Summary: During our sessions, we focused on one main application per session, and we saw how different features of the ConsoliDator+ make it an ideal accessory.

However, one feature that makes the ConsoliDator+ a truly unique solution is that we can actually monitor or control SEVERAL types of applications on just ONE unit. You can monitor flow and level on the same screen, or you can program different screens that each show you a different process within a plant. Either way, the point is that you don't have to dedicate a ConsoliDator+ to just ONE application at a time.

Level AND Flow: Two of the most common application types for Precision Digital products is flow and level, so that's why we are taking a look at that first!

This screen is rather basic, and there is not much to really dive into. The one thing I wanted you to see is that a customer can monitor the level of their tanks AND the flow rates that may be filling or draining their tanks at the same time, on the same screen.

One thing to take note of on this screen is the fact that we are reading the "Recycled Oil" in FEET AND INCHES, but we can still have our flow rate be in a volumetric unit. That's rather intuitive, of course, but just wanted to point out that our units don't HAVE TO agree when we set up two different processes like that on the same screen.

pH AND Flow In a previous session we briefly looked at the ConsoliDator+ being used to monitor pH, or other analytical properties. On the previous screen of this session, we took a look at two different processes which have almost nothing to do with each other.

Meaning, the flow will not be affected by the level, and vice versa (in that particular scenario).

However, this screen is showing us pH and Flow, and these two processes (in this particular scenario) are indeed related, and directly linked together.

You will notice how the GREEN bar graph has two "Alarm Markers" on it (A1 and A2). Since that bar graph is representing the pH of the water we are flowing, it is safe to assume that we are wanting to maintain a pH balance between 5 and 9 – with 7 being the ideal measurement.

When our pH is between those two Alarm Markers, the valve position is open, and we see a positive flow rate of the water since the valve is allowing the flow through.

However, if our pH exceeds EITHER of those Alarm Markers, the valve position will turn to "CLOSED", and you will notice the flow rate slowly coming back down to 0 as the valve closes.

So, that means we are monitoring and controlling a flow rate based on the pH measurement we are getting! How cool is that?!

NOTE: *To accomplish this type of control, I simply created a "Common Alarm" so that regardless of which direction the pH goes, if it gets out of our allowable zone, it will force the relay off (closing the valve).*

Pressure AND Temp: Just like the previous screen, the two parameters being measured here are directly linked to one another. One cannot increase or decrease without the other doing the same. It's also NOT a linear relationship between the two, so I had to get a bit clever with the programming.

First, let's take a look at what's going on here.

We are monitoring the internal pressure and temperature of a pressure cooker! Because of bad publicity, I think they're called "Insta-Pots" now, but for this class we are sticking with the traditional nomenclature.

Naturally, in a pressurized system, temperature and pressure are directly tied to each other. As the pressure increases in the system, so does the temperature. As the pressure decreases in the system, the temperature will follow. It's fairly intuitive, but like I said, it's not always going to be a linear relationship.

If it were a linear relationship, then I would have just been able to take two 4-20 mA signals, and just scale them accordingly to show you how this works. But, I didn't want to cheat you! I wanted to actually show you how the ConsoliDator+ can make this work for you!

To accomplish this, I took a 4-20 mA signal, and just scaled it for 0-15 PSI (this was what the article I read said the range was for a pressure cooker).

Then, I made a new channel, and the "Function" was "Multi-Point Scale". That means rather than just 4 and 20 mA, I can scale something with up to 50 points of linearization!

But, I DID NOT use an analog input to scale the temperature reading. No, I used the "PSI" channel from the pressure cooker. I then looked at the table for the pressure cooker, and entered in the appropriate PSI ranges, and the degrees which corresponded. All told, I had about 5 or 6 points in this scale (as compared to the standard "2-Point Scale").

Not only that, but I can prove to you I did it that way!

For example, you'll notice that when our "PSI" is at 0, our temperature is at room temperature, around 72 degrees F. If I were to have just used the 4-20 mA input to scale that, at 0 PSI, our temperature would read 0 as well (and just because you turn a pressure cooker off does NOT mean it will freeze – though, that would be cool!).

Then, as the PSI creeps up to 1 or 2 PSI, you'll notice the temperature starts to jump up quickly. Once we get to about 8 or 9 PSI, the temperature is still increasing, but the rate of change is much slower than it was at the beginning, and that makes sense, right?

So, even though we are not measuring the temperature in the pressure cooker directly, as long as we know how the two processes relate to one another, we can easily read two completely different application based on just ONE process input.

Or, of course, you could also do this application based off two separate signals, but the point remains the same. The ConsoliDator+ can handle multiple application types simultaneously, and on the same screen!

Leak Detection (Level AND Flow): This screen is actually only monitoring ONE process variable, but we are technically monitoring a flow rate as well – in a roundabout way…

On this screen you see a channel for a VERY "Important Tank". For the sake of humor, let's pretend this tank is filled with liquid gold, and we don't want to lose a SINGLE drop of this precious material.

The other object we see on the screen is labeled, "Rate of Change", and that is EXACTLY what it's doing. That object is monitoring the level of the tank and reporting back ANY change in the liquid level – whether a positive or negative change.

When the level is increasing, the “Rate of Change” will be a positive number, and when the level is decreasing, it will be a negative value.

The last object on this screen is simply another alarm channel that is asking the operator if a leak has been detected. Under normal operating conditions, this object is going to say, “NO”. However, if our Important Tank starts to lose volume when it isn’t supposed to be losing volume, that alarm will be triggered and will then say, “YES”.

Again, I show this on the screen simply because I think it’s clever to have an alarm be in the form of a basic question. Again, just personal preference – but it does look pretty cool, right?

So, I programmed the alarm to trigger when the “Rate of Change” is equal to -100 gallons/sec, and the alarm condition will not clear until the “Rate of Change” is equal to 0 or greater.

What that means is that the alarm goes away as soon as the leak is fixed, or as soon as more material is pumped into the tank. It works that way because if material is being introduced to the tank, well, the Rate of Change will be a positive value, and ANY positive value is greater than 0 (our alarm “reset point”).

All that said, since we are monitoring the RATE of change in the tank’s volume, we are TECHNICALLY monitoring a flow rate. It’s just that the flow isn’t going through a pipe, and is instead flowing all over the ground.

Now that we have officially completed the first half of the class, you should now have a very strong understanding of how the ConsoliDator+ can be used for ANY application you may encounter.

By this point, hopefully it is understood that the potential uses for the ConsoliDator+ are practically endless. Yes, the device does have limitations, but for the most part, there is a way to accomplish almost anything on this device.

I mean, you even saw how it can be used as a simple alarm clock! From an alarm clock that wakes you up in the morning to controlling the pumps that feed water into your home every day, the ConsoliDator+ can do almost anything you need it to do.

Starting next week, we will stop focusing on specific application types, and instead we will start learning how the ConsoliDator+ is configured, and take a look at some configuration “best practices”.

Because this device is so flexible, there are a handful of ways to program almost anything. That said, there are only one or two ways that really make sense, so I will teach you how to program the unit in a logical way that not only makes sense, but will satisfy your customers’ control AND display needs at the same time!

Sincerely,

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