Training Presentation

Session 2

MPower®
Digital Switching Platform

Session 1 Overview:

- ✓ Digital Switching Overview
- ✓ Target Customers
- ✓ Planning, Design & Troubleshooting
- ✓ MPower General Overview & Features
- ✓ N2KAnalyzer – MPower Overview
- ✓ Garmin Setup Video
- ✓ Website Resources
- ✓ Prerequisites:
  - N2KAnalyzer Overview
  - MConnect Overview
  - N2KView Overview Series

Maretron
Vessel Monitoring & Control

Session 2 Overview:

- Switching Concepts
- Switching Application Videos
- LIVE: Training Board – Overview
- LIVE: N2KAnalyzer – MPower Configuration Training
- LIVE: User Interface Configuration
- Website Resources

SWITCHING CONCEPTS

Inter-System Communication Method (Discrete I/O)

CLMD16

Channel	Trigger
1	Breaker 1 On
2	Breaker 2 On
3	Breaker 3 On
4	Breaker 4 On
5	Breaker 5 On
6	Breaker 6 On
7	Breaker 7 On
8	Breaker 8 On
9	Breaker 9 On
10	Breaker 10 On
11	Breaker 11 On
12	Breaker 12 On
13	Breaker 13 On
14	Breaker 14 On
15	Breaker 15 On
16	Breaker 16 On

Channel	Trigger
17	Input 1 (Voltage Sensing) 'On Level'
18	Input 2 (Voltage Sensing) 'On Level'
19	Input 3 (Voltage Sensing) 'On Level'
20	Input 4 (Voltage Sensing) 'On Level'
21	Input 5 (Voltage Sensing) 'On Level'
22	Input 6 (Voltage Sensing) 'On Level'
23	Input 7 (Voltage Sensing) 'On Level'
24	Input 8 (Voltage Sensing) 'On Level'
25	Input 9 (Resistance to DC -) 'On Level'
26	Input 10 (Resistance to DC -) 'On Level'
27	Input 11 (Current Loop Pair) 'On Level'

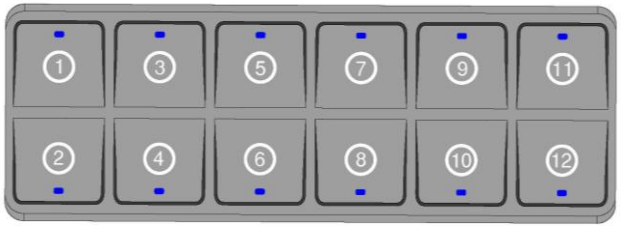
CLMD12

Channel	Trigger
1	Breaker 1 On
2	Breaker 2 On
3	Breaker 3 On
4	Breaker 4 On
5	Breaker 5 On
6	Breaker 6 On
7	Breaker 7 On
8	Breaker 8 On
9	Breaker 9 On
10	Breaker 10 On
11	Breaker 11 On
12	Breaker 12 On

Channel	Trigger
13	Input 1 (Voltage Sensing) 'On Level'
14	Input 2 (Voltage Sensing) 'On Level'
15	Input 3 (Voltage Sensing) 'On Level'
16	Input 4 (Voltage Sensing) 'On Level'
17	Input 5 (Voltage Sensing) 'On Level'
18	Input 6 (Voltage Sensing) 'On Level'
19	Input 7 (Voltage Sensing) 'On Level'

- The CLMD16, CLMD12, VMM6 and CKM12 send and receive NMEA 2000® 127501 Binary Status Report PGN. The tables below show the channel definition of the sent 127501 Binary Status Report for MPower Devices.
- This Binary Status Report is the signaling used for communicating from box to box over NMEA 2000.

CKM12



VMM6

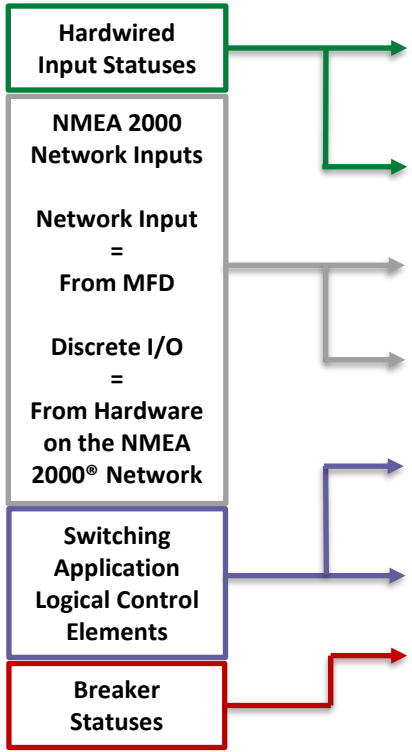
SWITCHING CONCEPTS

CLMD12 - Configuration Elements

Let's review Input signal options of the CLMD12, and review all of the different types of input potentials we have.

Everything Starts With an 'Input'

Logical Switching Elements receive an Input and then their Output can be used as the Input of the next desired action



Signal Name	
None Selected	This connects the specified input to a constant Logic '0' value
Input 1 - 7	The signal on binary event 1 - 7 is in the High, Low, or Both voltage range
Network Input 1 - 12	The state of the Network Input (1-12 respective to breaker #)
Discrete I/O 1 - 36	The I/O state of a Discrete Input (1 - 36)
Logic Output 1 - 12	The state of the output of Logic Element (1 – 12)
Flash Output 1 - 15	The state of the output of Flash Element (1 – 15)
Breaker On 1 - 12	A Breaker is On (1-12)

SWITCHING CONCEPTS

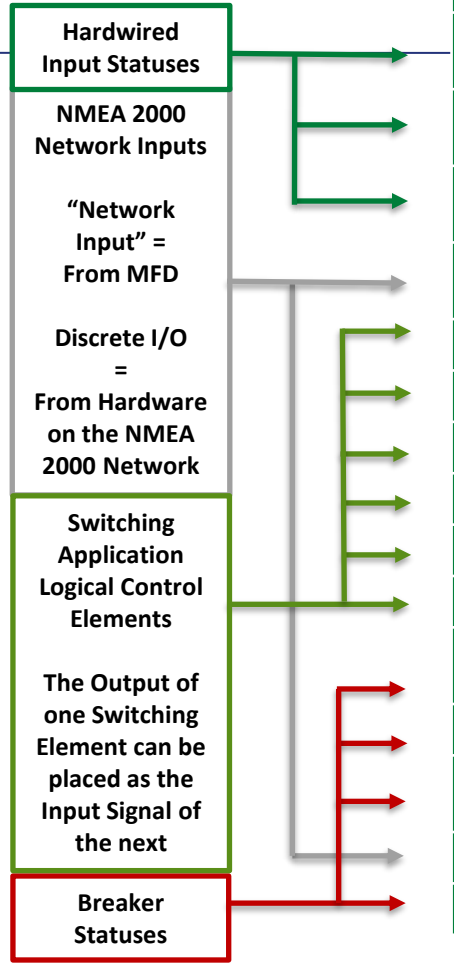
CLMD16 - Configuration Elements

Now let's jump to the big brother, the CLMD16, and review all of the different types of input potentials we have.

Everything Starts With an 'Input'

Logical Switching Elements receive an Input and then their Output can be used as the Input of the next desired action

See the CLMD16's 'Available Signal list' to the right for a description of the Inputs that can be used to switch a load(s) or placed into one another before switching a load(s).



Signal Name	Description
None Selected	This connects the specified input to a constant Logic '0' value
Input 1-11 Low	The signal on binary event 1 - 11 is in the Low voltage range
Input 1-11 Float	The signal on binary event 1 - 11 is in the Float voltage range
Input 1 - 11 High	The signal on binary event 1 – 11 is in the High voltage range
Network Input 1 – 16	The state of the Network Input (1-16 respective to breaker #)
Logic Output 1 – 48	The state of the output of Logic Element (1 – 48)
Latch Output 1 – 16	The state of the output of Latch Element (1 – 16)
Toggle Output 1 – 16	The state of the output of Toggle Element (1 – 16)
Timer Output 1 – 16	The state of the output of Delay Timer Element (1 – 16)
Flash Output 1 – 16	The state of the output of Flash Element (1 – 16)
Counter Active 1 - 16	The state of the output of Counter Element (1 – 16)
Over Current Fault Ch 1 - 16	A Breaker Over Current Fault has been detected (1 – 16)
Ch 1 - 16 Tripped	A Breaker has tripped (1 – 16)
Ch 1 - 12 Thermal Limit Hit	A Breaker has reached its thermal limit (1 - 16)
Discrete I/O 1 - 32	The I/O state of a Discrete Input (1 - 32)
Breaker On 1 - 16	A Breaker is On (1-12)

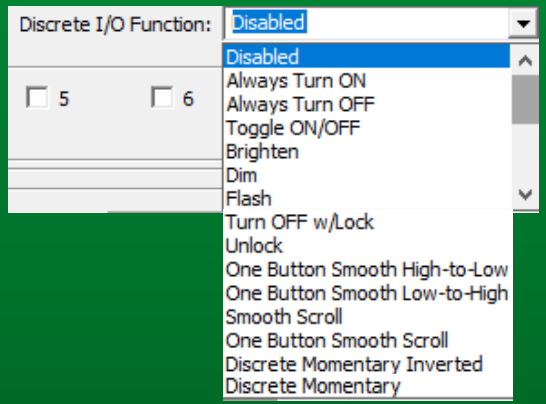
MPOWER CONFIGURATION

CLMD12 - Configuration Example Description Using Discrete I/O

Note: **'Manual Mode' is the means in which to sever the direct communication / control of the Breaker from MFD(s). By default, compatible MFD(s) present on the network containing a Maretron CLMD product will have direct control access unless Manual Mode is enabled.**

- The 'Discrete I/O' Data Instance and Indicator is the input relative to an instance of the NMEA 2000 127501 Binary Status Report PGN.

CLMD12 Features Pre-Defined Discrete I/O Input Functions:

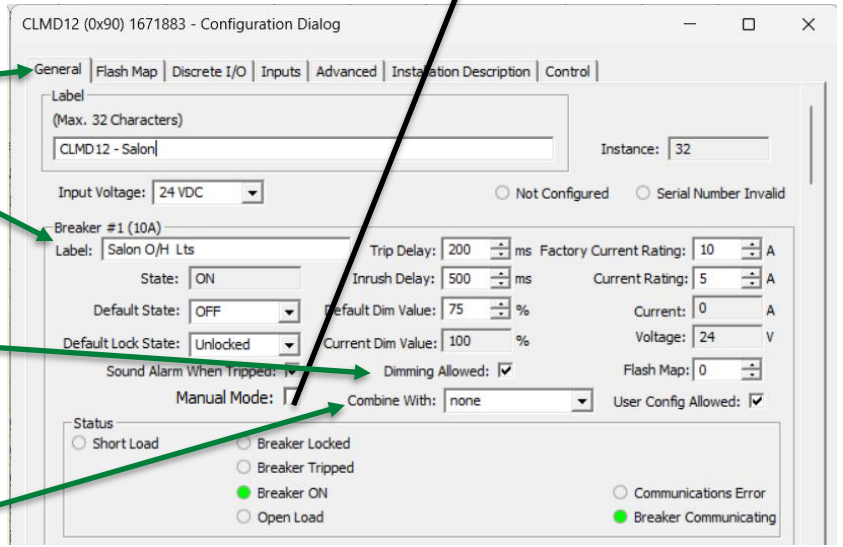


General Tab

Name the circuit and set the breakers trip parameters and default power-up state

Is this a Dimmable (PWM) Circuit?

Does this breaker need to be combined or Paralleled with another?

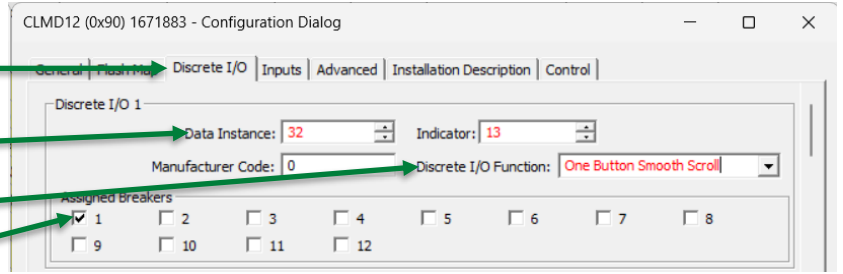


Discrete I/O Tab

What's the Binary Status Input Source?

What's the Function?

Assign Breaker(s)

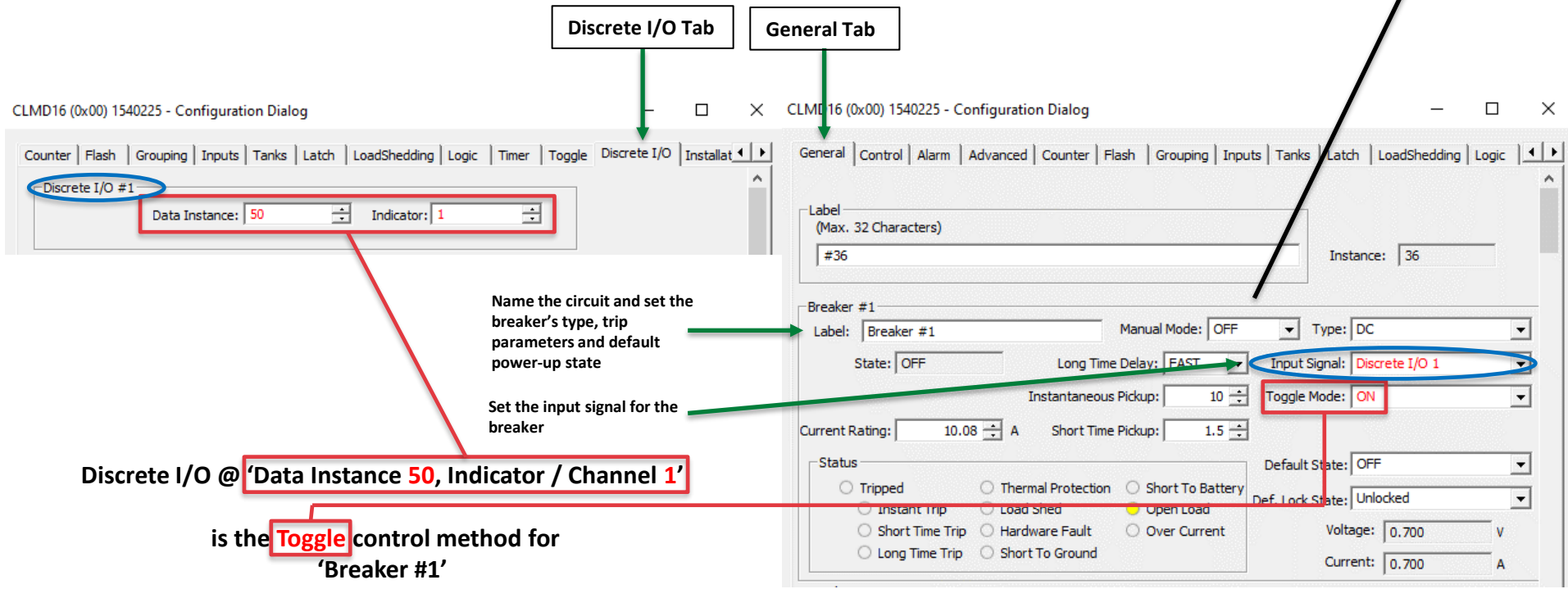


MPOWER CONFIGURATION

CLMD16 - Configuration Example Description Using Discrete I/O

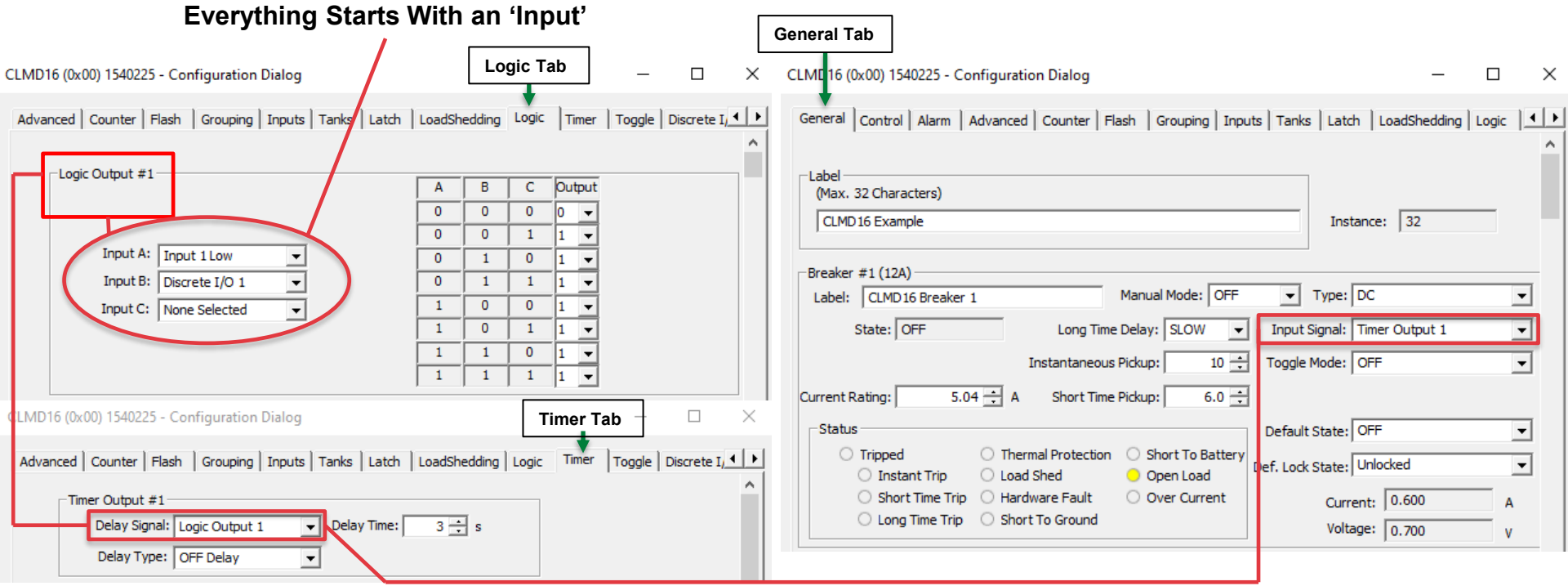
Note:

'Manual Mode' is the means in which to sever the direct communication / control of the Breaker from MFD(s). By default, compatible MFD(s) present on the network containing a Maretron CLMD product will have direct control access unless Manual Mode is enabled.



MPOWER CONFIGURATION

CLMD16 - More Advanced Configuration Flow Explained



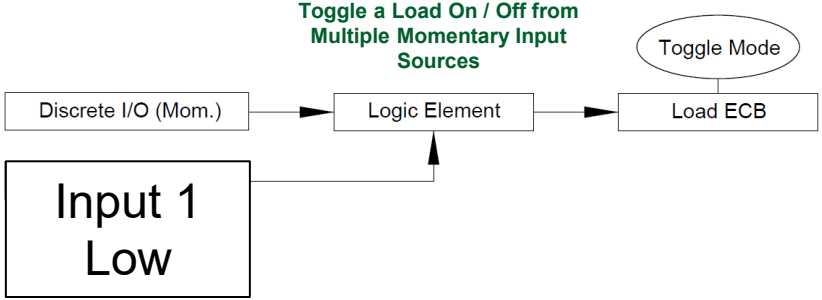
The Switching Application Elements can be placed in any order without regulation, even into one another for example, a Logic Element can be the Input of another Logic Element or Timer Elements can be sequenced by placing one Timer Element Output to another.

MPOWER CONFIGURATION

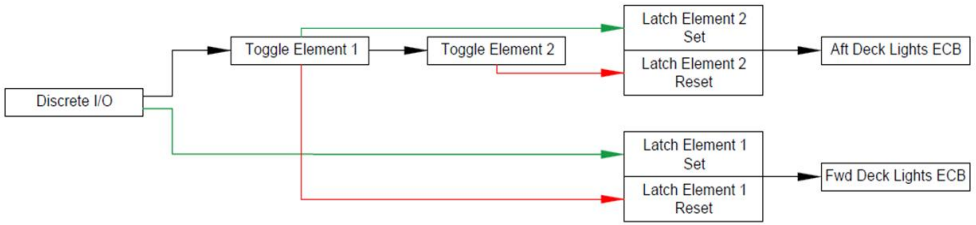
CLMD16 - Switch Application Possibilities

Below are some examples of the usage of CLMD16 Switching Application Elements for more advanced control.

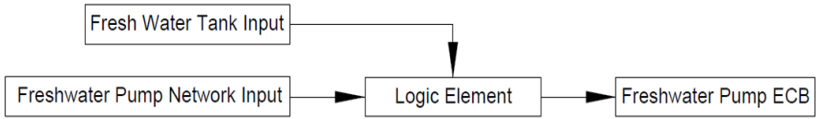
Toggle a Load On / Off from Multiple Momentary Input Sources



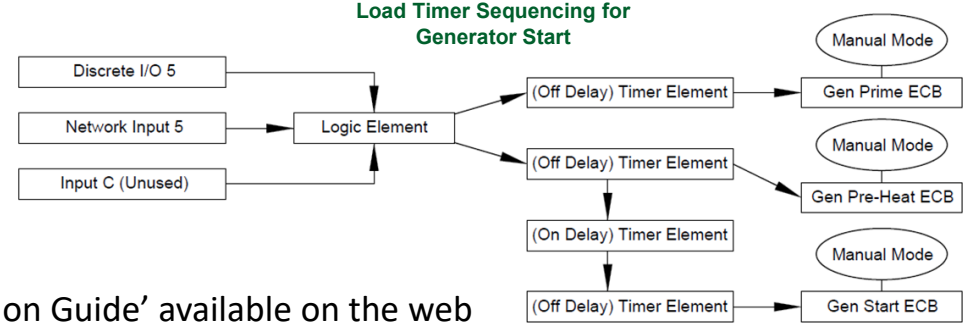
Single Input Load Control Sequence



Turning On or Off a Circuit Based on Fluid Level (Save your pumps by disallowing them to run dry)



Load Timer Sequencing for Generator Start



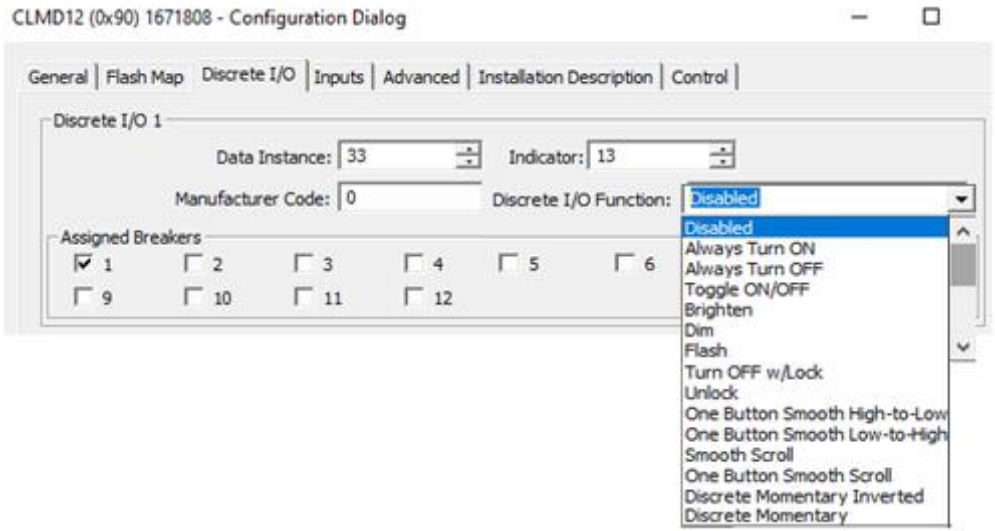
For more examples, please see our ‘CLMD16 Configuration Guide’ available on the web “CLMD16’s Configuration Capacity Is Only Limited By your Imagination”

CLMD SWITCHING APPLICATION FEATURES

Overview – CLMD12

How we bring the input signal into a CLMD module slightly differs between the CLMD12 and the CLMD16 due to available features. The CLMD12 offers a more direct approach.

- Define the source of the 127501 command on the NMEA 2000® network, could be local (same device) or via the network
- Define the Function, how we want our circuit to respond to this incoming signal
- Assign the breakers for this incoming signal and apply the desired function we have selected

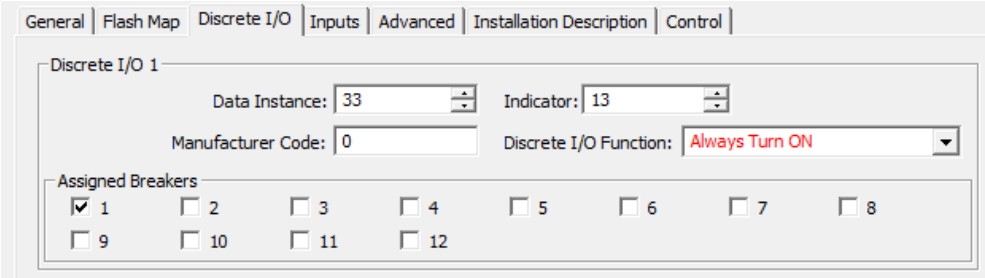


CLMD12 SWITCHING APPLICATION FEATURES

Always Turn On

The ‘Always Turn On’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 makes the output turn On if the output is Off when the associated input / command becomes activated.
Notice in the video demonstration, the input / command will only turn On the output and nothing else.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

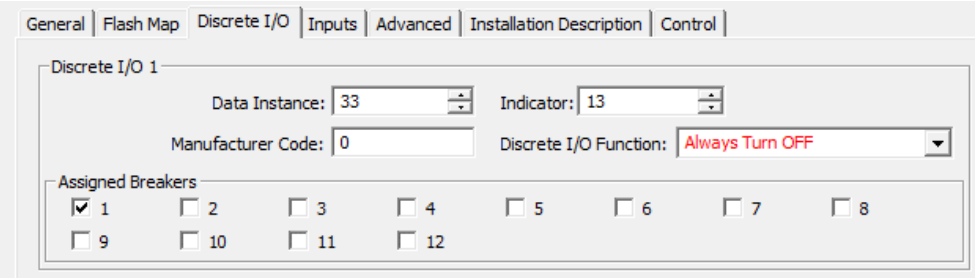
https://youtu.be/7Guye-yc25c

CLMD12 SWITCHING APPLICATION FEATURES

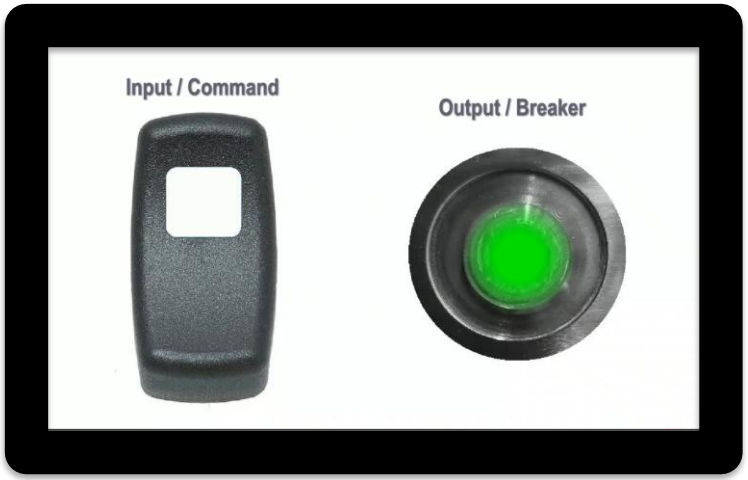
Always Turn Off

The ‘Always Turn Off’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 makes the output turn Off if the output is On when the associated input / command becomes activated.
Notice in the video demonstration, the input / command will only turn Off the output and nothing else.

N2KAnalyzer Configuration Dialog:



Video Demonstration:



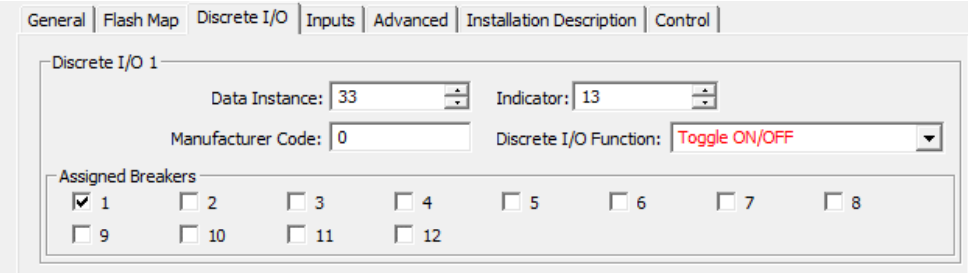
https://youtu.be/-wFApTe90KA

CLMD12 SWITCHING APPLICATION FEATURES

Toggle On / Off

The ‘Toggle On / Off’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 makes the output turn On if the output is Off and turn Off if the output is On anytime the associated input is activated. Each subsequent input / command will make the output / breaker change to the opposite state.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

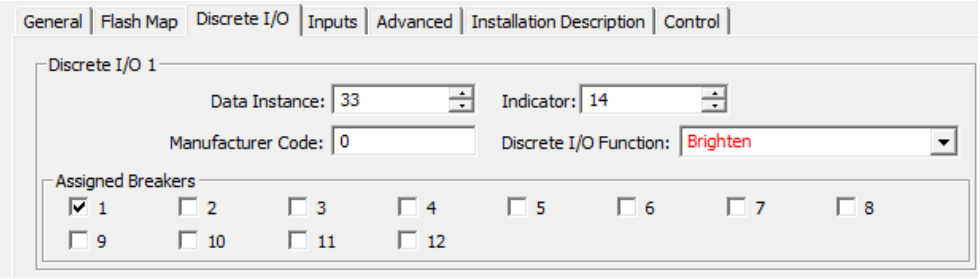
https://youtu.be/jJC8OvE-aiQ

CLMD12 SWITCHING APPLICATION FEATURES

Brighten

The ‘Brighten’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 makes the output turn On if the output is Off and each subsequent presence of input / command will increase the PWM of the output. The ‘Brighten’ feature will only perform this behavior.

N2KAnalyzer Configuration Dialog:



(PWM increments have been expanded for this video demo)

- ‘Dim’ PWM increment size is 1% PWM

Video Demonstration:

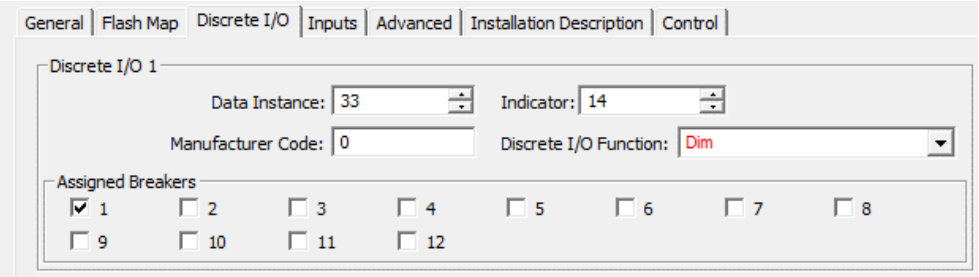
https://youtu.be/FGkSxAv5U7U

CLMD12 SWITCHING APPLICATION FEATURES

Dim

The ‘Dim’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 decreases the output PWM when an Input / Command becomes active. Unlike ‘Brighten’, ‘Dim’ will not command the breaker On / Off but instead its function is only to decrease the PWM. Each subsequent presence of input / command will increase the PWM of the output. The ‘Dim’ feature will only perform this behavior.

N2KAnalyzer Configuration Dialog:



(PWM increments have been expanded for this video demo)

- ‘Dim’ PWM increment size is 1% PWM

Video Demonstration:

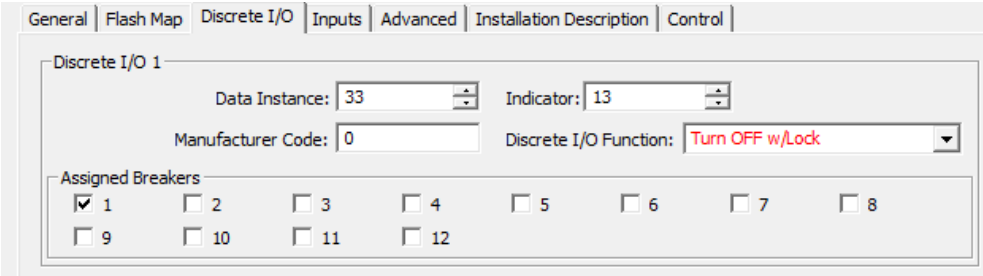
https://youtu.be/TDonJXwd5fk

CLMD12 SWITCHING APPLICATION FEATURES

Turn Off w/ Lock

The ‘Turn OFF w/Lock’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 makes the output turn Off if On and activates the breaker lock if the assigned Input is active. The breaker will ‘Unlock’ when the Input is no longer active.

N2KAnalyzer Configuration Dialog:



* Notice the ‘Breaker Status’ have an image of a lock appear when the Discrete I/O Input is active and then disappear when inactive. This will appear in N2KView with any switch associated with the respective breaker.

Video Demonstration:

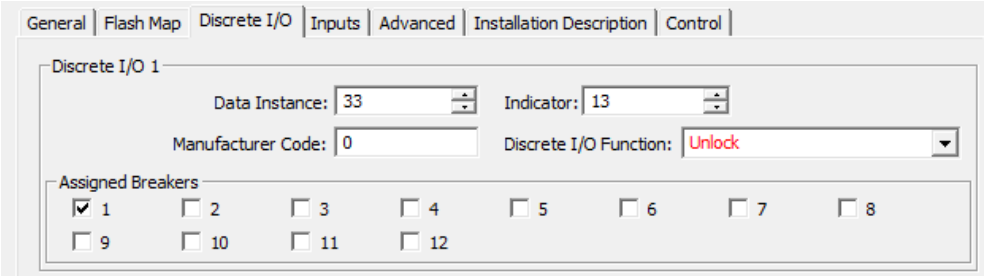
https://youtu.be/_z3EMv8cU50

CLMD12 SWITCHING APPLICATION FEATURES

Unlock

The ‘Unlock’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 unlocks a breaker lock if the assigned Input is active. The breaker will stay unlocked even after the Input is no longer active.

N2KAnalyzer Configuration Dialog:



* Notice the ‘Breaker Status’ have an image of a lock that disappears when the Discrete I/O Input becomes active. The image of a lock will appear in N2KView with any switch associated with the respective breaker is in the locked state.

Video Demonstration:

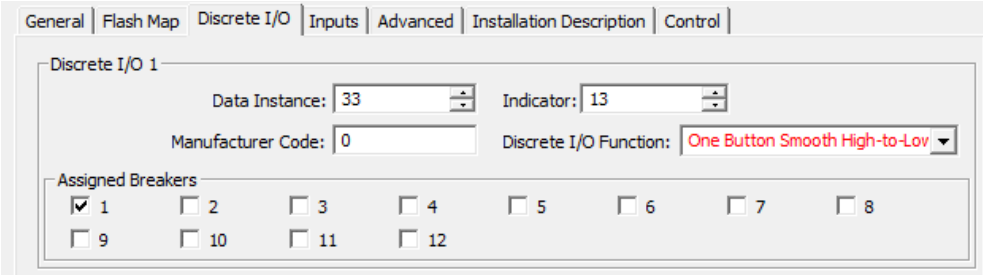
https://youtu.be/6Gj9U9gWrxs

CLMD12 SWITCHING APPLICATION FEATURES

One Button Smooth Hight-to-Low

The ‘One Button Smooth High-to-Low’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 turns on an assigned breaker when the input is first activated. When the input is held, the breakers PWM level will decrease. Once the PWM level reaches 0% when the input is being held active, the breaker will start the PWM level decreasing from 100% PWM back down to 0% then restart at 100% in an endless loop.

N2KAnalyzer Configuration Dialog:



* Notice the ‘PWM Level’ has a smooth movement from a higher PWM to a lower PWM

Video Demonstration:

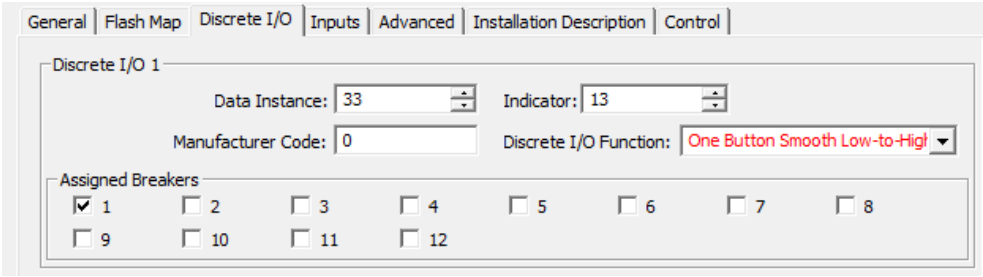
https://youtu.be/8WVpWsbrU8Y

CLMD12 SWITCHING APPLICATION FEATURES

One Button Smooth Low-to-High

The ‘One Button Smooth Low-to-High’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 turns on an assigned breaker when the input is first activated. When the input is held, the breakers PWM level will increase. Once the PWM level reaches 100% when the input is being held active, the breaker will start the PWM level increasing from 0% PWM back up to 100% then restart at 0% in an endless loop.

N2KAnalyzer Configuration Dialog:



* Notice the ‘PWM Level’ has a smooth movement from a lower PWM to a higher PWM

Video Demonstration:

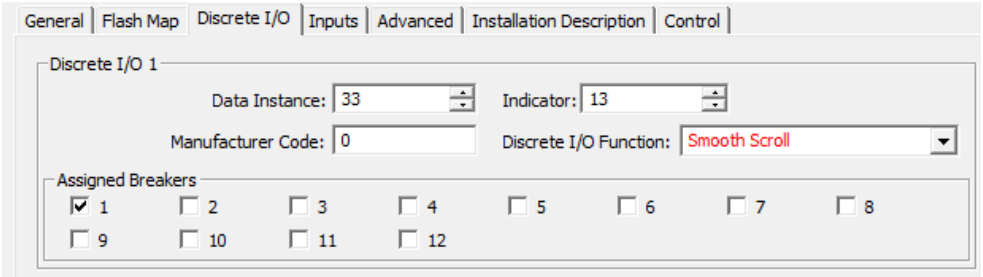
https://youtu.be/79NmjEvBV3E

CLMD12 SWITCHING APPLICATION FEATURES

Smooth Scroll

The ‘Smooth Scroll’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 turns on an assigned breaker when the input is first activated. When the input is held, the breaker’s PWM level will increase or decrease depending on the last state of PWM direction. Once the PWM level reaches 100% or 0% when the input is being held active, the breaker will start the PWM level increasing after reaching 0% or decreasing after reaching 100%.
This will function in an endless loop if the associative input is active.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

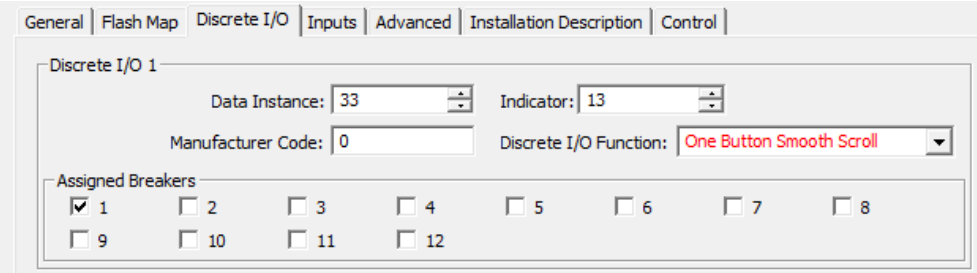
https://youtu.be/QTyO0DyBWyc

CLMD12 SWITCHING APPLICATION FEATURES

One Button Smooth Scroll

The ‘One Button Smooth Scroll’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 turns On and Off an assigned breaker in the same behavior as the ‘Toggle’ switching application however when the input for the breaker is held the ‘Toggle’ function is ignored and instead a ‘Smooth Scroll’ operation takes place.
The breaker’s last PWM state is recalled whenever the breaker toggles from Off to On.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

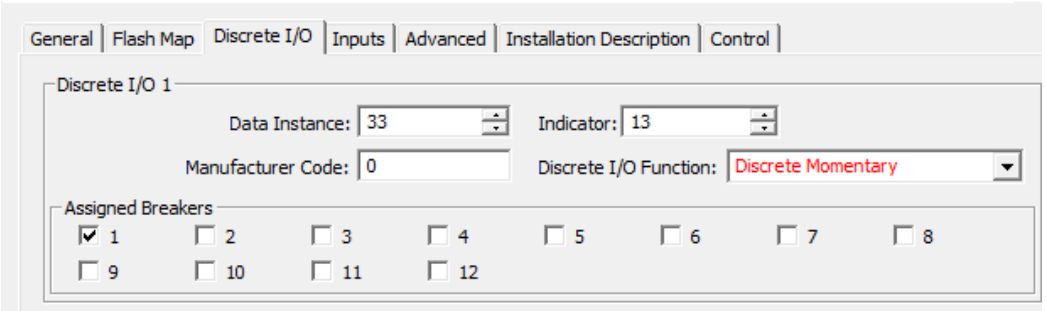
https://youtu.be/t9NMRKH2EoE

CLMD12 SWITCHING APPLICATION FEATURES

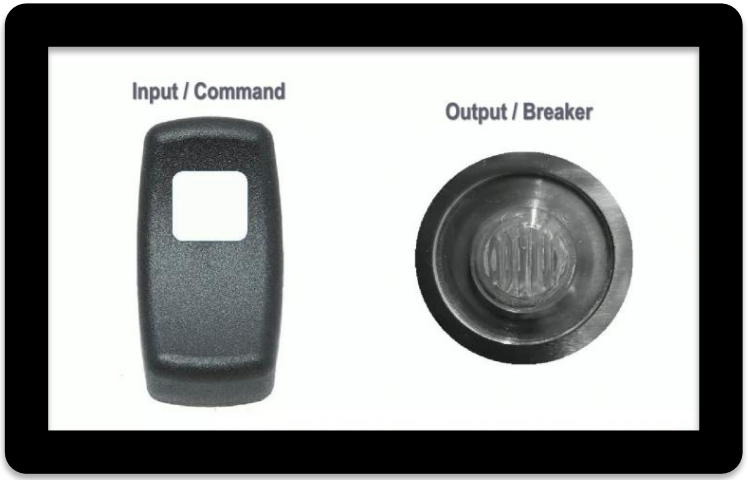
Discrete Momentary

The ‘Discrete Momentary’ switching application feature located in the ‘Discrete I/O’ section when configuring an CLMD12 makes the output turn On only if the Input controlling the breaker is On or being commanded.

N2KAnalyzer Configuration Dialog:



Video Demonstration:



https://youtu.be/bwnZ8_txKtA

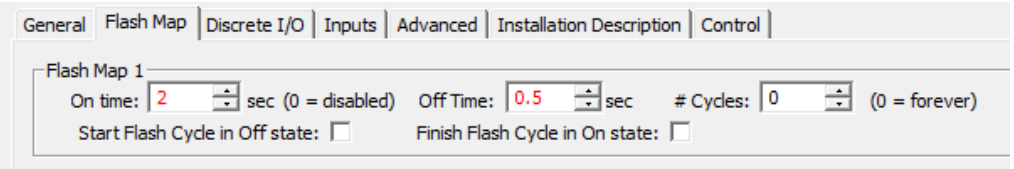
CLMD12 SWITCHING APPLICATION FEATURES

Flash Map

The ‘Flash Map’ switching application feature located in the ‘Flash Map’ section when configuring an CLMD12 makes the output turn On and Off in a configurable periodic manner.

In the following video example of ‘Flash Map’ behavior, the CLMD12 ‘Flash Map’ is configured to turn the output On for 2s then off for 0.5s with an infinite cycle count.

N2KAnalyzer Configuration Dialog:



Additional Definition:

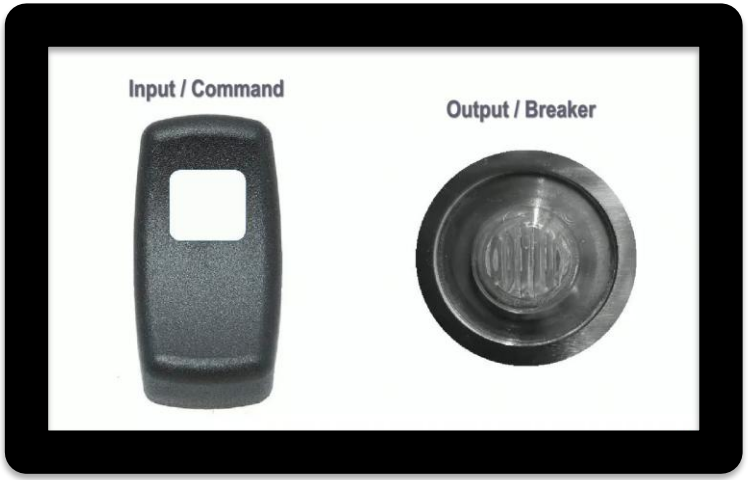
Start Flash Cycle in Off State

This parameter allows you to configure the Flash Map to start with ‘Off Time’ as the first behavior of the Flash Map. The Flash Map will then execute the configured number of Cycles.

Finish Flash Cycle in On State

This parameter allows you to configure the Flash Map to stop the flash cycle with the breaker to finish in the On state once the configured number of cycles are executed.

Video Demonstration:



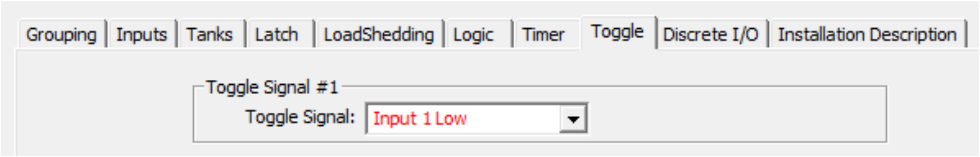
https://youtu.be/wc0Oz46ZayU

CLMD16 SWITCHING APPLICATION FEATURES

Toggle

The ‘Toggle’ switching application feature located in the ‘Toggle’ section when configuring an CLMD16 turns makes the output turn On if the output is Off and turn Off if the output is On anytime the associated input is activated. Each subsequent input / command will make the output / breaker change to the opposite state.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

https://youtu.be/jJC8OvE-aiQ

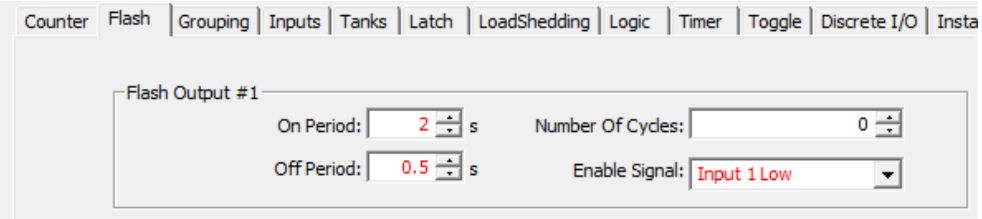
CLMD16 SWITCHING APPLICATION FEATURES

Flash

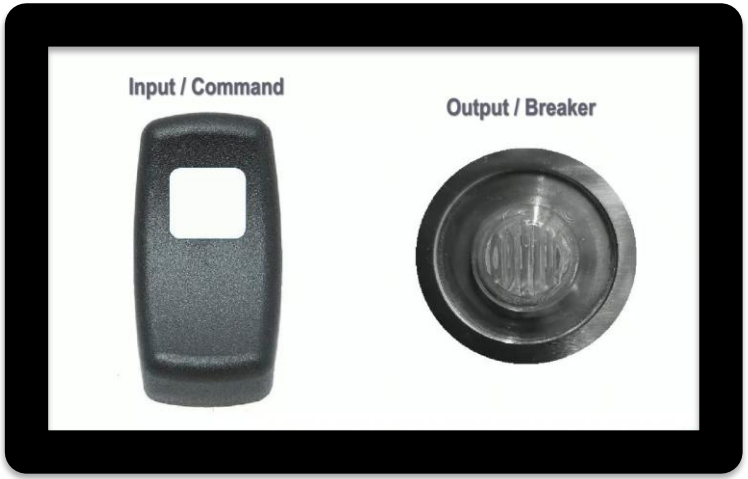
The ‘Flash’ switching application feature located in the ‘Flash’ section when configuring an CLMD16 makes the output turn On and Off in a configurable periodic manner.

In the following video example of ‘Flash’ behavior, the CLMD16 ‘Flash’ is configured to turn the output On for 2s then off for 0.5s with an infinite cycle count.

N2KAnalyzer Configuration Dialog:



Video Demonstration:



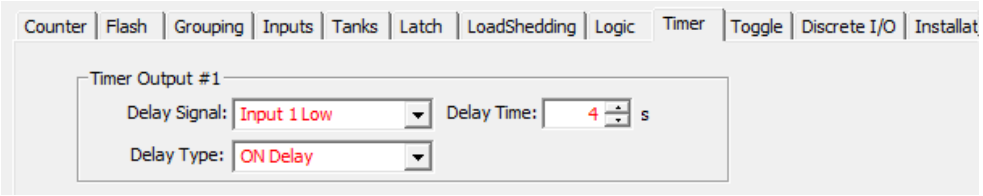
https://youtu.be/wc0Oz46ZayU

CLMD16 SWITCHING APPLICATION FEATURES

Time (On Delay)

The ‘Timer’ switching application feature located in the ‘Timer’ section when configuring an CLMD16 allows for a configurable delay for the respective timer output. When activated, the ‘On Delay Timer’ will turn On it’s output signal after the configured time. In the video demonstration below the ‘Timer (ON Delay)’ is configured to 4s

N2KAnalyzer Configuration Dialog:



*Tip:
Timer outputs can be the input to the next desired timer allowing the CLMD16 to control operations in a timed sequenced manner.

Video Demonstration:

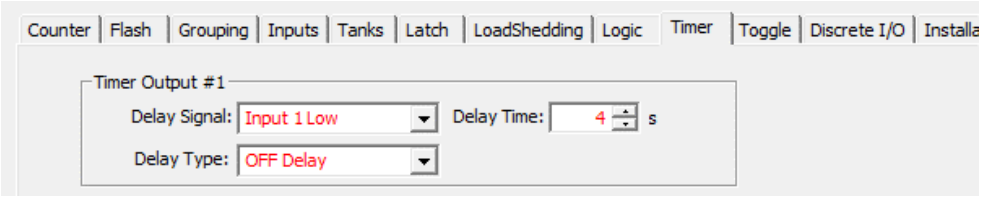
https://youtu.be/HOs0v3TgmJE

CLMD16 SWITCHING APPLICATION FEATURES

Time (Off Delay)

The ‘Timer’ switching application feature located in the ‘Timer’ section when configuring an CLMD16 allows for a configurable delay for the respective timer output. When activated, the ‘OFF Delay Timer’ will first turn On the output, then there will be a delay respective to the configured ‘OFF Delay’ time until the output will turn Off. In the video demonstration below the ‘Timer (Off Delay)’ is configured to 4s.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

https://youtu.be/3eqnjpI1UvY

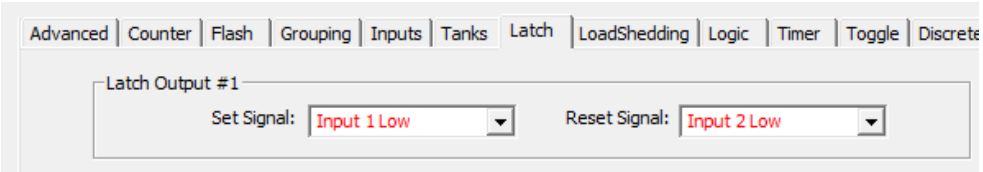
*Tip:
Timer outputs can be the input to the next desired timer allowing the CLMD16 to control operations in a timed sequenced manner.

CLMD16 SWITCHING APPLICATION FEATURES

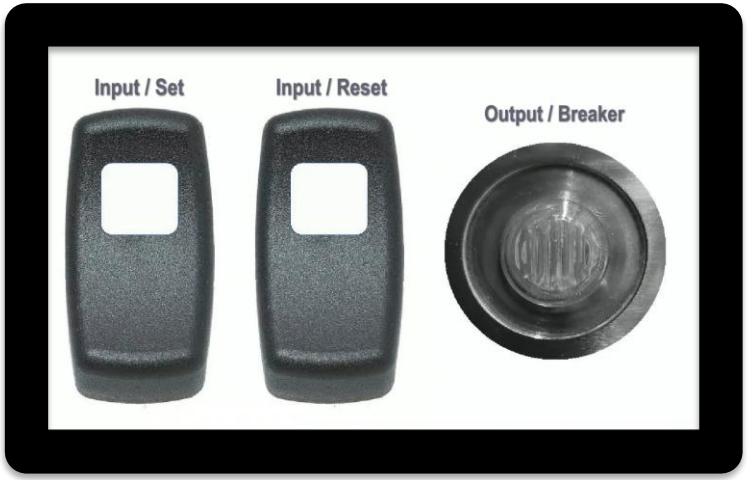
Latch

The ‘Latch’ switching application feature located in the ‘Latch’ section when configuring an CLMD16 allows for toggle behavior of the output however, requires two inputs separate from each other to ‘Latch / Set’ and ‘Unlatch / Reset’ the output. In the video demonstration below notice one input to turn On the output and another to turn Off the output.

N2KAnalyzer Configuration Dialog:



Video Demonstration:



https://youtu.be/3eqnjpI1UvY

CLMD16 SWITCHING APPLICATION FEATURES

Counter

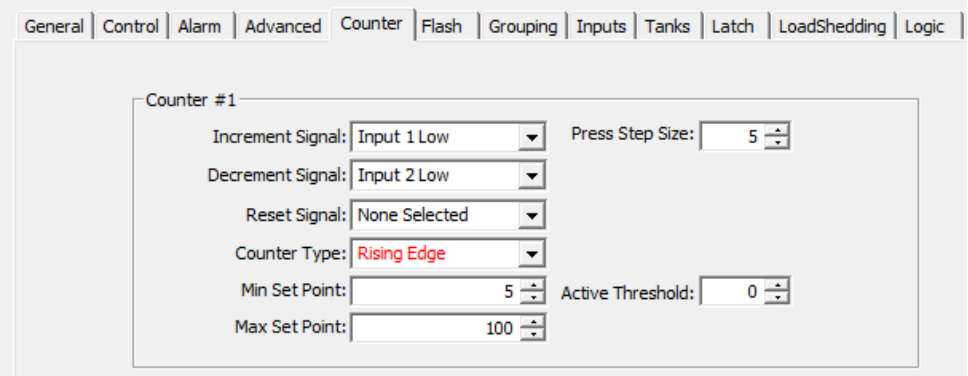
The ‘Counter’ switching application feature located in the ‘Counter’ section when configuring an CLMD16 can be used as a general counter and applied to a breaker or other switching application element once the counter’s active threshold is met. ‘Counters’ can also be configured to be used as a means to control PWM behavior of an output. In the following demonstrations there are configured circuits in where the ‘Counter’ switching application element is applied to PWM breakers to bring visual representation to the behavior the Counter switching applications perform.

CLMD16 SWITCHING APPLICATION FEATURES

Counter (Rising Edge)

The ‘Rising Edge Counter Type’ switching application located in the ‘Counter’ section when configuring an CLMD16 is demonstrated below by applying the ‘Counter’ to a PWM breaker for visible understanding. The ‘Press Step Size’, which is the percentage of PWM change in the following example is set to 5% therefore for every input signal to increment or decrement the PWM percentage, the percentage of PWM will change 5%. ‘Rising Edge’ counter type means the 5% increment or decrement will occur the instant the increment or decrement input signal is active.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

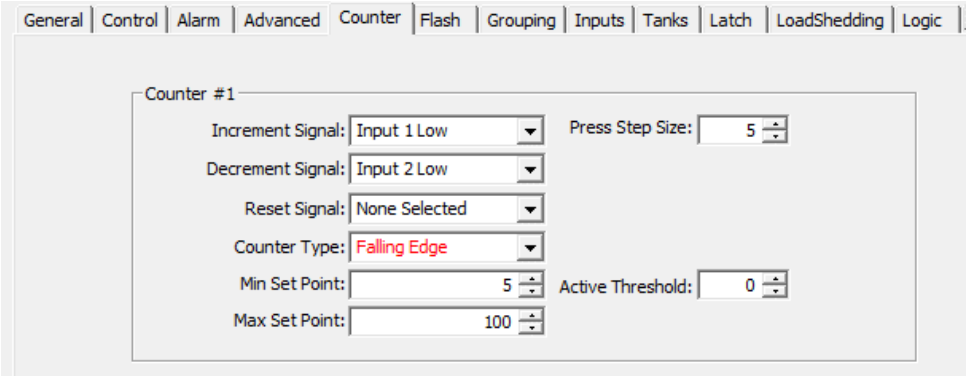
https://youtu.be/yHiPEgD39jY

CLMD16 SWITCHING APPLICATION FEATURES

Counter (Falling Edge)

The ‘Falling Edge Counter Type’ switching application located in the ‘Counter’ section when configuring an CLMD16 is demonstrated below by applying the ‘Counter’ to a PWM breaker for visible understanding. The ‘Press Step Size’, which is the percentage of PWM change in the following example is set to 5% therefore for every input signal to increment or decrement the PWM percentage, the percentage of PWM will change 5%. ‘Falling Edge’ counter type means the 5% increment or decrement will occur the instant the increment or decrement input signal goes from an active state to an inactive state.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

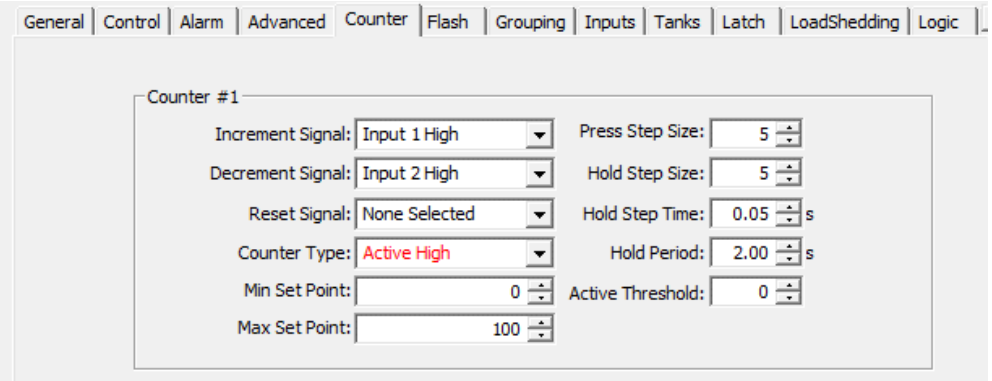
https://youtu.be/nUsHAjyFAnI

CLMD16 SWITCHING APPLICATION FEATURES

Counter (Active High)

The ‘Active High Counter Type’ switching application located in the ‘Counter’ section when configuring an CLMD16 is demonstrated below by applying the ‘Counter’ to a PWM breaker for visible understanding. The ‘Active High’ Counter Type configuration refers to when the input signal to increment or decrement is considered active. When ‘Active High’ type is selected the Counter will increment or decrement when the input is active or ‘On’. The ‘Hold Step Time’ and ‘Hold period’ is a configurable parameter when this counter type is selected.

N2KAnalyzer Configuration Dialog:



*Notice the ‘Hold Period’ time frame must be met before the ‘Hold Step Size’ and ‘Hold Step Time’ becomes the active counter adjustment parameters whereas only ‘Press Step Size’ is acknowledged for the initial activation happening in a timeframe less than ‘ Hold Period’.

Video Demonstration:

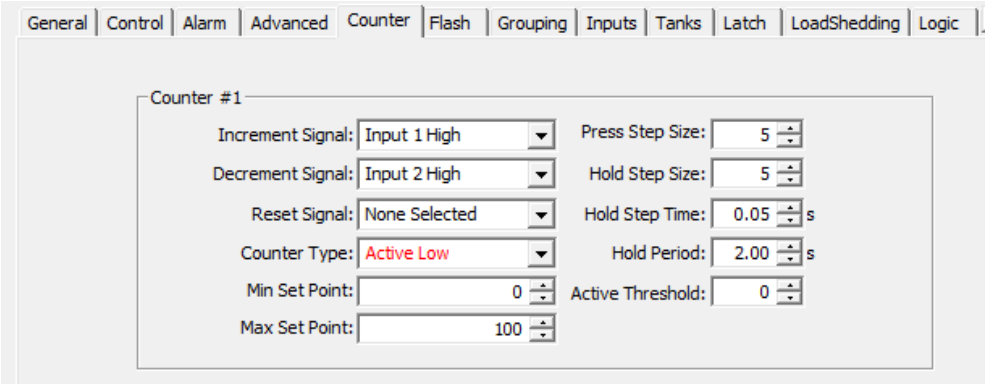
https://youtu.be/4nYiCwTen98

CLMD16 SWITCHING APPLICATION FEATURES

Counter (Active Low)

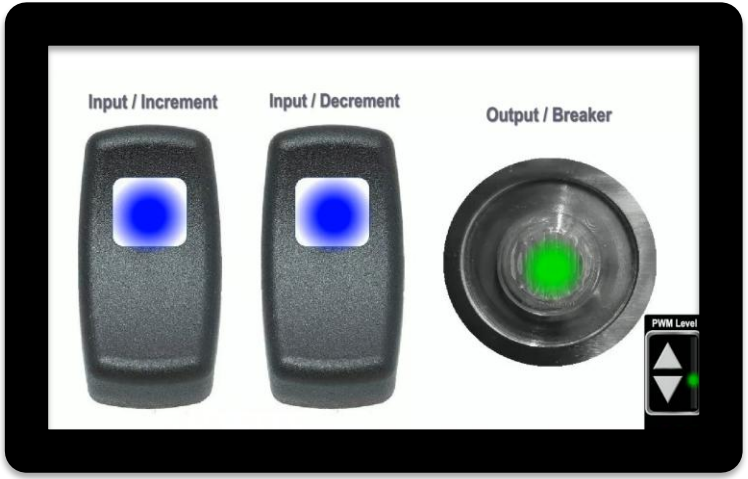
The ‘Active Low Counter Type’ switching application located in the ‘Counter’ section when configuring an CLMD16 is demonstrated below by applying the ‘Counter’ to a PWM breaker for visible understanding. The ‘Active Low’ Counter Type configuration refers to when the input signal to increment or decrement is considered active. When ‘Active Low’ type is selected the Counter will increment or decrement when the input is inactive or ‘Off’. The ‘Hold Step Time’ and ‘Hold period’ is a configurable parameter when this counter type is selected.

N2KAnalyzer Configuration Dialog:



*Notice the ‘Hold Period’ time frame must be met before the ‘Hold Step Size’ and ‘Hold Step Time’ becomes the active counter adjustment parameters whereas only ‘Press Step Size’ is acknowledged for the initial activation happening in a timeframe less than ‘ Hold Period’.

Video Demonstration:



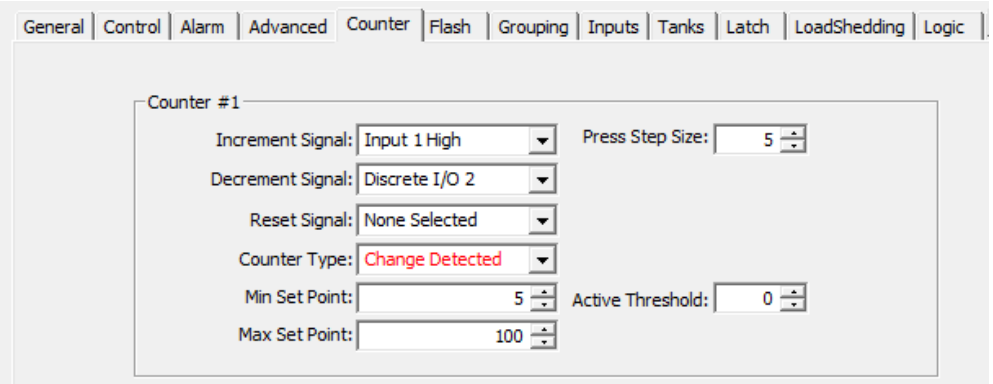
https://youtu.be/cYv6gWSMGLo

CLMD16 SWITCHING APPLICATION FEATURES

Counter (Change Detected)

The ‘Change Detected Counter Type’ switching application located in the ‘Counter’ section when configuring an CLMD16 is demonstrated below by applying the ‘Counter’ to a PWM breaker for visible understanding. The ‘Press Step Size’, which is the percentage of PWM change in the following example is set to 5% therefore for every input signal to increment or decrement the PWM percentage, the percentage of PWM will change 5%. ‘Change Detected’ counter type means the 5% increment or decrement will occur the instant the increment or decrement input signal goes from an inactive state to an active state and also from an active state to an inactive state or otherwise upon every input signal change.

N2KAnalyzer Configuration Dialog:



* Notice the ‘PWM Level’ change both when the input signal becomes active and becomes inactive.

Video Demonstration:

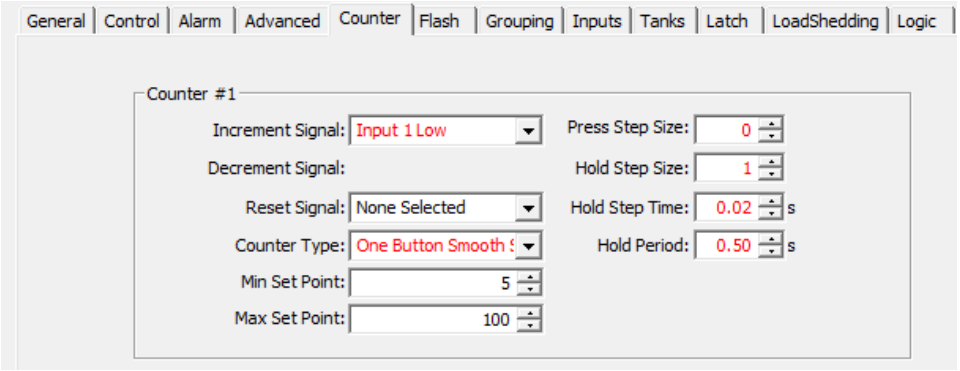
https://youtu.be/BNOjSgKzv-o

CLMD16 SWITCHING APPLICATION FEATURES

Counter (One Button Smooth Scroll)

The ‘One Button Smooth Scroll’ switching application located in the ‘Counter’ section when configuring an CLMD16 has been designed exclusively to be applied to PWM circuit breakers. The feature turns On and Off an assigned breaker in the same behavior as the ‘Toggle’ switching application however when the input for the breaker is held the ‘Toggle’ function is ignored and instead a Smooth Scrolling PWM operation takes place. The breaker’s last PWM state is recalled whenever the breaker toggles from Off to On

N2KAnalyzer Configuration Dialog:



Video Demonstration:

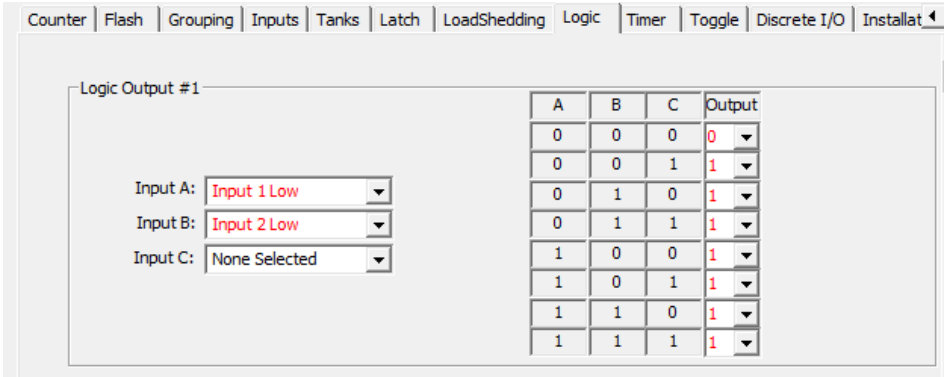
https://youtu.be/t9NMRKH2EoE

CLMD16 SWITCHING APPLICATION FEATURES

Logic (Example 1)

The ‘Logic’ switching application located in the ‘Logic’ section when configuring an CLMD16 allows for Boolean Logic to be applied to an output directly or could be applied as imposing logic to create a logic rule for a breaker or other parts of the switching application. In the following example the logic created is an OR Gate in where two inputs can activate the ‘Logic Output’, ‘Input 1’ OR ‘Input 2’. Where ‘1’ is ‘On’ and ‘0’ is ‘Off’ the columns ‘A’, ‘B’, and ‘C’ indicate the possible states of ‘Inputs A, B and C’ respectively. The ‘Output’ of ‘1’ or ‘0’ indicates the desired ‘Logic Output’ state of ‘On’ or ‘Off’ for the combinatory arrangement indicated for the row.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

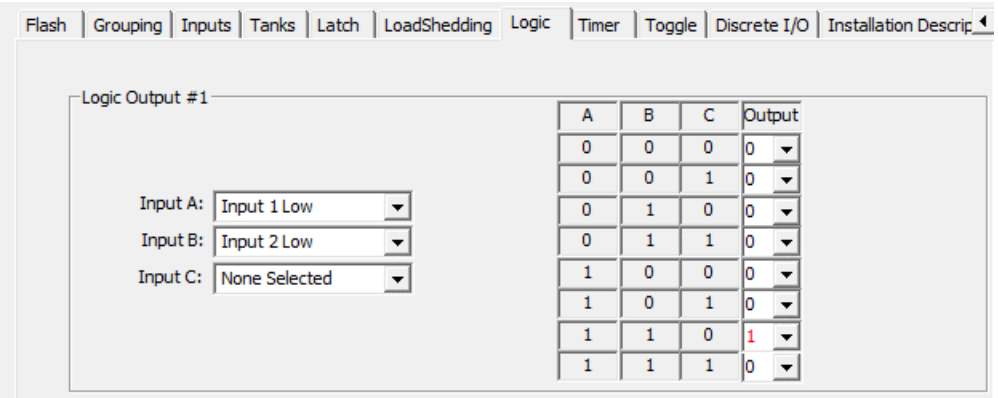
https://youtu.be/MvkMxKGuCwM

CLMD16 SWITCHING APPLICATION FEATURES

Logic (Example 2)

The ‘Logic’ switching application located in the ‘Logic’ section when configuring an CLMD16 allows for Boolean Logic to be applied to an output directly or could be applied as imposing logic to create a logic rule for a breaker or other parts of the switching application. In the following example the logic created is an AND Gate in where it requires two inputs it activate the ‘Logic Output’, ‘Input 1’ AND ‘Input 2’. Where ‘1’ is ‘On’ and ‘0’ is ‘Off’ the columns ‘A’, ‘B’, and ‘C’ indicate the possible states of ‘Inputs A, B and C’ respectively. The ‘Output’ of ‘1’ or ‘0’ indicates the desired ‘Logic Output’ state of ‘On’ or ‘Off’ for the combinatory arrangement indicated for the row.

N2KAnalyzer Configuration Dialog:



Video Demonstration:

https://youtu.be/Kp__B-OW5rk

MPower®

Digital Switching Platform

Demo Board Overview

Revision: 01/26

HARDWARE DESCRIPTION:

CLMD16 Hardwired Inputs

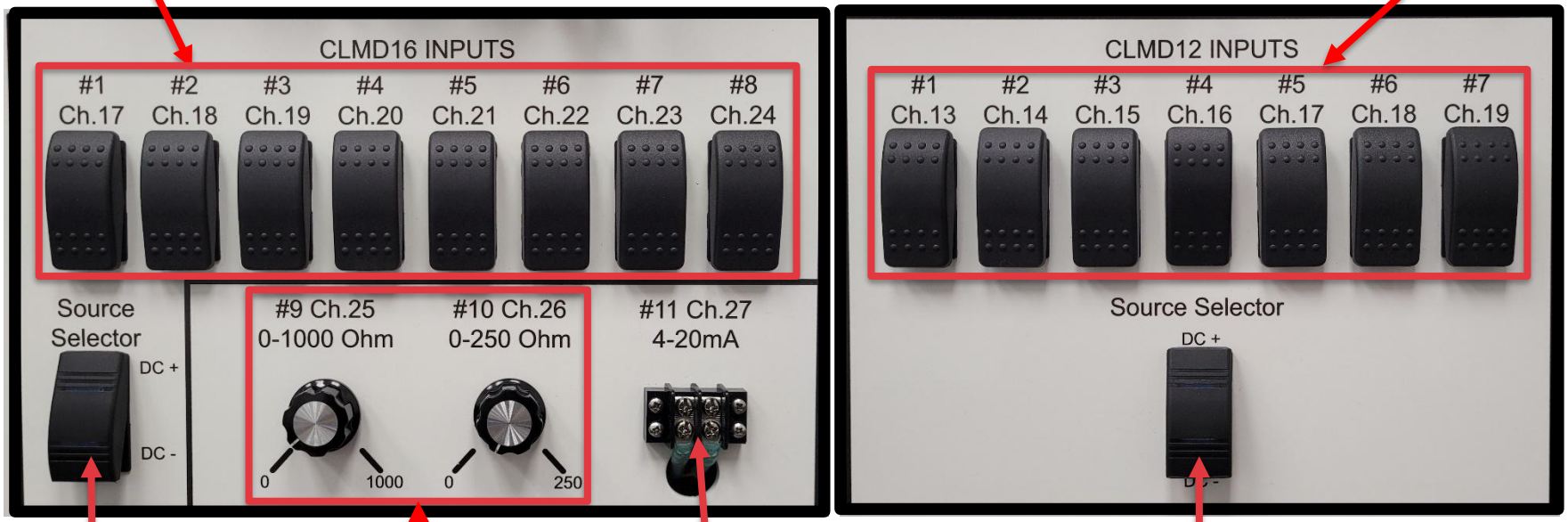
CLMD16 Output Indication LEDs

CLMD16 Alarm Output

CLMD12 Hardwired Inputs

CLMD12 Output Indication LEDs

CLMD16 & CLMD12 HARDWIRED INPUT SWITCHES & POTS



MPower®

Digital Switching Platform

Configuration Training

MPOWER CONFIGURATION TRAINING

Device Instance

- Ensure the device instances for the MPower devices are unique from one another

  In this demonstration we will be using the following Device Instances for the MPower devices contained on the demonstration board.

CLMD16

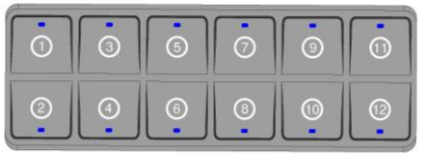
Device Instance: **32**

CLMD12

Device Instance: **33**

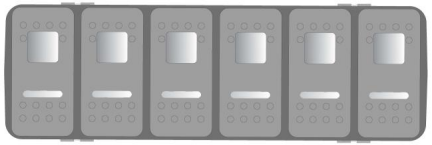
CKM12

Device Instance: **50**



VMM6

Device Instance: **51**



MPOWER CONFIGURATION TRAINING

CLMD12 - Configuring Breaker Trip Values

General Tab

CLMD12 (0x90) 1671808 - Configuration Dialog

General | Flash Map | Discrete I/O | Inputs | Advanced | Installation Description | Control

Label
(Max. 32 Characters)
CLMD12 Out of Box Configuration
Instance: 32

Input Voltage: 12 VDC
Not Configured | Serial Number Invalid

Breaker #1 (10A)
Label: CLMD12 Breaker 1
State: OFF
Default State: OFF
Default Lock State: Unlocked
Trip Delay: 750 ms
Inrush Delay: 500 ms
Default Dim Value: 100 %
Current Dim Value: 100 %
Dimming Allowed:
Manual Mode:
Combine With: none
Factory Current Rating: 10 A
Current Rating: 10 A
Current: 0 A
Voltage: 0 V
Flash Map: 0
User Config Allowed:

Status
Short Load
Breaker Locked
Breaker Tripped
Breaker ON
Open Load
Communications Error
Breaker Communicating

Name the Breaker

Choose the default power-up state of the breaker.

Set In-Rush Trip Delay and Current rating of the breaker

If the breaker is to be PWM enabled, select 'Dimming Allowed'.

Parallel breakers with the 'Combine With' function

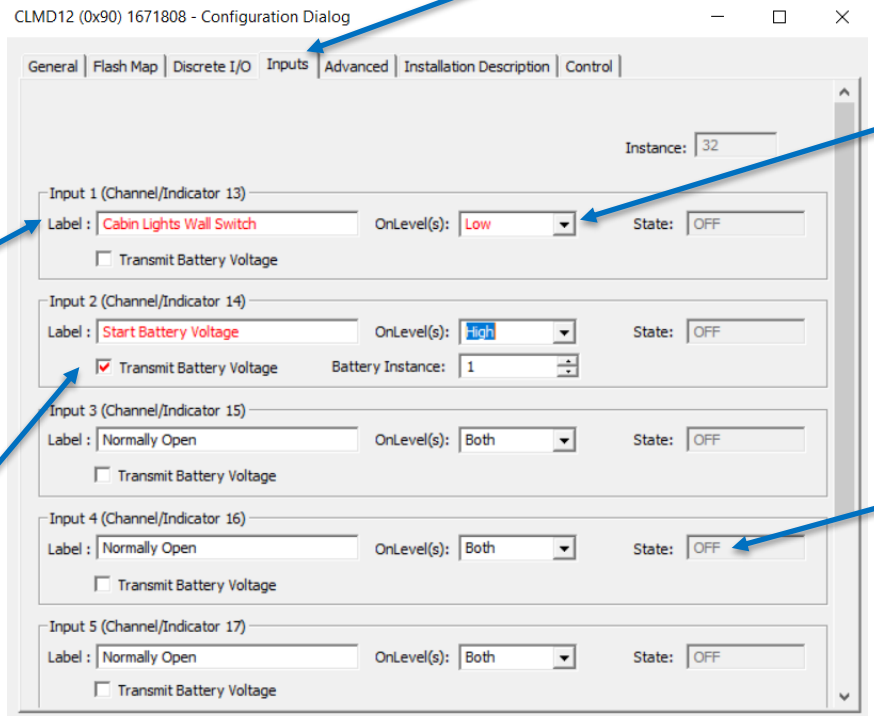
Turn Manual Mode On/ Off with the Manual Mode checkbox

If using Flash Map, assign the Flash Map respective to the desired Flash Table

MPOWER CONFIGURATION TRAINING

CLMD12 - Configuring Hardwired Input Signals

Inputs Tab



Choose 'High', 'Low' or 'Both' To tell the CLMD12 whether your CLMD12 will be receiving a High or DC (+) signal or a Low or DC (-) Signal.

Name the Input

Choose if you want to transmit 127508 Battery Status PGN associated with this voltage sensing input.

Check the real-time status of the input here.

MPOWER CONFIGURATION TRAINING

CLMD12 - Configuring its own Input to switch a breaker

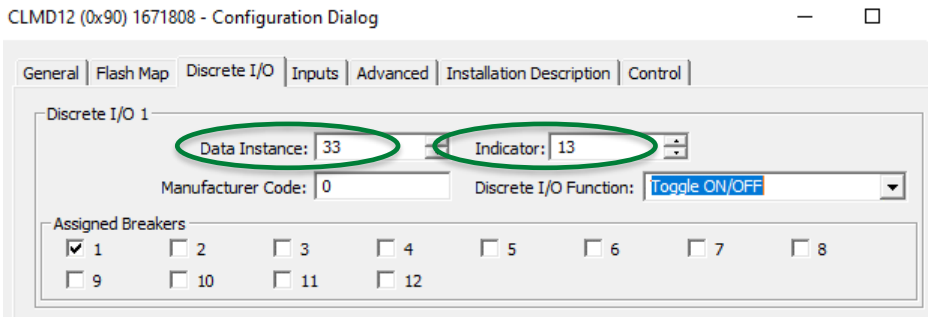
CLMD12: Device Instance: **33**

NMEA Data Instance: **33**
Instance Channel / Indicator: **13**

Channel	Trigger
13	Input 1 (Voltage Sensing) 'On Level'
14	Input 2 (Voltage Sensing) 'On Level'
15	Input 3 (Voltage Sensing) 'On Level'
16	Input 4 (Voltage Sensing) 'On Level'
17	Input 5 (Voltage Sensing) 'On Level'
18	Input 6 (Voltage Sensing) 'On Level'
19	Input 7 (Voltage Sensing) 'On Level'

Channel	Trigger
1	Breaker 1 On
2	Breaker 2 On
3	Breaker 3 On
4	Breaker 4 On
5	Breaker 5 On
6	Breaker 6 On
7	Breaker 7 On
8	Breaker 8 On
9	Breaker 9 On
10	Breaker 10 On
11	Breaker 11 On
12	Breaker 12 On

- CLMD12 Switching Application Behavior is selected in the Discrete I/O Function dialog. A breaker is assigned by checking the assigned breaker checkbox



Note: **Ensure the Input signal is configured in the Inputs Tab Dialog**

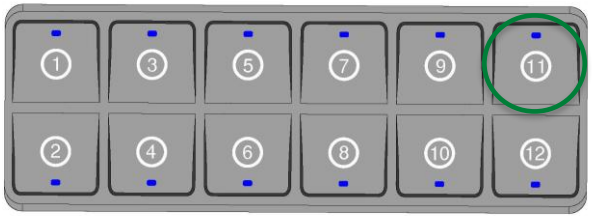
MPOWER CONFIGURATION TRAINING

CLMD12 - Configuring a CKM12 key to a breaker

CKM12: Device Instance: **50**

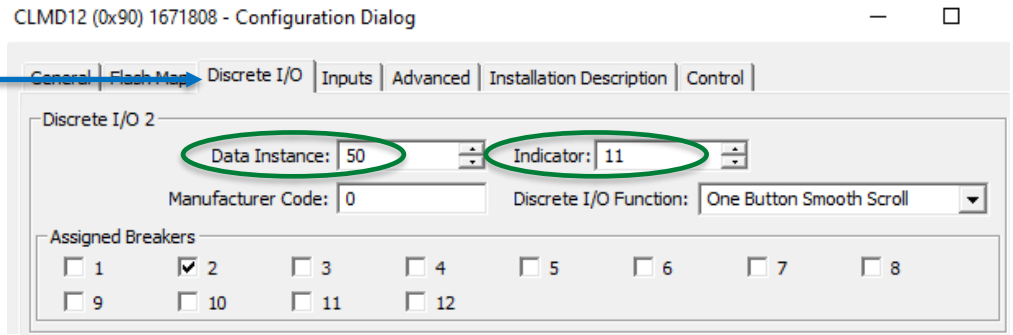
NMEA Data Instance: **50**

Instance Channel / Indicator: **11**



Breaker 2's function is 'One Button Smooth Scroll' when (50 / 11) is active

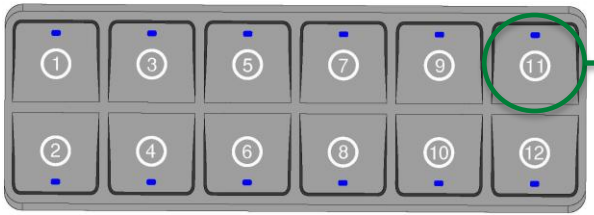
CLMD12 Discrete I/O Tab

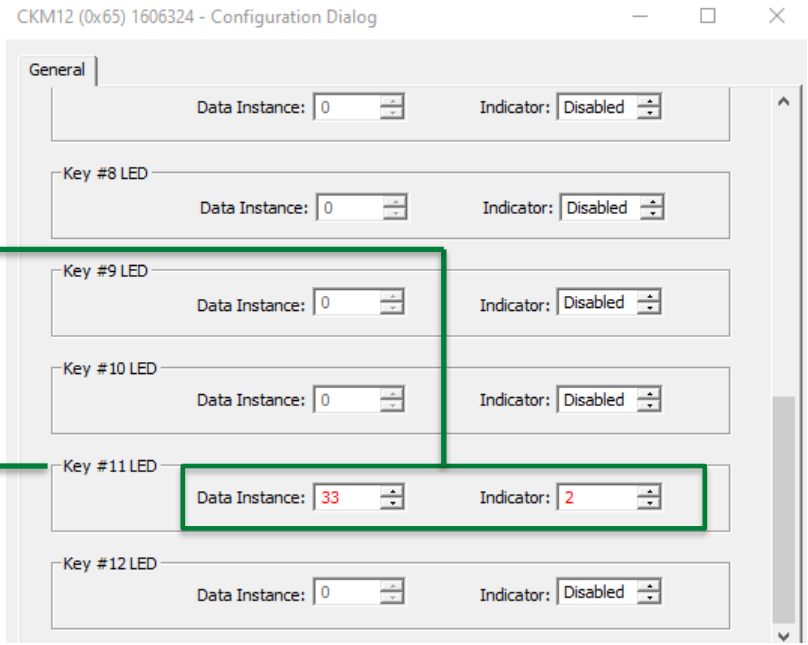


MPOWER CONFIGURATION TRAINING

CKM12 - Configuring the CKM key's LED to illuminate when a breaker is On

CLMD12: Device Instance: **33**
Breaker 2: Channel / Indicator: **2**





CKM12 'Key 11' LED will now illuminate when CLMD12 'Breaker 2' is On.

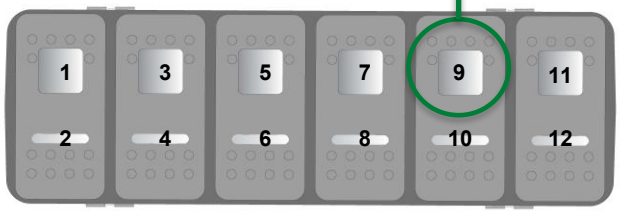
MPOWER CONFIGURATION TRAINING

CLMD12 - Configuring a VMM switch to a breaker

VMM6: Device Instance: **51**

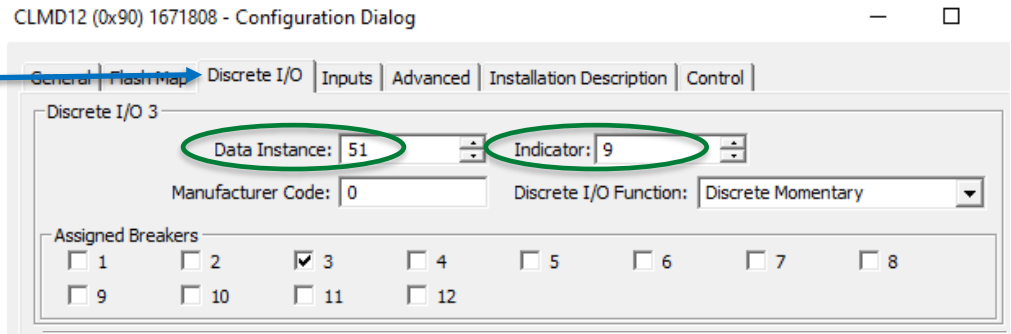
NMEA Data Instance: **51**

Instance Channel / Indicator: **9**



Breaker 3's function is 'Discrete Momentary' when (51 / 9) is active

CLMD12 Discrete I/O Tab

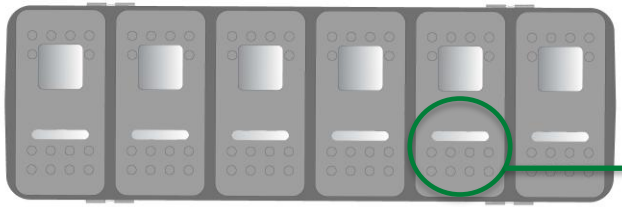


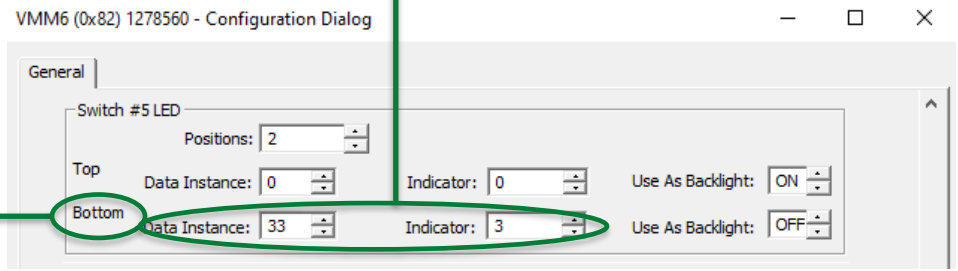
MPOWER CONFIGURATION TRAINING

VMM6 - Configuring the VMM switch's LED to illuminate when a breaker is On

CLMD12: Device Instance: **33**
Breaker 2: Channel / Indicator: **3**

'Sw. 1' 'Sw. 2' 'Sw. 3' 'Sw. 4' 'Sw. 5' 'Sw. 6'

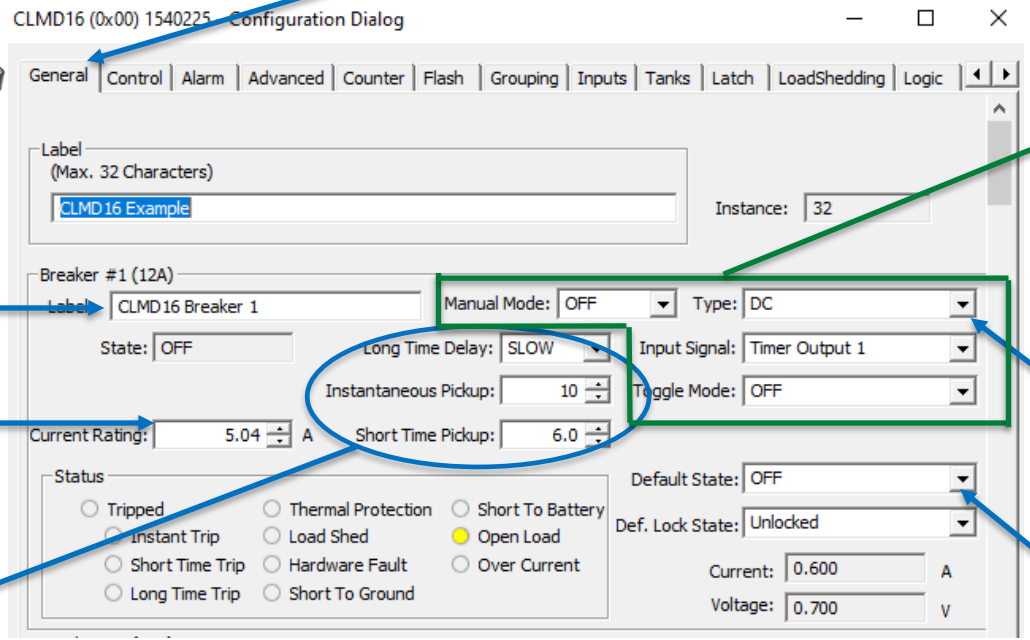




- The VMM6 'Switch 5, Bottom' LED will now illuminate when CLMD12 'Breaker 3' is On.
- The 'Switch 5, Top' LED will stay illuminated at all times via the 'Use as Backlight' function.

MPOWER CONFIGURATION TRAINING

CLMD16 - Configuring Breaker Trip Values



Name the Breaker

Set the trip current rating of the breaker here

Set the trip curve of the breaker here

These parameters are usually setup if there is a need to have more than MFD control.

Manual Mode disallows direct MFD control

Input Signal is the signal used to activate the breaker

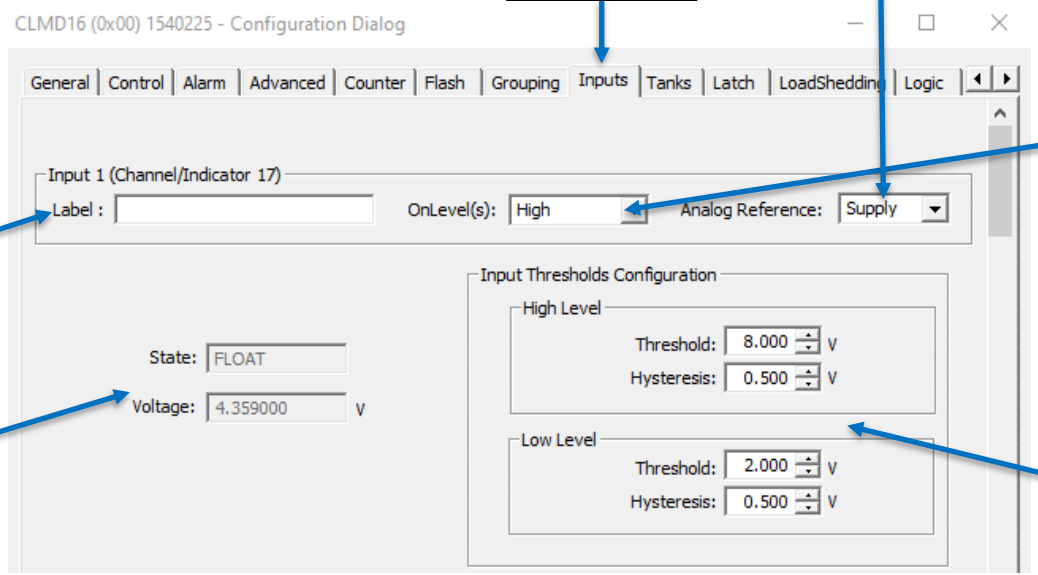
Toggle Mode On makes for each rising edge of the input signal to toggle the breaker state.

Choose the breaker type

Set the default power-up states of the breaker here

MPOWER CONFIGURATION TRAINING

CLMD16 - Configuring Hardwired Input Signals



Name the Input

Check the real-time status of the input here.

Choose 'High' or 'Low' to configure when the CLMD16 will change the Binary Status Report PGN from 'Off' to 'On'. Please note that 'High' and 'Low' voltage thresholds are configurable.

Configure 'High' and 'Low' voltage thresholds here if needed

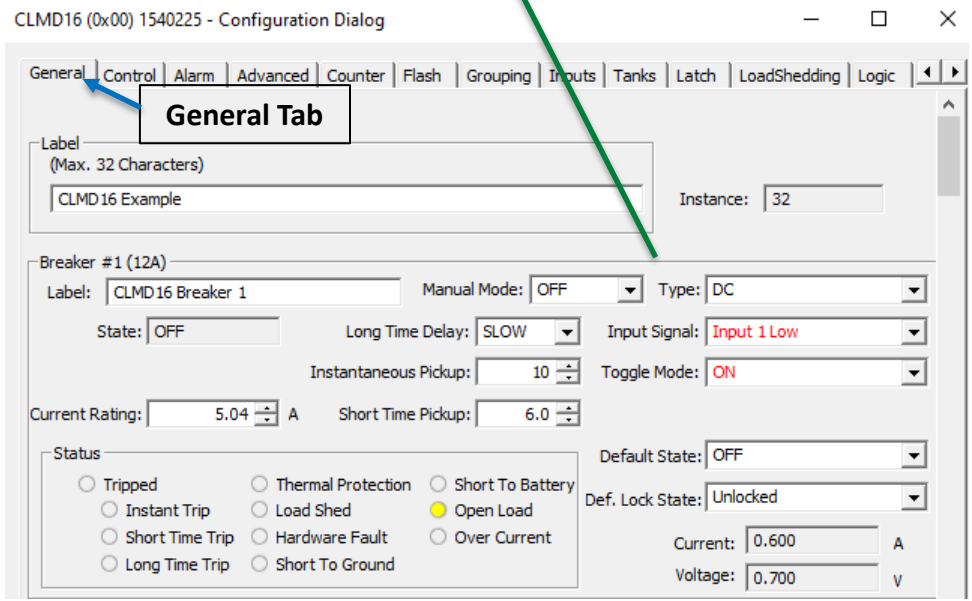
MPOWER CONFIGURATION TRAINING

CLMD16 - Configuring its own Input to switch a breaker

Channel	Trigger
1	Breaker 1 On
2	Breaker 2 On
3	Breaker 3 On
4	Breaker 4 On
5	Breaker 5 On
6	Breaker 6 On
7	Breaker 7 On
8	Breaker 8 On
9	Breaker 9 On
10	Breaker 10 On
11	Breaker 11 On
12	Breaker 12 On
13	Breaker 13 On
14	Breaker 14 On
15	Breaker 15 On
16	Breaker 16 On

Channel	Trigger
17	Input 1 (Voltage Sensing) 'On Level'
18	Input 2 (Voltage Sensing) 'On Level'
19	Input 3 (Voltage Sensing) 'On Level'
20	Input 4 (Voltage Sensing) 'On Level'
21	Input 5 (Voltage Sensing) 'On Level'
22	Input 6 (Voltage Sensing) 'On Level'
23	Input 7 (Voltage Sensing) 'On Level'
24	Input 8 (Voltage Sensing) 'On Level'
25	Input 9 (Resistance to DC -) 'On Level'
26	Input 10 (Resistance to DC -) 'On Level'
27	Input 11 (Current Loop Pair) 'On Level'

Instead of using the Binary Status Channel
(in the CLMD16's case 'Input 1' would be 'Channel / Indicator #17'),
The input's 'High', 'Low' or 'Float' status can be placed directly into the breaker's Input



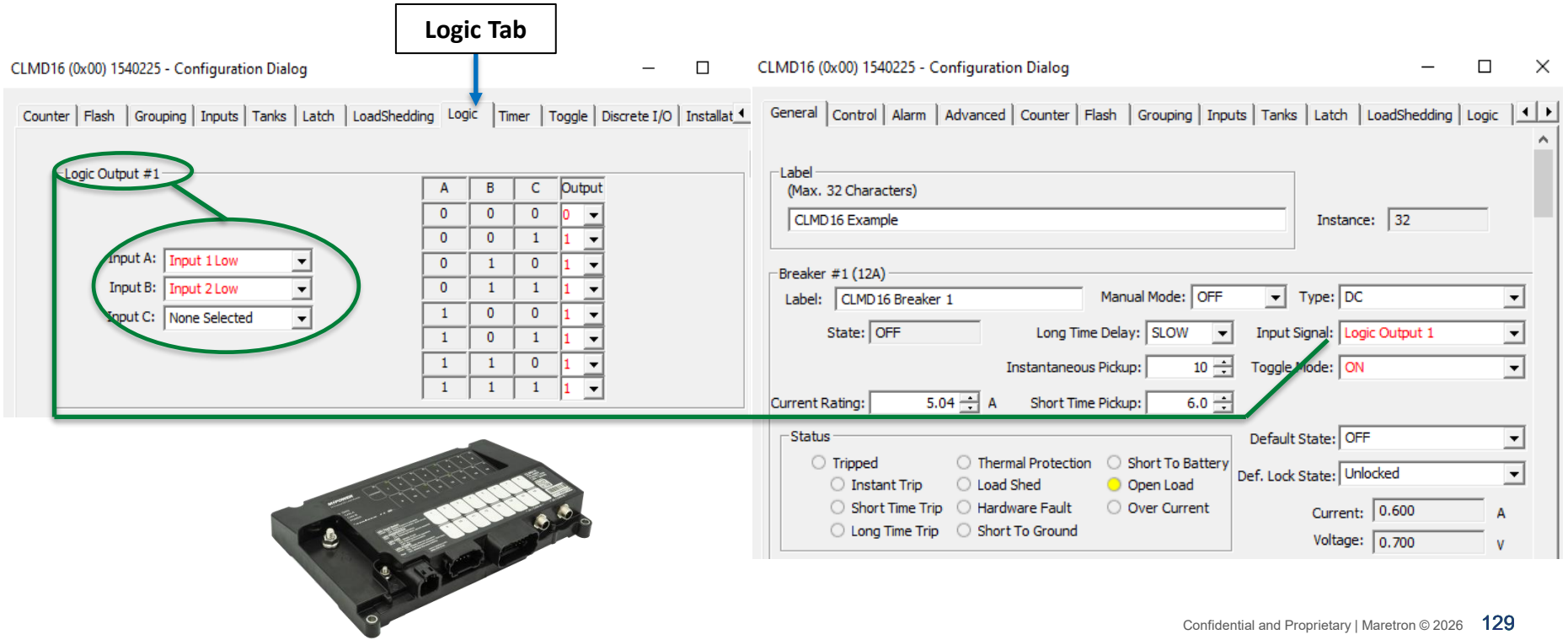
'Input 1 Low' will Toggle 'Breaker 1' with this configuration

Unlike CLMD12, the CLMD16 has direct access to the Hardwired Input status inside it's Switching Application. This is because by separating the Switching Application Elements instead of having pre-defined functions like the CLMD12, the CLMD16 can perform advanced Logic operations.

MPOWER CONFIGURATION TRAINING

CLMD16 - Configuring Multiple Inputs to a single breaker

In this example, we will configure a ‘Logic OR Gate’ to configure both ‘Input 1 Low’ and ‘Input 2 Low’ to toggle breaker 1.



MPOWER CONFIGURATION TRAINING

CLMD16 - Alarm Output

In this example, we will configure a hardwired input to the Alarm Output

Inputs Tab

Alarm Tab

CLMD16 (0x00) 1540225 - Configuration Dialog

Advanced | Counter | Flash | Grouping | Inputs | Tanks | Latch | LoadShedding | Logic | Timer | Toggle | Discrete I/

Input 3 (Channel/Indicator 19)

Label : High Water Bilge Pump

OnLevel(s): High

Analog Reference: Supply

Input Thresholds Configuration

High Level

Threshold: 8.000 V

Hysteresis: 0.500 V

State: FLOAT

Voltage: 4.359000 V

Low Level

Threshold: 2.000 V

Hysteresis: 0.500 V

Voltage:

CLMD16 (0x00) 1540225 - Configuration Dialog

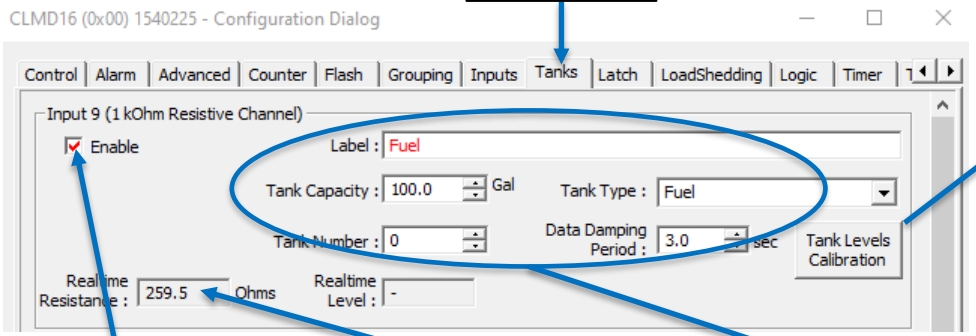
General | Control | Alarm | Advanced | Counter | Flash | Grouping | Inputs | Tanks | Latch | LoadShedding | Logic

Alarm Enable Signal: Input 3 High

MPOWER CONFIGURATION TRAINING

CLMD16 - Tanks

Tanks Tab

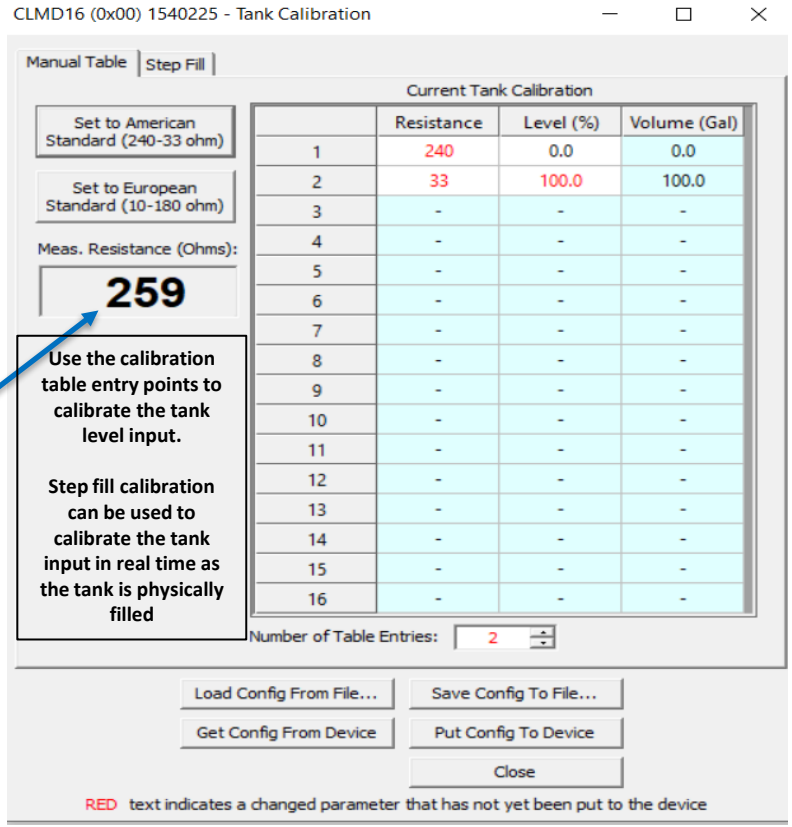


Press 'Enable' to enable the broadcast of the NMEA 2000 Tank Data PGN (127505)

See the real-time measurements of the input here

Label the tank input, set the tank capacity, NMEA 2000 instance/tank number, fluid type and capacity into these fields.

The data damping period prevents rapid data changes that can be caused by tank sloshing.



Use the calibration table entry points to calibrate the tank level input.

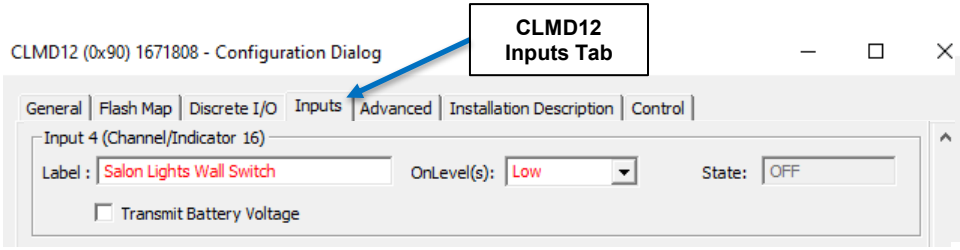
Step fill calibration can be used to calibrate the tank input in real time as the tank is physically filled

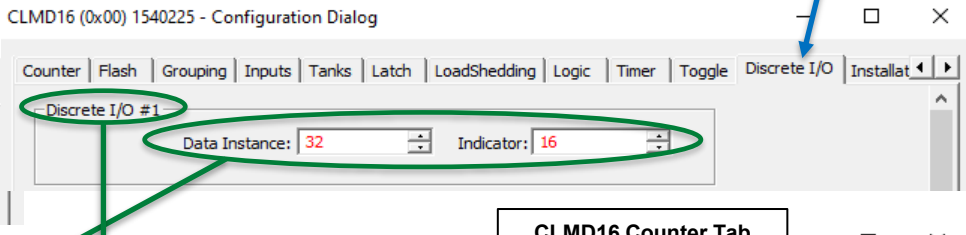
MPOWER CONFIGURATION TRAINING

CLMD - Configuring One CLMD Hardwired Input to Switch a Breaker on another CLMD Unit.

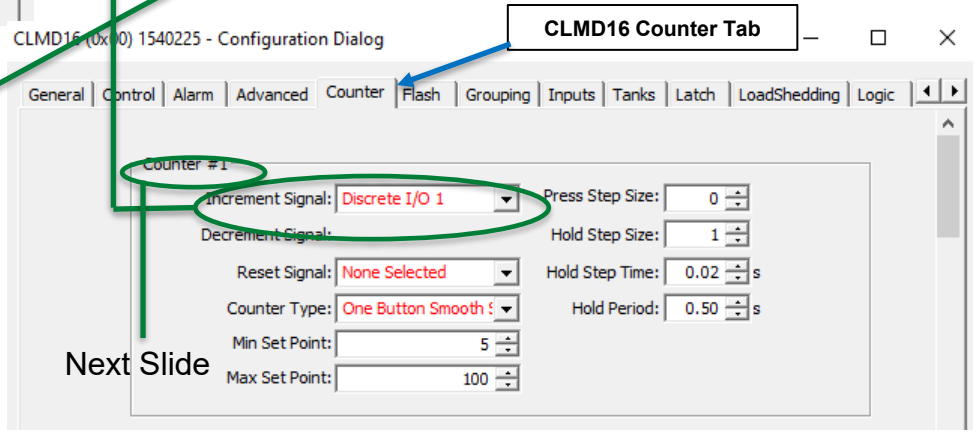
In this example, we will configure a CLMD12 hardwired Input to One Button Smooth Scroll a CLMD16 breaker

1. Start by configuring the desired CLMD12 Hardwired Input





Remember, in this training we had configured the CLMD12 to have a device instance of '33', so this input's NMEA 2000 Binary Status can be monitored by observing Device instance 33, channel / indicator 16.



2. Configure '33 / 16' in an available CLMD16 Discrete I/O
3. Configure the CLMD16 Discrete I/O to an available Counter Element and set up the One Button Smooth Scroll parameters

Next Slide

MPOWER CONFIGURATION TRAINING

CLMD - Configuring One CLMD Hardwired Input to Switch a Breaker on another CLMD Unit Continued

Last, Configure the One Button Smooth Scroll Counter Signal to the Desired Breaker

CLMD16 General Tab

CLMD16 (0x00) 1540225 - Configuration Dialog

General | Control | Alarm | Advanced | Counter | Flash | Grouping | Inputs | Tanks | Latch | LoadShedding | Logic

Breaker #4 (12A)

Label: Salon Lights

Manual Mode: OFF

Type: PWM

State: OFF

Long Time Delay: SLOW

Input Signal: Counter Active 1

PWM Default: 100 %

Instantaneous Pickup: 10

Toggle Mode: OFF

Current Rating: 5.04 A

Short Time Pickup: 6.0

PWM Counter: Counter1

Default State: OFF

Def. Lock State: Unlocked

Status

- Tripped
- Instant Trip
- Short Time Trip
- Long Time Trip
- Thermal Protection
- Load Shed
- Hardware Fault
- Short To Ground
- Short To Battery
- Open Load
- Over Current

Current: 0.000 A

Voltage: 2.000 V

MPOWER CONFIGURATION TRAINING

CLMD16 - Timer Sequencing and when to use Manual Mode

In this example, we will be configuring a hypothetical generator start sequence. This Generator Start Sequence will be controlled by a single Input therefore in order for MFDs not to have access to break into the sequence some of the controlling breakers will need to have ‘Manual Mode’ enabled.

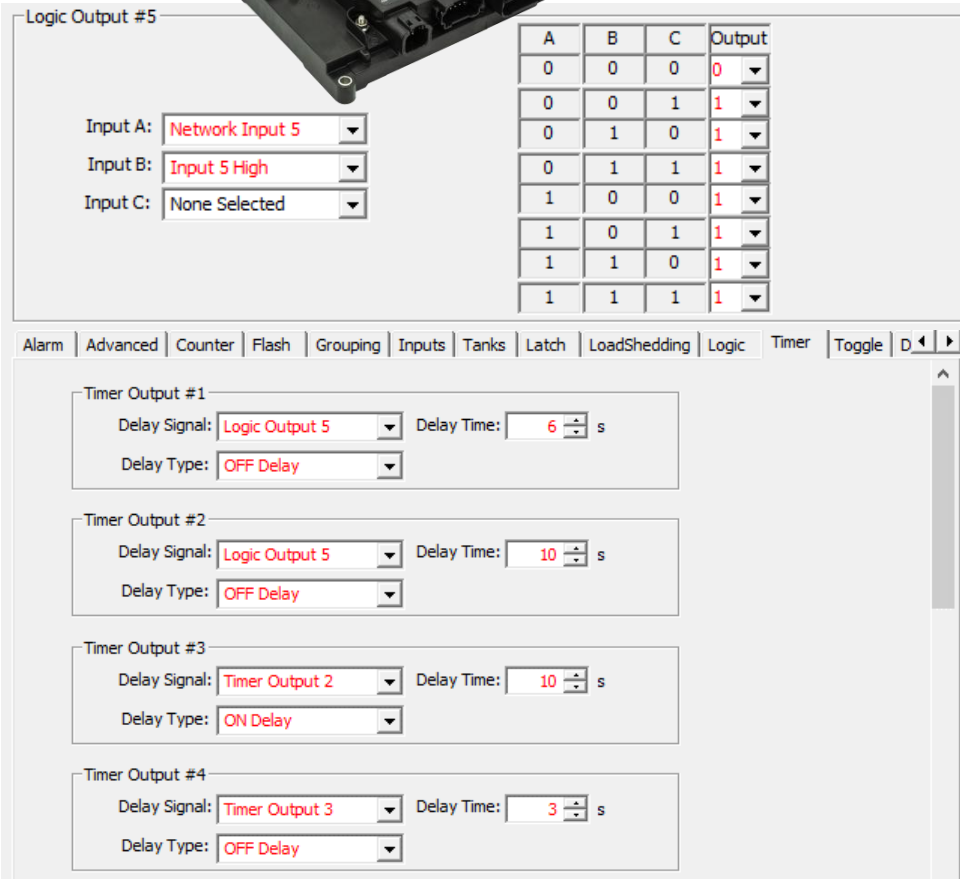
Let’s say the following sequence will be used for ‘Generator Prime’, ‘Preheat’, and ‘Start’ sequencing.

In this example a Logic OR Gate will be used to allow multiple inputs to start the following sequence:

‘Timer 1’ is used as the input signal to a ‘Generator Prime’ Breaker.

‘Timer 2’ is used as the input signal to a ‘Generator Preheat’ Breaker.

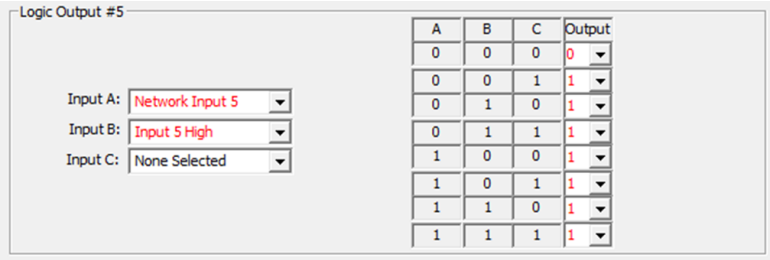
‘Timer 3’ is used to create a timed gap before ‘Timer 4’ is enabled to ensure the first two processes are complete first and finally, ‘Timer 4’ is used as the input signal to a ‘Generator Start’ Breaker.



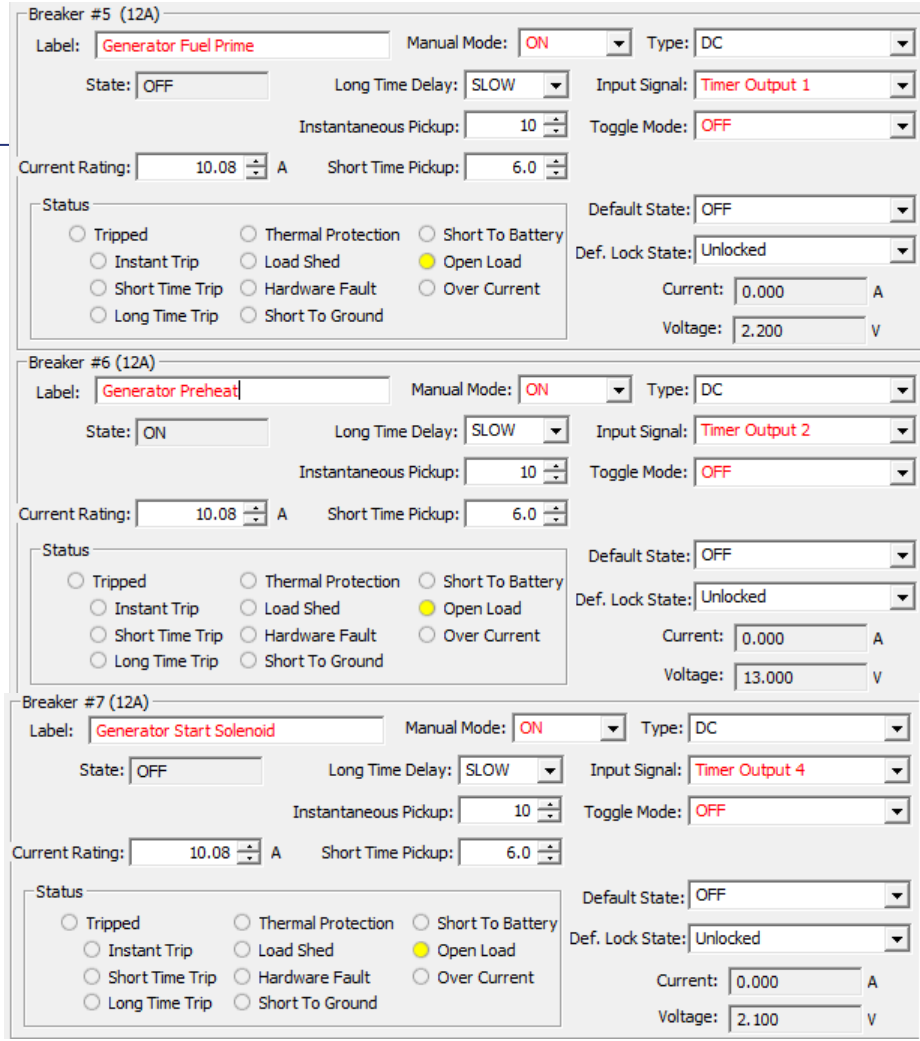
MPOWER CONFIGURATION TRAINING

Timer Sequencing & Manual Mode Continued

‘Manual Mode’ is enabled on these breakers to ensure that direct breaker control from MFD is disallowed therefore only this sequence can be performed when the inputs that were added to the Logic OR Gate are commanded. The inputs we assigned are :



‘Network Input 5’ (which is the MFD command for ‘Breaker 5’) and ‘Input 5 High’. Either one of these two input signals will start the Configured Timer sequence



MPOWER CONFIGURATION TRAINING

Timer Sequencing & Manual Mode Continued

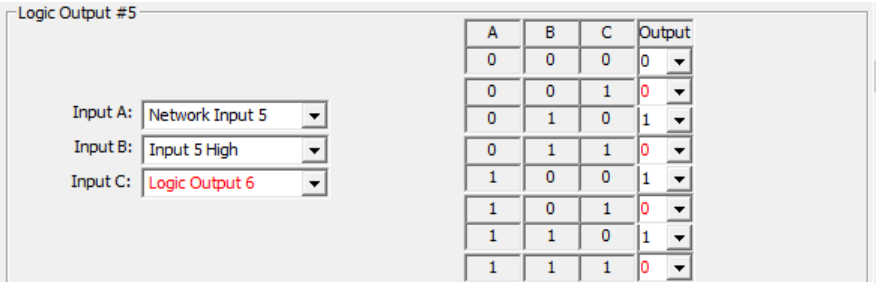
Now, one may ask “How do you prevent my start sequence from starting once my generator is started or the sequence is already started”

This problem can be easily remedied.

Let’s have some fun and add more Logic to the same circuit.

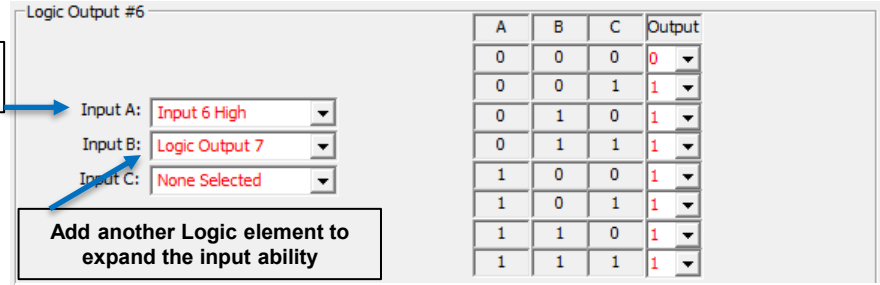
Taking the original Logic OR we will modify it and add more to it to add a ‘Lockout feature’ with the idea that we will receive a ‘Generator Running’ signal from the generator (in this case, I will choose ‘Input 6 High’ and lastly I will need to monitor the assigned breakers for this sequence (Breakers 5,6,7) so that if any of the three are ‘ON’ not to allow the re-start of the sequence as this will signify that the sequence has already started. This is how this would look:

First, modify the original input OR Gate to feature another Logic input and adjust the Logic gate to make this additional input to be the ‘Lockout Input’



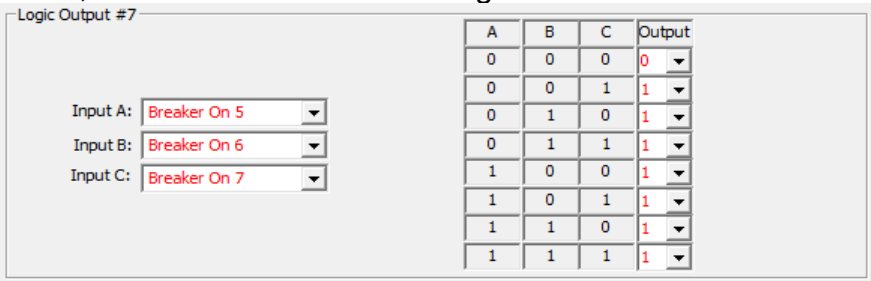
Second, add the ‘Generator Running’ signal to the Lockout

‘Generator Running’ Signal (Input 6 High)



Add another Logic element to expand the input ability

Last, add the ‘Breaker On 5-7’ signal to the lockout



USER INTERFACE CONFIGURATION

WSV100 - Overview

Vessel Monitoring and Control Web Server

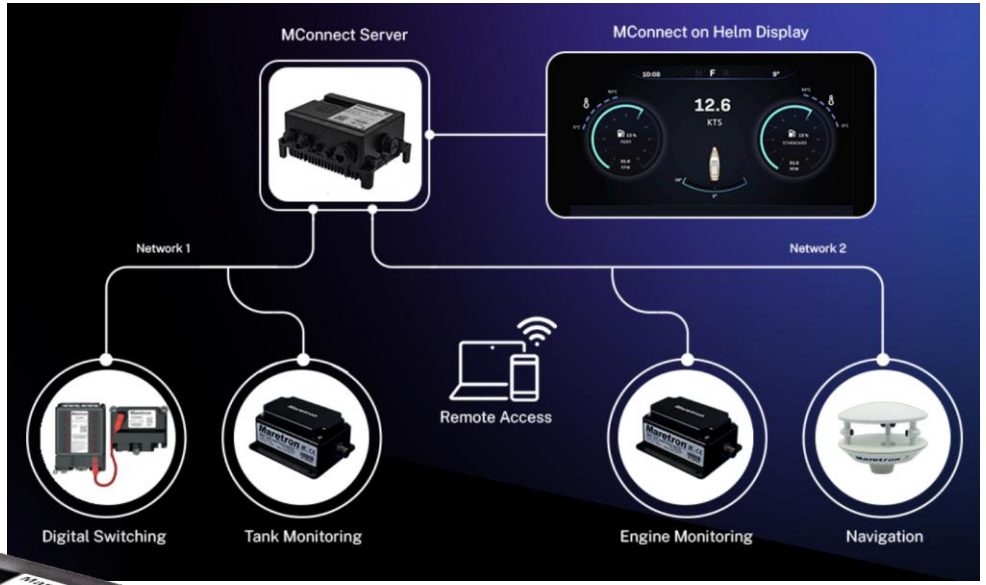
- ✓ 9-30VDC Power Supply, 1.5A MAX
- ✓ 1 x Gigabit Ethernet (HTML Web Server)
  - ➢ Garmin OneHelm, Raymarine LightHouse, Simrad, B&G, Furuno, Hatteland, Q-Experience and most devices with a browser.
  - ➢ Dual Isolated NMEA 2000® network connections
    - ➢ Navigation
    - ➢ Vessel Monitoring
- ✓ 1 x USB Port (Ethernet adapter, updates, cellular)
- ✓ 1 x RS232 Port (Future Use)
- ✓ Telemetric
- ✓ VPN

USER INTERFACE CONFIGURATION

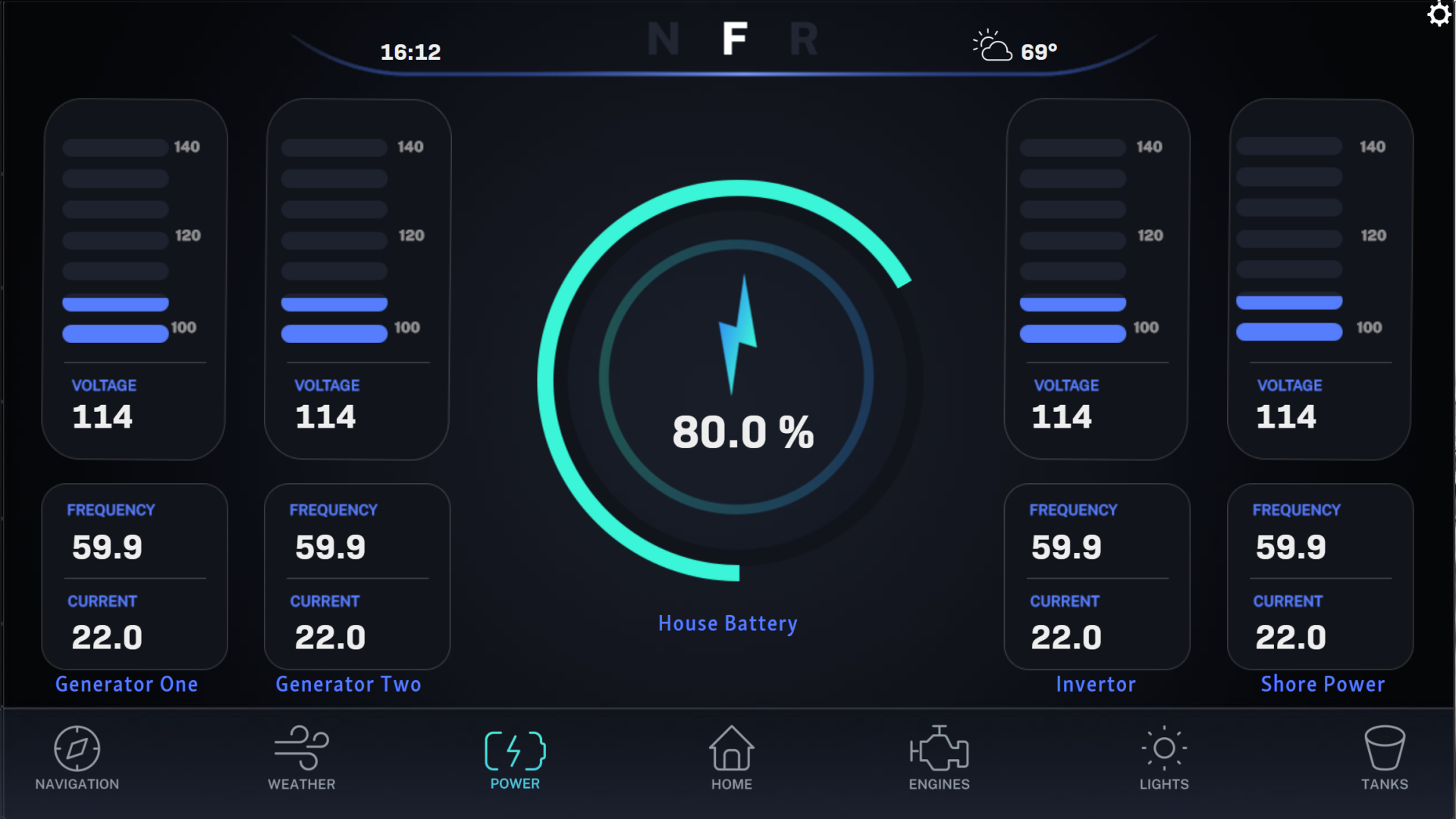
WSV100 - HTML Webserver

MConnect is a cutting-edge, NMEA 2000®, certified web server and screen editor.

MConnect connects to hundreds of NMEA 2000® data points on your boat and displays vessel information with visually engaging graphics on your multi-function display so you can monitor your vessel at a glance.




Display Mode
Image Manager
Documentation
Configuration
Telemetric Data
CONFIGURATION
(NEW-DEFAULT)
SCREEN
(POWER) 888 X 498
COMPONENTS
(1 OF 66)
Copy
Cut
Paste
Component : Parameter : Title : Comment
Digital Custom 2x1 : Date / Time : Date :
Digital Custom 2x1 : Date / Time : Time :
Digital 1x1 : Latitude / Longitude : :
Digital 2x1 : Vessel Mode : Vessel Mode :
Digital 2x1 : Depth of Water : Depth :
Digital 2x1 : Heading : Heading :
Digital 2x1 : Variation : Variation :
Digital 2x1 : Temperature (Outside) : Temp
Screen Status 2x1 : Screen Status : Home
Screen Status 2x1 : Screen Status : Engine
Screen Status 2x1 : Screen Status : Tanks :
Screen Status 2x1 : Screen Status : Weath
Screen Status 2x1 : Screen Status : Power
Action Button 1x1 Invisible : Open Setting
Image : Image : :
Image : Image : :
SWITCH GROUPS
VESSEL DATA
ACTIONS/CONDITIONS
Undo
Redo
Save
Cancel Changes
CONFIGURATION: new-default
SCREEN: Power
16:25:25
09/02/2025
26°07.344'N
80°08.244'W
HOME
ENGINES
TANKS
WEATHER
POWER
AWAY
Vessel Mode
FEET
8.9
Depth
273°
Heading
-6.9°
Variation
°C
20.2°
Temperature
Maretron
Vessel Monitoring & Control
Service Battery
VOLTS
13.6
12.1 ... 14.2
AMPS
5.7
Service Battery
80.0 %
SOC
Inverter
VOLTS
119
118 ... 122
AMPS
17.4
Inverter Current
Inverter Voltage
60.1
Inverter Frequency
AC Main
VOLTS
119
Generator Voltage
AMPS
19.0
Generator Current
60.0
Generator Hz
VOLTS
125
Shore Power
AMPS
21.8
Shore Power Cur...
59.6
Shore Power Hz
Electronics
Navigation Lights
Refrigerator
Steaming Light
Water Pressure
Anchor Light
Saloon Lights
Deck Lights
Cabin Lights
Cockpit Lights
Red Lights
Bilge Pump
Outlets Port
Outlets Stbd
Outlets Galley
Microwave
Refridgerator
Washing Machine
Spare
Spare
Spare
Battery Charger
Top Right AC Main
Air Conditioning Pump
Freezer
Air Cond. Aft Cabin
Air Cond. Saloon
Air Cond. Fwd Cabin
Watermaker
Spare
Spare
EDIT COMPONENT ID: 23
Add
Delete
Parameter:
Generator - Avera...
Component:
Digital 2x1
Parameter Fields
Comment:
Use Label from Device:
Instance:
101
Units:
Volts
Component Fields
Left:
638
Top:
97
Width:
90
Title:
Generator Voltage
Format:
Decimal (1 place)
Ranges:
Backplate Color:
0e0e0e
Backplate Opacity:
0
Include in screen status when ANCHORED:

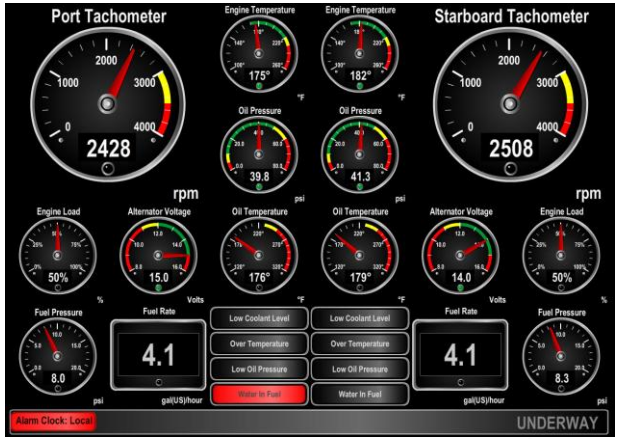

16:12
N F R
69°
140
120
100
VOLTAGE
114
FREQUENCY
59.9
CURRENT
22.0
Generator One
Generator Two
80.0 %
House Battery
Invertor
Shore Power
NAVIGATION
WEATHER
POWER
HOME
ENGINES
LIGHTS
TANKS

USER INTERFACE CONFIGURATION

N2KView® V3

Maretron's N2KView® V3 is a comprehensive vessel monitoring and control software that goes beyond simple monitoring.

N2KView V3 is completely user-configurable, and you are free to create different screens for your exact needs while easily switching from screen to screen for monitoring all your systems.



Vessel Monitoring & Control Software for PCs

- ✓ Connects to NMEA 2000® Network via a Maretron Gateway, either USB100 (Windows®) or IPG100 (Windows & MAC)
- ✓ Comprehensive software includes services of Monitoring, Control, Alerts, Video, Power Management, and Fuel Management
- ✓ Engines, Generators, Electrical, Tanks, Rudders, Navigation instruments, and so much more.

N2KView V3 software built in!

- ✓ TSM810C & MBB300C

[N2KView Datasheet]

NMEA 2021 Product Awards

SAIL 2020 PITTMAN INNOVATION AWARDS

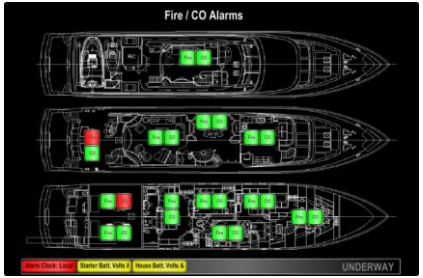
BoatingIndustry TOP PRODUCTS 2020

MIAMI 2020 INNOVATION AWARDS WINNER

USER INTERFACE CONFIGURATION

N2KView® V3

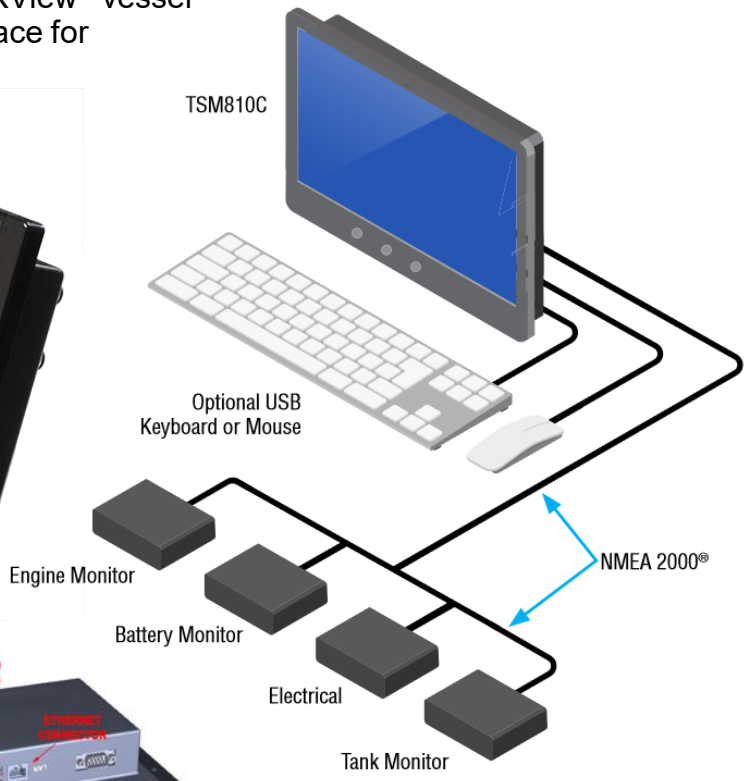
- ✓ Optimized for Touchscreen Interface
  (Full Support for Keyboard and Pointing Devices)
- ✓ Favorite Screens are Completely User Defined and Tailored for Installed NMEA 2000® Sensors
- ✓ As Many Favorite Screens as Desired, User Defined Tab Names
- ✓ User Defined Background Images
  (Vessel Profiles, Deck Views, Systems Diagrams, etc.)
- ✓ Integrated Video with Pan, Tilt, and Zoom Controls
- ✓ Comprehensive Alerts System Showing Alarms and Warnings at Bottom of Screen
- ✓ Emailing & Texting* On User Selectable Alerts
  *NA Customers Only with the SMS200
- ✓ User Defined Graphs for Monitoring Trends



USER INTERFACE CONFIGURATION

TSM810C - 8” Vessel Monitoring & Control Touchscreen

The TSM810C is an 8” dedicated touchscreen that includes Maretron’s N2KView® vessel monitoring and control software, providing an extremely simple touch interface for monitoring and controlling critical systems from anywhere on the vessel



Features:

- ✓ 800 x 480 LED backlit LCD Panel
- ✓ Widescreen aspect ratio 5:3
- ✓ 9-32VDC Power, Supply 2 Watts
- ✓ Solid State Disk Drive
- ✓ Dedicated Hardware Boots and Runs N2KView® V3
- ✓ Fanless (Salt Air Not Pulled through the Unit)
- ✓ IP66 Front Panel Protection
- ✓ Flush or VESA mounting capability
- ✓ Dual NMEA 2000® ports for Single or Redundant Network Connections
- ✓ Two USB Ports for Keyboard, Mouse, Trackball, or other connections
- ✓ Ethernet Connector for IP Camera Input or Email Notifications

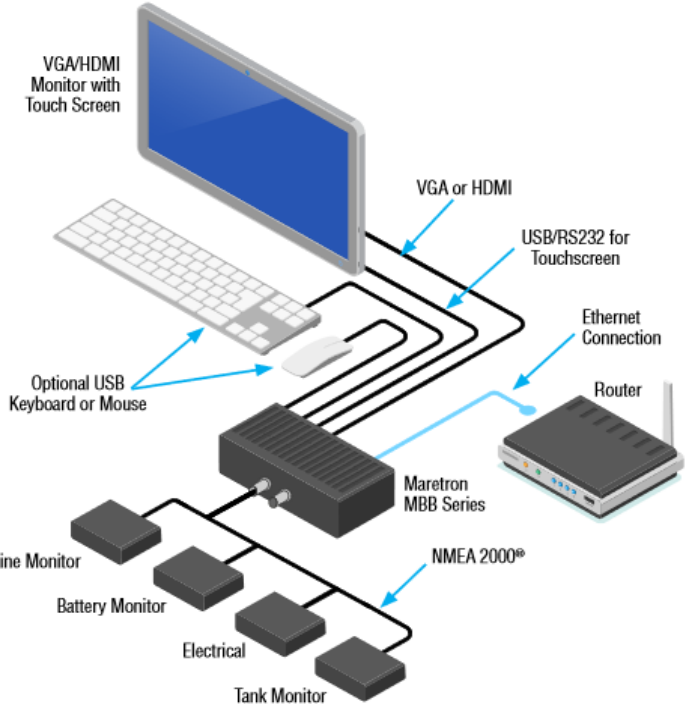
TSM810C Datasheet

USER INTERFACE CONFIGURATION

MBB300C - Vessel Monitoring & Control Black Box

Maretron's third generation Black Box (MBB300C) is a dedicated processing unit that includes Maretron's N2KView®.

Unlike a PC that allows any software to be loaded, the MBB300C runs only N2KView® software making it extremely stable and dedicated to monitoring and controlling your vessel



Other Features:

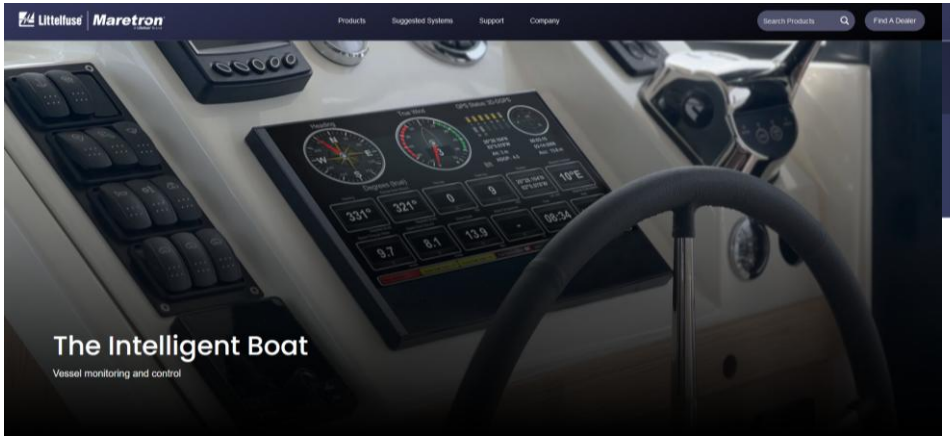
- Solid State Disk Drive
- Fanless Cooling System
- Dual NMEA 2000 ports for Single or Redundant Network Connections
- Four USB Ports for Touchscreen, Keyboard, Mouse, Trackball, or other connections
- VGA or HDMI Video Connection (2560 x 1600 Maximum Resolution)
- Ethernet Connector for IP Camera Input or Email Notifications

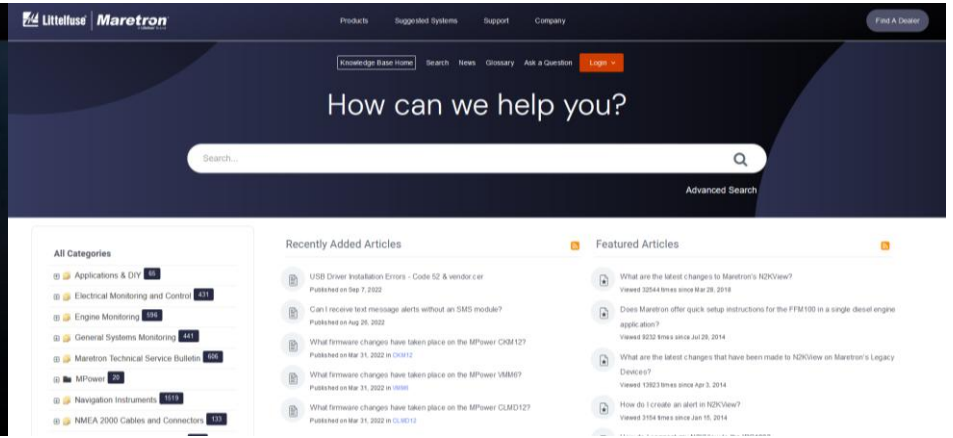
MBB300C Datasheet

CONFIGURATION

Website Resources

The Maretron website has been recently updated to offer our users access to all of the latest technical materials with the ease of navigation. Datasheets, Manuals, Training Videos, Software, Knowledge Base and Sample Systems and more at your fingertips!!





https://www.maretron.com/
https://www.maretron.com/wp-content/phpkbv95/

WEBSITE RESOURCES

N2KAnalyzer - Training Videos

- Overview
- Applications
- Documentation
- Downloads
- Videos

https://www.maretron.com/products/n2kanalyzer-v3-nmea-2000-analysis-software/

WEBSITE RESOURCES

MConnect - Training Videos

- Overview
- Key Features
- Specifications
- Documentation
- Diagram
- **Videos**
- Configurations
- Updates
- Software Revision History

https://www.maretron.com/products/mconnect/

WEBSITE RESOURCES

N2KView - Training Videos

- Overview
- Applications
- Alerts
- Videos
- Documentation
- Application Design
- BNWAS
- Video Cameras
- Screenshots
- Downloads
- Anchoring

Maretron N2KView Basic Operation - Overview

Maretron N2KView Basic Operation - Component Types 2

Maretron N2KView Basic Operation - Component Types

Maretron N2KView Basic Operation - Alerts

https://www.maretron.com/products/n2kview-vessel-monitoring-and-control-software/

MARETRON WEB PAGES

Technical Support

Maretron Technical Support
(Maretron, MPower and OctoPlex Brands)

Monday – Friday 830am - 5pm (EST)
End-User Support: (603) 324-7900

Inquiries & RMAs

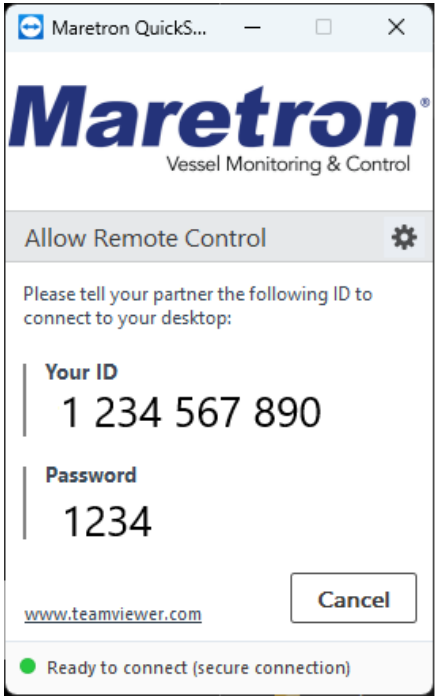
Customer Portal

Add to Contacts

Contact Us

Knowledge Base

Raymarine Maretron



maretron.com/remotesupport

Maretron®

Vessel Monitoring & Control

www.Maretron.com