Pressure Measurement in the Food Industry

Application:

Overpressure protection in coffee extraction

The DN100 contact pressure gauge with overpressure protection and a Sandvik DN50 flat-diaphragm seal

The production of the extract used in making instant coffee is done in extraction tanks by means of a process that includes the application of differing pressures. During this process, LABOM's DN100 contact pressure gauge with Sandvik DN50 flat-diaphragm seal ensures precise pressure control.

Precise Pressure Control is Critical for The Best Instant Coffee

A contact pressure gauge from LABOM precisely regulates changes in pressure.

Its enticing aroma tempts your senses, and its active ingredients stimulate both body and mind. Once affordable only by the wealthy, today many mil ions of people wouldn't think of starting their day without at least one enjoyable cup of coffee. Of course, preparing coffee from grounds does take a bit of time, no matter how you do it. So whenever you're in a rush and don't have time for all that, you simply grab a jar of instant. These days, even cappuccino and latte macchiato are both available in this form. The process for making instant coffee has been around for about 70 years. In it, the soluble materials are removed from ground coffee through several cycles in extractors. Water is added to percolation columns at temperatures up to around 170°C and under varying pressures. During this process, LABOM's DN100 contact pressure gauge with a Sandvik DN50 flat-diaphragm seal ensures precise pressure control with a level of overpressure protection unavailable anywhere else. What's more, its clamp-on technology makes it easy to install and then easy to clean the extraction system at regular intervals, saving both time and money.

The task: The extraction of the soluble materials from the ground coffee is done in an extended extraction pro-cess usually involving six containers, known as extraction columns, connec-ted in series and by applying the countercurrent principle. These columns are alternately fil ed with fresh coffee grounds and emptied of spent coffee grounds (dregs). During the extraction process, fresh hot water at a temperature of 50°C to 170°C and a pressure of 15 to 25 bar enters the extraction column containing the cofee grounds that are most spent, where it takes up soluble material. The weak solution from this initial step is than fed into the next container, where it takes up more soluble material. The solution resulting from each step in the extraction process progressively moves onward through each column of lesser spent coffee grounds until it reaches the last container filled with fresh, and as yet unused, grounds. Extract from this last column is withdrawn intermittently. The result of this extended process is a "thin extract" with a temperature of about 80°C. This thin extract is cooled immediately for quality control purposes and then cleaned of any solids. After this, it is sent to the freeze drying area for further processing, the result of which is the final product: soluble instant coffee. To verify that the extractor system is empty and pressure-free before being filled again, contact pressure gauges are used that are able to reliably register pressure changes between –1.0 and +0.6 bar.

The solution: LABOM's DN100 contact pressure gauge with a Sandvik DN50 flat-diaphragm seal and overpressure protection up to 40 bar.

The customer benefits: With its unmatched overpressure protection (available in a 60 bar rating, upon request), LABOM's solution regulates the system pressure within the smal range of between –1.0 and +0.6 bar and ensures precise switching of the fil ing and discharge processes in the extraction columns. The previously used flange-mounted pressure gauge was attached to the system piping with four mounting screws. In contrast, the clamp-on system from LABOM makes it easy to instal the gauge as wel as clean it at regular intervals, saving both time and money in maintaining the extraction system. The device is easily mounted on any pipe system by means of a simple adapter consisting of a two-piece sleeve. This sleeve al ows the device to be directly mounted on the pipe section used for readings. Similarly, it can also be quickly and easily removed for cleaning purposes. The latest version of the contact pressure gauge is not only smal er but also more robust than ever.

Although smaller, the diaphragm surface now withstands fluctuations in temperature as wel as fluctuations in pressure (from the overpressure range to the vacuum range) better, which means that it is greatly resistant to zero-point drift. The unit previously used was larger in size and also more expensive. Al in al , the new gauge from LABOM is smal er, more precise, more robust and more economical.

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DESCRIPTION OF DEVICE:

DN100 contact pressure gauge with overpressure protection and Sandvik DN50 flat-diaphragm seal

PRESSURE GAUGE with Bourdon tube and electrical contact device

- DN100 with stainless steel housing, safety-rated with solid baffle wall
- Liquid-filled gauge, protection type IP 66, bottom connection
- Nominal range: -1 to 0.6 bar
- Inductive contact safety initiator (SN)
- Switching function: 1 x max. break contact

Process connection:
FLAT-DIAPHRAGM SEAL, SPECIAL DESIGN

- For Sandvik L connection
- Material: stainless steel; diaphragm: Hastelloy C276
- Special overpressure protection up to 40 bar
- Liquid filling: FD1 foodstuff oil
- Operating temperature: +10/+190°C

The new version (left) of the LABOM DN100 contact pressure gauge with flat-diaphragm seal is even more compact. Compared to the previous flat gaskets (far right), the PTFE gasket in the new design can be reused many times. The previous, larger version required special, expensive flat gaskets that had to be replaced each time the system was cleaned.

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