equipment for Craft Brewers

Rainer Kruppa is a passionate craft brewer who has optimized his own organic-certified Calenberger brewery, ensuring optimal efficiency for up to four brews of 1,200 liters each per day, all crafted according to his personal recipes. In addition to his own beer varieties, Kruppa also produces unique brews for "gipsy brewers" who lack their own brewing facilities. To achieve this remarkable level of production flexibility, Kruppa combines his expertise as a brewmaster with support from Anderson-Negele's instrumentation solutions.

Drawing from his practical experience, Kruppa has established a secondary venture: a brewery manufactory. He sources old brewing equipment, restoring and modernizing it to create fully functional breweries for local customers. When it comes to his projects in Spain, Southeast Asia, Brazil, and other locations, Kruppa exclusively considers Anderson-Negele as a partner for measurement technology, given their global sales and service network. Together with Anderson-Negele, Kruppa ensures the success of his brewing endeavors while upholding the highest standards of quality and innovation.

### The application

The Calenberger Brewery is equipped with state-of-the-art instrumentation, which is truly remarkable considering the size of the company. This level of technology enables Rainer Kruppa or his son to efficiently manage the entire production process as a "one-man business" while still maintaining the utmost level of individuality and customization. During the design phase of the plant, Kruppa prioritized innovative production techniques and sustainability as the key criteria. As an illustration of this commitment, Kruppa developed a unique method for direct mashing-in, and energy-saving measures were implemented to recover almost 100 % of the energy from the wort boiler. In his pursuit of these innovative solutions, Kruppa found the ideal measurement technology partner in Anderson-Negele.

### Advantages in the application

- » All essential measuring equipment for craft brewers from a single source, in the highest quality and reliability
- » Large variety of individual sensor types for individual adaptation to each application and installation situation
- » High measuring accuracy and easy adaptation to individual recipes and processes
- » Very good personal support on site and worldwide sales and service network for their international projects

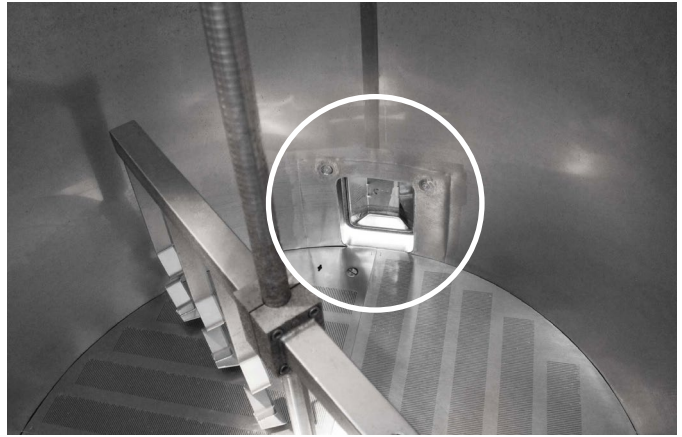


### The appropriate instrumentation for every process

A wide variety of sensors are operating at the Calenberger Brewery to ensure efficient production. Based on his more than 20 years of positive experience, Rainer Kruppa relies on Anderson-Negele products for temperature, pressure, level, flow and conductivity sensors. In addition to the wide range of applications, he considers the ease of product customization to meet individual requirements as a major benefit:

“ I design and configure each sensor for each individual application and take maximum advantage of Anderson-Negele’s wide range of variants. ”

For example, TS Temperature Sensors are used in diverse variations. First as a flush-mounted version in the lauter tun to precisely control the brew temperature despite the movements of the rake arms. During mashout, on the other hand, the temperature of the hot water supplied is monitored directly downstream of the FMQ Flowmeter in the pipe. Here Kruppa employed a long, tapered temperature probe to obtain the shortest possible response time. Finally, in the various vessels in the brewhouse or fermentation cellar, long, robust standard probes are used to precisely determine the core temperature in the vessel.



A TS Temperature Sensor (flush) and the upper pressure probe of the D3 Differential Pressure Sensor monitor the lauter tun.



FMQ Flow Meter and TS Temperature Sensor with long, tapered tip inserted in the pipe Tee, provide fast and concise mashing-in

### Highest precision required for the self-designed mashing system

Rainer Kruppa's inventive spirit is evidenced by several techniques he developed himself:

“ Our direct mashing-in is really something special. Here, milling, grist conveying and mashing-in take place fully automatically in a single process. ”

The malt grist is fed to the mash tun via a grist mill with integrated conveyor system. An FMQ Magnetic-Inductive Flow Sensor and a TS Temperature Sensor with an extra short response time ensure that the quantity, temperature, and flow rate of the water added are exactly as specified. This ensures a consistent mash quality even with a broad range of brewing recipes.



The Pfening Braumatik process control system uses all sensor data for optimum process automation and control



**Lautering: Brewmaster know-how with sensor support**

When it comes to lautering, Kruppa's sense for a harmonious and, for craft brewers, appropriate combination of brewmaster skills and automated processes is evident. The lautering process itself is monitored with sensing technology, but it remains the eye of the brewmaster that determines the right moment for lautering.

During the lautering process, a D3 Differential Pressure Sensor provides permanent, precise control of the pressure above and below the spent grains cake.

“The electrical differential pressure control with the D3 is many times more practical for installation, maintenance, and servicing than mechanical systems with capillaries”

finds Kruppa. In addition to the upper pressure port, there is also a flush-mounted TS Temperature Sensor.

Kruppa does not use a turbidimeter to determine the correct moment for lautering. In a brewery of this size, he does not yet see any need for this technology; he considers this to be more useful in larger breweries, where saving a few minutes of time already matters for optimizing the overall efficiency.



D3 Differential Pressure Sensor and FMQ Flow Meter: Perfect assistance for the craft brewer

**Energy optimization with the goal: 75% own electricity**

More topical than ever is the subject of energy costs. Here, too, Rainer Kruppa developed several ideas that make him less dependent. Energy saving, energy recovery, and energy management are central starting points for a holistic approach.

The core element for energy recovery is a thermal vapor recompressor to capture the waste heat from the wort boiler. Its function is monitored by TS Temperature Sensors and HH Pressure Transmitters.

“Through intelligent production control and energy management, such as the use of the hot water tank for energy storage, and a photovoltaic system for heating and cooling energy currently being planned, we want to achieve the target of 75% of our total energy consumption being generated in-house this year” Kruppa is certain.



The vapor recompressor: the heart of energy recovery with TS Temperature Sensor and HH Pressure Sensor in the wort boiler

**Other applications in the process**

In the brewhouse, the fermentation cellar, the filling skid and in the CIP system, additional measuring equipment are used to monitor all processes at all times in the central control station „Braumatik“. This includes TS Temperature Sensors for tanks and process lines as standard equipment, L3 Hydrostatic Level Meters for tank monitoring, LS Level Switches for full and empty vessel detection, FMQ Flow Meters for all process steps, and ILM-4 Conductivity Meters for the CIP system.




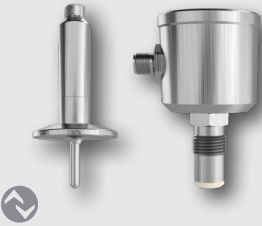


The standard equipment for process vessels: Temperature (TS), Level (L3) and Point Level (LS)


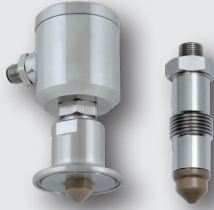



“More than 20 years ago I bought the first Anderson-Negele sensor. Since then, I have remained loyal to the brand. Quality, service, reliability, everything just fits.”

— Rainer Kruppa, Owner and Managing Director



Sensors used in this application			
Flow FMQ	Temperature TSBA / TSMA	Level L3	Differential Pressure D3
			
<b>Advantages</b>	<b>Advantages</b>	<b>Advantages</b>	<b>Advantages</b>
<ul style="list-style-type: none"> <li>· Compact, robust, cost-efficient all-rounder</li> <li>· Simple process connection</li> <li>· Very high measuring accuracy</li> </ul>	<ul style="list-style-type: none"> <li>· For pipes and vessels</li> <li>· Flush design possible</li> <li>· Measuring accuracy &lt; ±0.1 K</li> <li>· Extremely robust and enduring precision</li> <li>· Optional Programming display</li> </ul>	<ul style="list-style-type: none"> <li>· Significantly reduced temperature effect</li> <li>· Direct output of volume, level or pressure</li> <li>· Integrated tank linearization and density compensation</li> </ul>	<ul style="list-style-type: none"> <li>· For lauter tun monitoring or pressurized tanks</li> <li>· For media up to 110 °C (230 °F), CIP up to 135 °C (275 °F)</li> <li>· Measuring accuracy +/- 0.15 %, effect &lt; 0.03 % per 10 °C</li> </ul>

Sensors used in this application		
Pressure HH	Point Level LS	Conductivity ILM-4
		
<b>Advantages</b>	<b>Advantages</b>	<b>Advantages</b>
<ul style="list-style-type: none"> <li>· Compact sensor for process pressure control in pipes and vessels</li> <li>· Robust and durable - even at continuous temperatures up to 150 °C (300 °F)</li> <li>· Optionally relative or absolute measuring cell</li> </ul>	<ul style="list-style-type: none"> <li>· Reliable level indication even with foam</li> <li>· Hygienic installation on top, bottom bottom or laterally</li> <li>· Very short response time</li> <li>· Also for double-walled containers</li> <li>· Optionally heated to avoid condensate</li> </ul>	<ul style="list-style-type: none"> <li>· Measuring range selectable: 1...999 mS/cm</li> <li>· Sensor response time only approx. 1.2 sec.</li> <li>· Modular configuration from the basic version to the high end model</li> <li>· Extremely robust and durable: 5 years warranty</li> </ul>

 = IO-Link available

 = Remote version available

