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INDUSTRY PERSPECTIVE – SPONSORED CONTENT

Pressure-Based Measurements Level Challenges

Yokogawa's Nicholas Meyer explains the benefits of a tried-and-true technology.

NICHOLAS MEYER
Industry Marketing Manager, Yokogawa Corporation of America

There is no one-size-fits-all solution for level applications.

WHILE LIQUID tank level is one of the basic measurements used in process plants, its importance cannot be overstated. Incorrect high level measurements can cause vessels to overflow leading to lost product, a safety hazard or an environmental problem. Incorrect low level measurements can burn out pumps and can cause problems with inventory control.

Enter differential pressure level measurement, which infers liquid level in a vessel by measuring the pressure generated at the bottom of the vessel.

To better understand this long-standing technology, Chemical Processing spoke with Nicholas Meyer, Industry Marketing Manager, Yokogawa Corporation of America.

Q: Why is differential pressure level important?

A: Differential pressure (DP) level has been around for a long time. It is a tool in everyone's tool belt. It is readily accessible. There are few limitations in terms of how or where people can deploy the technology. It is also relatively inexpensive and less complicated than other technologies. Additionally, it can help overcome challenges from extreme heat or cold or from corrosive materials that may harm other instrumentation. DP level has a solution for many users out there to tackle those challenges.

Q: What are some challenges for DP level technology?

A: It is not suited for every application. It cannot measure the interface of multiple fluids except in very specific cases. It also has some limitations in terms of dynamic temperature effects on accuracy and reliability of a DP level measurement. But in terms of issues such as corrosive environments, we are able to add diaphragm seals, also called chemical seals, to protect the instruments. That is something that DP level technology can do quite well. It does require the use of a capillary, which extends that diaphragm away from where the transmitter would be mounted. But with that capillary comes some inaccuracy, some lag in the system. The overall length of those capillaries can be a big challenge as well. The longer you make those capillaries, the more that outside influences can affect the performance of the measurement.

In the past, people engineered systems themselves to try and eliminate or overcome errors or shortcomings. For example, they may choose what we call a balanced system where on the high-pressure side or low-pressure side of a system, they want to balance that out and make sure the seals are the exact same size and material, and the capillaries are the exact same size. That way if they experience an error, the hope is that it would be seen equally on both sides and cancel itself out. Others have looked at it in ways where they try to tune a system for performance if they know how it is being measured to measure level in a tank. They know one capillary is going to be shorter, so they make the diaphragm a little bit bigger. That also is intended to help balance out the performance of the system.

There are few limitations in terms of how or where people can deploy the technology

At Yokogawa, we have taken those scenarios into account and have looked at other ways that we can help compensate for some of the effects on the performance of a DP level system. For example, many standard pressure transmitters are characterized in an oven where they run through various pressure and temperature cycles and record the performance. Those are burned right into the memory of the transmitter so it can compensate for those conditions in the real world. But oftentimes the remote seals are added afterward and that adds another layer into the equation. At Yokogawa, we perform all the characterization after the full system is assembled. Therefore, our diaphragm seal system will help eliminate those using that environmental characterization. That is unique to Yokogawa.

Q: This isn't a one-size-fits-all technology. How do facilities manage multiple applications?

A: That is something each facility will have to address based on the particular applications. We certainly will not advocate using a DP level solution where it does not make sense. There are some applications such as interface level where it is just impossible. Also, DP level technology requires a constant density. If the density is shifting, now there are multiple variables; the density and the level make it impossible to really calculate. It requires planning ahead and considering other technologies for those applications. We do that on a case-by-case basis. Yokogawa does have a great customer support team available for consultation on these applications. If any end-user needs to specify or size out a level application, we are able to help them find the best technology.

Q: What are some considerations in terms of maintenance and inventory?

A: At its heart, a DP level application is a pressure application. It is important to take all needs into account. Requirements for accuracy must be compared to the long-term stability of the sensor. That will help develop a maintenance strategy to ensure performance. The Yokogawa solution is based on our silicon resonant sensor, which is a digital sensor at its heart and provides some advantages over traditional sensors that would require an analog to digital conversion. Those can introduce drift and errors. Since it is an active sensor, it does not require users to periodically check it for performance. The active sensor will actually indicate if one of the pressure ports has had an issue, or if the sensor itself has failed. Other technologies require more manual checks from a maintenance crew.

Q: What makes the solution better than others already on the market?

A: There is no one-size-fits-all for level applications. But Yokogawa has gone to great lengths to address many of the shortcomings that may affect DP level technology.

COMPENSATING CAPILLARY DP LEVEL SOLUTIONS

Compensation Capillary-type diaphragm seal systems are the latest design in Yokogawa's EJX Series differential pressure level solutions.

PODCAST ACCESS
Listen to the entire conversation via podcast at https://bit.ly/DPLevel.

Our hope is that this will make DP level require less maintenance and be more broadly applied throughout a plant because we have taken the steps necessary to overcome challenges. Otherwise, the burden is on the end-users to either change their practices, address it themselves, or search for another technology. DP level can be deployed more generally with the features in which we have invested.

Q: How is cybersecurity addressed?

A: Given recent incidents, OT cybersecurity has taken on a new sense of urgency. Unfortunately, a lot of instrumentation is based on communication protocols that are decades old. There was really no concept of cybersecurity built into them. You need to take a step back and look at this from a defense in-depth approach. This means including physical security as well as cybersecurity measures. Be sure to have the right policies and procedures in place to limit access to these devices, as well as the tools that are used to interact with them. Whether it is a handheld communicator in a technician's hands or an asset management system with remote access, you need to make sure that you can control those not just from an individual perspective, but also from a training perspective.

It is exciting that the new technologies are heavily invested in cybersecurity. They are designed in a way that cybersecurity considerations are baked-in. Now, communication can be encrypted end to end. There are session keys and role-based access.

Q: Is there anything you want to add?

A: With every technology, it is not just a matter of set-and-forget. There are many considerations. We want users to realize that Yokogawa as a partner has really looked into all the challenges our users face when it comes to selecting the right technology. And we have taken care of as many of those challenges as possible. It is a partnership and we are here for any user who wants to employ our technology to solve any of their tough challenges out in the field. ⊕

For more information, visit: www.yokogawa.com/us

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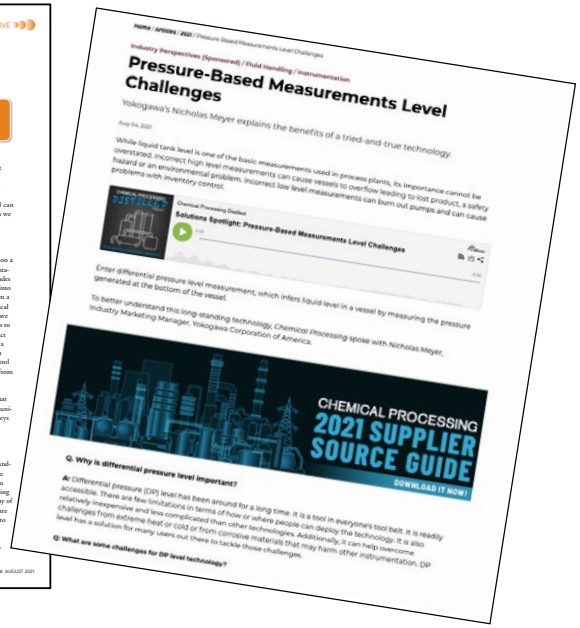
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