

Summary: Our legacy products are no stranger to simple math functions using basic arithmetic. However, our ConsoliDator+ has all the same basic mathematical functions one would find on a scientific calculator. From trigonometric formulas to weighted averages, the ConsoliDator+ can calculate almost anything you need!

We also have some “nice to mention” features that wouldn’t be able to take up an entire session, but they are still important nonetheless!

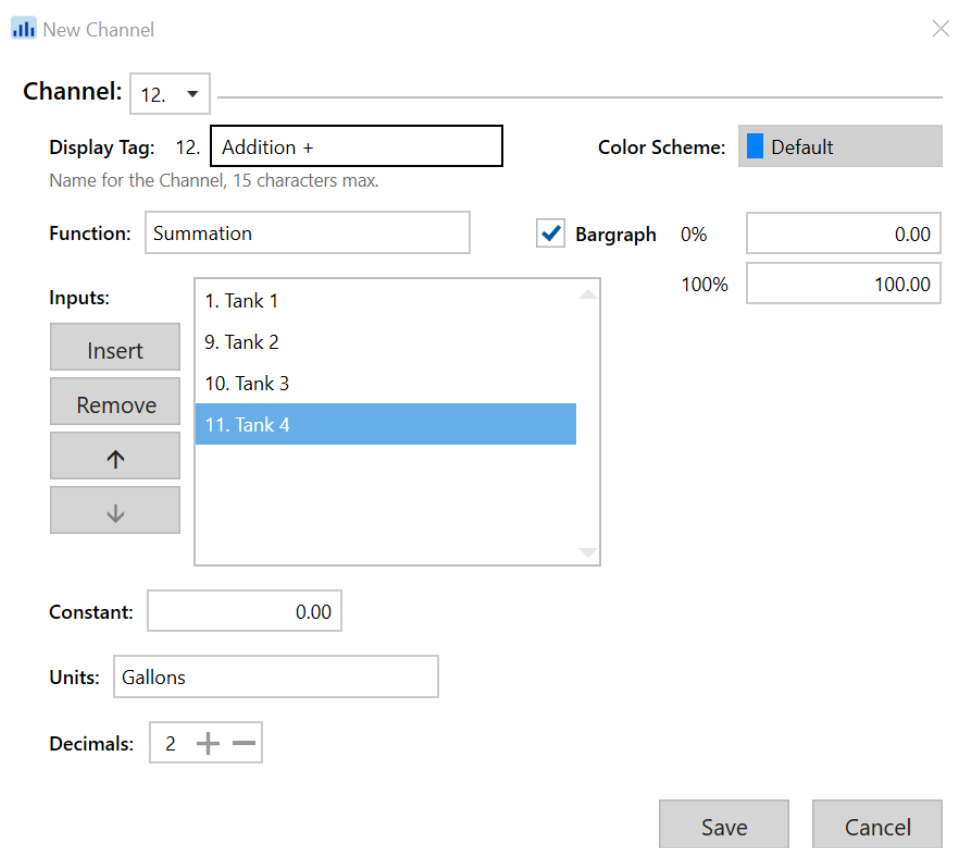
Basic Arithmetic We may as well get the basic arithmetic out of the way up front. As mentioned in the Summary, even our legacy products were capable of basic math functions between two channels, but the ConsoliDator+ can do MUCH more than just that.

For example, rather than ONLY having the option to subtract two channel values or add two channel values together, we can do basic math between multiple channels! In fact, our only limitation is the number of channels we are able to create (99 channels is the maximum).

For example, let’s say you want to subtract the value of Channel B from the value of Channel A.

But, you also want to divide that difference by a constant of X. Well, the ConsoliDator+ is flexible enough to allow you to perform these simple math functions. And, as you can imagine you can just keep going and going with these math calculations until your heart’s content.

Just for the fun of it, let’s take a look at what an “Addition” (called a “Summation” in the software) channel looks like in the software:



The screenshot shows the 'New Channel' configuration window. The 'Channel' dropdown is set to '12.'. The 'Display Tag' is '12. Addition +' with a note 'Name for the Channel, 15 characters max.'. The 'Color Scheme' is 'Default'. The 'Function' is 'Summation'. The 'Bargraph' checkbox is checked, with a scale from 0% (0.00) to 100% (100.00). The 'Inputs' list contains '1. Tank 1', '9. Tank 2', '10. Tank 3', and '11. Tank 4' (highlighted). There are 'Insert', 'Remove', and arrow buttons for the list. The 'Constant' is '0.00', 'Units' is 'Gallons', and 'Decimals' is '2'. 'Save' and 'Cancel' buttons are at the bottom.

Rather straight forward, but you simply add all the channels you want to add together. What’s nice about this is that you can even add a “Constant” number to add to everything WITHOUT having to create a “Constant” channel which can help if you’re bumping up against your 99 Channel Limitation!

One thing to pay attention to is “Order of Operations” when you are doing math like this. It doesn’t matter so much for addition, but when we start dividing channel values, it will pay off to be very mindful of the math operator you are choosing, and make sure you are entering in the correct values in the correct spot.

See below for what I mean:

The screenshot shows the 'New Channel' configuration window. At the top left is a small bar graph icon and the text 'New Channel'. At the top right is a close button (X). The main configuration area includes:

- Channel:** A dropdown menu showing '12.' with a downward arrow.
- Display Tag:** A text input field containing '12. Division /'. Below it is the text 'Name for the Channel, 15 characters max.'
- Color Scheme:** A button labeled 'Default' with a blue square icon.
- Function:** A dropdown menu showing 'Divide'.
- Bargraph:** A checked checkbox followed by the text 'Bargraph'.
- 0%:** A text input field containing '0.00'.
- 100%:** A text input field containing '100.00'.
- Input: (A / B):** A label for the input fields below.
- A:** A text input field containing '1. Tank 1'.
- B:** A text input field containing '10. Tank 3'.
- Units:** A text input field containing 'None'.
- Decimals:** A text input field containing '2' with plus and minus buttons on either side.

At the bottom right of the window are two buttons: 'Save' and 'Cancel'.

The software shows you exactly how it will calculate your answer. It will take the value of “Tank 1” and divide that by the value of “Tank 3”.

However, unlike addition, it DOES matter which channel or number is being divided. It’s possible that you will get a wrong number, or even a weird looking decimal if you don’t think it through and make sure you are performing the math correctly.

Remember, the ConsoliDator+ just does what it is told. It’s up to the user to tell the machine the correct stuff to do!

NOTE: Do not try to divide by “zero”. Dividing by 0 can be catastrophic and has been theorized to end the world as we know it... No, but in all seriousness, dividing by zero on purpose can cause harm to computer electronics, so just don’t do it! The software will not allow the machine to calculate that answer, but just to be safe, DO NOT try dividing by zero.

Trigonometry So who remembers their trigonometry lessons from high school?! Would my good friend “SOCAHTOA” ring any bells for you?!

No, no, this is not meant to be a lesson in trigonometry, although I will admit, if anyone would like an explanation or a lesson in trig, I'd be MORE than happy to do so!

For those of you who DO remember trig lessons from high school, you may be thinking to yourself, “**why on Earth would anyone need to use trig with the ConsoliDator+?**”

To that question, my answer is simply: “maybe they won’t, but they’ll be happy it’s there if they ever DO need it”.

Here’s the deal; when this product was being developed, the main goal was to make it as useful as possible, while maintaining the ease of use our customers have come to know from Precision Digital. Typically, the more flexible something is, the more complicated the interface can become, so we had to walk a fine line when developing this product, as you can imagine.

When it came time to add basic math functions, and the built-in formulas for open-channel flow, one of the engineers decided to allow a user to use the ConsoliDator+ like a scientific calculator. So, most of the operators you see on a calculator can be used with the ConsoliDator+, and it’s simply to allow the device to be as flexible as possible.

Will YOU ever need to use Sine or Cosine for an application?! Maybe not, but it’s still good to be aware that it CAN be used if a customer ever needed to use that math for an application

NOTE: *If you can think of a real-life example of when trig functions could be used in an application, there may be a prize in it for you!*

Just for fun, let’s take a look at what a “Trig” screen would look like:

The screenshot shows a 'New Channel' configuration window with the following fields and options:

- Channel:** 12. (dropdown menu)
- Display Tag:** 12. Trig! (text input, 15 characters max)
- Color Scheme:** Default (dropdown menu)
- Function:** Trigonometry (text input)
- Bargraph:** (checkbox), 0% (text input), 100% (text input), 0.00 (text input), 100.00 (text input)
- Input:** 11. Tank 4 (text input)
- Trig:** sine (dropdown menu)
- Angle:** Degrees (dropdown menu)
- Units:** Gallons (text input)
- Decimals:** 2 (text input), + (button), - (button)

Buttons for 'Save' and 'Cancel' are located at the bottom right of the window.

On this screen, you basically choose your input like you would any other channel, and then you have a few other selections to make!

You decide which trigonometric function you want to choose (Sine, Cosine, Tangent, Arcsine, Arctangent etc.) and then you choose whether or not you measure the arc length of a segment in degrees or radians!

NOTE: Degrees would be used for a “scalar measurement” where as Radians can be used for a “proportional measurement” since everything is expressed in terms of Pi

After that, you can choose your units of measure, and decide how many decimal places to display.

As previously mentioned, it is VERY likely that you will never need to use this type of functionality, but again, it’s always good for you to at least know that it is possible! You just never know when it may come in handy!

Average: Averaging is something that is very commonly used in our industry, and in fact, it’s one of the most popular math functions that have been used on the Consolidator+.

However, we can perform two different types of averaging with this device. One of them is just a regular average between multiple channels, and the other one is a “weighted average”.

So, let’s take a look at what a basic averaging screen would look like:

The screenshot shows the 'New Channel' configuration window. At the top left is the Consolidator+ logo and the text 'New Channel' with a close button. Below this, the 'Channel' dropdown is set to '12.'. The 'Display Tag' is '12. Average Reading' with a note 'Name for the Channel, 15 characters max.'. The 'Color Scheme' is 'Default'. The 'Function' is 'Average'. There is a checked 'Bargraph' option with two input fields: '0%' with '0.00' and '100%' with '100.00'. An 'Inputs' list contains '1. Tank 1', '9. Tank 2', '10. Tank 3', and '11. Tank 4' (highlighted). To the left of the list are 'Insert', 'Remove', and arrow buttons. There is an unchecked 'Exclude Failed Inputs' checkbox. The 'Units' are 'Gallons' and 'Decimals' are '2' with '+' and '-' buttons. At the bottom right are 'Save' and 'Cancel' buttons.

It's rather straightforward what's happening here. We have four tanks that we are monitoring, and with this channel setup, we are just going to get the average volume of all four tanks.

If you remember, I did this exact type of application during our "Week 4 Misc. Applications" session where we were reading two pressure readings, and then displaying the average pressure reading from both of our channels.

Pretty simple stuff, but what about this "weighted average" function? What's that all about?!

Well, for that, let's use a much more practical type of setup.

Let's pretend for a minute that you have to monitor the level of a tank with two level sensors. These two levels sensors also have to be two different measurement technologies (ultrasonic and radar – as an example) and you need to report the level of the tank based on the AVERAGE reading of both level sensors.

However, in this scenario, we know for a fact that our radar gauge is MUCH more accurate at measuring the material we have in the tank, so you trust your radar sensor much more.

So, when you average the readings together, you want the radar gauge to have much more of an impact on the average than the ultrasonic sensor does. THAT is when we use "Weighted Average"!

Below is a screenshot of this configuration screen:

New Channel [Close]

Channel: 12

Display Tag: 12. Color Scheme: Default

Name for the Channel, 15 characters max.

Function: Weighted Average Bargraph 0%
100%

Inputs:

Insert	AI-1. Radar Level	0.00
Remove	AI-2. Ultrasonic Xmit	0.00

↑
↓
Edit

Total Weight: 0.00

Units:

Decimals: + -

Save Cancel

With how the screen is setup now, if we were to save it and continue, then this would be nothing more than just a regular “Average” channel. So, we need to add our “weights” to the averaging so that we can use this channel how it’s meant to be used.

To do that, we simply want to highlight which level sensor to edit, and then press the “Edit” button.

But before we do that, let’s understand what we are doing first!

As I mentioned, in this situation you trust the radar sensor much more than the ultrasonic sensor, so you want more of the averaging to come from the radar level sensor.

Think of it this way, if we DO NOT select “weighted average” for our “Function”, each of the sensors will contribute to the average 50%.

So, in this example, let’s say we want our radar gauge to contribute about 70% to our average reading, and we only want the ultrasonic sensor to contribute 30% (make sure your weights add up to 100%!).

Let’s see what that looks like:

New Channel
✕

Channel: 12.

Display Tag: 12.

Name for the Channel, 15 characters max.

Color Scheme: Default

Function: **Bargraph** 0%

100%

Inputs:

Insert	AI-1. Radar Level	70.00
Remove	AI-2. Ultrasonic Xmit	30.00

↑

↓

Edit

Total Weight: 100.00

Units:

Decimals: + -

Save

Cancel

You can see the weights next to each channel, and you can also see at the bottom of the window that it shows you your “total weight”. Now, with only two items on this list, it’s pretty simple to make sure your weights add up to 100%, but you can understand if you had multiple items on this list, it could get rather confusing.

Now, you will notice that our “Units” on this channel is “mA”, so that means the VALUE of this channel is going to be between 4-20 mA.

What does that mean?!?

Well, that means we can use THIS “Weighted Average” channel as the Input to our tank level channel! That’s right, so instead of having BOTH of these signals being made into a tank channel and THEN using the average feature, we could just as easily just use this weighted average as the input to a tank channel!

You can always go back in and change the weights on your average if anything changes in the performance of your level sensors.

Or, let’s say you are required to add a THIRD level continuous level measurement device. Well, you could just as easily add a third device to this list, and redistribute the weights accordingly!

Absolute Value: Another interesting math function of the Consolidator+ is the “Absolute Value” channel function. It’s a rather simple function, but it can be important for certain applications.

First, we need to define what “Absolute Value” actually is!

The definition of “Absolute Value” is; “the absolute distance a number is away from zero”.

To conceptualize this, think about numbers in terms of DISTANCE as opposed to QUANTITY.

The number “2” is exactly a “distance of 2” away from “0”.

The number “-2” is exactly a “distance of 2” away from “0”.

The only difference between the two numbers is the DIRECTION. They are both the same exact distance away from “0”, but they are coming from different directions.

So, that is the conceptual idea behind “Absolute Value”. However, it is technically absolute VALUE and NOT absolute DISTANCE, so then what’s that all about?

Well, we simply use “Absolute Value” to make ALL possible outcomes a positive value. For example, if you were to take the absolute value for the equation: $-3+1$... the answer would be “2”, NOT “-2” even though that’s what the answer is when doing the arithmetic.

Long story short, we use the “Absolute Value” function on the Consolidator+ so that the unit will ONLY EVER DISPLAY POSITIVE VALUES.

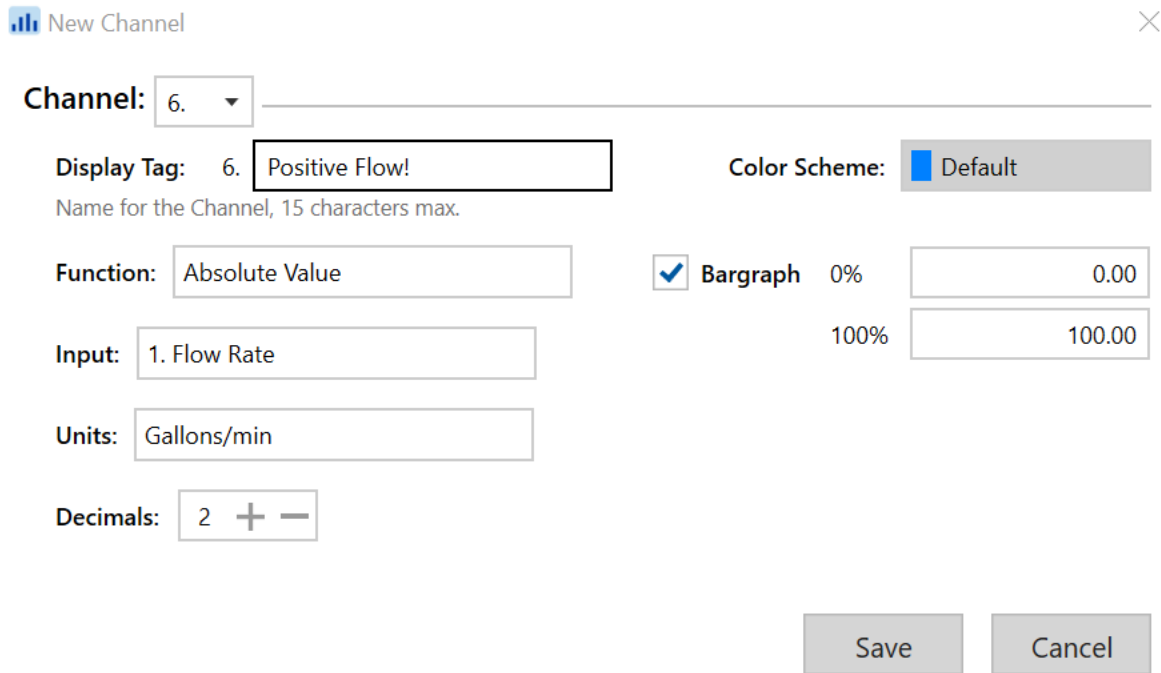
Let’s use a practical example for this.

Let’s say you are monitoring a bi-directional flow rate. The flow can move in either direction, but for whatever reason, the customer just wants to know how much liquid has gone through the flow meter. If the flow is in the “opposite” direction, they still want that flow to be totalized regularly.

Well, under normal circumstances, if the flow is going in the opposite direction, it would give us a negative flow rate value, and therefore, our totalizer will begin to count backwards.

So, what you do instead is take your flow rate channel, and turn that into another channel with the “Function” of “Absolute Value”.

See below:



The screenshot shows the 'New Channel' configuration window. The 'Channel' dropdown is set to '6.'. The 'Display Tag' is '6. Positive Flow!' with a note 'Name for the Channel, 15 characters max.'. The 'Color Scheme' is 'Default'. The 'Function' is 'Absolute Value'. The 'Bargraph' checkbox is checked. The 'Input' is '1. Flow Rate'. The 'Units' are 'Gallons/min'. The 'Decimals' are set to '2'. The 'Bargraph' scale is from 0% (0.00) to 100% (100.00). 'Save' and 'Cancel' buttons are at the bottom right.

With this channel configuration, regardless of what happens to the direction of flow, the flow rate value will ALWAYS be a positive value.

This will also mean that the totalizer will ONLY count UP, never down (unless you want the total to count down, we can do that. That is certainly an option!).

Now, what you can do is make THIS channel the “Input” to your totalizer, and now the totalizer will only count up!

If you wanted to, you could apply this “Absolute Value” channel to your totalizer as well, but that would just be redundant and would use up a channel that could be used for something else entirely!

OTHER UNIQUE FEATURES

Select (A or B): So, the rest of the features discussed here are not exactly MATH functions, but they are VERY unique features that can really make the ConsoliDator+ as flexible as possible!

One of the most unique features we have is the “Select (A or B)” channel Function.

This function can be a bit tricky for me to explain, but we’ll get through it!

This function can allow you to change an input to a channel based on some sort of process condition, or triggered alarm.

In this example, let's just take a look at a simple wet well level measurement.

Let's assume that the customer's primary measurement sensor is a submersible pressure transducer that sits at the bottom of the pit.

The customer also has an ultrasonic level sensor mounted at the top of the well, and that is going to be used as a backup sensor, or redundant sensor. What I mean is, the ultrasonic sensor will continually measure the level of the wet well, but that sensor's reading will ONLY be the input to our level channel under certain process conditions.

So, let's also assume that if the submersible pressure transducer breaks, or somehow the signal drops out, we then want the Consolidator+ to switch over to the ultrasonic sensor as the input to our level channel.

To achieve this level of sophistication, we will have to create several different objects and then combine them to make this happen flawlessly!

In total, we will have to create: 2 Inputs, 1 alarm, and 3 channels. It's going to be a long one, but the end result is totally cool!

So, the first thing we want to do is just setup our 4-20 mA inputs just like we would any other time.

However, for the "Primary Sensor" (the pressure transducer) we want to really make sure we are aware of a break condition. What I mean is, the default "Break Below" option on an analog input is ".010 mA" which is VERY low. In fact, if we used the default number for this application, it would be possible that our signal is no good, but never drops to that level and therefore the Consolidator+ will not be able to switch the inputs.

So, when we create the input for our primary sensor, let's make the "Break Below" value equal to 4! That way, if we get ANY signal below 4 mA, we will consider that a signal break, and the Consolidator+ can switch over to the ultrasonic sensor!

2b : mA Input

Display Tag: AI-2.

Name for the mA input channel, 15 characters max.

Filter:

Filter time window. If you need a more stable reading, select IIR 16 or 32 sec.

Bypass: Percent of Full Scale

If the signal change is greater than the bypass value, the reading jumps to the actual value \pm Bypass % of full scale.

Glitch Filter
Eliminates short duration noise spikes

Break Below: mA

Set the mA value at which a sensor break is reported to the system

Disable Input Channel
Turns off the power to the input.
This should only be used to save power on unused inputs.

Now that we have BOTH of our inputs configured the way we want, we should now configure an alarm to trigger when our primary sensor does go into a break condition.

Basically, when the sensor “breaks”, we want THAT to be a trigger to have the Consolidator+ switch inputs. And to do that, we must create an alarm (because an “Alarm” is just a conditional statement, right?).

So, let’s create a new Single Source “Alarm” with the input being the actual physical mA signal from our primary sensor!

Alarm 1

Display Tag: A1. Color Scheme: Default

Name for the Alarm, 15 characters max.

Type: Sound Horn

Input: Alert!

Automatic

Ack Anytime

Break:

Set Pt: On Delay:

Reset: Off Delay:

The first thing we need to do here is edit the “Break” field. The default setting for this is “Stay As Is” – meaning, if there is a break on the signal, the alarm would just stay the way it is (whether it is on, or off).

However, we want this alarm to trigger when we get a signal break.

So, we want to make sure our “Break” field says, “Alarm On”. Now, you may intuitively look at this and think that’s all you need to do, but we still need to enter in a set point and a reset point.

However, this setpoint isn’t going to be a mA value, as you may assume. Just like with some of the other alarms we have configured in the past, we must think of this in logical terms.

0 = OFF

1 = ON

Think of it this way...

If our primary sensor is working correctly and outputting a normal signal, the sensor can be considered “ON”, yeah?

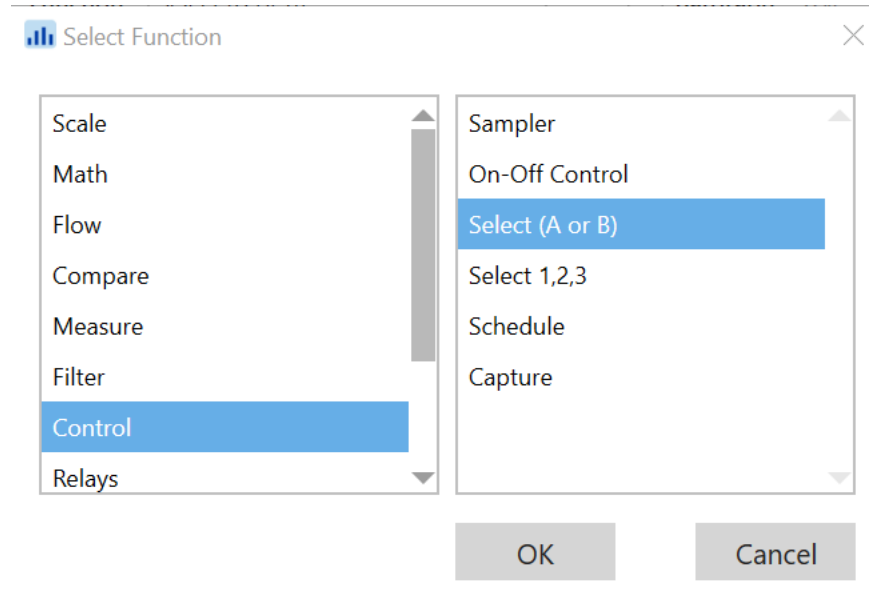
If the primary sensor has a BREAK, well, we can consider that to be “OFF”.

Using that logic, when our sensor is “OFF”, we want this alarm to trigger! When our sensor turns back “ON”, we want this alarm to clear or go away!

And how exactly does the ConsoliDator+ “know” when our sensor is on or off? Well, that’s because we have our “Break” edited to “Alarm On”. If that field was still the default, “stay as is”, and we used the same set point and reset points, the Alarm would ONLY trigger if our sensor was outputting 0 mA, and would clear when it is outputting 1 mA.

Okay, now that we have our inputs setup, and we have our alarm configured, it’s time for the most critical part of this entire setup.

Now we must create a Channel with the “Select (A or B)” function which can be found in the “Control” category:

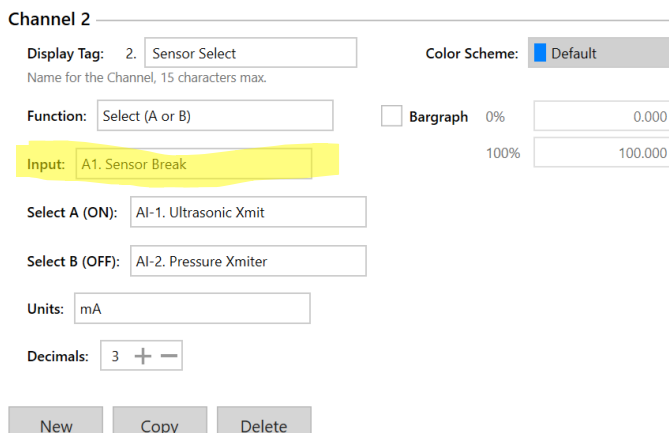


Now, before we move forward, let me explain what it is we are trying to accomplish here.

This function allows us to CHOOSE between two different inputs, and that can be controlled with some sort of “discrete” channel (any channel or “Object” which only has binary values of “ON/OFF” – EXACTLY like the alarm we just created).

That said, what do YOU think the “Input” to this “Select (A or B)” channel is going to be?!

If you guessed the alarm we just created, you would be 100% correct!



Now this part can be a little tricky to grasp at first, but it's going to work similarly to the way thought about setting up the Alarm set and reset points.

Remember, this channel is being directed by the "Sensor Break" alarm that we just created, right?

So, the "ON" and "OFF" fields here refer to the state of the alarm – NOT the state of the sensor itself!

Just to recap...

When our SENSOR is "OFF", our ALARM is "ON".

When our SENSOR is "ON", our ALARM is "OFF".

That said, when our ALARM is "ON" (or, our SENSOR is "OFF") we want the ConsoliDator+ to start using the output from our ultrasonic sensor to monitor the level of our wet well!

So, in the "Select A (ON)" field, we want to make sure that our ultrasonic sensor is selected.

Then, we want the "Select B (OFF)" field to be our primary sensor that has failed us!

That means as long as the primary sensor is outputting a signal above 4 mA, THAT is the sensor we will use for our level readings!

Okay, ONE last step, and I promise this one is super easy!

Now that we have all of these objects configured and the logic written out, all we need to do is finally setup our level channel!

So, all you have to do is create a new "Channel", and the INPUT to that channel is going to be the "Select (A or B)" channel that we just created!

It'll look something like this:

Channel 3

Display Tag: 3. Color Scheme: GREEN
Name for the Channel, 15 characters max.

Function: Bargraph 0%
 100%

Input:

Units:

Decimals:

Scale:	Input (mA)	Output (Gallons)
1.	<input type="text" value="4.000"/>	<input type="text" value="0.0"/>
2.	<input type="text" value="20.000"/>	<input type="text" value="1000.0"/>

Cutoff: Gallons

After that, you just scale the channel and set everything up just as you would if the input were just a basic 4-20 mA signal. Except now, the input to this channel is going to change depending on process conditions!

Pretty slick, huh?

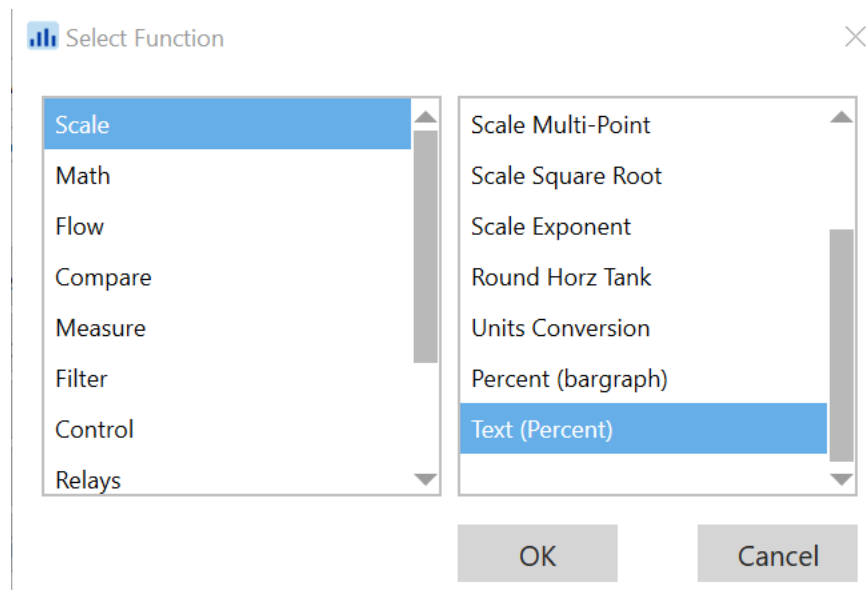
Text (Percent): This feature is actually one of my favorites, and it was actually a personal request of mine to add this type of capability to the ConsoliDator+ once it was officially released!

See, during the first half of the class, I used a lot of “Annunciator Panel Screens” which would show words and phrases instead of numerical values. Personally, I just think it’s clever when you can have the device show a message instead of just a number (and I’m a huge fan of anything clever!).

Well, that got me thinking... what if we could scale a 4-20 mA signal with WORDS instead of numerical values?!

What I mean is, instead of the ConsoliDator+ showing, “500 Gallons” on the screen, what if we could have it say, “Almost Empty” or “Needs Filling” or something like that?

Let’s take a look at what this would look like! Of course, we need to create a new Channel, and we want our “Input” to be either a 4-20 mA input, or a scaled channel and our “Function” to be “Text (Percent)”:



Now we are basically going to scale this channel just like we would any other type of level channel, except we are going to use words and RANGES instead of absolute values.

What I mean is, the words won’t constantly be changing as the level increases. The words will only change at certain points along the scale! That makes sense, right?

Ok, so let’s take a look at a channel that I have already fully configured, and then I can explain what I am “telling” the ConsoliDator+ to do:

Channel 5

Display Tag: 5. Color Scheme: GREEN
Name for the Channel, 15 characters max.

Function: Bargraph 0%
 100%

Input:
 Use Percentage from Input Bargraph

Inputs:

Insert	0%	TOTALLY EMPTY!
Remove	10%	Critical Low Level
↑	25%	Tank Needs Filling!
↓	50%	Level is Okay
Edit	75%	Tank is Full
	85%	CRITICAL HIGH LEVEL!
	100%	Get Out the Buckets!

Below 0%:
 Break:

Under “Input” you notice a checkbox for, “Use Percentage from Input Bargraph” – make sure that remains checked. It can get a little wonky if you try using the channel bargraph!

All we are doing here is telling the ConsoliDator+ at which PERCENT of our input signal to display various messages. For example, instead of saying, “at 12 mA, display ‘Level is Okay’” I am saying, “at 50% of my input, display ‘Level is Okay’”.

So, let’s start from the bottom of the scale and work our way up!

At 0% of my input, I want the ConsoliDator+ to display “TOTALLY EMPTY!”.

The display will keep showing that message until we reach our next percentage. So, in this case, the message will read, “TOTALLY EMPTY!” until our input gets to 10%. When our input reaches 10%, the display will now show “Critical Low Level”. It will keep showing this message until we reach our next percentage, 25%, at which point it will display “Tank Needs Filling”.

It will keep doing this all the way up until it says, “Get Out the Buckets!” when our tank reaches 100% capacity or more!

The same thing will happen as the tank empties. It will still follow the same ranges, but the messages will just be displayed in reverse.

Now, you can get REALLY clever with this type of channel function. Let’s say you want your customer to call you for service if something in their process goes wrong – whatever it may be. Well, you could always program a channel that displays, “Call 800-555-7895” or something so that the customer knows exactly who they should call when something goes wrong!

However, we still have two more messages we can add to this type of channel.

We can add a message if the process gets BELOW 0%, and we can also display a specific message if the input to this channel breaks (goes below a certain mA value, or just breaks all together).

In this example, for both situations, I made the message say, "Check Xmitter Output".

That could be extremely valuable to a customer if their level readings aren't quite matching what they can physically SEE in the tank, they will at least know they should check their transmitter output!

In this example, I used several scaling points for this, but you don't need to have that many. For example, let's say you want an analog signal to only show a discrete value on the screen, like "ON" or "OFF", well you can do exactly that with this channel feature.

Or, let's say for example that regardless of the application, you want there to be some sort of "Check your Transmitter" message. Well, you can do exactly that as well! It's completely customizable, and I'd be curious to see how it gets used in the real world!

Capture: This feature is actually something that I discovered while I was planning out the syllabus of this class and figuring out how to actually present all of this information!

We have seen in various sessions how we can use the "Soft Keys" to perform certain meter functions. As in, we can use them to jump to a specific screen, force on a relay, acknowledge an alarm, and MANY other meter functions.

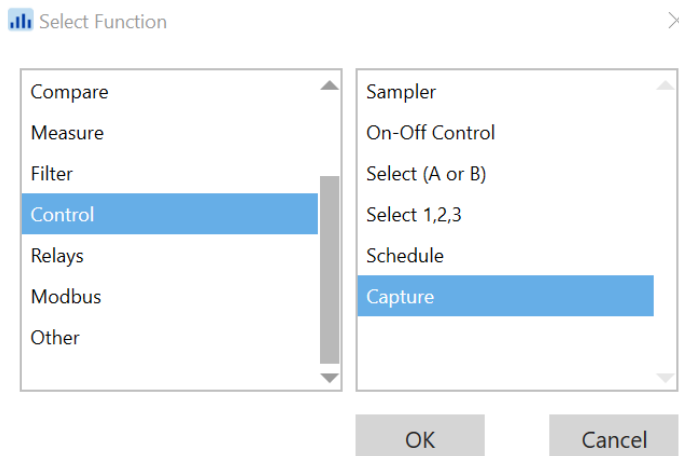
The exact same thing can be said for digital inputs as well. By engaging a digital input on the ConsoliDator+ we can have it perform the same functions that the "Soft Keys" would do!

But, wouldn't it be great if we could perform these types of meter functions WITHOUT any input from a human or another machine? What if we could do something like jump to a specific screen when a specific alarm occurs?

Or, what if we could have the ConsoliDator+ display all of the information about our "Primary Sensor" (from the "Select (A or B)" application we just did) when it turns off?

What I mean is, as soon as that sensor turns off, we can have the ConsoliDator+ jump to a special screen that shows us the analog input values, and which channels it is associated with. This would be a REALLY good indication to any operator that their primary sensor input is down and they need to fix it!

So, let's create a new Channel with "Capture" as the Function. "Capture" can be found in the "Control" category:



Now, for THIS particular scenario, we don't actually need any inputs or units. That said, you COULD add inputs and units if you wanted this channel to be displayed on some screen, but for the most part, this type of channel is just going to be running in the background, so we can ignore "Input" and "Units".

For this example, we want this capture function to be triggered (quite literally...) by the "Alarm" we created to have the ConsoliDator+ switch between sensors.

So, our "Trigger" is going to be that "Alarm", and we want it to trigger whether it is rising or falling, so we want to select "Rising/Falling". Basically, we don't care if the sensor breaks when we are above or below 4 mA, we just want to know when the sensor breaks.

The screenshot shows the 'New Channel' configuration window. The 'Channel' dropdown is set to '7.'. The 'Display Tag' is '7. Screen Switch' with a note 'Name for the Channel, 15 characters max.'. The 'Color Scheme' is 'Default'. The 'Function' is 'Capture'. The 'Bargraph' checkbox is checked, with a scale from 0% (0.0) to 100% (100.0). The 'Input' and 'Units' are both set to 'None'. The 'Decimals' are set to 1. The 'Trigger' is 'A1. Sensor Break' and the direction is 'Rising/Falling'. The 'On Capture' action is 'Do Nothing'. 'Save' and 'Cancel' buttons are at the bottom right.

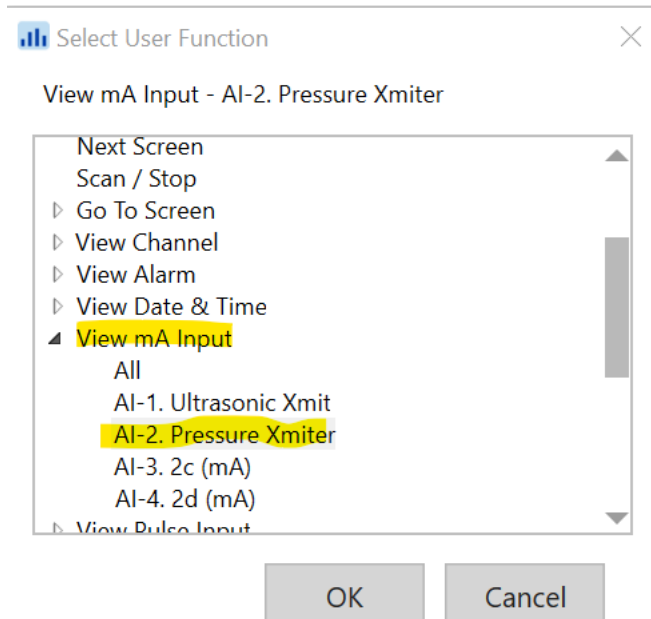
As you can see, we have told the ConsoliDator+ that our "Sensor Break" Alarm is going to be the trigger for this "Capture" function, and we don't care in which direction the break occurs. When the signal break happens, we want this "Trigger" to switch over to a screen that allows us to view the broken mA input!

Now we have to tell the ConsoliDator+ what we want it to do when this Alarm trips.

The options are actually ALMOST exactly the same as the options for programming a "Soft Key", or using a digital input to control certain meter functions.

In this case, we want to find the "Screens" category.

Then, we want to find the "View mA Input" subcategory, and then choose which mA input we want to view!



Now, after you select that “On Capture” function, you have successfully configured the Consolidator+ to automatically show the operator all the relevant information for the input that broke during normal operation!

This screen will stay displayed to the operator until they manually go back to the “home screen”.

Or, you could also setup another “Capture” channel that allows it to go back to the “home screen” automatically!

Again, this is an extremely basic and vague lesson on this feature, but I hope it gets you thinking about other meter functions you could perform with this function.

Here are just a **few more** examples of what can be accomplished:

- Acknowledge and/or reset alarms
- View the date and time (system clock)
- Simulate inputs, outputs, or channels
- Force relays on or off, view relay information, and more.

Again, as a reminder, this can all be accomplished with ZERO human intervention. This is all being controlled based on specific process conditions that just happen automatically!

This is the FIRST Precision Digital product that is capable of doing such complex meter functions without human intervention (pressing a button, or otherwise controlling the machine manually).

Keep in mind that this function is similar in nature, but very different from the “Schedule” function we learned about last week. With that function, the meter can be controlled based on day and time, but the “Capture” function just needs some sort of process condition to be met for the function to be activated!

Can you think of any clever ways to utilize the “Capture” functionality?!

With that, that will be the last of the “how to program” sessions! Next week will be our final session, and I genuinely appreciate all of you and your efforts in this class. This class was much more successful than I could have imagined, and that would not be possible without YOU!

Next week’s session topic is going to remain a surprise, but I promise I will try to make it fun!!

As mentioned previously, I am ALWAYS available and open for one-on-one sessions, additional training, or for anything you need to help you sell the Consolidator+!

Thank you, and hope you all learned a little something in the last three months!

Sincerely,

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