

Mastervolt Battery Integration Guide

Version 1.0 | January 2024

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2 INTRODUCTION

This document describes how to configure Mastervolt batteries to integrate seamlessly with the Integrel system.

Mastervolt products generally use the proprietary MasterBus protocol to communicate with each other on a CAN bus network. Mastervolt is moving towards supporting the NMEA2000-based CZone protocol to replace MasterBus, however CZone is not yet supported on all products.

Integrel communicates with Mastervolt battery products on an NMEA2000 network using a **MasterBus NMEA2000 Interface** available from Mastervolt. Once CZone becomes generally available on all Mastervolt products, Integrel will also provide direct communication support for CZone.



MasterBus NMEA2000 Interface

3 CONFIGURATION

3.1 Prerequisites

The following devices and software are required to configure Mastervolt batteries ready for integration with the Integral System.

- Mastervolt MLI batteries suitable for configuration into a 48V (nominal) bank; examples are provided to configure up to four [MLI Ultra 24/6000](#) batteries.
- [MasterBus NMEA2000 Interface](#) (MN2K Interface)
- [Mastervolt USB Interface](#)
- A computer installed with [MasterAdjust software](#)
- Mastervolt installer access code (required to access MasterAdjust software)

3.2 Configuration Instructions

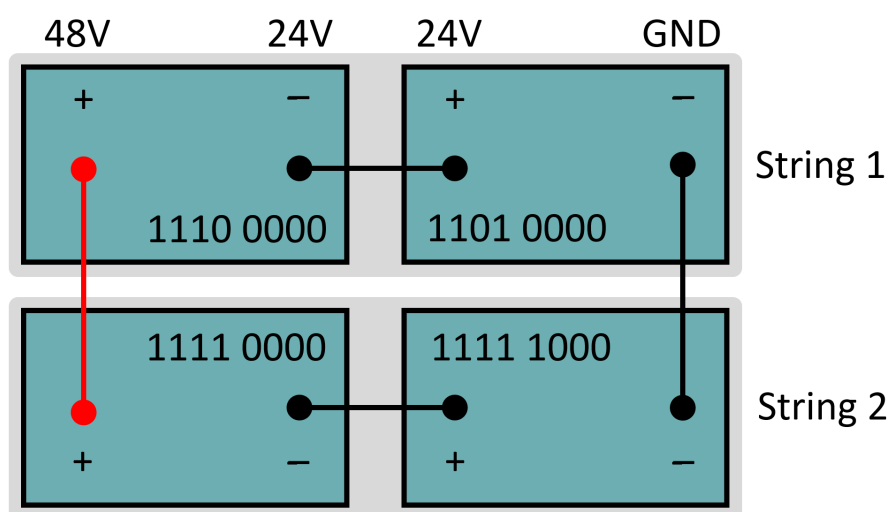
The steps required to configure all batteries and the MasterBus NMEA2000 Interface are as follows.

1. Batteries are configured by setting the DIP switches on each battery to a unique value on the MasterBus bus then, using the MasterAdjust tool, batteries are grouped into clusters.
2. The MasterBus NMEA2000 interface is setup to monitor battery PGNs as follows:
 - a. Each Battery
 - i. PGN Number **127501** (Bank status)
 1. MB Field **62** (Stop Charge)
 2. MB Field **111** (Battery Safety)
 - b. Master Battery
 - i. PGN Number **127506** (State of Charge)

3.2.1 Battery Configuration

1. Connect the Batteries

Connect the batteries together, taking care to **set the DIP switch combination** on each battery to be **UNIQUE** on the MasterBus network. Note the physical location of each battery relative to other batteries. The following example shows how to create a 48V system with two strings of two MLI6000 24V batteries.



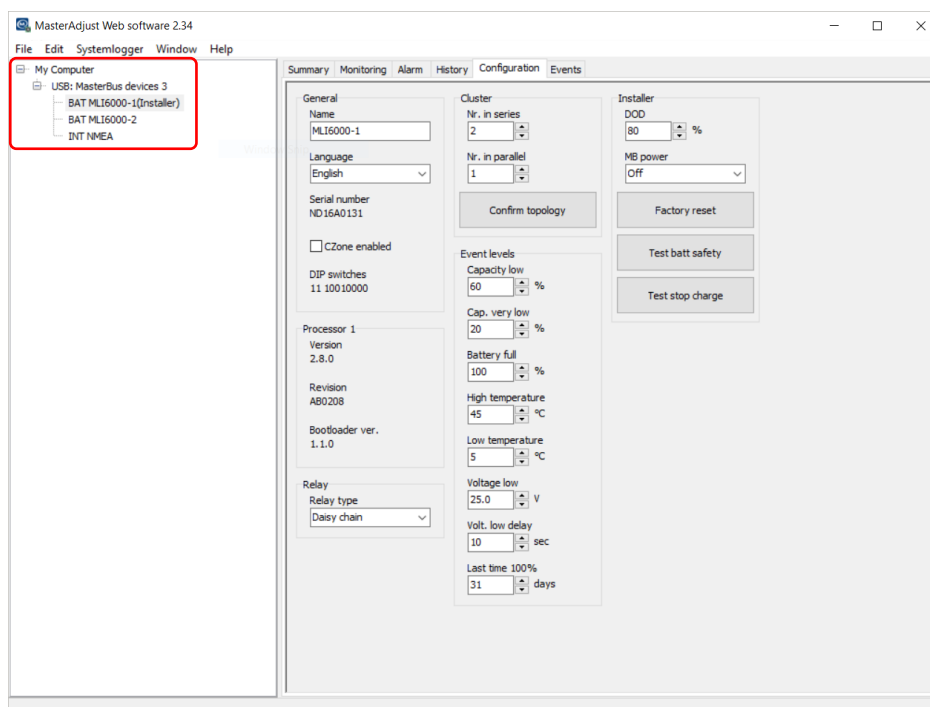
2. Launch MasterAdjust

Launch the MasterAdjust software Configuration Tool.

NOTE! The following MasterAdjust screen capture examples demonstrate how to configure 2 x 24V batteries to create a single string of batteries to create a 48V battery bank; where applicable, additional notes are provided to describe how to create a 48V battery bank with four batteries. Tables showing the final configuration for 2-batteries and 4-batteries are provided at the end of the document for reference.

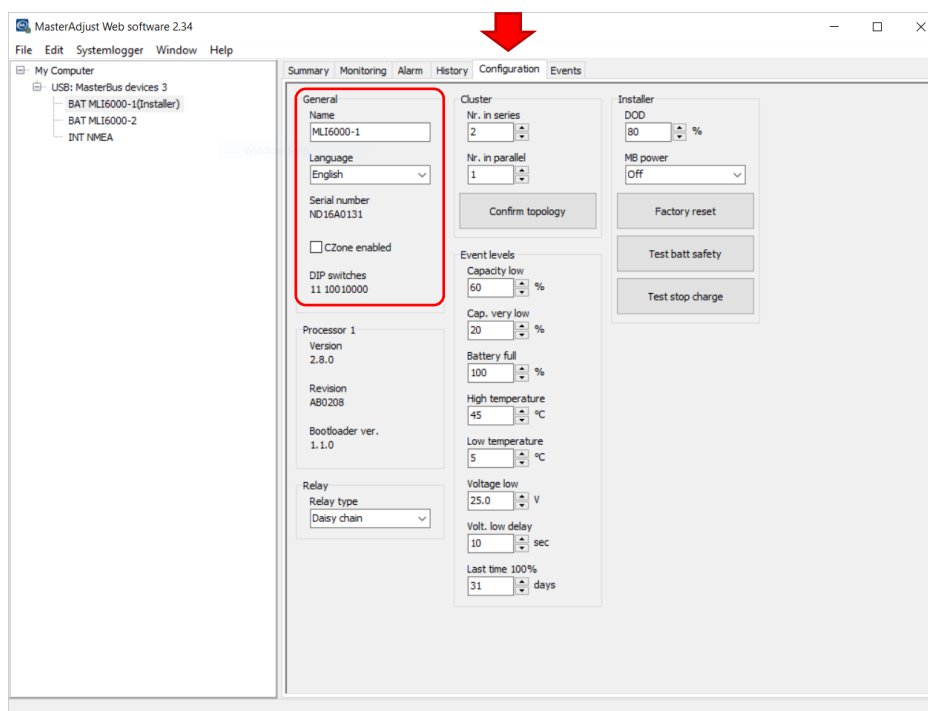
3. Check Devices

Ensure all devices appear in the left-hand column of MasterAdjust; batteries should appear as **BAT MLI6000-X** and the MN2K interface should appear as **INT NMEA**. The following example shows two batteries and the MN2K Interface.



4. Identify Battery Names

Select the Configuration tab. For each battery, look at the 'DIP switches' value in the *General* section and note down the corresponding battery name (shown in the left-hand column); the name/number may not be in alphabetical or numerical order. See the following examples.



```
String 1 48V-24V = 1110-0000 = BAT MLI6000-1
String 1 24V-GND = 1101-0000 = BAT MLI6000-3
String 2 48V-24V = 1111-0000 = BAT MLI6000-2
String 2 24V-GND = 1111-1000 = BAT MLI6000-4
```

5. Select the Master Battery

Choose a battery to be the Master Battery e.g. String 1 48V-24V

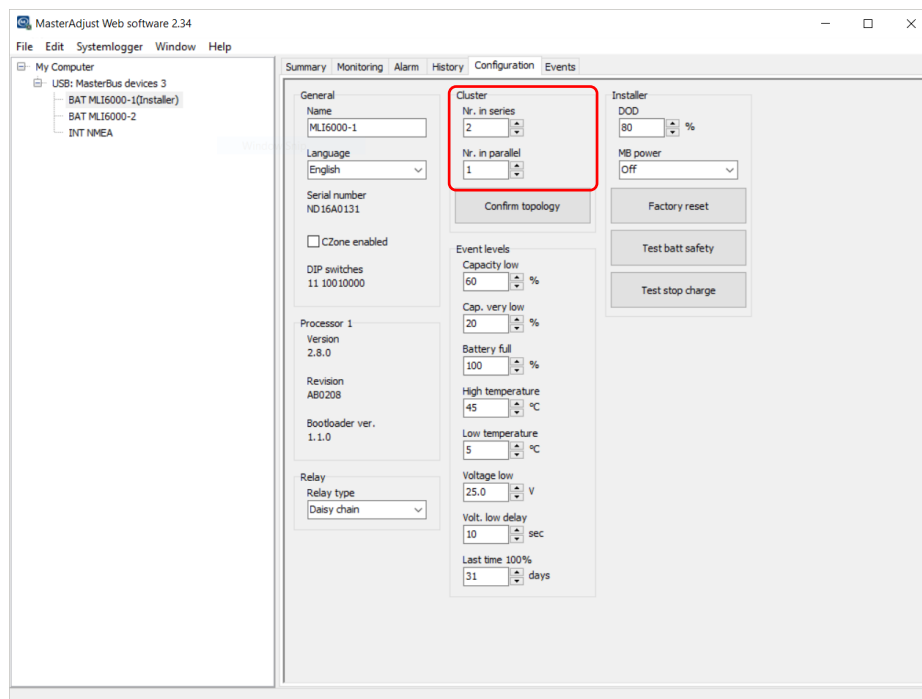
NOTE! To work correctly with *Integrel* integration, only **ONE** Master Battery is allowed; all 48V battery strings must be physically wired together in series/parallel.

6. Login

Right-click on the desired Master battery in the left-hand column, choose 'Login' and then enter your Installer access code.

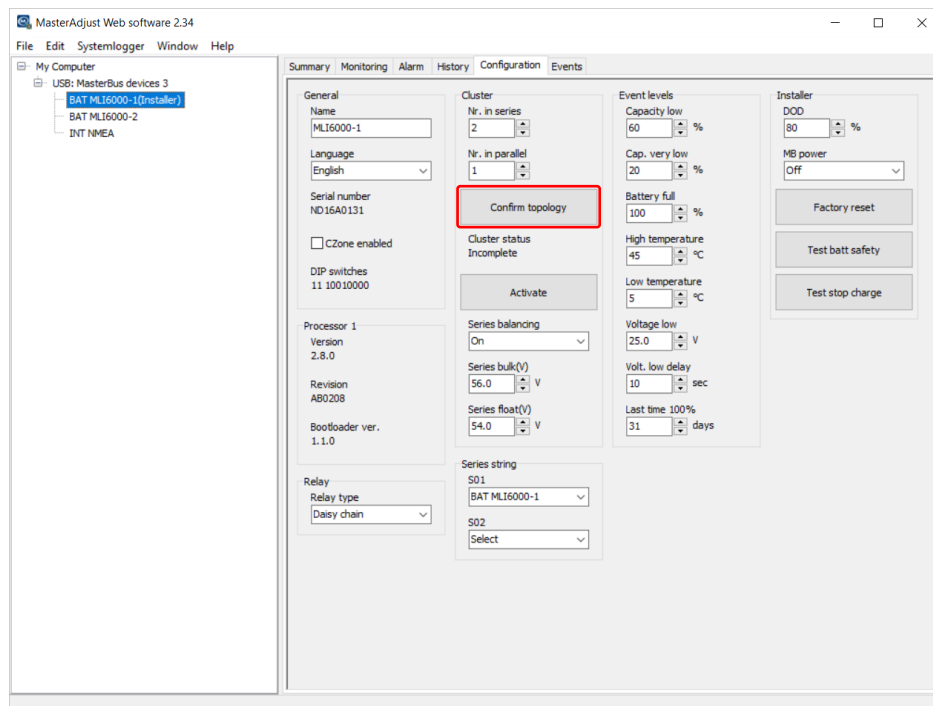
7. Configure Battery Cluster

In the *Cluster* section, configure the 'Nr. in series' and 'Nr. in parallel' settings according to the configuration of physical batteries being configured. The following example shows the configuration for a single string that contains two batteries in series with 'Nr. in series = 2' and 'Nr. in parallel = 1'.



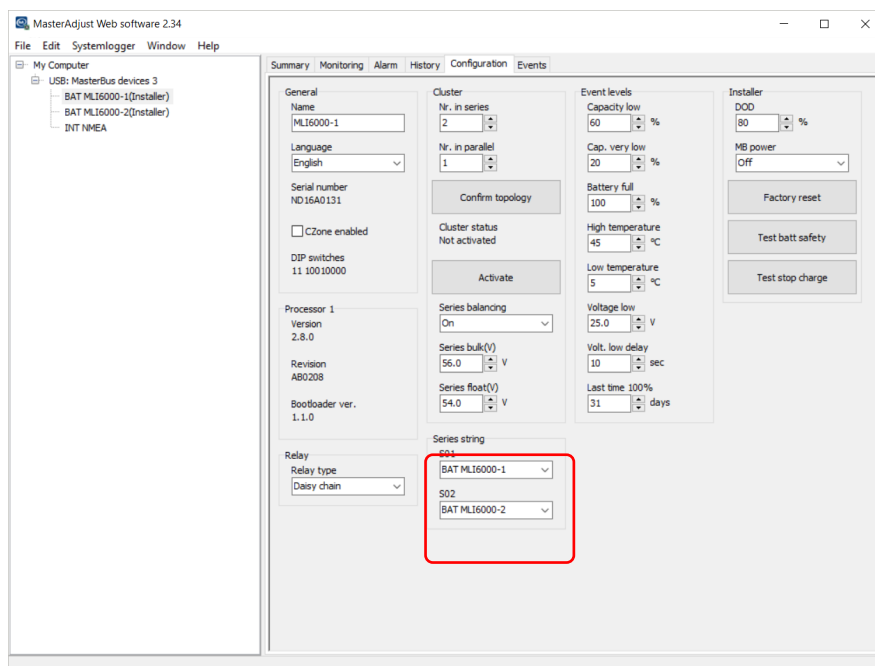
8. Confirm Topology

Select *Confirm topology* and wait for the screen to refresh; several new options and buttons appear as shown in the following example.



9. Configure Series String

In the *Series string* section, configure the batteries as shown in the following example. If more than one parallel string is being configured, the Series string labels will appear as 'S01 P01', 'S02 P01', 'S01 P02', 'S02 P02', etc.).

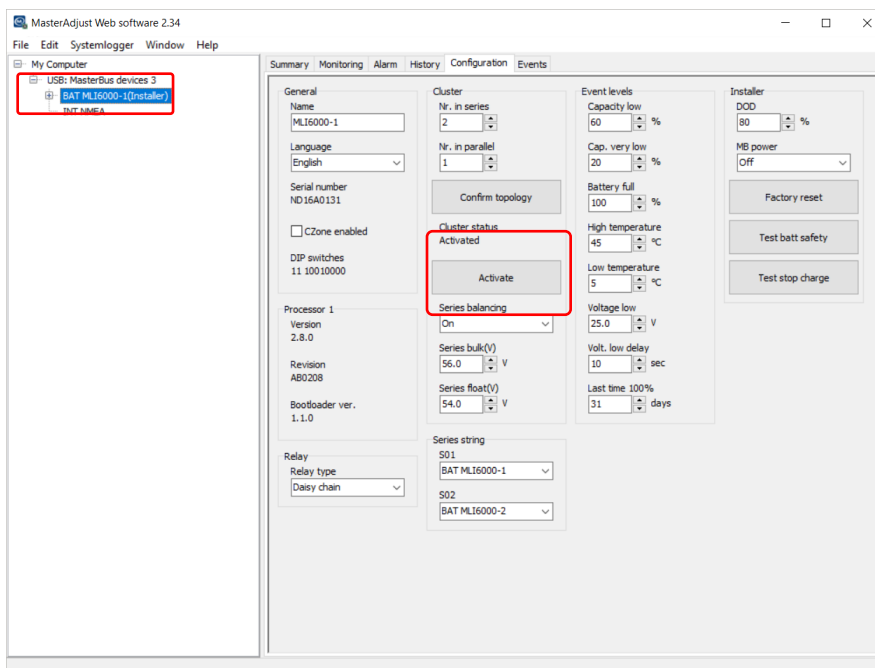


S01 48V-24V = BAT MLI6000-1

S02 24V-GND = BAT MLI6000-2

10. Activate the Cluster

In the *Cluster* section, select the 'Activate' button and wait for the screen to refresh. After refresh, 'Cluster status' changes from 'Not Activated' to 'Activated' and the left-hand column now groups all batteries under the Master battery. In the left-hand column, select '+' next to the Master battery to reveal all batteries in the cluster.



Battery configuration is now complete.

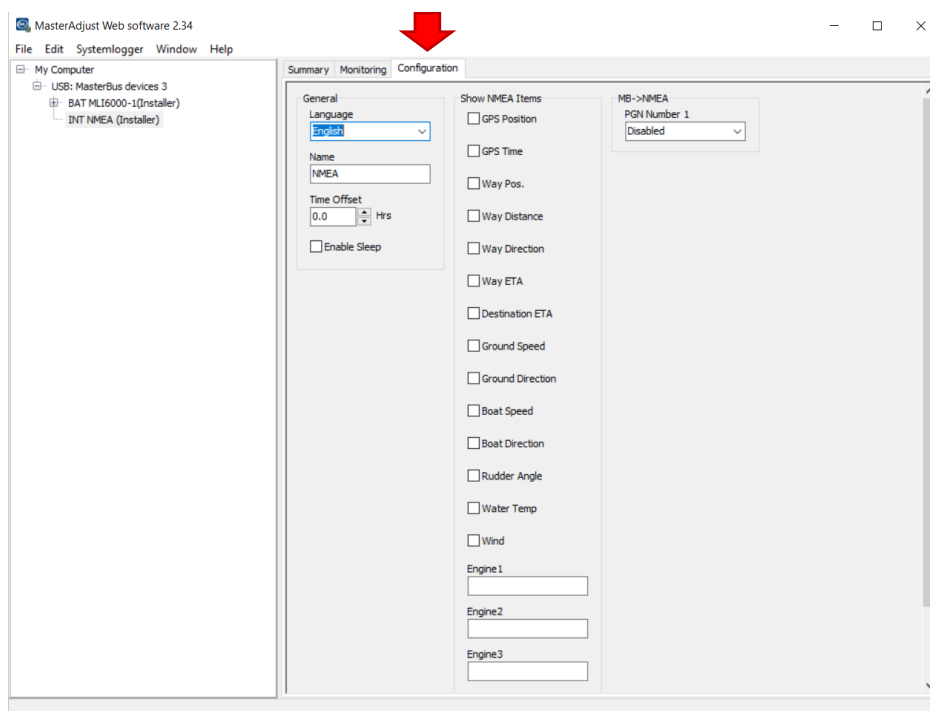
3.3 MasterBus NMEA2000 Interface Configuration

1. Login

The MasterBus NMEA2000 Interface is named **INT XXXX** in the left-hand column; right-click **INT XXXX** and login as an Installer using your installer code.

2. Configuration

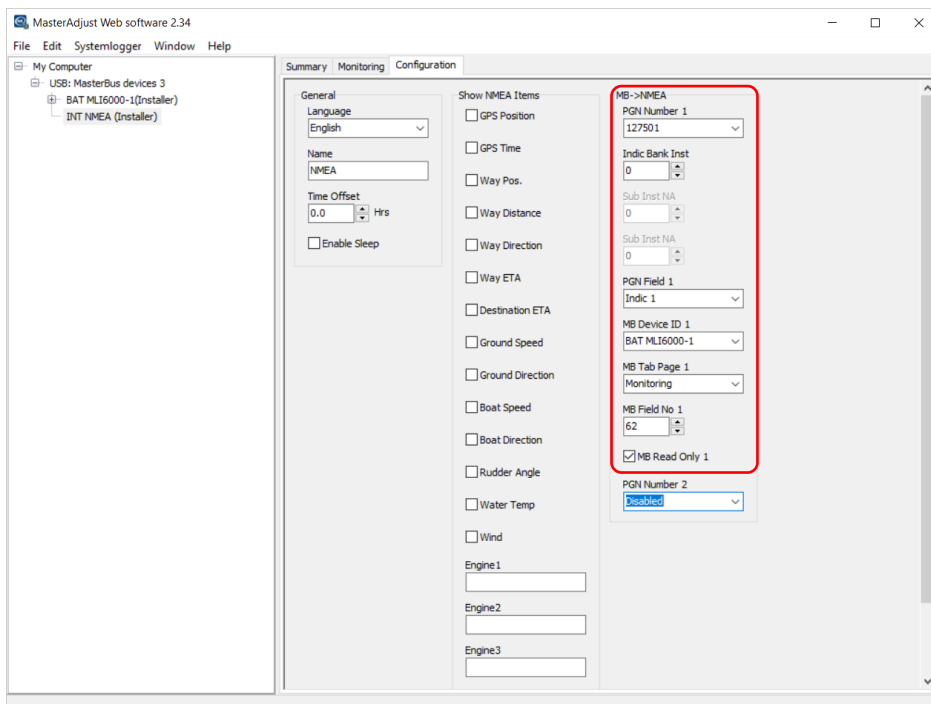
Select the Configuration tab.



3. PGN Number 1 Configuration

In the **MB->NMEA** section, choose **127501** from the PGN Number 1 dropdown. The screen refreshes and the following fields appear; configure each field as shown.

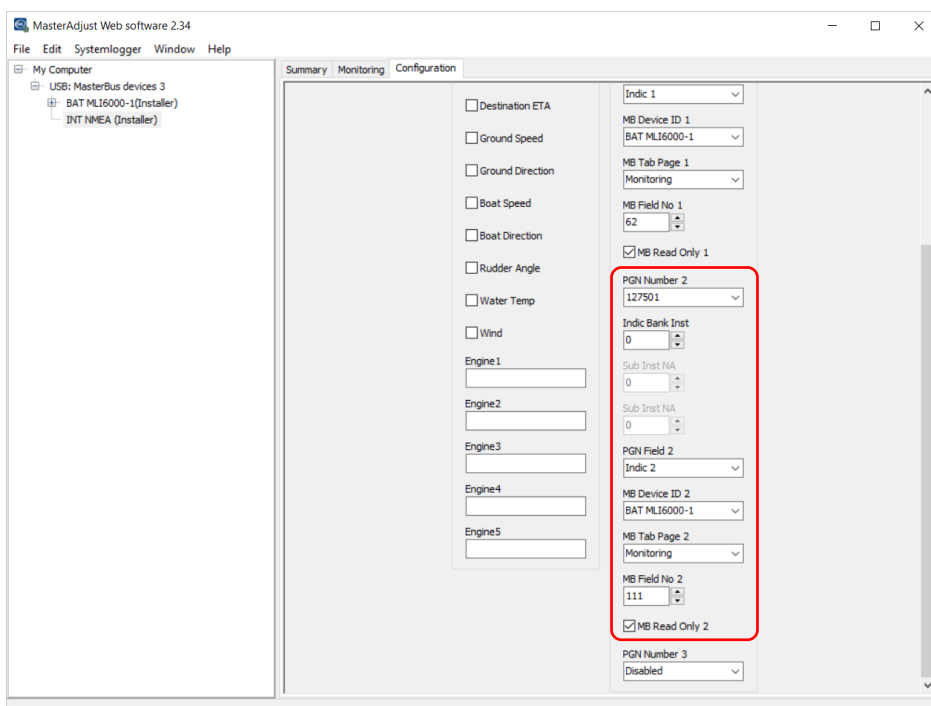
```
PGN Field 1      : Indic 1
MB Device ID 1   : BAT MLI6000-1
MB Tab Page 1    : Monitoring
MB Field No 1    : 62 (indicates: Stop Charge)
MB Read Only 1   : ☒
```



4. PGN Number 2 Configuration

Choose **127501** from the PGN Number 2 dropdown. The screen refreshes and the following fields appear; configure each field as shown.

PGN Field 2 : Indic 2
 MB Device ID 2 : **BAT MLI6000-1**
 MB Tab Page 2 : Monitoring
 MB Field No 2 : **111** (indicates: Battery Safety)
 MB Read Only 2 : ☒



5. PGN Number X Configuration

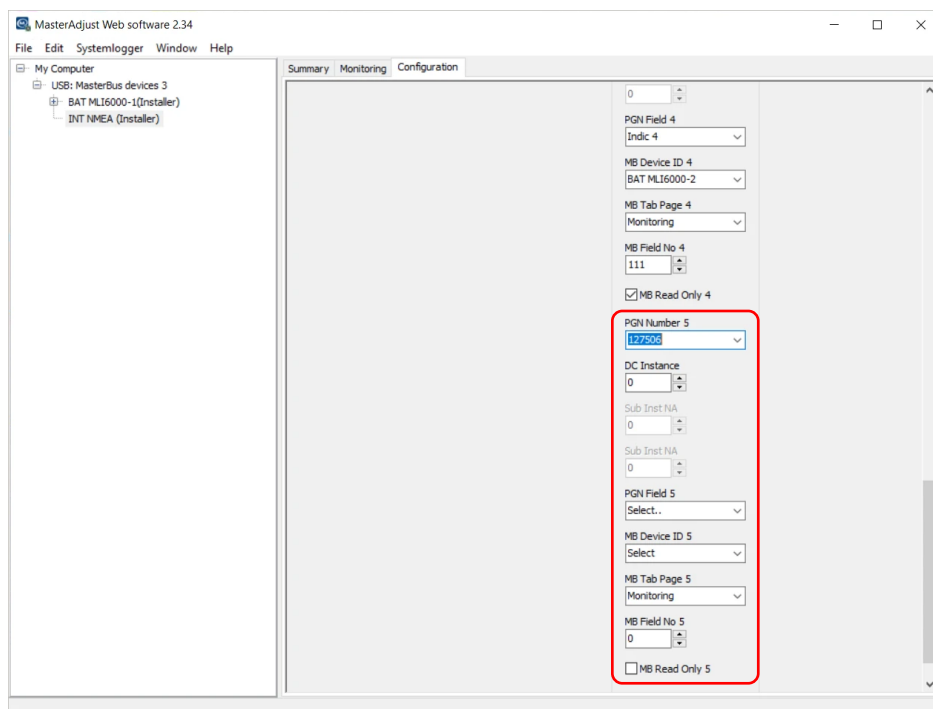
Repeat Steps 3 and 4 for PGN Numbers 3 & 4, 5 & 6, etc. until all battery flag pairs have been configured. Each battery **MUST** configure 2 x PGN Numbers with fields 62 and 111.

- MB Field No x: **62** (stop charge)
- MB Field No x: **111** (battery safety)

6. State of Charge Configuration

Once all battery flags have been configured, it is necessary to configure **State of Charge** on PGN Field **127506**. This should be done only **ONCE** for the master battery **ONLY**. See the example configuration for PGN Number 5 in the following example.

```
PGN Field 5      : 127506
DC Instance      : 0
PGN Field 5      : State of Charge
MB Device ID 5   : BAT MLI6000-1 (the Master battery)
MB Tab Page 5    : Monitoring
MB Field No 5    : 0 (state of charge of the cluster)
```



The MasterBus NMEA200 Interface configuration is complete and the Integral system can now be configured.

3.3.1 Example Configuration for 2 Batteries

#	PGN Number	Indic Bank Inst	PGN Field x	MB Device ID x	MB Tab Page x	MB Field No x	MB Read Only x	Purpose
1	127501	0	Indic 1	BAT MLI6000-1	Monitoring	62	☒	Stop Charge
2	127501	0	Indic 2	BAT MLI6000-1	Monitoring	111	☒	Battery Safety
3	127501	0	Indic 3	BAT MLI6000-2	Monitoring	62	☒	Stop Charge
4	127501	0	Indic 4	BAT MLI6000-2	Monitoring	111	☒	Battery Safety
5	127506	[DC Instance] 0	State of Charge	[Master] BAT MLI6000-1	Monitoring	0	-	State of Charge of Cluster

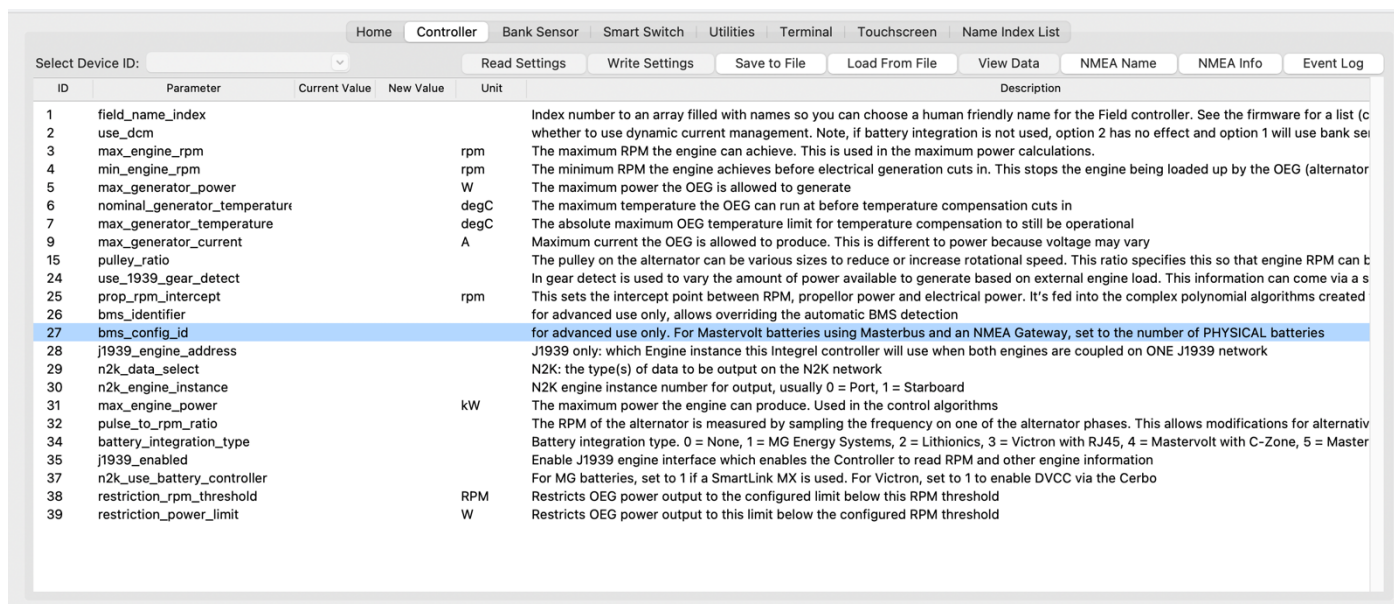
3.3.2 Example Configuration for 4 Batteries

#	PGN Number	Indic Bank Inst	PGN Field x	MB Device ID x	MB Tab Page x	MB Field No x	MB Read Only x	Purpose
1	127501	0	Indic 1	BAT MLI6000-1	Monitoring	62	☒	Stop Charge
2	127501	0	Indic 2	BAT MLI6000-1	Monitoring	111	☒	Battery Safety
3	127501	0	Indic 3	BAT MLI6000-2	Monitoring	62	☒	Stop Charge
4	127501	0	Indic 4	BAT MLI6000-2	Monitoring	111	☒	Battery Safety
5	127501	0	Indic 5	BAT MLI6000-3	Monitoring	62	☒	Stop Charge
6	127501	0	Indic 6	BAT MLI6000-3	Monitoring	111	☒	Battery Safety
7	127501	0	Indic 7	BAT MLI6000-4	Monitoring	62	☒	Stop Charge
8	127501	0	Indic 8	BAT MLI6000-4	Monitoring	111	☒	Battery Safety
9	127506	[DC Instance] 0	State of Charge	[Master] BAT MLI6000-1	Monitoring	0	-	State of Charge of Cluster

3.4 Setting up the Integral system

Once the Masterbus NMEA adapter and the batteries are set up you will need to check/amend the Masterbus settings on the Integral controllers.

Connect a PC to a controller using a USB C cable. Open the Integral Config tool.



Check and change the following settings on the controller tab.

Also in the table below are the Bank Sensor settings, these are usually preconfigured but can be crosschecked with the following table.

Device	Setting no.	Setting name	Set to	Pre config
Controller	27	Bms_config_id	No of batteries is the PHYSICAL batteries in the cluster.	-
Controller	34	battery integration type	5	-
Bank sensor	0	bank_ah_rate (Ah)	230	✓
Bank sensor	8	warning_voltage[1] (V)	48-50	✓
Bank sensor	39	LI_battery_manufacturer	5	✓
Bank sensor	40	LI_battery_model	1	✓
Bank sensor	41	Li_bulk_target (V)	57	✓
Bank sensor	42	Li_bulk_float (V)	54	✓
Bank sensor	43	Li_min_charge_temp (°C)	0	✓
Bank sensor	44	Li_max_charge_temp (°C)	50	
Bank sensor	45	Li_min_discharge_temp (°C)	-25	✓
Bank sensor	46	Li_max_discharge_temp (°C)	50	✓
Bank sensor	47	Li_min_voltage (V)	44	✓
Bank sensor	48	Li_max_voltage (V)	58.5	✓
Bank sensor	49	_max_discharge_current (amp)	230	✓
Bank sensor	50	Li_max_charge_current (amp)	160	✓



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