HSE Data Acquisition Manual

USER MANUAL

Publication 015584 Rev #02

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Essential Safety Notes

This section describes potential hazards that may exist in the operation of these units. Some warning labels and symbols are affixed to your instrument. These symbols are used to inform you of potential dangers which may exist or where caution is required. Before installing your new unit, please take time to familiarize yourself with these warnings and symbols.

THE PROTECTION GIVEN BY THE EQUIPMENT MAY BE IMPAIRED IF USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER.

Environmental Conditions

- Indoor use;
- Altitude up to 2000 m;
- Ambient temperature 4°C to 40°C
- 4°C to 40°C; 10% - 80% Rh, Non-condensing
- Overvoltage Category 2
- Pollution degree 2

Hazards and Warnings

This instrument is subject to the following identified hazards:

HB cannot guarantee the safety of this device if used other than intended or used by any procedures other than those described in this manual.

Do Not Operate with Suspected Failures

If damage is suspected on or to the product, do not operate the product. Contact qualified service personnel to perform an inspection.

Orient the Equipment Properly

Do not orient the equipment so that it is difficult to manage the disconnection device.

Observe all Warning Labels on the Product

Read all product labels to ensure proper usage.

Do Not Immerse in Liquid

USB hardware contains electronic and must never be immersed in liquid e.g. for cleaning.

Welcome

Congratulations on joining the community of users worldwide who rely on DSI products to perform preclinical physiologic research. Thank you for your interest in DSI products. We are committed to providing you with quality products and services.

This manual will help you get to know the HSE Data Acquisition Hardware. The structure of the manual was designed to sequentially guide you through setting up your DSI system.

Assumptions

The HSE Data Acquisition Hardware requires Ponemah version 5.6 or later. Please view the Ponemah Manual for specific software requirements.

Application Overview

The HSE Data Acquisition Hardware is one of the available acquisition interfaces for the DSI Ponemah software. An acquisition interface unit allows the recording of analog signals in the Ponemah software.

The Ponemah software is designed for the user whose application demands flexibility along with accurate, continuous, non-interrupted data monitoring, recording, and analysis in a standardized environment. The Ponemah system combines specialized hardware and software, transforming your personal computer into a medical research workstation. This comprehensive data recording tool can be used to provide you with continuous data storage and real-time analysis of the results of your experiment as data is collected and after collection in a data review mode. The Ponemah system is an application designed for the Microsoft Windows® operating system.

The HSE Data Acquisition Hardware accepts any conditioned high-level input (up to ±10V full scale), allowing the system to be easily configured for special application requirements. The HSE Data Acquisition Hardware is the interface between instrumentation signal conditioner modules and the system computer. The acquisition interface accepts the input from an expansive array of analog signals and converts the signal for use by the system computer.

The HSE Data Acquisition Hardware transfers data over a USB connection with the PC. All that is needed on the PC is one available USB port.

System Components

This section will cover the basic hardware necessary when using the HSE Data Acquisition Hardware. Additional components may be necessary depending on the study design and the desired endpoints; these will be discussed in dedicated sections.

The following components should be part of every HSE Data Acquisition Hardware installation:

HSE Data Acquisition Hardware

The interface permits continuous data acquisition at up to an aggregate of 100,000 samples per second. It is available in two forms: The 16-channel standalone acquisition hardware (PN 73-3330) or USB-Control PLUGSYS modules (73-4817 for 8-channel, 73-4818 for 16-channel).

16-Channel Standalone Acquisition Hardware

Figure 1: 16-channel standalone acquisition hardware

The HSE Data Acquisition Hardware accepts up to sixteen single-ended or pseudo-differential inputs. Analog signal inputs are connected to the individual BNC input connectors on the acquisition interface. The unit is connected to the PC and powered by a single USB connection on the side. No additional power supply is required.

Open Connections are not water resistant

Open connectors are not water resistant and if recommended to avoid splashing water around the unit. Dirt or dust on the housing can be removed with a moist, but not damp, cloth.

Hardware Connections (PN 73-3330)

USB Port Connector

The HSE Standalone Data Acquistion Hardware has a single USB connector on one end.

Input/Output Connections

A. -G. Items are not currently available for use.

8. Analog Signal Input [AD Ch0 through AD Ch15]

⚠	**Important**: BNC AD Ch0 on the Acquisition Hardware is referred to as Input 1. Therefore, AD Ch0 will be channel 1 in the software setup.

The sixteen BNC connectors are used for analog inputs using a standard BNC cable. The input circuit has a buffered fixed span of ±1.25, ±2.5, ±5, or ±10 Volts full scale. These ranges are selectable in the Ponemah software. The ranges allow you to set up the HSE Data Acquisition Hardware Unit for full-scale compatibility with most common signal conditioning systems

USB-Control PLUGSYS modules

Figure2: PLUGSYS System Case

The PLUGSYS System is a modular amplifier system that can accept 1 of 2 USB Control PLUGSYS modules. The USB Control Module, PN 73-4817, has up to 8 channels, while the PN 73-4818 has up to 16 channels. The modules are internally connected to the amplifier or signal conditioner modules. Communication and power are done via a USB connection on the front of the interfacing computer.

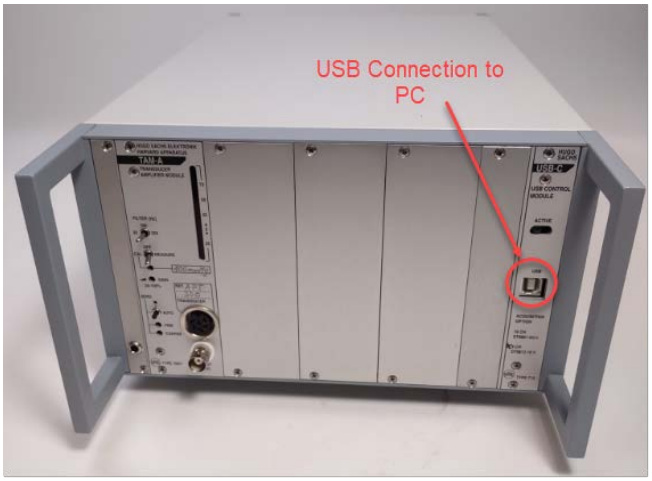
Hardware Connections

AC Power Connection

The housing requires an AC Power connection. The Power connection and switch are in the rear of the housing.

USB Connection

The USB connection is located on the front of the USB Control module and requires a USB-A to USB-B cable to connect to the computer for communication.



Amplifier Connections

Please note that the connections for the amplifier (signal conditioner) will depend on the specific type of amplifier you are using. If you are using the PLUGSYS system, there are signal conditioners available for various types of measurements such as blood pressure, ECG, temperature, flow transducers, and more. For a complete list of available options, please refer to the Hugo Sachs website.

Software Installation

See the Ponemah Installation note that is provided with the Ponemah software for installation instructions.

Getting Started

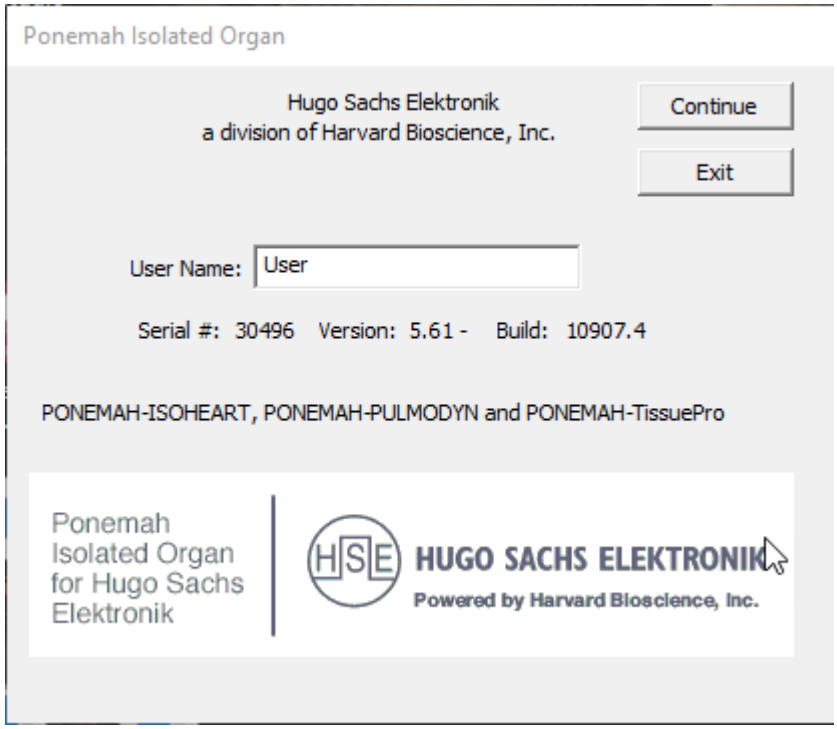
Before connecting the HSE Data Acquisition Hardware to your PC, please ensure that you have installed the Ponemah software first. Refer to the Ponemah reference manual for installation instructions. After the software installation, connect the HSE Data Acquisition Hardware to the PC using the supplied USB-B to USB-A cable.

Connect input signal cables to the HSE Data Acquisition Hardware.

Start the Ponemah Program

Start the system by double-clicking the **Ponemah** icon on the desktop.

Select Continue to open the main Ponemah window.

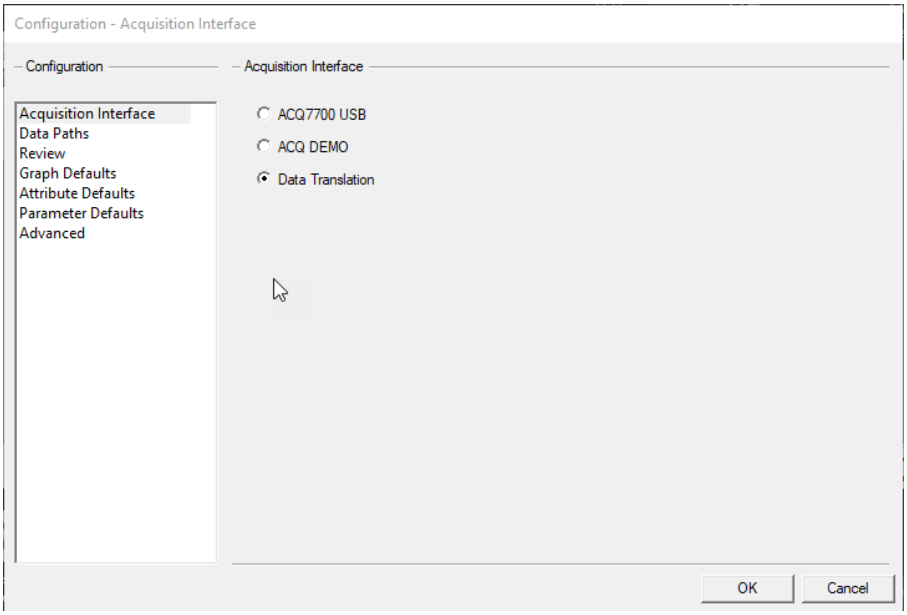


The Ponemah software includes a “default” test setup, called a Protocol, to help you get started. The default Protocol (filename: default.pro) will automatically be loaded when the program is opened.

Calibration Dialog

Configuring the HSE Data Acquisition Hardware

The HSE Data Acquisition Hardware must be set as the selected hardware interface in Ponemah to be used for data collection. This is done in Ponemah by selecting the menu Options – Application Configuration, selecting the **Acquisition Interface** tab, and **then choosing HB DAQ Hardware as the interface**. If the interface is changed, Ponemah will prompt to restart the program.

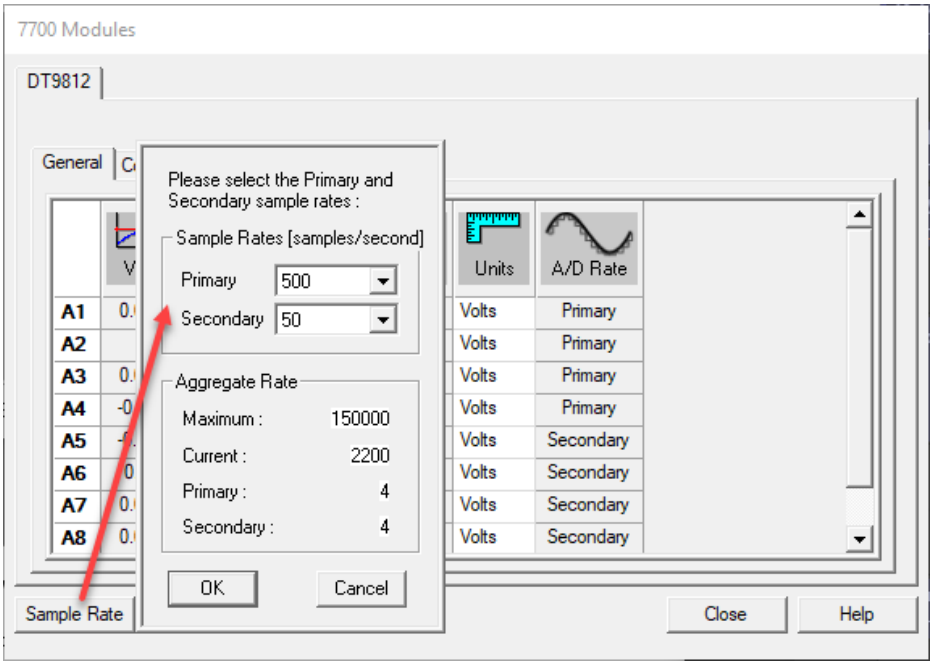


Note: If the Ponemah Isolated Organ ONLY license was purchased then the hardware options that will show up will be limited to ACQ7700 USB, ACQ Demo and HSE Data Acquisition Hardware.

When Ponemah is started with the correct hardware interface selected it will connect to the HSE Data Acquisition Hardware upon opening. An error will indicate if Ponemah does not detect the unit. If this happens, close Ponemah, make sure the HSE Data Acquisition Hardware is connected and powered on (if applicable), and restart Ponemah.

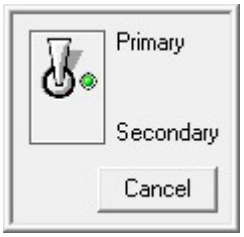
Select the menu option Hardware – 7700 Amplifier Setup from the main Ponemah window to access channel settings. The "7700 Modules" window will open and display the model of the connected unit with a group of tabs labeled **General, Configuration,** and **Description**. as well as a button at the bottom to set up the **sample rate**.

Sample Rate In the lower left corner of the 7700 Modules window there is a Sample Rate button. Click this to open the Sample Rate selection dialog. Both a Primary and a Secondary sample rate can be selected, which is the number of data samples per second the system will record from the incoming analog signal and store the digital samples. The Primary sample rate is a higher rate that is typically used for channels such as blood pressure and ECG, and the secondary rate is set as a lower rate typically for ambient temperature/pressure and body temperature. At least 1 Primary channel must be enabled to begin data collection.

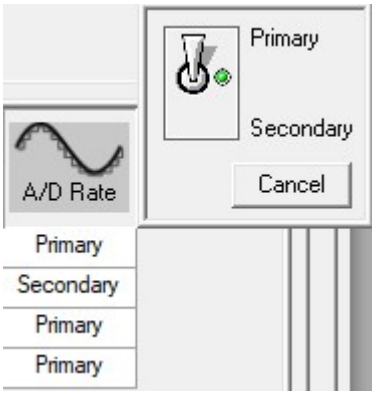


After the Primary and Secondary sample rates are set, each channel can be set to be either Primary or Secondary from the rightmost column called A/D Rate.

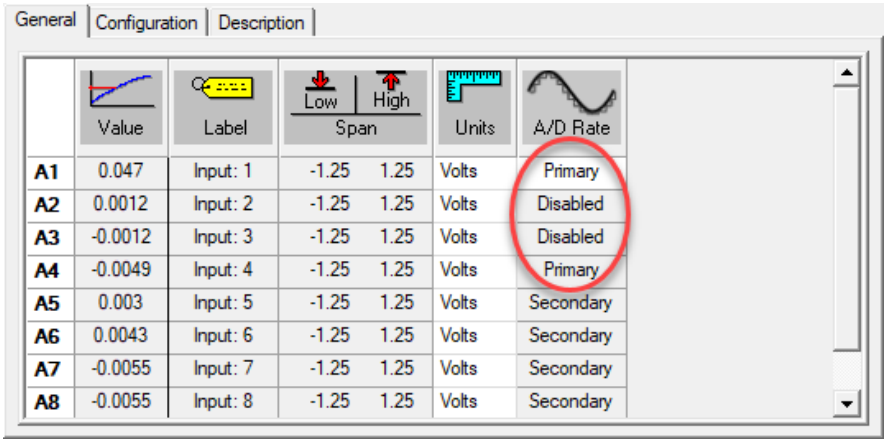
Double-clicking on an individual row for the A/D Rate will toggle the channel between the Primary and Secondary sample rates.



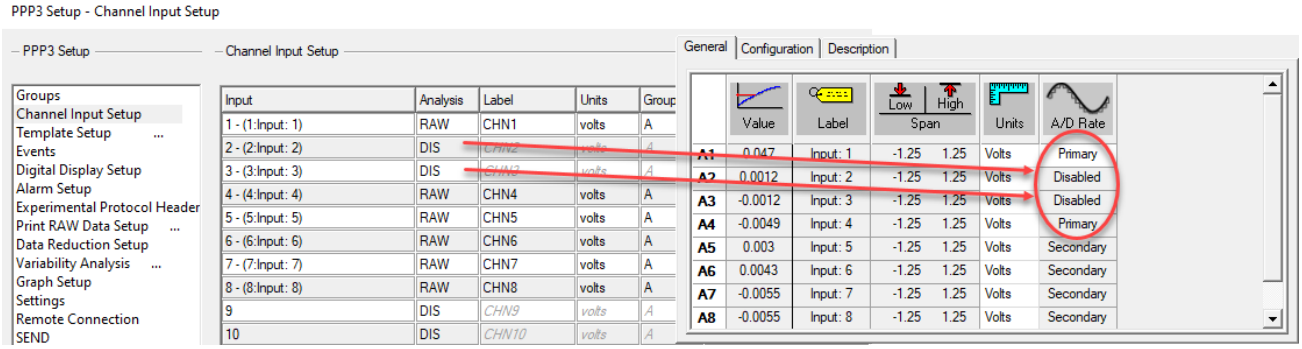
Double-clicking on the A/D Rate column header will toggle all channels in the column to either Primary or Secondary.



If a channel is showing ‘Disabled’ in the A/D Rate column that means it has been set to DIS analysis type from the Channel Input Setup menu.

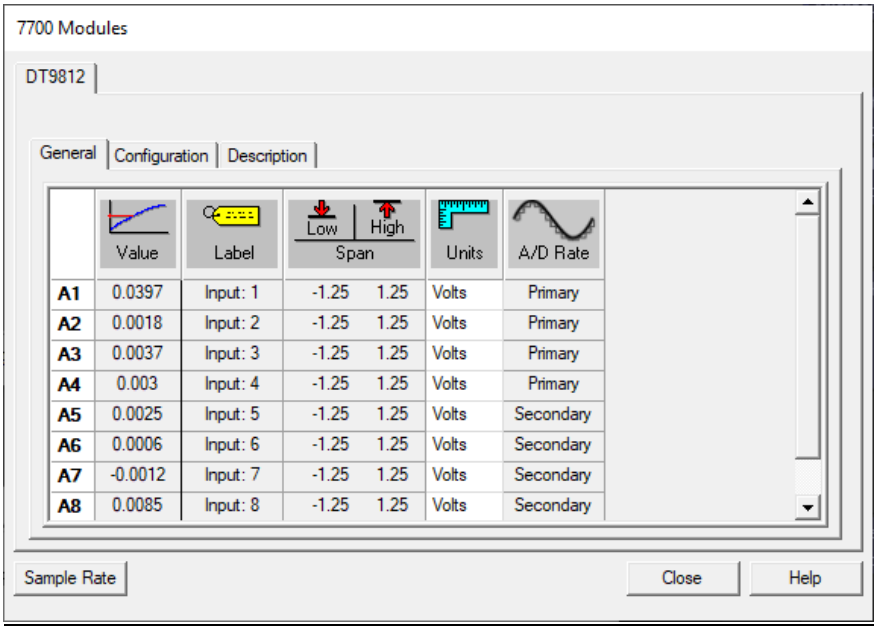


The channel will have to be set to any other analysis than DIS for it to be enabled and the sample rate selected.



General Tab

The General Tab allows the user to set up channel-specific signal conditioner parameters. They include the channel Label, Span, Units, and A/D Rate



Value

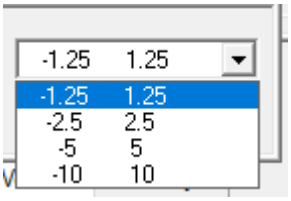
This column continuously displays the current value that is on the input of the signal conditioner. This column is updated by the system once every second and cannot be updated by the user.

This column is useful in troubleshooting the signal conditioner input connection.

Label

Label allows you to type in a logical name of up to 10 additional characters for a particular input channel. The chosen name will be saved and used to identify the input data throughout the system, such as in the dialog that displays input channel information. The default is the slot letter and channel number in slot.

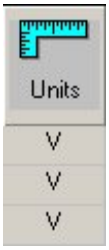
Low and High Span



There is one span control that sets the maximum input of the signal conditioner. The span is symmetrical. Ranges available are ±1.25V, ±2.5V, ±5V, and ±10V. The Span defines the sensitivity or scale for each channel. This function sets the maximum and minimum values in user units that will be recorded.

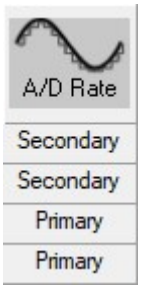
The Span may be chosen to be any of the four selections within the valid range for that input. When Span is selected, a dialog box appears. Simply select the range desired. The actual value you enter may be considerably different since it will usually be in the units corresponding to your application.

Units



This column displays the units that have been set in the **Configuration** tab and cannot be changed in this tab. The Units have no effect on the channel recording, this is for documenting the Input units.

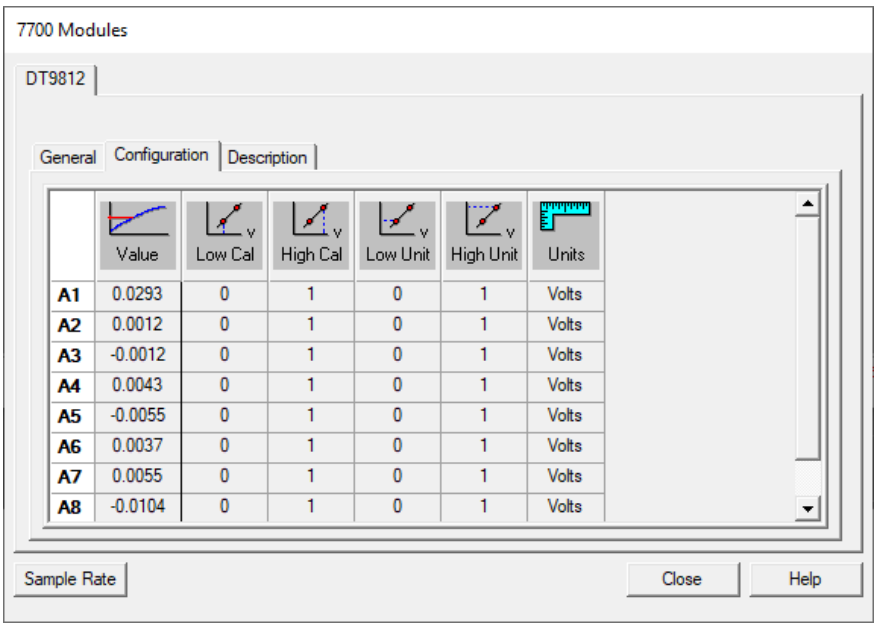
A/D Rate



This column displays the sample rate, either Primary or Secondary, that has been selected for each channel.

Configuration Tab

To set up the signal input configuration, select the Configuration tab. The Configuration setup screen as shown below will be displayed.

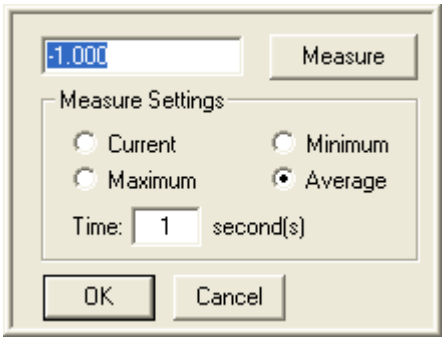


Value

This column continuously displays the current value that is on the input of the signal conditioner. This column is updated by the system once every second and cannot be updated by the user.

This column is useful in troubleshooting the signal conditioner input connection.

Low Cal & High Cal

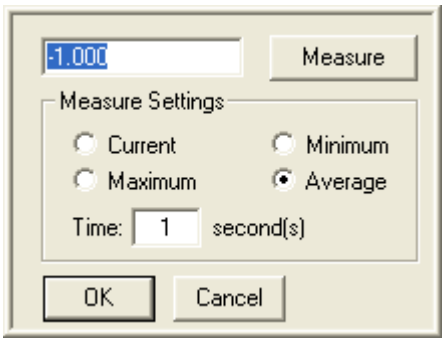


If you have available an input calibration signal (voltage), it can be used to calibrate the inputs. Double-clicking on either the Low Cal or High Cal cell associated with the channel will open a dialog box as shown. This function allows a specific value to be entered that will be assigned to either the Low or High Cal. See the Measure section for more information on this function and the use of the feature.

Additional setup information is needed to correctly scale the particular signal input. Since the input can be from a vast number of different sources, the specific input Units, High Unit, and Low Unit, of measure should be set up. This calibrates the channel to the actual user units and scaling. The system will now display, record, and perform analysis directly in your units of measure. System defaults are: -5 Low Cal = -5 Low Unit and +5 High Cal = +5 High Unit. Low and High Cal entries are actual voltage values. The same defaults are present in the High Cal function. Also, see the Low Units & High Units and Measure sections.

The calibration values entered are in the base units of the signal conditioner (Volts).

Measure



In instances where there is an offset on the input signal, the Measure function can compensate for this offset. The software can Measure a Low or High Cal value, and set that value to equal the entry in the Low or High Units cells.

If you have available an input calibration signal (voltage), it can be used to calibrate the inputs. Double-clicking on either the Low Cal or High Cal cell associated with the channel will open a Measure dialog box as shown here. This function allows you to manually enter a specific value that will be assigned to either the Low or High Cal, or, by clicking the Measure button accept an external voltage that will set the calibration of the signal conditioner channel to correspond to the external calibration signal. Measure will enter any value that is being read at that time.

Measure Settings: provides user control over how data is sampled and recorded for the Low and High Cal values.

- Current – Will record the value at the end of the interval specified in the Time column. After selecting the Measure button, the software will utilize the following number of seconds entered in the Time column to determine the endpoint for calibration and will record the last data point when the time interval is completed.
- Maximum - Will record the maximum value over the interval specified in the Time field. After selecting the Measure button, the software will utilize the following number of seconds entered in the Time column to determine this value.

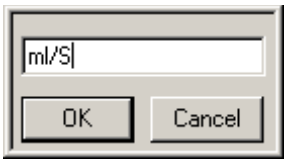
- Minimum - Will record the minimum value over the interval specified in the Time field. After selecting the Measure button, the software will utilize the following number of seconds entered in the Time column to determine this value.
- Average - Will record the average value over the interval specified in the Time field. After selecting the Measure button, the software will utilize the following number of seconds entered in the Time column to determine this value.
- Time - Number of seconds used to define the interval over which the calibration value for the Maximum, Minimum, or Average will be sampled.

NOTE: The Average selection with a Time of one second is the default setting for the Universal, Bridge, Transducer, ABDC, and Carrier signal conditioners. The previous method utilized to determine Low and High Cal values was to take the value at the time that the Measure button was selected.

Low Units & High Units

The user can select the units he wishes to display. Combined with Low Cal and High Cal, the user can set the “x” value in Cal to equal the “y” number of Units. Example: If 2.500V is entered in the High Cal and 100 is entered in High Units, then 2.500V = 100 units. See the Measure Section for more information.

Units



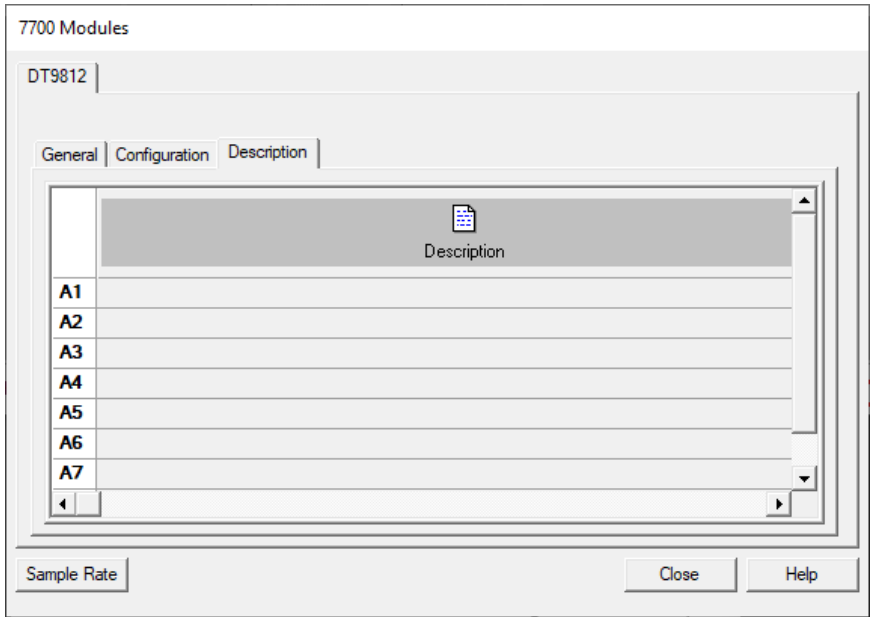
Units allow you to enter the actual engineering units being measured. The default is Volts (V), but this may be changed to any engineering unit. The User Unit input field is limited to 9 characters.

Example: Suppose channel 4 is connected to a flow meter that outputs a voltage proportional to the blood flow. To record this, input A4 will be configured in Voltage Mode. Double-clicking on the A4 Units cell will display a text box, allowing you to enter "ml/S".

Descriptions Tab

The Descriptions tab allows the user to enter a text description for each input.

The Descriptions Menu allows you to enter text to further describe the parameters being recorded. This may include additional user information or test setup information. This information is stored with the test set up in a text file. It is not directly used as part of the signal conditioner configuration but is available for review or printing whenever desired. Double-click on the text area, type in the information, and then click on the OK button. Below is a typical Description tab.

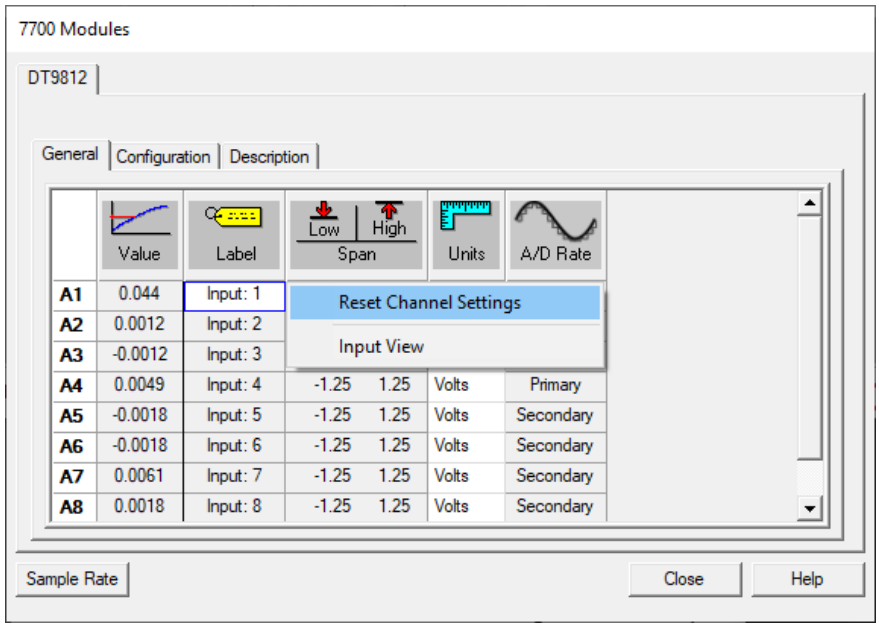


Input View and Resetting

The HSE Data Acquisition Hardware has the capability of viewing its values for debugging purposes and also resetting each channel if a problem has occurred during setup.

Input View

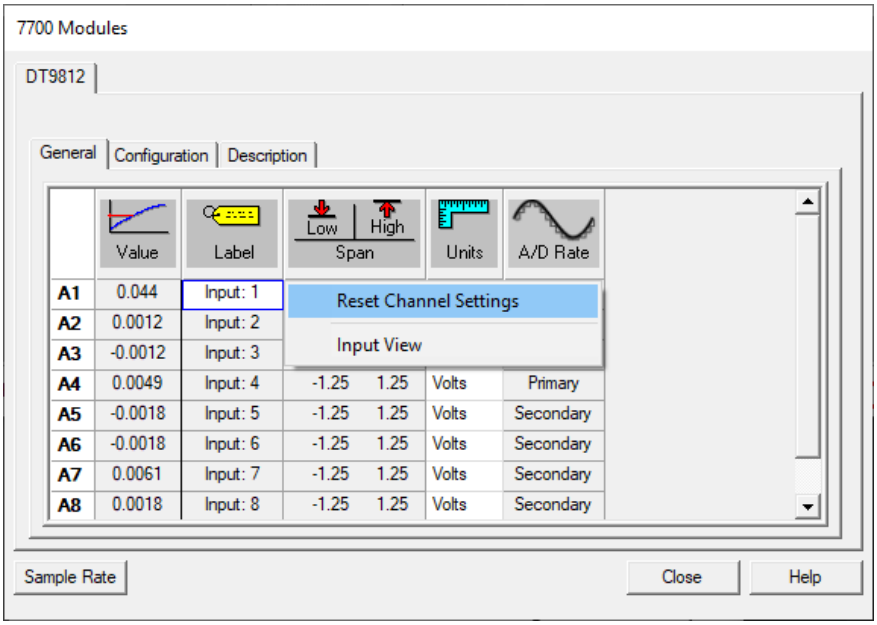
This view allows the user to see the raw voltage that is being inputted into the channels. Right-click on one of the channels (anywhere except for the Input Identifier or Value columns) and select **Input View**. Below is an example of the right-click menu that will appear.



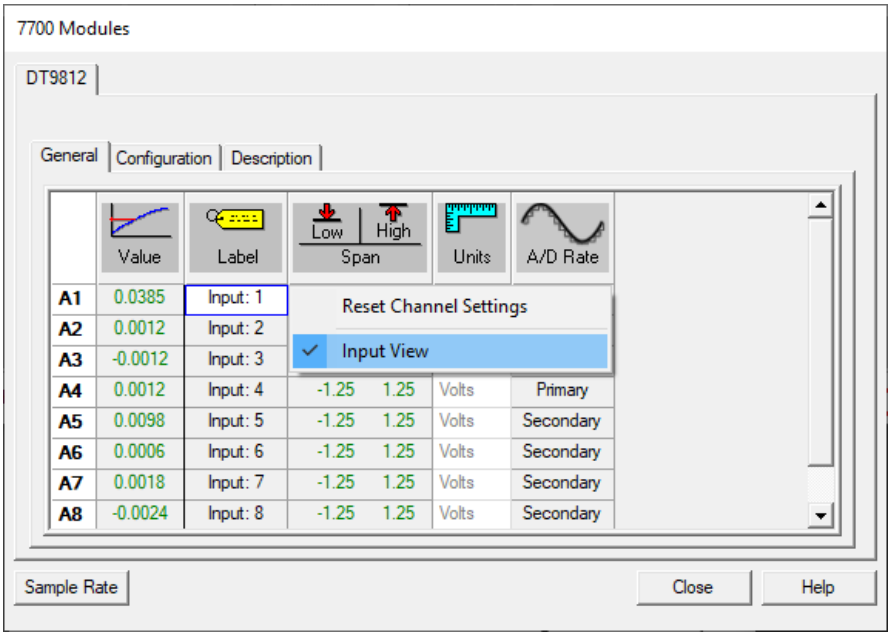
Input View Menu

Once the Input view has been selected the values listed for **Value** and **Low/High Span** columns are listed in volts. Those columns values will change from black numbering to green numbering to notify the user that they are running in the

input view. Also, the **Units** column entry will change from black lettering to gray lettering. When the input view has been set, the units of the values shown are in V. Shown below is an example of the **7700 Modules** dialog with the input view set.



To return to normal view, right-click the channel once more and select **Input View** again.



Reset

This selection allows the user to reset the settings of the channel selected. When selected, the channel will reset all values back to the default settings. See the individual sections for the default values. When this selection is selected, a message box will appear asking if the channel should be reset. This allows the user to select **No** to cancel the resetting of the channel and **Yes** to reset the channel.

Specifications – HSE Data Acquisition Hardware

Analog Inputs				
Module	**Channels**	**Res.**	**Input Range**	**Sample Rate**
73-3330	16 SE/8 DIFF	12 bit	±1.25 V, ±2.5 V, ±5 V, ±10 V	100 kS/s
73-4817	8 SE	12 bit	±1.25 V, ±2.5 V, ±5 V, ±10 V	100 kS/s
73-4818	16 SE/8 DIFF	12 bit	±1.25 V, ±2.5 V, ±5 V, ±10 V	100 kS/s

Accessories / Replacement Parts

- USB 2.0 Cable, 2 meters long (supplied)
- Input Cables (BNC)

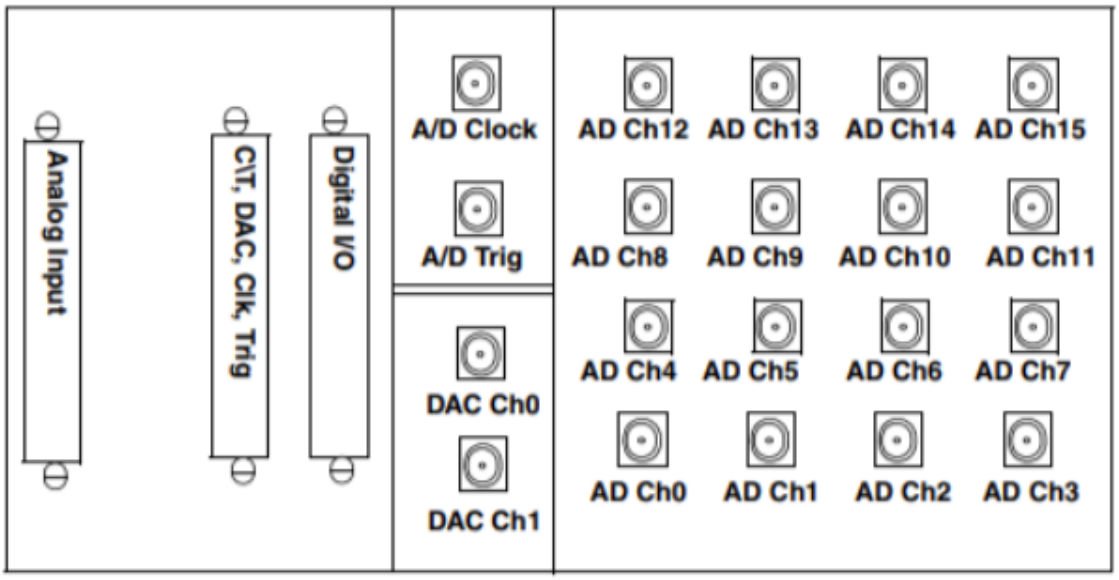
Note: Replace cables when subjected to deterioration or abuse

Troubleshooting

If the system displays the following message on startup, **Acquisition Unit Not Found**, then verify the following:

1. The Acquisition Interface is powered up, and the USB cable is connected to the personal computer.
2. The Windows device driver needs to be functional. Check the device through the Hardware Devices menu.

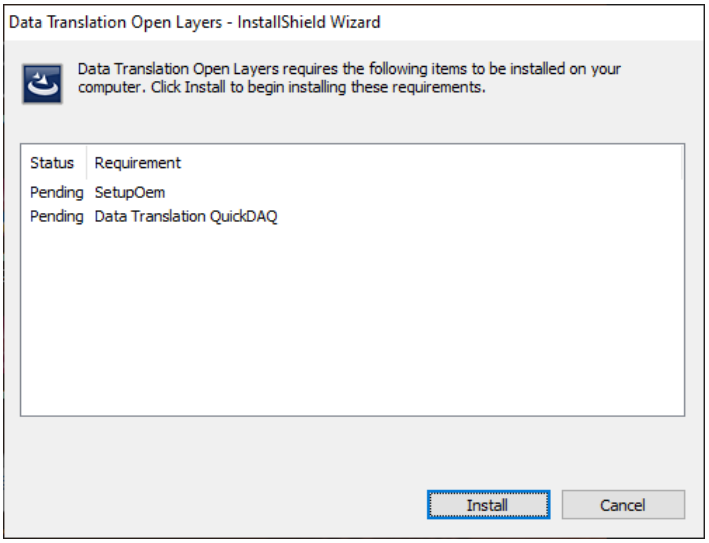
Interface Diagram



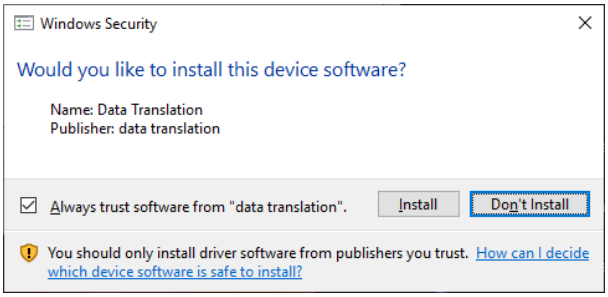
Manual Install of HSE Data Acquisition Hardware Drivers

The HSE Data Acquisition Hardware Driver is automatically installed as part of the Ponemah software installation. However, if the HSE Data Acquisition Hardware driver is not installed properly it will need to be installed manually. A backup of the HSE Data Acquisition Hardware Driver installation is located in the C:\Ponemah\Data Translation folder after Ponemah extracts all folders.

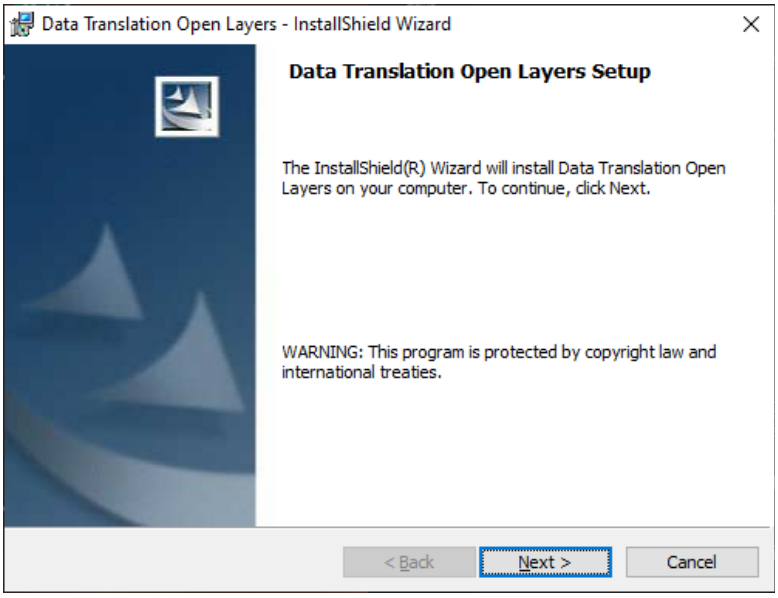
To install manually, run the installation SetupOem.exe to launch the wizard. Click the Install button in the wizard to begin the installation.



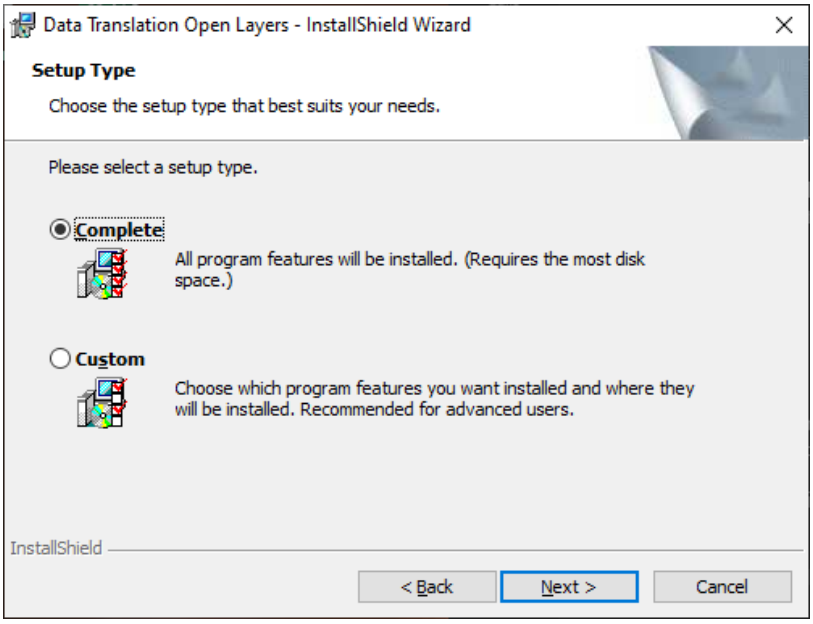
If a Windows Security prompt appears, click Install to continue the installation.



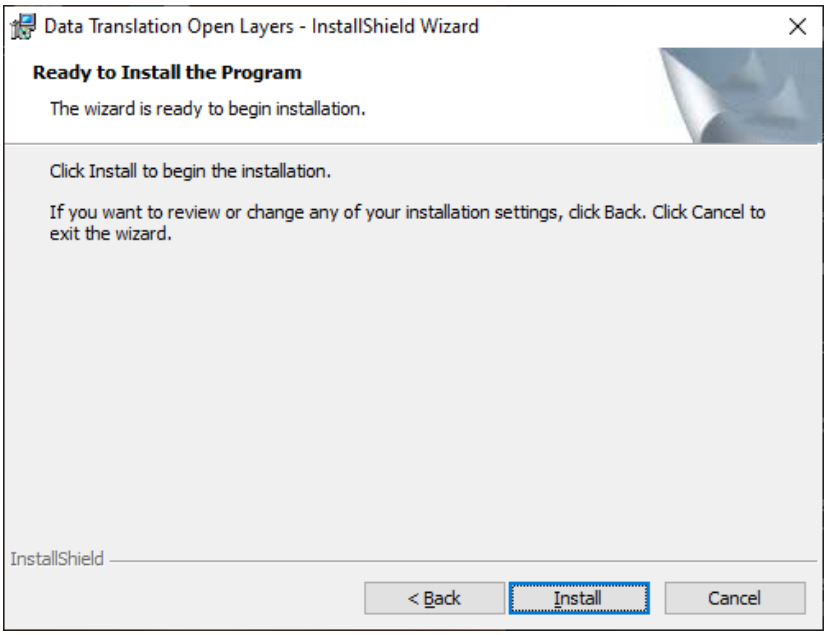
Click Next to proceed with the installation.



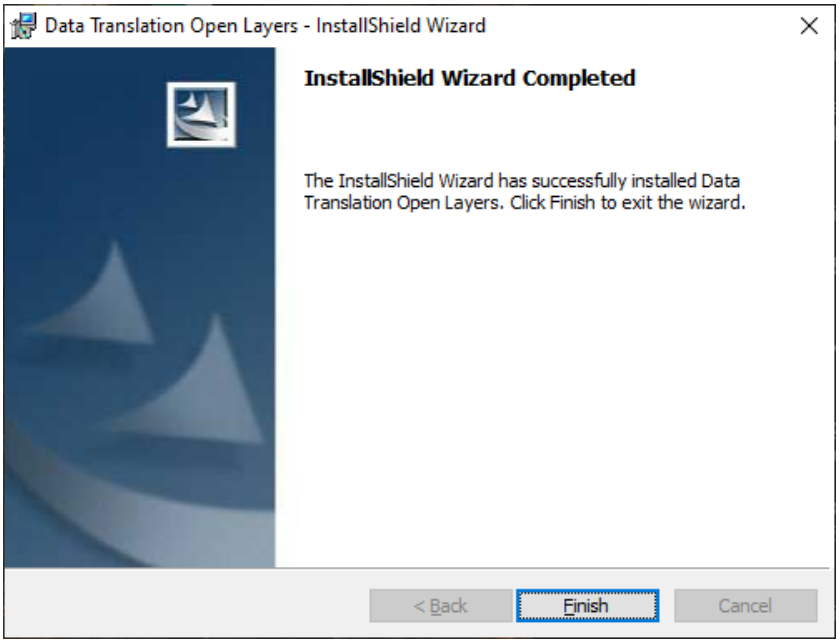
Choose the Complete option and click Next.



Click Install to finish the Installation of the Open Layers



Click Finish to complete the installation.



Contact Information

We are available to help you with your questions and concerns. Should you hit a roadblock or need some additional training, please feel free to visit the HB Harvard Apparatus Support Center at https://support.harvardapparatus.com to find articles and helpful information in our knowledge base, Chat with an agent, or setup a time to receive one-on-one consultation. We are happy to help!

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