



## **Power Distribution System GUI**

Documentation of the GUI to configure the  
Dataspeed power distribution system.

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# 1 Initial Setup

In order to run the Power Distribution System (PDS) configuration GUI, a few things need to be set up first.

## 1.1 Install Visual C++ Redistributable Package

The Microsoft Visual C++ 2013 Redistributable Package (x86) is required to run the GUI, as well as the USB driver installer. This can be downloaded at

<https://www.microsoft.com/en-us/download/details.aspx?id=40784>

## 1.2 Install USB Driver

The USB driver can be installed using the **USBDriverInstaller.exe** program, which can be found in

PowerDistribution\GUI\Driver

relative to the Dataspeed software release directory. To install the drivers, click the **Install Drivers** button in the installer program, as shown in Figure 1.

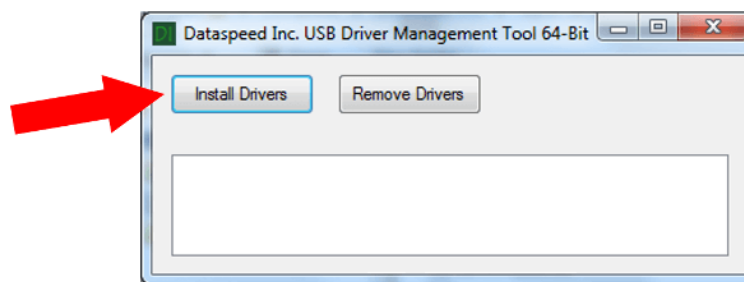


Figure 1: Dataspeed USB driver installation GUI.

- Be sure to run **USBDriverInstaller.exe** as administrator. The installation will hang indefinitely otherwise.
- The installer program requires .NET runtime libraries that might not be installed. These libraries will have to be downloaded and installed.
- If the USB device is connected, disconnect and reconnect it after successful driver installation.

## 2 Main GUI Screen

The main screen of the Power Distribution System (PDS) GUI is shown in Figure 2. Each labeled section of the GUI is described in more detail in the subsequent sections of this document. They are:

- **Configurable Channel Names** – The names of the channels can be changed to reflect the particular hardware that is connected to them. These will also be the names that appear on the touch screen display. (Section 3).
- **Individual Channel Control** – Manually turn each channel on and off from the GUI (Section 4).
- **Channel Status** – Reports the current status of each channel (Section 5).
- **Fuse Protection** – Each channel can be configured to automatically shut down in conditions where the fuse will likely blow (Section 6).
- **Board Configuration** – Various configuration settings (Section 7).
- **Multi-Channel Grouping** – Multiple channels can be combined in parallel to service loads that exceed the 20 A continuous limit of an individual channel (Section 8).
- **Startup and Shutdown Scripts** – Startup and shutdown sequences can be precisely configured using scripts (Section 9).

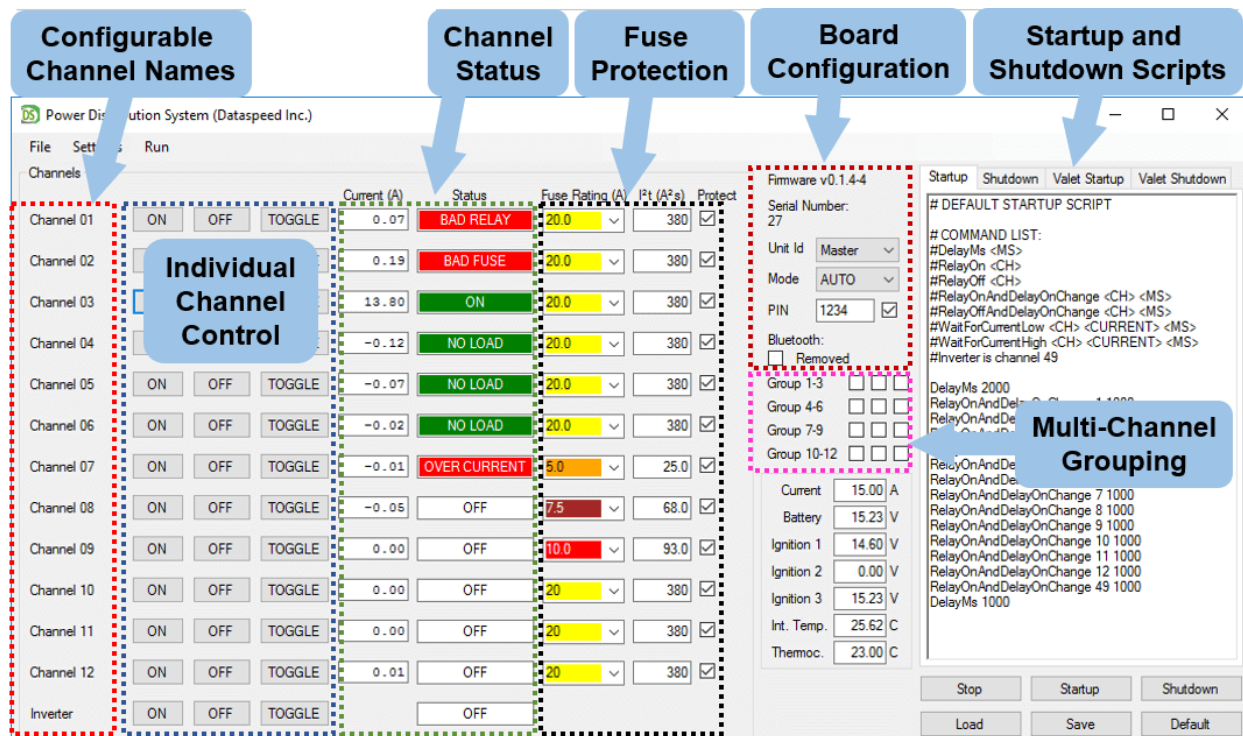


Figure 2: Main screen of the PDS GUI.

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### 3 Configurable Channel Names

To change a channel name, simply click on the existing name to bring up the dialog box shown in Figure 3. Enter the desired name and click OK.

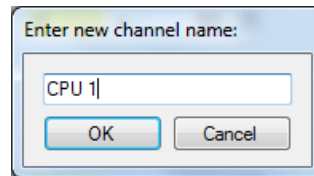


Figure 3: Dialog box to change a channel name.

### 4 Individual Channel Control

Each channel can be manually controlled by clicking the On, Off, and Toggle buttons.

### 5 Channel Status

Here is shown the current load of the particular channel, as well as a text indication of the operating mode. The different operating modes and their conditions are as follows:

- **Off** – The PDS has turned this channel off.
- **On** – Channel is on and a load is detected on the channel.
- **No Load** – Channel is on, but the current being drawn on the channel is low. The state transitions from **No Load** to **On** when the current exceeds 150 mA, and from **On** to **No Load** when the current drops below 100 mA.
- **Over Current** – Current being drawn by the channel is in excess of the fuse rating, and the channel is configured to shut down to protect the fuse. See Section 6 for details on how to configure fuse protection.
- **Bad Fuse** – Fuse is either blown or unplugged. Replace the fuse on this channel.
- **Bad Relay** – Relay is malfunctioning. Return unit to Dataspeed for repair.

## 6 Fuse Protection

A screenshot of the fuse protection portion of the PDS GUI is shown in Figure 4. The current rating of the fuse is set using the **Fuse Rating** drop-down box, and the  $I^2t$  rating is automatically set to the nominal value for that particular fuse. The **Protect** checkbox enables and disables fuse protection.

If fuse protection is enabled, the channel will automatically shut off and go into the **Over Current** operating mode if the load on the channel exceeds the rating of the fuse (see Section 5 for details about the different operating modes). If fuse protection is disabled, the fuse protection settings are ignored and the channel will not automatically shut off.

Fuse Rating (A)	$I^2t$ (A <sup>2</sup> s)	Protect
20.0	380	<input checked="" type="checkbox"/>
5.0	25	<input checked="" type="checkbox"/>

Figure 4: Fuse protection configuration.

## 7 Board Configuration

### 7.1 Switch Board

Settings → Switchboard on the main GUI will open the window shown in Figure 5. Here, the behavior of each of the physical buttons on the switch board mounted in the center console can be configured. Each drop-down box contains the various functions that are able to be bound to the physical buttons. If a certain function is bound to a button, all other bindings for that function are canceled.

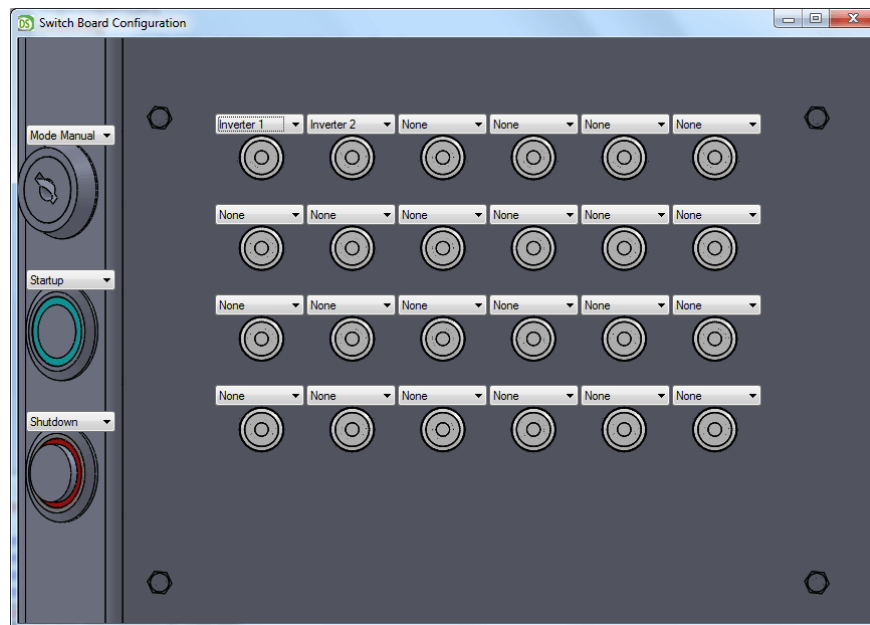


Figure 5: Window to configure the behavior of the switch board.

## 7.2 Network Settings

Settings → Network on the main GUI will open the window shown in Figure 6. There, the Ethernet communication of the PDS can be configured.

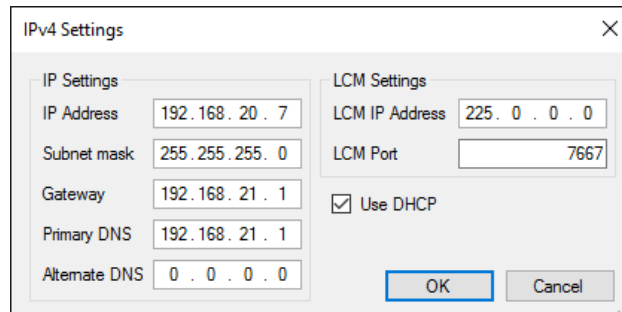
The image shows a window titled "IPv4 Settings" with a close button (X) in the top right corner. It is divided into two main sections: "IP Settings" and "LCM Settings".  
Under "IP Settings", there are five input fields:  
- "IP Address" with the value "192.168.20.7"  
- "Subnet mask" with the value "255.255.255.0"  
- "Gateway" with the value "192.168.21.1"  
- "Primary DNS" with the value "192.168.21.1"  
- "Alternate DNS" with the value "0.0.0.0"  
Under "LCM Settings", there are two input fields and a checkbox:  
- "LCM IP Address" with the value "225.0.0.0"  
- "LCM Port" with the value "7667"  
- A checkbox labeled "Use DHCP" which is currently checked.  
At the bottom right of the window are two buttons: "OK" and "Cancel".

Figure 6: IP settings window.

## 7.3 Unit ID

Up to four PDS boards can be connected together if more channels are required. To do this, each board must have a different ID, which can be set using the **Unit Id** drop-down box on the main GUI, shown in Figure 7. In single-board configurations, be sure the board is set to the **Master** ID. In multi-board configurations, be sure one is set to **Master** and the others set to **Slave 1** through **Slave 3**.

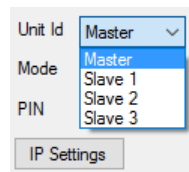
The image shows a portion of the main GUI. It features a "Unit Id" label next to a drop-down menu. The menu is open, showing four options: "Master", "Slave 1", "Slave 2", and "Slave 3". Below the drop-down menu is a "Mode" label and a "PIN" label, both with empty input fields. At the bottom of this section is a button labeled "IP Settings".

Figure 7: Unit ID setting values.

## 7.4 Mode

Different modes can be selected using the **Mode** drop-down box on the main GUI, shown in Figure 8. Each mode allows a different set of communication and scripting capabilities, which are described in Table 1.

USB, CAN, Ethernet, and Bluetooth are the different communication standards supported by the PDS. Shutdown and startup refer to scripts that automatically run upon removing and applying the ignition signal, respectively. Scripting is discussed in Section 9.

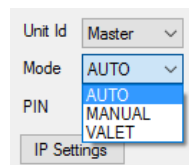
The image shows a portion of the main GUI, similar to Figure 7. It features a "Unit Id" label with a drop-down menu set to "Master". Below it is a "Mode" label with a drop-down menu that is open, showing four options: "AUTO", "MANUAL", and "VALET". There is also a "PIN" label with an empty input field. At the bottom of this section is a button labeled "IP Settings".

Figure 8: PDS mode setting values.

Table 1: Mode Descriptions

Mode	USB	CAN	Ethernet	Bluetooth	Shutdown	Startup
AUTO	X	X	X	X	X	X
MANUAL	X	X	X	X	X	
VALET	X					

## 7.5 PIN

The **PIN** text box on the main GUI is used to specify a four-digit number that must be entered on the touch screen display in order to change modes between **AUTO**, **MANUAL**, and **VALET**. The PIN is optional, and can be disabled by unchecking the box next to the text box. The PIN is also used for Bluetooth pairing.

## 7.6 Bluetooth

The status of the Bluetooth communications module is displayed in this section. Not all units are equipped with a bluetooth module. If enabled, the Bluetooth name will show up as PDS-XXXX, where XXXX represents the serial number. The Bluetooth pairing pin is the same pin from section (Section 7.5). Possible status values:

- Searching: Checking if module is present
- Removed: Module not present
- Disabled: Module present, but disabled
- Disconnected: Broadcasting, but not connected
- Connected: Connected to phone/tablet

## 7.7 Saving and Loading Configurations

File → Save Config

File → Load Config

The current status of the configuration settings can be saved to an xml file. The settings that are saved include:

- Channel names (Section 3)
- Fuse protection configuration (Section 6)
- Channel groups (Section 8)
- IP settings
- Switch board settings
- Unit ID, mode and PIN

Upon loading a previously saved configuration file, the connected PDS board will be immediately configured according to that file.



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## 8 Multi-Channel Grouping

The multi-channel grouping portion of the GUI is shown in Figure 9. Up to four multi-channel groups can be configured, and are comprised of the individual channels in the listed ranges. By checking more than one channel in each group, they will be combined such that when one of the channels is switched on, the others in its group are also switched on.

In the example of Figure 9, channels 1 and 2 are grouped into a combined channel that can handle 40 A, twice the continuous current of a single channel. Similarly, channels 7, 8, and 9 are combined into one channel that can handle 60 A. All other channels operate independently as usual.

Group 1-3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group 4-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Group 7-9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Group 10-12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 9: Checkboxes to configure multi-channel grouping.

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## 9 Startup and Shutdown Scripts

Startup and shutdown sequences can be programmed flexibly using scripts. The script commands are described in Table 2, and the format of the arguments are described in Table 3.

For example, to turn on Channel 3 and then wait for one second, the script command would be:

```
RelayOnAndDelayOnChange 3 1000
```

To wait for the current on Channel 6 to drop below a quarter amp, with a maximum wait time of two seconds:

```
WaitForCurrentLow 6 0.25 2000
```

When ignition voltage is removed, the unit will power off when the shutdown script is finished, or after 5 minutes. The startup script has no limit for execution time.

Table 2: Script Function Descriptions

Command	Arguments	Description
DelayMs	<MS>	Delay for the specified time
RelayOn	<CH>	Turn on a channel's relay
RelayOff	<CH>	Turn off a channel's relay
RelayOnAndDelayOnChange	<CH><MS>	Turn on a relay and then wait the specified time
RelayOffAndDelayOnChange	<CH><MS>	Turn off a relay and then wait the specified time
WaitForCurrentLow	<CH><CURRENT><MS>	Wait for current to drop below threshold, with timeout
WaitForCurrentHigh	<CH><CURRENT><MS>	Wait for current to exceed threshold, with timeout

Table 3: Argument Descriptions

Argument	Description
<MS>	Integer milliseconds of delay
<CH>	Channel number (special inverter channel is 49)
<CURRENT>	Floating point current in amps