

CHAPTER 7: VFD SUITE SOFTWARE

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GETTING STARTED

VFD SUITE CHARACTERISTICS

VFD Suite is the configuration software for the Automation Direct Ironhorse ACN variable frequency drive. It is designed to allow you to connect a personal computer to the drives and perform a variety of functions:

- Create new drive configurations
- Upload/Download drive configurations
- Edit/Compare drive configurations
- Utilize Parameter Wizard for easy configuration
- Archive/Store multiple drive configurations on your PC
- Trend drive operation parameters
- Tune the drive PID loop
- View real time key operating parameters
- Start/Stop drive and switch directions, provided drive is set up for remote operation
- View drive faults
- Program Function blocks for simple control applications (18 steps maximum)

VFD Suite includes the ACN manual for complete instructions and parameter explanations. VFD Suite can be downloaded for free or from Automationdirect.com.

SYSTEM CONFIGURATION

VFD Suite supports 2 communication methods, Serial and Ethernet. Both connection options require optional accessories.

SYSTEM REQUIREMENTS

Category	Requirement
Windows	Windows 8/10
Processor	1 GHz or higher
RAM	1 GB (32-bit) or 2 GB (64-bit)
HDD	16 GB (32-bit) or 20 GB (64-bit)
Graphics	Graphic card supporting MS DirectX 9

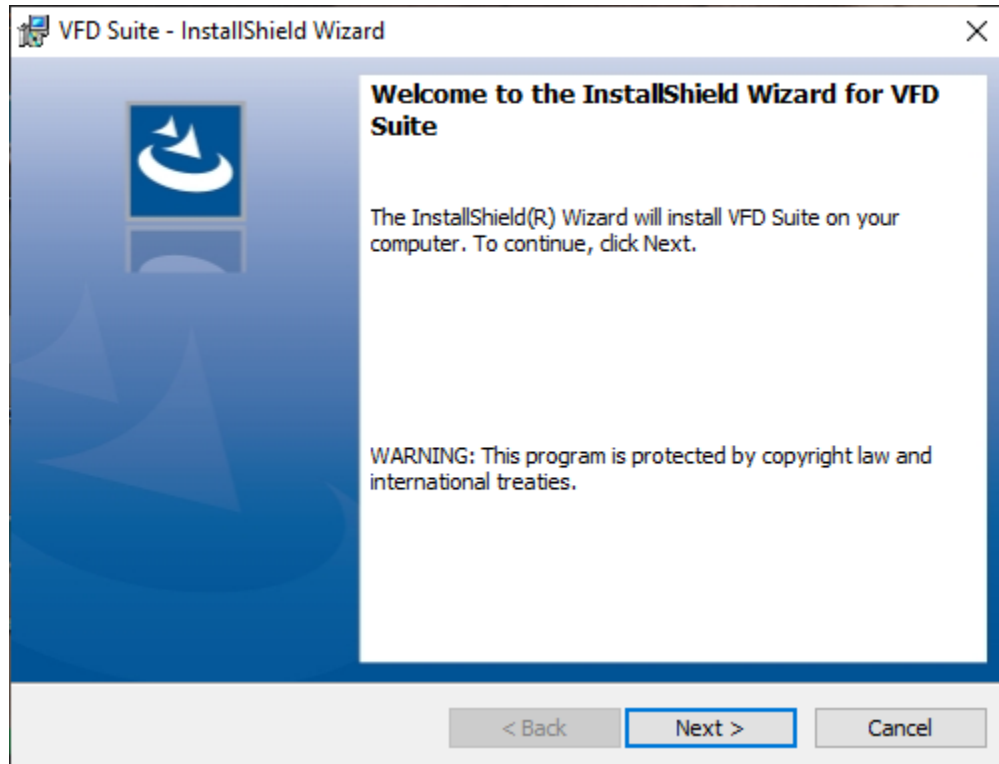
PREPARE INSTALLATION

- 1) Run the installation file.
- 2) For normal operation, there may be essential redistribution packages that must be installed. Click on the installation button if the following installation screen appears.

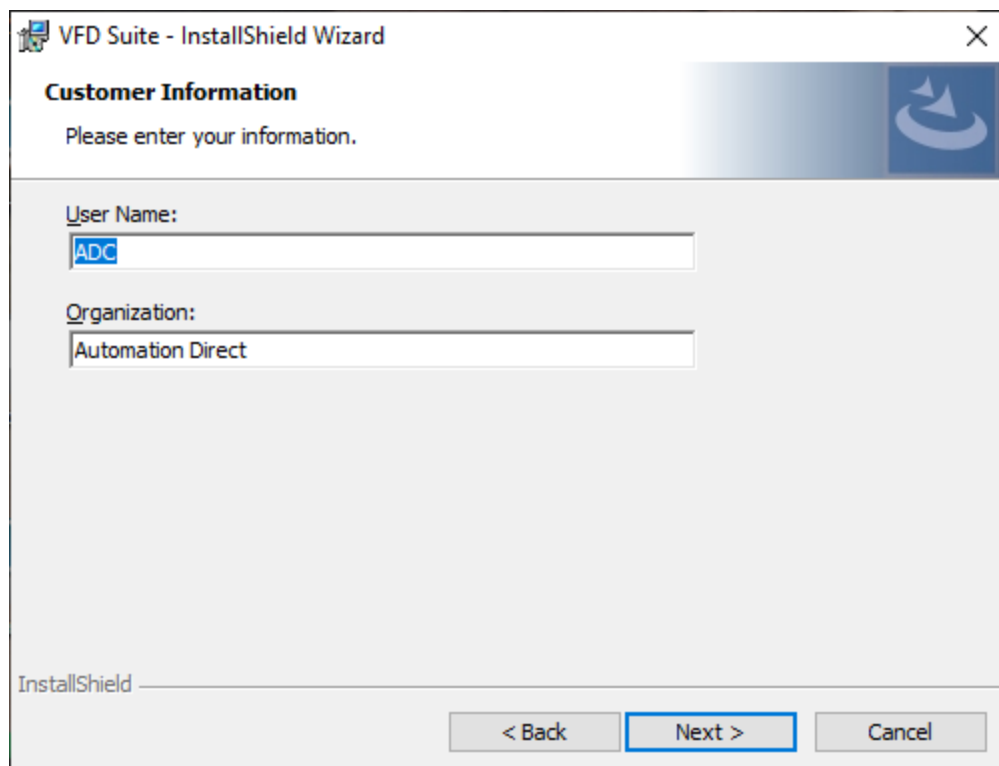


- 3) The time taken to install the redistribution package differs depending on the PC environment. In some cases, it may take more than 1-2 minutes. Even after it has been installed once, the installation of the redistribution package will not be requested again, even if VFD Suite is installed again.

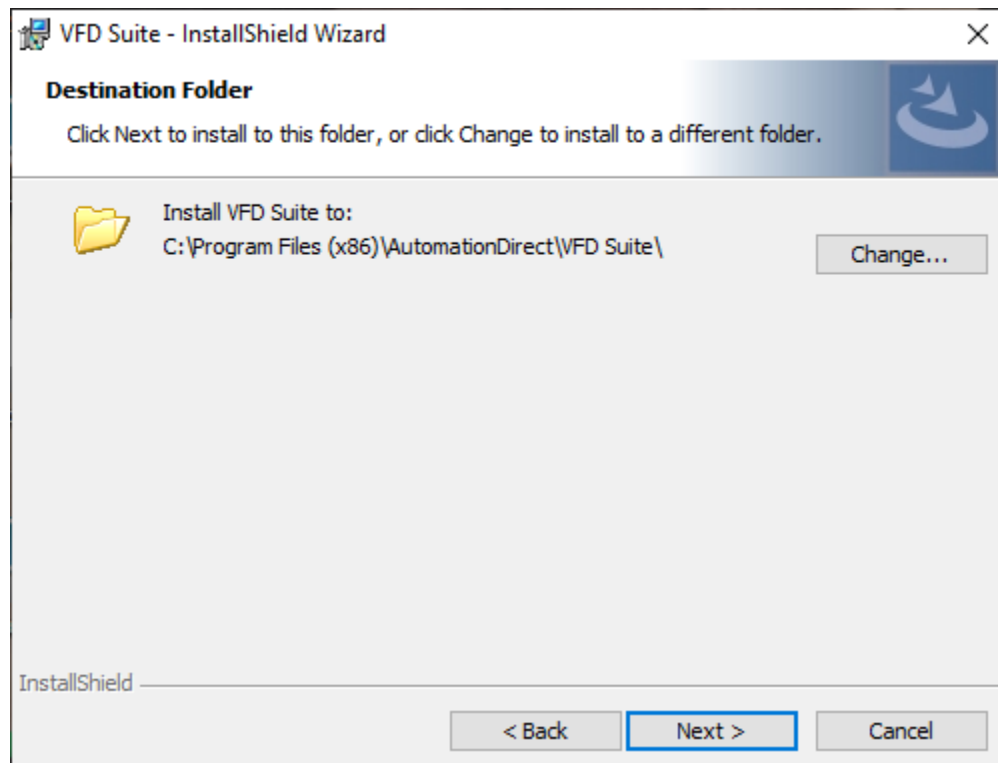
- 4) Select the installed language (if prompted) and click "Next". When the following screen appears, click "Next" again.



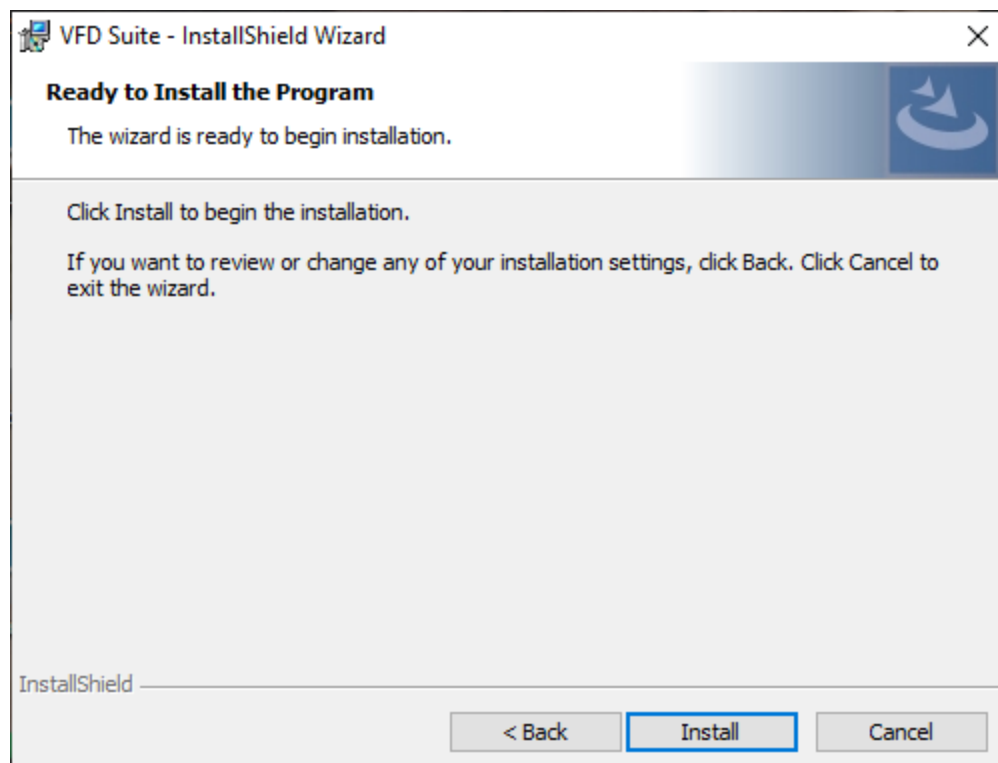
- 5) Enter the user and company name and click "Next".



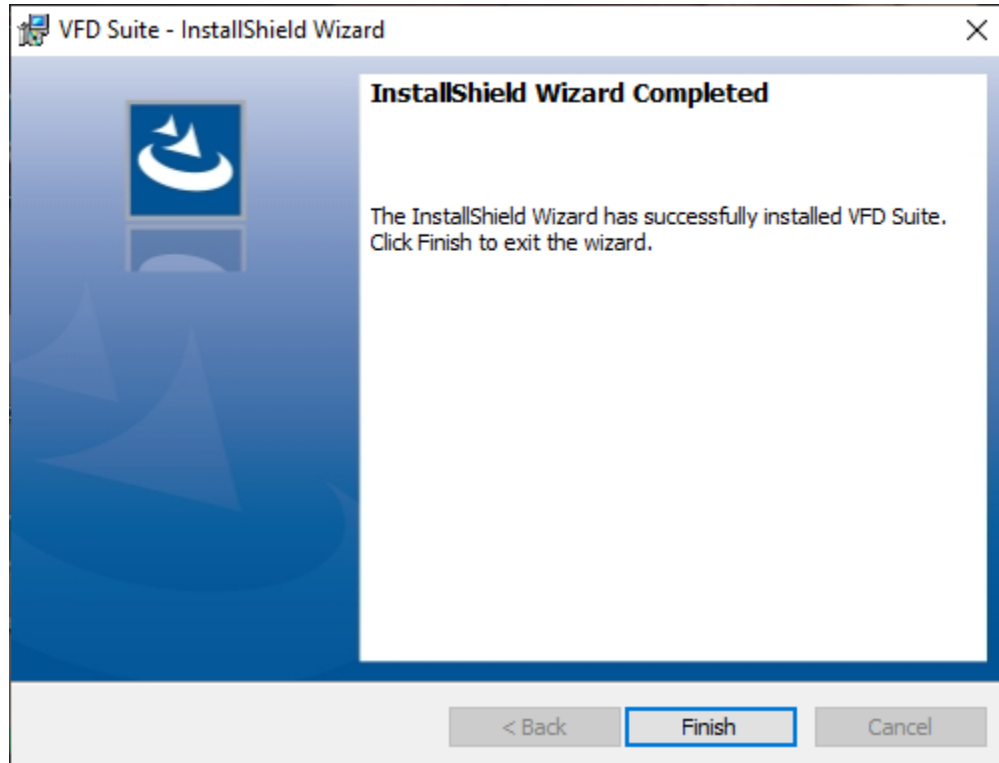
- 6) Specify the folder to install the files in. If you want to change the folder, click on the Browse button to enter or select a new folder. VFD Suite needs around 120 MB of space for installation, so select a disk with sufficient space. If there is an insufficient amount of space, a warning message will appear and you cannot proceed to the next step.



- 7) Once you have selected the folder, select "Next". Check the installation information and click the Install button. Start installing as below.



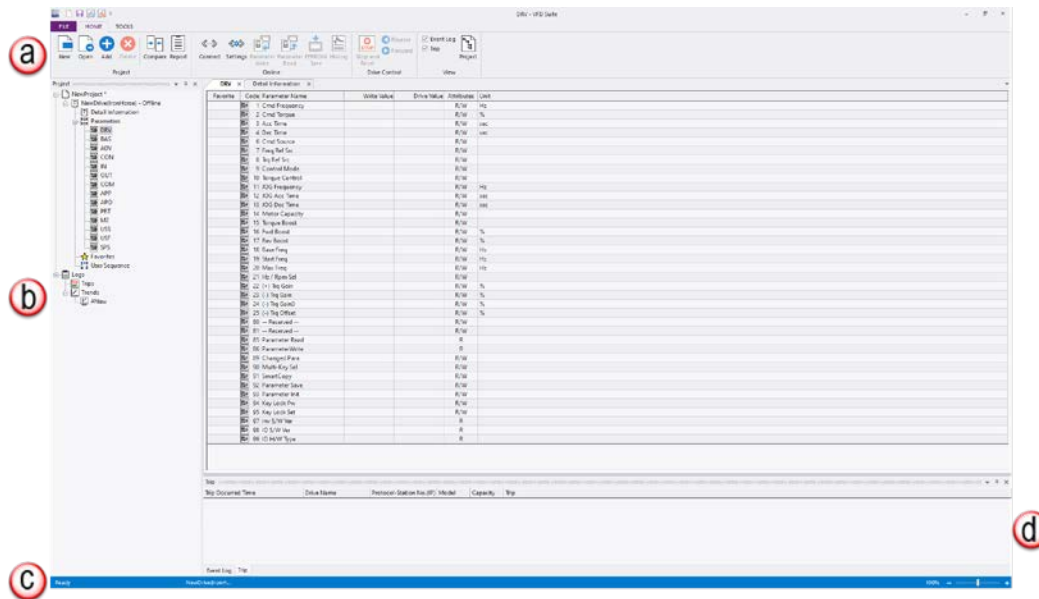
8) The installation will complete as shown below.



KEY FEATURES

MAIN SCREEN

This is the screen displayed when VFD Suite is started. The main screen consists of a title, menu, toolbar, control, search screen, parameter edit screen, result edit screen, and state screen.



- A) **Ribbon Bar:** The basic menu for the program. This ribbon is made up of a panel with command buttons and icons. The commands are divided into tabs.
- B) **Project Screen:** Shows the components of the current project.
- C) **State Bar:** Shows the state of the VFD Suite, accessed drive information, and more.
- D) **Status Display Screen:** Shows information of events and trips.

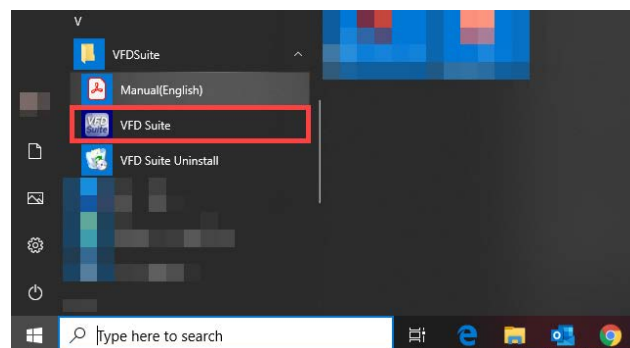
STARTING

VFD Suite is installed in the system. You can run it using two methods.

- Click the icon on the desktop



- Windows Start button – Run VFD Suite



COMMUNICATION

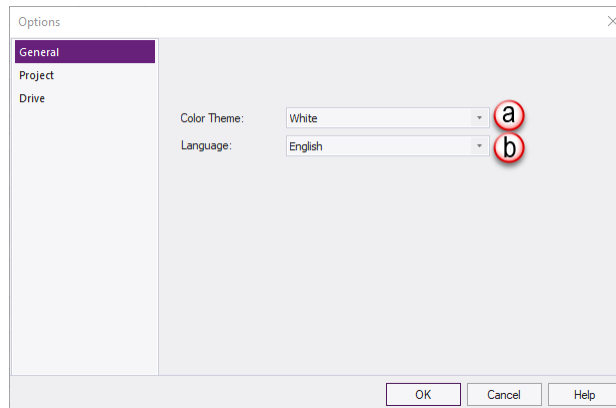
VFD Suite can connect to a drive by one of two methods, both requiring optional accessories.

- **Ethernet Connection:** Requires installation of the ACN-ETH option card. Modbus-TCP, an Ethernet communications protocol, is supported automatically without any additional settings.
- **Serial Connection:** Utilize the ACN-232C cable to connect the Drive RJ45 port directly to a PC USB port. Serial communication uses Modbus-RTU protocol.

See "Connection Option" on page 7–28 for connection settings.

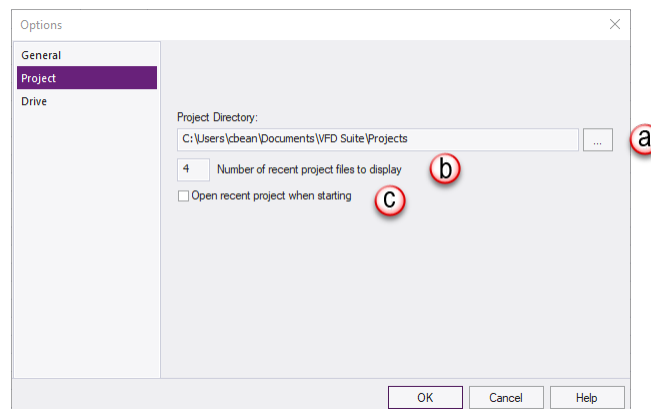
OPTIONS

- 1) General: You can set the general features of VFD Suite.

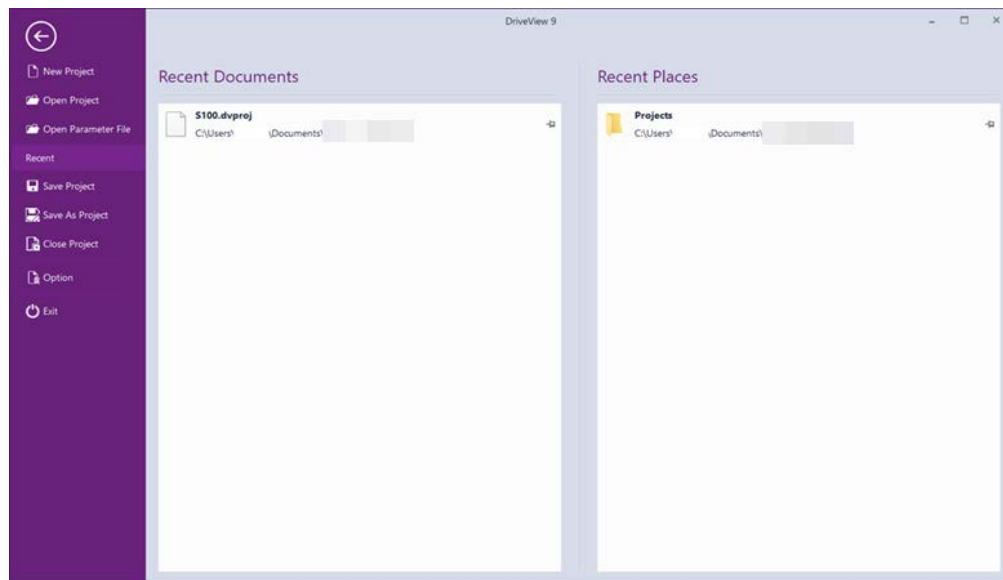


- a) Theme color: Colors the theme of three colors (bold, dark, and bright).
- b) Language: Supports English and Korean. Initially, the language is set to the language installed on the PC. Changes to the language selection will be reflected after restarting.

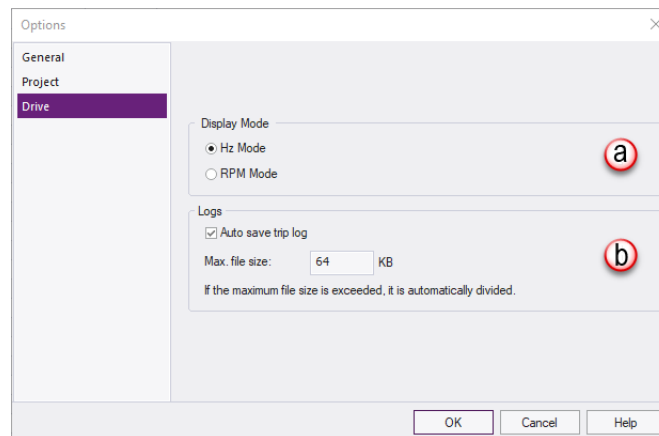
- 2) Project: You can set the project features of VFD Suite.



- a) Project Path: Set the folder where the generated projects are saved.
- b) Display Recent Projects: Sets the maximum number of items displayed in recent projects. This is the number of items shown on the screens, as shown below.



- c) Opening the Previous Project when Starting: Opens the previously opened project when VFD Suite launches.
- 3) Drive: If speed-related values are displayed from the parameter items of VFD Suite, it is displayed in the selected Hz and RPM.

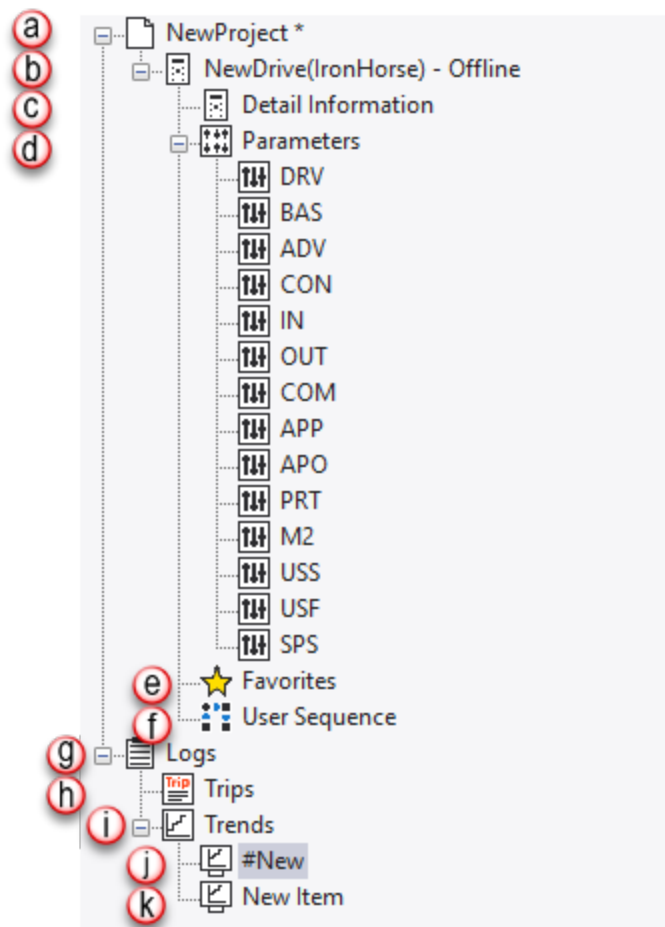


- a) Display Mode: Select the display mode of Hz and RPM.
- b) Logs: Turns log autosave feature on or off and sets maximum size of log file.

PROJECT

PROJECT CONFIGURATION

The project configuration items are as follows.

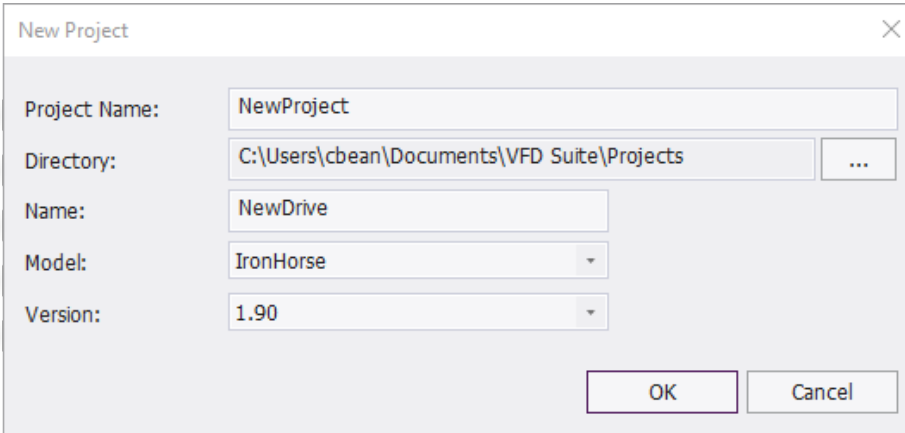


- a) Project: Defines the entire system. Many related drives can be included in a single project.
- b) Drive: Shows the system for a single drive.
- c) Detailed Information: Shows the detailed information of the drive and the monitoring parameters.
- d) Parameters: Shows the information of the drive parameters.
- e) Favorites: Shows the information of the parameters registered as favorites.
- f) User Sequence: Shows the additional features provided for each drive.
- g) Logs: Shows the information saved in logs.
- h) Trips: Shows trips
- i) Trend: Shows the information saved as trends.
- j) #New Item: Double-click and a dialog box will appear for adding a new item.
- k) New Item: Shows trends

PROJECT MANAGEMENT

CREATING A NEW PROJECT

Create a new project by selecting FILE>New Project. The following window will open.



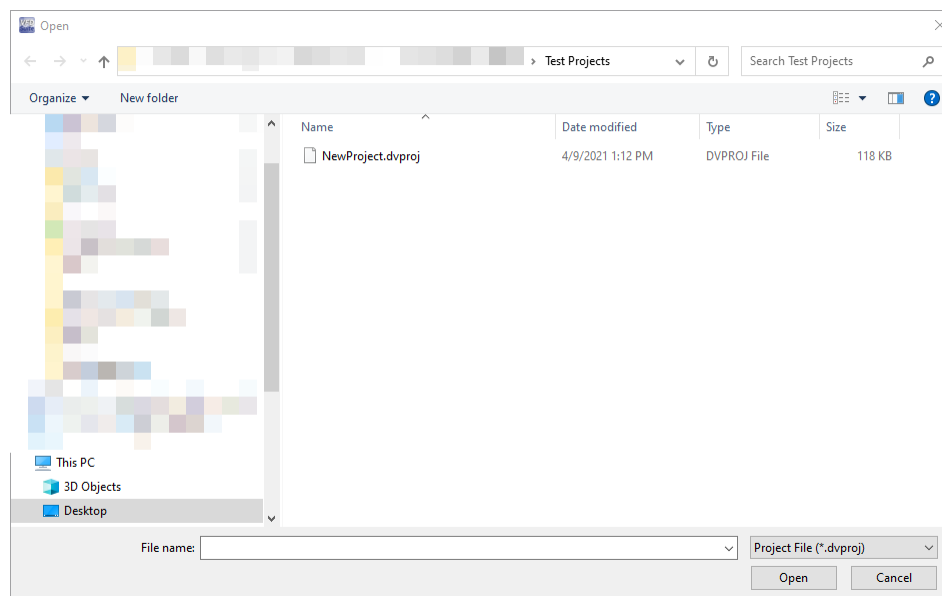
The 'New Project' dialog box contains the following fields and controls:

- a** Project Name: Text box containing 'NewProject'.
- b** Directory: Text box containing 'C:\Users\cbean\Documents\VFD Suite\Projects' with a browse button (...).
- c** Name: Text box containing 'NewDrive'.
- d** Model: Dropdown menu showing 'IronHorse'.
- e** Version: Dropdown menu showing '1.90'.
- OK and Cancel buttons at the bottom right.

- a) Project Name: Enter the project name of your choice. This becomes the name of the project file, using the “dvproj” file extension.
- b) Path: The project file is created in the path as the name input by the user.
- c) Name: Input the drive name.
- d) Model: Select the model name of the drive.
- e) Version: Select the drive version.

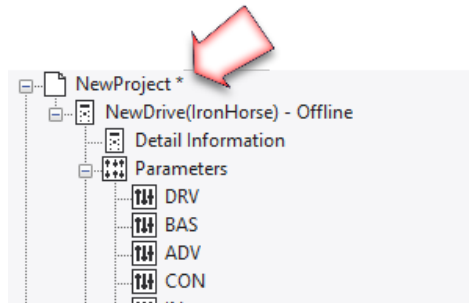
OPEN PROJECT

Open a previously saved project file by selecting FILE>Open Project. Navigate to the desired project file and select Open.



SAVE PROJECT

Save changed project by selecting FILE>Save Project. If changes have been made to the project since it was last saved, an asterisk “*” will appear next to the project name in the project window.

**SAVE AS**

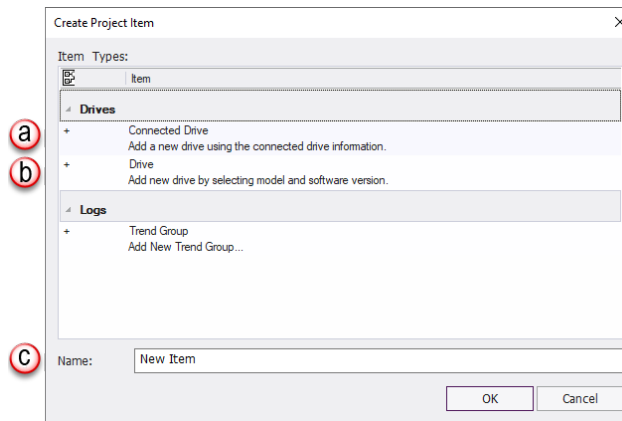
Save the project as a different file by selecting the menu FILE>Save As.

PROJECT ITEM

Explains the items displayed in the project.

DRIVE

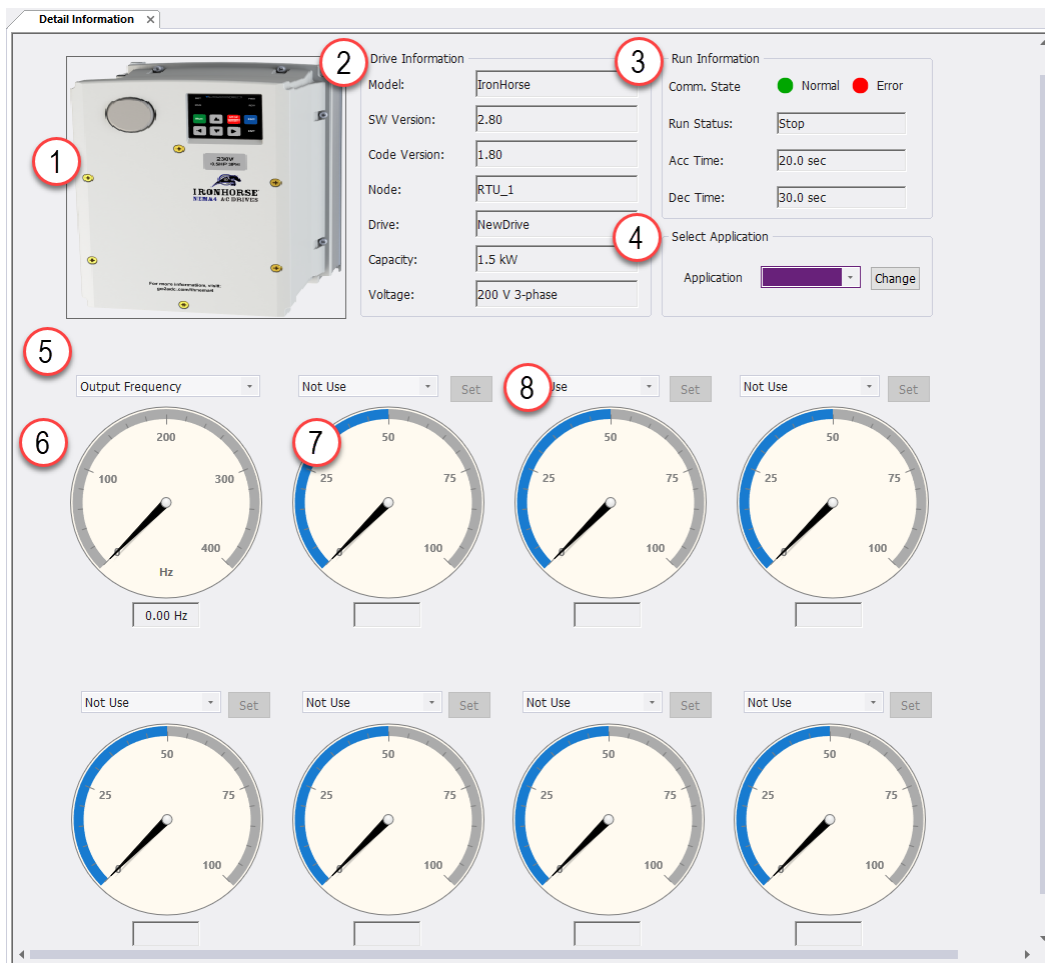
- 1) Add: Select the project name item and click Add.



- a) Connected Drive: Use the connected drive information to add a drive.
 - b) Drive: Select a model to add a new drive.
 - c) Name: Input the drive name.
- 2) Delete Drive: Select a drive item to delete from the project tree and click Delete.

DETAILED INFORMATION

Shows the detailed information of the drive and the monitoring parameters. Double-click the "Detail information" item under the drive item in the project window.



- 1) Model Image: Shows the generic image of the drive.
- 2) Drive Information: Shows the information of the drive device.
 - » Model Name: Shows the model name of the drive.
 - » SW Version: Shows the version.
 - » Node: Shows the node name made up of the communication method, IP address, or telephone number.
 - » Drive: Displays the device name chosen by the user. The device name can be changed in the Project tree menu.
 - » Change Button: Change the device name and click on the Change button to apply the changes.
 - » Capacity: Shows the wattage output capacity of the drive.
 - » Voltage: Shows the drive input and output.
- 3) Run Information
 - » Communication State: Shows whether the communication state of the drive is normal or experiencing an error.
 - » Operation State: Shows the operation of the drive as Trip, Stop, or Operation.
 - » Acc Time: Shows the Acc Time.
 - » Dec Time: Shows the Dec Time.
- 4) Select Application
 - » This function is not supported
- 5) Select Monitoring: The user can select the monitoring parameters for monitoring, and information is provided in the gauge format.



WARNING: *IF THE FREQUENCY REFERENCE IS AN ANALOG SOURCE, THE OPERATION FREQUENCY MUST BE SET TO COMMAND FREQ IN THE DROPDOWN MENU AND THE PARAMETER VALUE MUST BE CHANGED.*

- 6) Output Gauge: Select from Output Frequency or Output Speed for monitoring.
- » Use the dropdown and select Output Frequency and Output Speed.
 - » Double-click on the gauge to display the maximum and minimum setting screen.

Min/Max Setting

Output Frequency

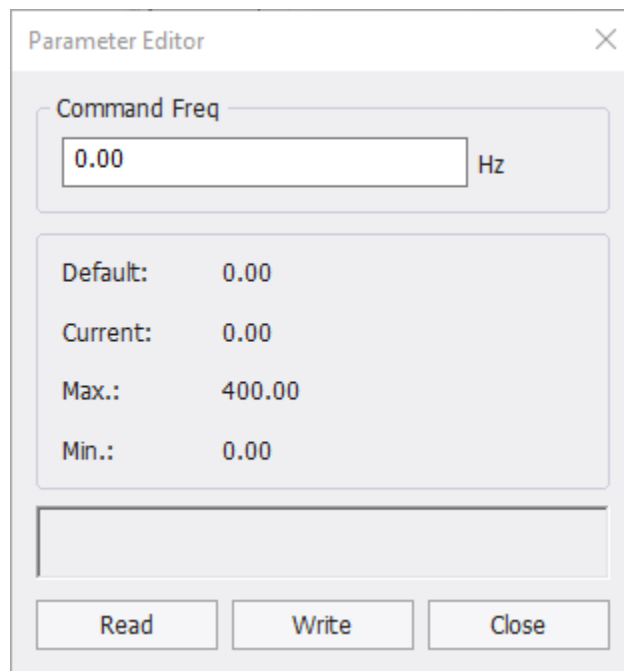
Max.: 400.00 Hz 400.00

Min.: 0.00 Hz 0.00

OK Cancel

- » Enter the maximum and minimum and click Apply.
 - » The gauge is applied with the new settings.
- 7) Select Monitoring Gauge: Seven gauges are provided. The user can select a gauge from the monitoring parameters.
- » The monitoring parameters can be selected from dropdown.
 - » Double-click on the gauge to adjust the maximum and minimum setting screen if necessary.

- 8) Change Parameter Value: If the selected type of the monitoring parameter is a changeable parameter, then a control button for changing the parameter value is activated.
- » Click the "Set" button.
 - » The Parameter Edit window will be shown.



The image shows a 'Parameter Editor' window. At the top, it says 'Command Freq' above a text input field containing '0.00' and a unit label 'Hz'. Below this is a table of parameter values:

Default:	0.00
Current:	0.00
Max.:	400.00
Min.:	0.00

Below the table is an empty text input field. At the bottom are three buttons: 'Read', 'Write', and 'Close'.

- » Enter the value within the minimum and the maximum value range, and click the Write button to apply it to the drive.
- » The result after writing will be output on the Status Display window.
- » The Read button is used to read the parameter value again from the drive.

Parameter Detail

[DRV] 7 : Freq Ref Src

Value: 0] Keypad-1 << >>

Default: Keypad-1

Current: Keypad-1

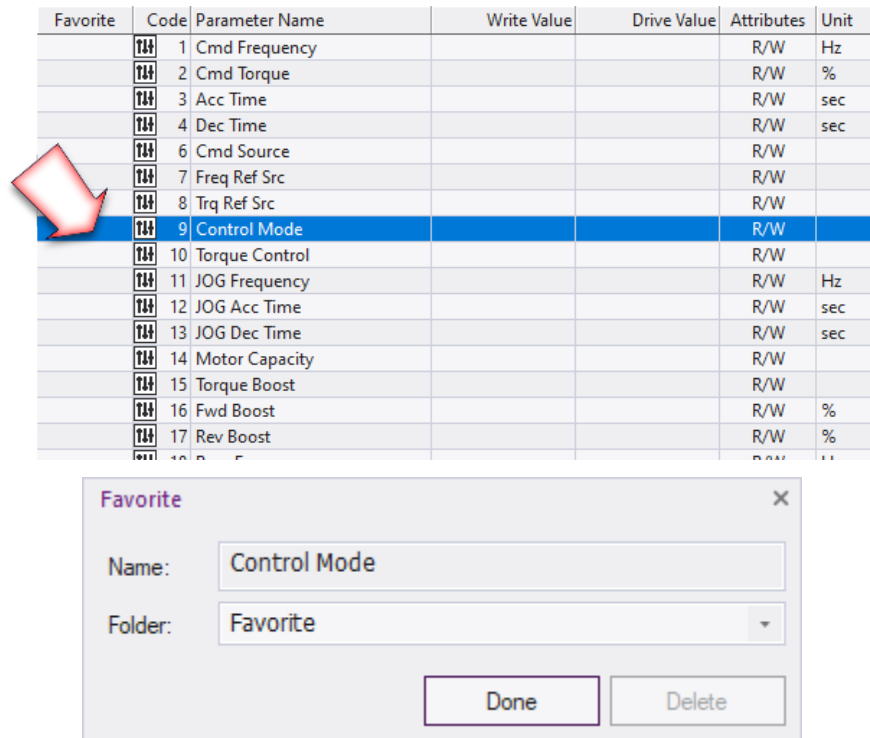
Read Only during running

Read Write Close

FAVORITES

You can make a separate favorites group for the parameters that you use frequently. You can only collect groups in favorites to view or read and write the favorites group only on the drive.

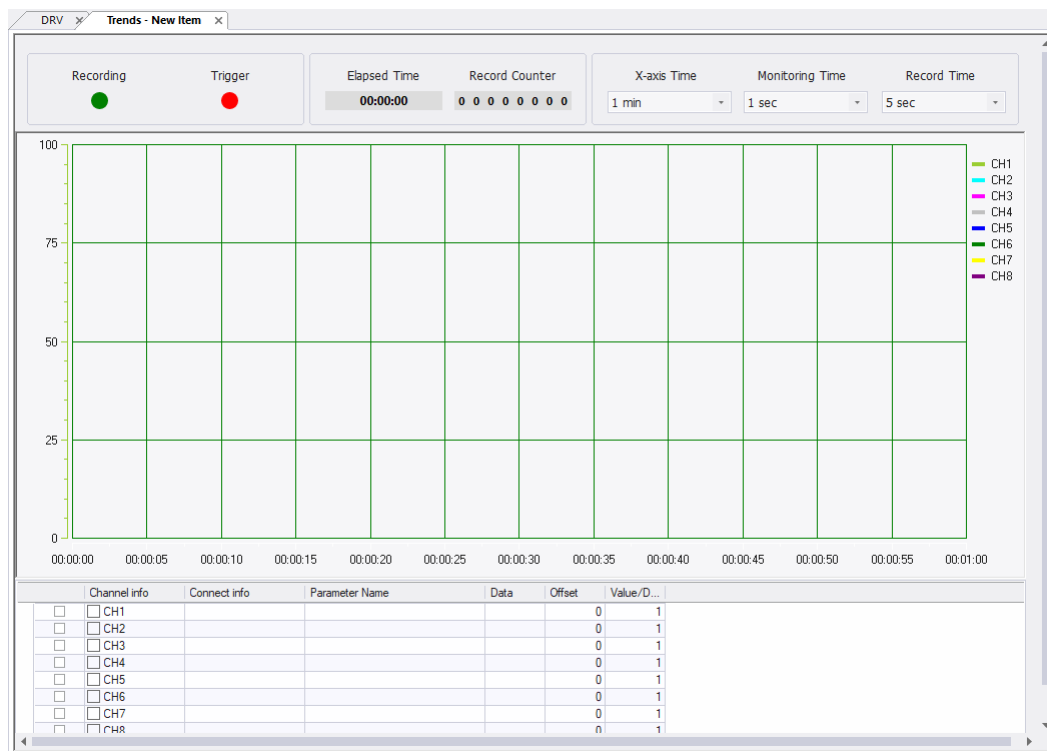
- 1) Add: Select the favorites area from the Parameter Edit window. The following dialog box will be displayed. Click the Done button in the dialog box.



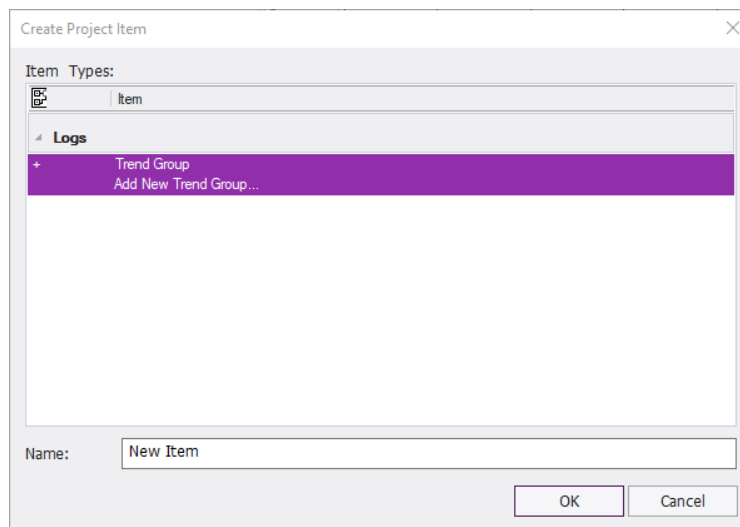
- 2) Delete: Select the registered parameter area from the parameter edit window. Click the Delete button in the dialog box. You can also delete items from the favorites group.

TREND

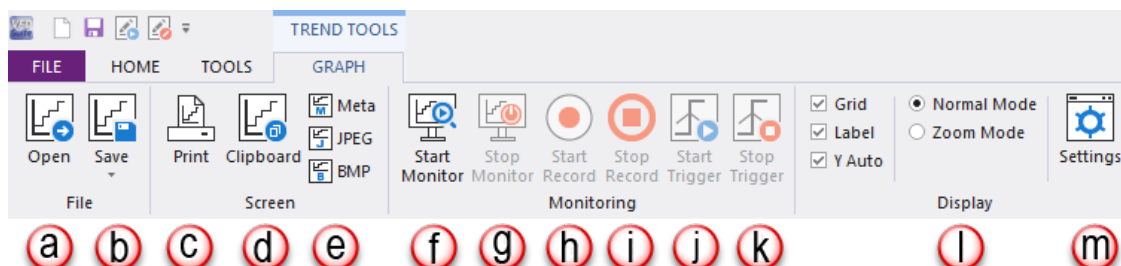
This is a feature for monitoring parameters as graphs. The monitoring graphs show 8 channels. These 8 channels can be shown on one graph or each channel can be shown on each graph. Also, up to 8 graphs can be shown.



- 1) Add: On the project tree, double-click on the “#New Item” below the trend item. Enter the name and click the Confirm button.



- 2) Delete: Select the trend item to delete from the project tree and select Delete from the menu.
- 3) Menu

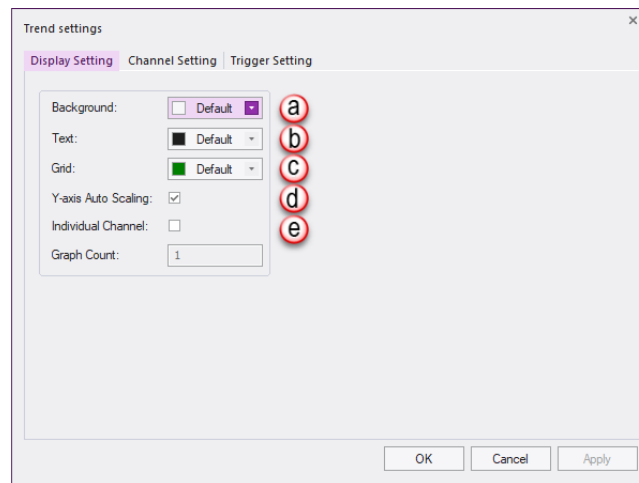


- select a file to open. The file extension is *.sco. This feature is enabled when monitoring is stopped.
- b) Save: Select Graph>Save. This is a feature for saving the currently monitored graph. Save all the settings information of the graph. The extension of the saved file is *.sco.
 - c) Print: Select the menu at Graph>Print. Print the current graph screen.
 - d) Clipboard: Select the menu at Graph>Clipboard. Copies the current graph screen.
 - e) Image: Select the menu Graph>Image.
 - i) Meta File: Save the graph screen in the meta file format.
 - ii) JPEG File: Save the graph screen in the JPEG file format.
 - iii) BITMAP File: Save the graph screen in the BITMAP file format.
 - f) Start Monitoring: Select the menu at Graph>Start Monitoring. If you start monitoring, the recording icon and the triggering icon is enabled so you can start the recording and triggering.
 - g) Stop Monitoring: Select the menu at Graph>Stop Monitoring. When you stop monitoring, the recording icon and the triggering icon will be disabled. Also a marker is enabled so you can check each channel value.
 - h) Start Recording: Select the menu at Graph>Start Recording. When you start recording, the channels and values are recorded at every set recording time. The recordings are stored in the file specified in the recording file path. When recording, the signal blinks on the screen. Also, the recording counter shows the number of currently recorded items.
 - i) Stop Recording: Select the menu at Graph>Stop Recording.
 - j) Start Trigger Observation: Select the menu at Graph>Start Trigger. Start trigger observation. When you start triggering, the screen will be stored if the channel value is higher or lower than the set value set on the trigger settings. The triggers are stored in the file specified in the screen save path.
 - k) Stop Trigger Observation: Select the menu at Graph>Stop Trigger.
 - l) Display:
 - i) Grid: The grid of the graph will be shown or hidden.
 - ii) Show Label: The label that shows the channel name will be shown or hidden.
 - iii) Automatic Y-Axis Scaling: This feature allows automatic movement of the Y-axis to the amount of the set channel value. Uncheck this value and the value of the Y-axis is adjusted to the specified minimum and maximum value.
 - iv) Normal Mode: The marker becomes active in the graph.
 - v) Zoom Mode: The graph become zoom in.
 - m) Settings: Select the menu at Graph>Settings. This shows the option setting dialog box on the graph.

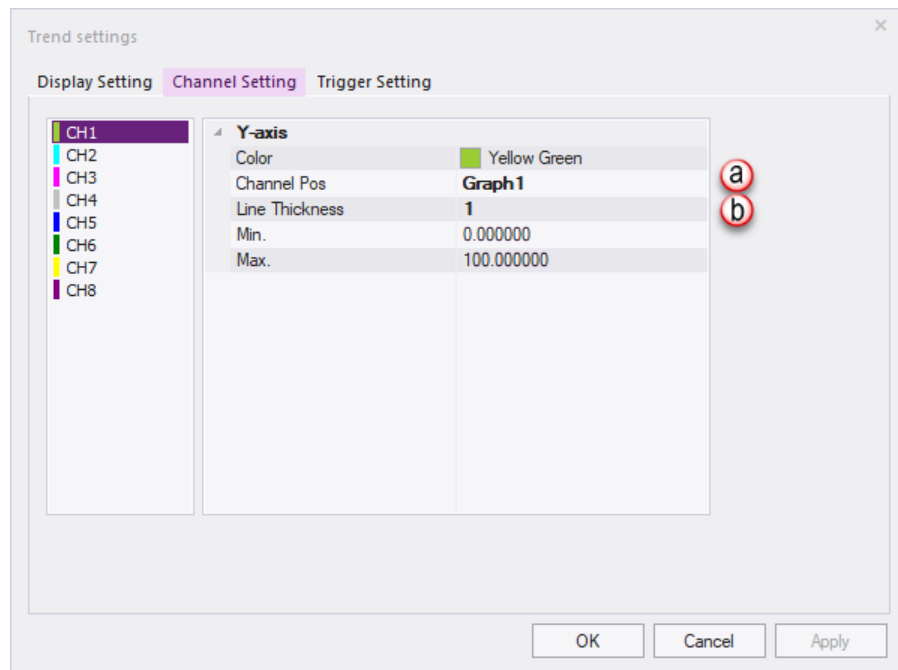
Graph Setting

Select the menu GRAPH>Settings.

- 1) Display Setting

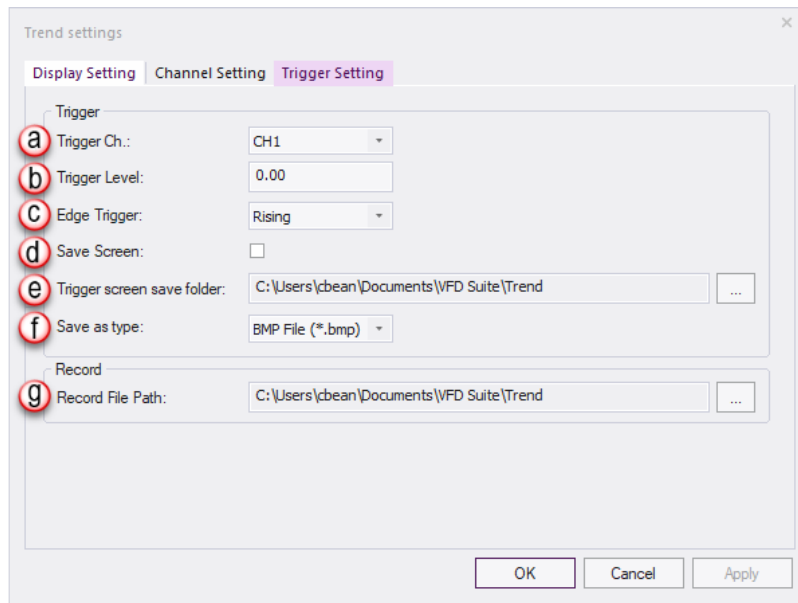


- a) Background Color: Select the color of the graph.
 - b) Text Color: Select the text color of the graph.
 - c) Grid Color
 - d) Y-Axis Auto Scaling: This feature allows automatic movement of the Y-axis to the amount of the set channel value. Uncheck this value and the value of the Y-axis is adjusted to the specified minimum and maximum value. If the channel value is lower or higher than the minimum or maximum values respectively, the Y-axis still will not change.
 - e) Individual Channel: This feature provides each channel as a separate graph. First select the individual channel view, enter the number of graphs (1-8), and click the Apply button to see the monitoring graphs, depending on the set number. By default, all channels are allocated as graph 1. If you do not select separate view of channels, only 1 graph is shown again and all channels are shown in that one graph.
- 2) Monitor Screen Settings



- a) Channel Location: You can select the channel location for each channel.

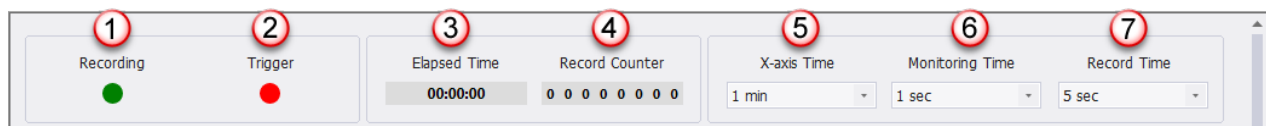
- b) Line Width: Select the line width of the channel.
- 3) Trigger and Record Settings



- a) Trigger Channel: To use the triggering feature, you must have saved the 1 trigger setting. The number of channels that can be triggered is limited to 1.
- b) Trigger Level: Set the reference value for triggering.
- c) Edge Trigger: Select whether to save the screen if the channel value is rising in reference to the triggering value, or if the channel value is falling.
- d) Save Screen: Select whether to save the screen if the channel value matches the condition.
- e) Trigger Screen Save folder: Select file path for the trigger screen file.
- f) Save as type: Select the file type for the trigger screen.
- g) Record File Path: Select the file path for recording. While recording, this is disabled and cannot be changed.

Feature

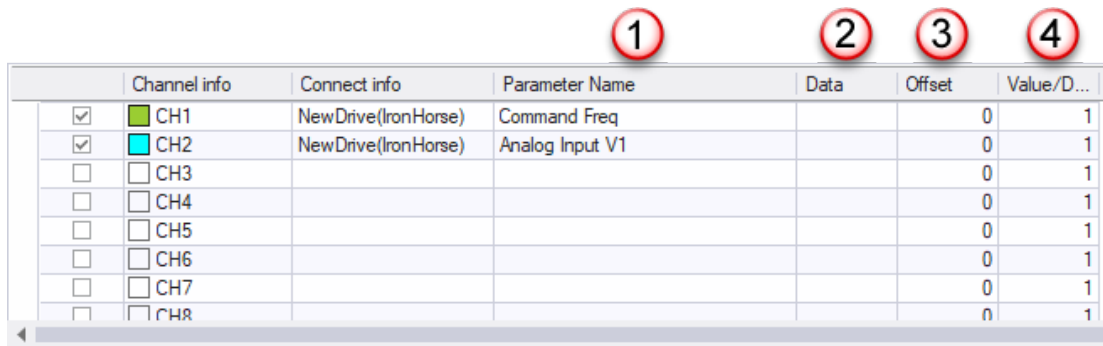
Show Graph



- 1) Recording: If you start recording during a monitoring operation, the light will flash to indicate that is recording. This action can be used to indicate whether you are currently recording or not.
- 2) Trigger Generation: When you start trigger observation and a trigger occurs, this light will flash.
- 3) Elapsed Time: This shows the elapsed time since monitoring started. The time is output in the 00:00:00 format.
- 4) Record Counter: Shows how many recordings were after recording started.
- 5) Adjust X-Axis Time: Select the time scope of the X-axis. You can select from 10 seconds to 1 hour.

- 6) Monitoring Time: Select the monitoring time interval of the channel. You can select between 0.1 - 5 seconds and a graph will be shown depending on the selected time period.
- 7) Record Time: Select the interval of record time. You can select between 1 second to 1 hour, and recording will be performed based on the selected interval.

Parameter Settings



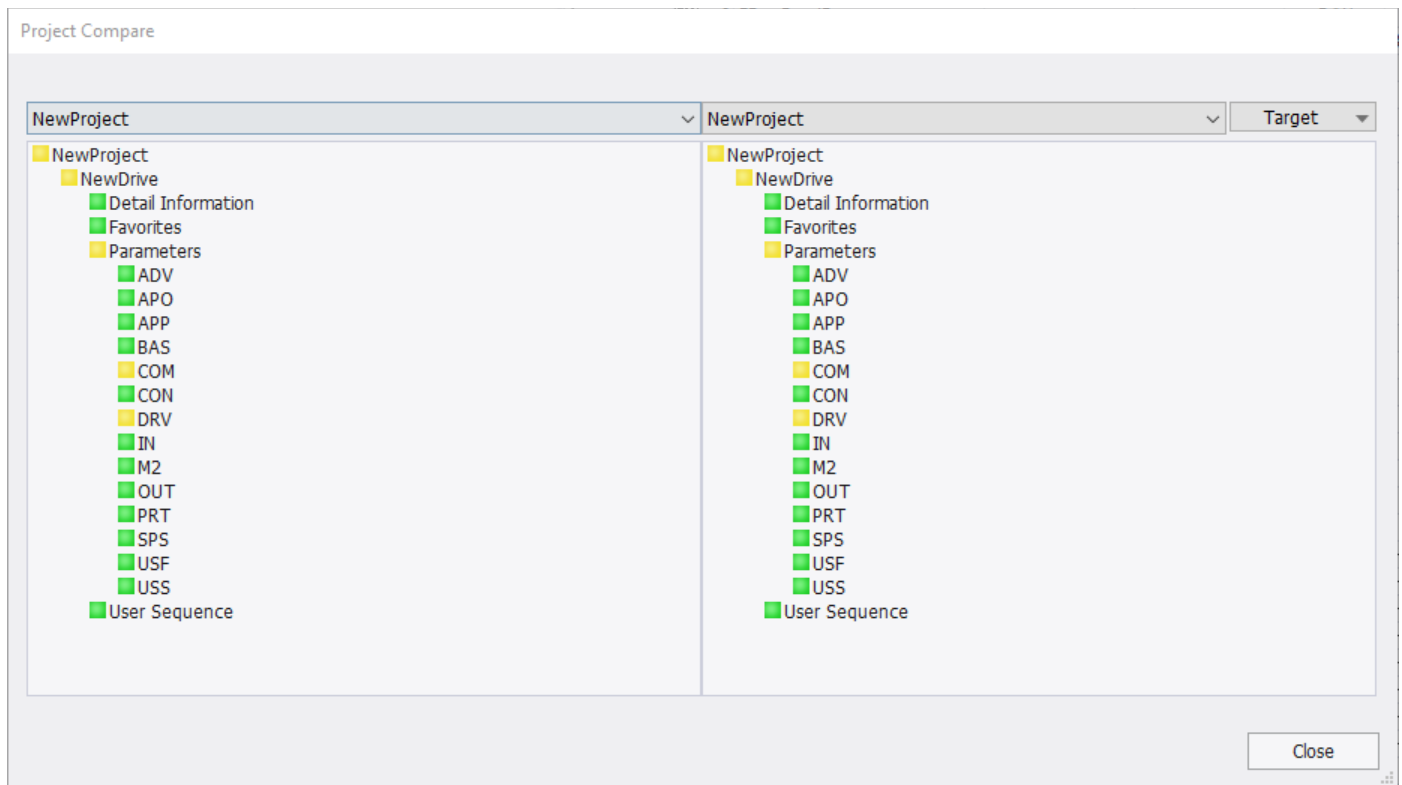
	Channel info	Connect info	Parameter Name	Data	Offset	Value/D...
<input checked="" type="checkbox"/>	CH1	NewDrive(IronHorse)	Command Freq		0	1
<input checked="" type="checkbox"/>	CH2	NewDrive(IronHorse)	Analog Input V1		0	1
<input type="checkbox"/>	CH3				0	1
<input type="checkbox"/>	CH4				0	1
<input type="checkbox"/>	CH5				0	1
<input type="checkbox"/>	CH6				0	1
<input type="checkbox"/>	CH7				0	1
<input type="checkbox"/>	CH8				0	1

- 1) Parameter Name: For monitoring, you must enable the channel. If disabled, it is excluded from the monitoring item. You can select the connection information from the enabled channel. The connected information can select the drive included in the current project. You can select the parameter that can be monitoring in the drive.
- 2) Data: Shows the current value. This is the original value that is not offset or applied with a ratio. If there is an error with communication, it will be displayed as a communication error.
- 3) Offset: This is applying offset to the current value. The applied value is shown in the graph.
- 4) Value/Division: This is applying a ratio to the current value. The applied value is shown in the graph.

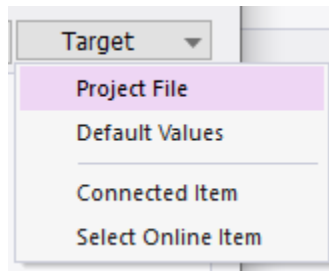
BY BUSINESS SITE

This is a feature for comparing drive-drive, drive-file, file-file, drive-default value (null device), and file-default parameter values.

Select the menu at HOME>Compare. It will be displayed as below.



In Compare with, select the items to compare.



A green box is shown if the content is the same and a yellow box is shown if the content is different. For more information, double-click on the group and the following dialog box is shown.

Group	Code	Parameter Name	Value	Unit	Group	Code	Parameter Name	Value	Unit
COM	1	Int485 St ID	1		COM	1	Int485 St ID	1	
COM	2	Int485 Proto	ModBus RTU		COM	2	Int485 Proto	ModBus RTU	
COM	3	Int485 BaudR	9600 bps		COM	3	Int485 BaudR	9600 bps	
COM	4	Int485 Mode	D8 / PN / S1		COM	4	Int485 Mode	D8 / PN / S1	
COM	5	Resp Delay	3	msec	COM	5	Resp Delay	5	msec
COM	6	FBus S/W Ver	1.00		COM	6	FBus S/W Ver	1.00	
COM	7	FBus ID	1		COM	7	FBus ID	1	
COM	8	FBus BaudRate	9600 bps		COM	8	FBus BaudRate	9600 bps	
COM	9	FBus Led	b0000	Bit	COM	9	FBus Led	b0000	Bit
COM	10	Opt Parameter1	0		COM	10	Opt Parameter1	0	
COM	11	Opt Parameter2	0		COM	11	Opt Parameter2	0	
COM	12	Opt Parameter3	0		COM	12	Opt Parameter3	0	
COM	13	Opt Parameter4	0		COM	13	Opt Parameter4	0	
COM	14	Opt Parameter5	0		COM	14	Opt Parameter5	0	
COM	15	Opt Parameter6	0		COM	15	Opt Parameter6	0	
COM	16	Opt Parameter7	0		COM	16	Opt Parameter7	0	
COM	17	Opt Parameter8	0		COM	17	Opt Parameter8	0	
COM	18	OptParameter 9	0		COM	18	OptParameter 9	0	
COM	19	OptParameter10	0		COM	19	OptParameter10	0	
COM	20	OptParameter11	0		COM	20	OptParameter11	0	
COM	21	OptParameter12	0		COM	21	OptParameter12	0	
COM	22	OptParameter13	0		COM	22	OptParameter13	0	

- 1) Shows all parameters on the screen.
- 2) Shows only different parameters on the screen.
- 3) Shows only the same parameters on the screen.

REPORT

This is a feature for outputting the parameter values as a report format.

This explains the report edit and output features.

Run

Select the menu HOME>Report. Shows the currently selected parameter content of the drive on the project window. This is shown on the dialog box of the report.

Report

FILE FUNCTION CONFIGURATION

Export Print Refresh Settings

Company		Department	
Date		User Name	
Model Name	IronHorse	Model Version	1.60
Node Name	NewDrive(IronHorse)	Operation Mode	RTU_1

[Parameter Group : DRV]

Code	Parameter Name	Write Value	Drive Value	Default Value	Unit
1	Cmd Frequency			0.00	Hz
2	Cmd Torque			0.0	%
3	Acc Time			20.0	sec
4	Dec Time			30.0	sec
6	Cmd Source			Fx/Rx-1	
7	Freq Ref Src			Keypad-1	
8	Trq Ref Src			Keypad-1	
9	Control Mode			V/F	
10	Torque Control			--- No ---	
11	JOG Frequency	15.00	15.00	10.00	Hz
12	JOG Acc Time			20.0	sec
13	JOG Dec Time			30.0	sec
14	Motor Capacity			0.4 kW	
15	Torque Boost			Manual	
16	Fwd Boost			2.0	%
17	Rev Boost			2.0	%
18	Base Freq			60.00	Hz
19	Start Freq			0.50	Hz
20	Max Freq			60.00	Hz
21	Hz / Rpm Sel			Hz Display	
22	(+) Trq Gain			100.0	%
23	(-) Trq Gain			80.0	%
24	(-) Trq Gain0			80.0	%
25	(-) Trq Offset			40.0	%
80	-- Reserved --			0	
81	-- Reserved --			0	
85	Parameter Read			--- No ---	

Export File

This is a feature to save the report information as an Excel or web file.

Select the menu at FILE>Export File.

- 1) Output in Excel Format: It is saved as an Excel file with the extension .xls.
- 2) Output as a Web File: It is saved as a web file with the extension .htm.

Header Settings

This is a feature to edit the text shown in the report header. Select the menu at CONFIGURATION>Header Settings. The edit window of the report header is output.

Report Setting

Company:

Department:

Date:

User Name:

Model Name:

Model Version:

Node Name:

Operation Mode:

OK Close

The items that can be edited are company name, department name, and writer. The rest are automatically input. Click on the OK button and all setting information are saved. The changed content are applied to the report.

Refresh

This is a feature for updating the report content to the latest information. Select the menu at FUNCTION>Refresh. This newly reads information and displays as a report.

Output

This is a feature to print the report with the printer. Select the menu at FILE>Print. The print settings window will be output. Click the OK button to print the report with the selected printer.

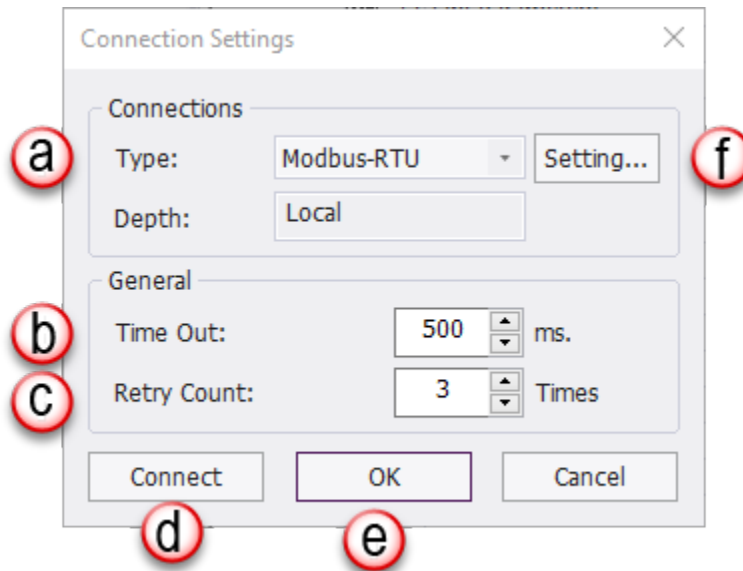
ONLINE**CONNECTION OPTION**

Set the network to connect with the drive.

Connecting to the ACN drive with VFD Suite can be accomplished in 2 ways:

- 1) Serial communication (Modbus-RTU) via RJ45 port integrated in the drive and optional cable ACN-232C (default method).
- 2) Ethernet communication (Modbus TCP) via the optional ACN-ETH card.

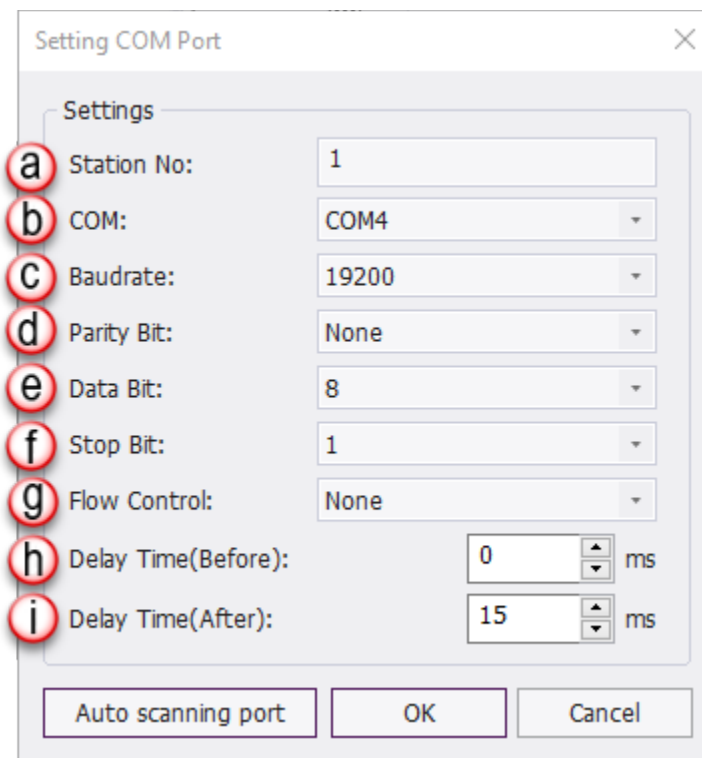
Select the menu HOME>Settings.



- a) Type: Set the communication media to be used when there is a connection with the drive. You can set to Modbus-TCP or Modbus-RTU.
- b) Timeout: Enter the communication timeout with the drive to one thousandth of a second.
- c) Retry Count: Enter the number of communication attempts to try after communication failure.
- d) Connect: This is a set access option that tries to establish a connection with the drive.
- e) OK: Saves connection settings without connecting to a drive
- f) Setting: Displays a dialog to set the IP address.

Serial Connection

- 1) Connection Method - Set the method to Modbus-RTU and click the Set button.
- 2) Set the communications port.



The 'Setting COM Port' dialog box contains the following settings:

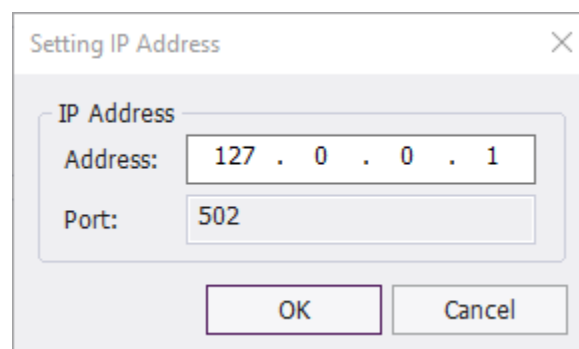
- a** Station No: 1
- b** COM: COM4
- c** Baudrate: 19200
- d** Parity Bit: None
- e** Data Bit: 8
- f** Stop Bit: 1
- g** Flow Control: None
- h** Delay Time(Before): 0 ms
- i** Delay Time(After): 15 ms

Buttons at the bottom: Auto scanning port, OK, Cancel.

- a) Station Number: Input the Node number assigned to the drive.
- b) COM: Select the COM Port connected to the drive. Only the COM Port installed in the system will be displayed. If needed, Go to your PC Device Manager->Ports to determine which COM port is being used.
- c) Baudrate: Set the communication speed to 19200.
- d) Parity Bit: Input the parity bit.
- e) Data Bit: Input the data bit.
- f) Stop Bit: Input the stop bit.
- g) Flow Control: Select the flow control.
- h) Delay time (Before): Delay time used for RTS control (before transmission)
- i) Delay time (After): Delay time used for RTS control (after transmission)

Ethernet Connection

- 1) Connection Method - Set the method to Modbus-TCP and click the Setting button.
- 2) Enter the IP address.



The 'Setting IP Address' dialog box contains the following settings:

- IP Address**
 - Address: 127 . 0 . 0 . 1
 - Port: 502

Buttons at the bottom: OK, Cancel.

- a) Address: Enter the address assigned to the drive.
- b) Port: Shows the port information used after connecting to the drive.



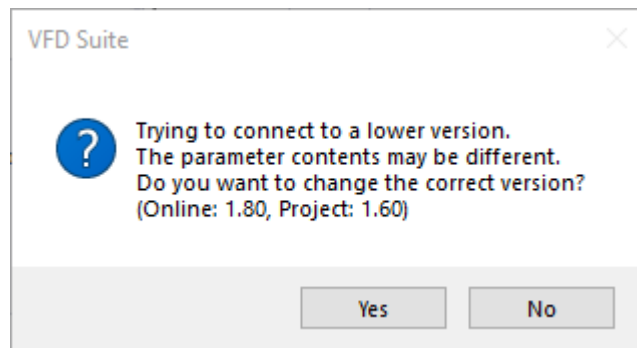
CAUTION: FOR AN ETHERNET CONNECTION, THE PC MUST HAVE AN ETHERNET CONNECTION. THE IP SETTING IS THE IP OF THE ETHERNET COMMUNICATIONS MODEL. YOU CAN CHECK WHETHER NORMAL ACCESS IS POSSIBLE WITH THE SET IP ADDRESS USING PING UNDER RUN IN THE WINDOWS STARTS MENU.

CONNECT/END CONNECTION

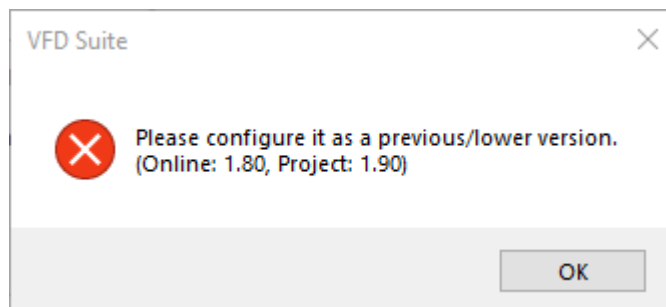
This tries to establish a connection with the drive, depending on the access option you set. Select the menu HOME>Connect. A dialog box appears during connection.

CAUTION: IF A NORMAL CONNECTION CANNOT BE ACHIEVED

1. IF THE PROJECT DRIVE AND THE CONNECTION DRIVE ARE DIFFERENT MODELS, A NORMAL CONNECTION WILL NOT BE MADE AND A DIALOG BOX WILL BE DISPLAYED.
2. IF THE PROJECT DRIVE AND THE CONNECTION DRIVE HAVE A DIFFERENT CODE VERSION (IF THE VERSION OF THE CONNECTION DRIVE IS HIGHER), THE FOLLOWING DIALOG BOX IS DISPLAYED. CLICK YES TO CONNECT.



3. IF THE PROJECT DRIVE AND THE CONNECTION DRIVE HAVE DIFFERENT CODE VERSIONS (IF THE VERSION OF THE CONNECTION DRIVE IS LOWER)



WRITE

Select the menu at HOME>Parameter Write. You can select the parameters to send to the drive, favorites, and features for each product.

READ

Select the menu at HOME>Parameter Read. You can select the parameters to receive from the drive, favorites, and features for each product.

DRIVE CONTROL

This feature acts as a keypad that gives a control command to the drive. This is located in the menu HOME>Drive Control group and is enabled only when the drive is connected.

- 1) Reverse direction (Reverse direction operation): If you select the reverse drive and click the Reverse icon, the reverse operation will be applied to the drive and the result can be checked through the operation status.
- 2) Reset/Stop: If you select a drive and click the Reset/Stop icon, a reset command is issued if a trip occurs or a command is given to stop the drive if it is operating.
- 3) Forward direction (Forward direction operation): If you select the Forward drive and click the forward icon, the forward operation will be applied to the drive and the result can be checked through the operation status.

EEPROM SAVE

Changing Drive Parameter values through remote communication only modifies the volatile Drive RAM. On power loss, this memory is erased, and any parameter changes will be lost. Utilize the EEPROM Save to save the parameter changes in the Drive.

In the Project window, select the drive you want to save, select the menu HOME>EEPROM save. Select the Yes button to save the EEPROM. The saved result is displayed in the event window.

TRIP

If a trip occurs on the connected drive, the information will be shown on the trip screen.

- 1) View Trip: To view a trip, click on a trip on the navigation window or click the Trip tab in the Result Information window and it will be shown in the results information window.

Trip Occurred Time	Drive Name	Protocol-Station No.(IP)	Model	Capacity	Trip
2021/04/15 08:56:55	NewDrive(IronHorse)	RTU_1	IronHorse	1.5 kW	External Trip

- 2) View Detailed Trip: This is a feature for viewing the status and additional trip information when trip occurs. Select the trip to view the detailed information from the trip list and double-click on it. As shown below, the dialog box will appear with detailed information of the trip.

Trip Information

Occurred Time: 2021/04/15 08:56:55 Protocol-Station No.(IP): RTU_1

Node Name: NewDrive(IronHorse)

Capacity: 1.5 kW

No.	Trip Name
1	External Trip

Parameter	Value	Unit
Output Frequency	0.00	Hz
Output Current	0.0	A
Inverter State	Over Voltage	
DCLink Voltage	330	V
Inverter Temperature	22	C
Digital Input Status	b00000000001	B
Digital Output Status	b000100	B

Close

- a) Occurrence Time: Shows the time of the trip occurrence.
- b) Protocol-Station number (IP): Shows communication method of the drive and the station number (IP).
- c) Node Name: Shows the drive name.
- d) Capacity: Shows the drive size in kW.
- e) Trip information: Shows the detailed trip information upon trip occurrence.
- f) Status Information: Shows the main parameter values upon trip occurrence.

SPECIALIZED FEATURES

USER SEQUENCE

This is used to implement a simple sequence using a combination of various functional blocks. It can be composed of up to 18 steps using 29 function blocks and 30 void parameters.

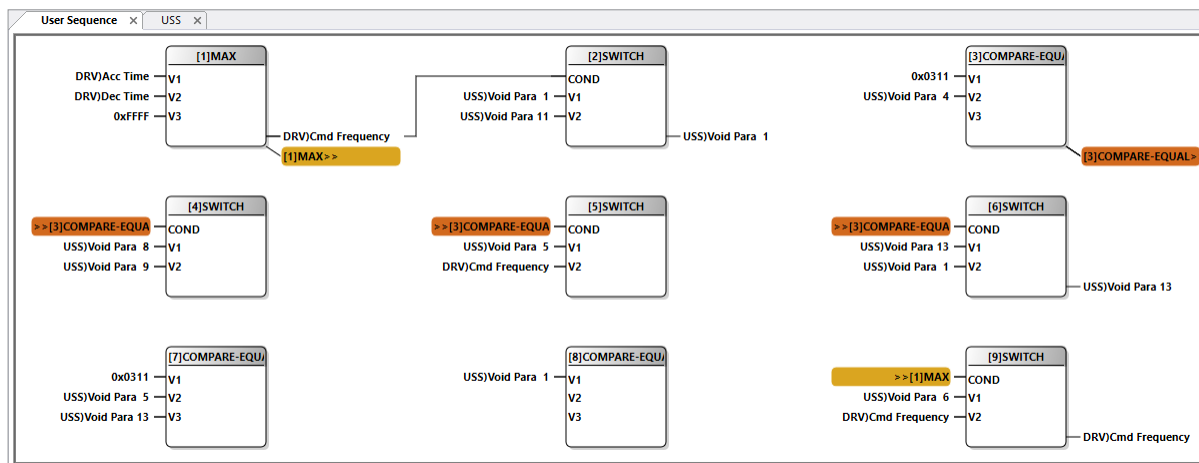
1 loop means that a maximum of 18 user-defined sequences are performed once. 1 Loop Time can be selected by the user between 10 and 1,000 ms.

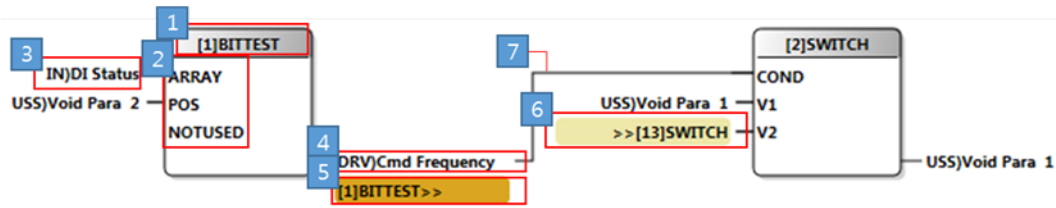
User-sequence-related groups include the USS group responsible for setting up the user sequences and the USF group responsible for setting up the function blocks.

See "User Sequence Setting" on page 4–106 for more information on user sequence. For programming examples, see the support resources section on the drive item page on the webstore.

DIAGRAM

Double-click "User Sequence" in the project. Then, the parameter information (USS and USF group parameter) will be read and displayed on the screen.



BLOCK DESCRIPTION

- 1) This displays the feature name that is used by the function block. (Number shows the block number)
- 2) Shows the input information depending on the function
- 3) Shows the name of the input parameter
- 4) Shows the name of the output parameter
- 5) Shows if the output parameter of the block is set as the input parameter of another block (If it is not a nearby block)
- 6) Shows if the input parameter of the block is set as the output parameter of another block (If it is not a nearby block)
- 7) Shows if the input parameter of the block is set as the output parameter of another block (If it is a nearby block)

BLOCK SETTINGS

- 1) Feature Settings: Click on the block and the feature can be changed. Select NOP if a function block is not being used.

Parameter Detail

[USF] 1 : User Func 1

Value: 5] MAX

Default: NOP

Current: MAX

Read Write Close

- 2) Input/Output Parameter Settings: Select the parameter area to change and the parameter edit window will appear as shown below. The parameter can be changed from the window.

Parameter Detail

[USF] 13 : User Input 3-B

Group: USS

Code: [34]Void Para 4 Setting

Value: 0x1D22 Hex

Default: 0x0000

Current: 0x1D22

Max.: 0xFFFF

Min.: 0x0000

Read Write Close

- a) Group: Select the parameter groups.
- b) Code: Select the parameters of the selected group.
- c) Value: Directly enter the communication address. This is changed when the group and the group code are changed.
- d) Settings: Settings is enabled for parameters where its value can be set and a dialog box for setting the value is displayed.

If the parameter being changed is not in the area, select the block and right-click it. Then, the following context menu will be displayed. Select the parameter to change from the menu and select the parameter. Then, the following parameter edit window will be displayed.

User Input A
User Input B
User Input C
User Output

SCREEN SETTINGS

Screen Mode

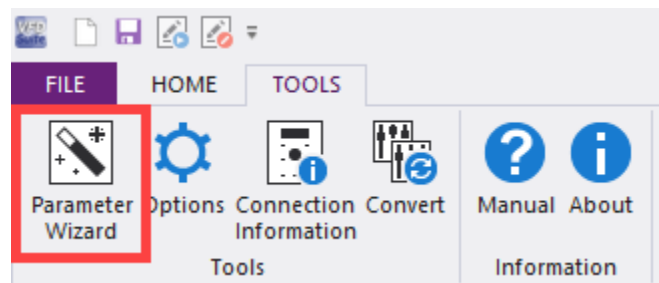
You can change the screen mode by right-clicking on the diagram screen.

Zoom In	Ctrl +
Zoom Out	Ctrl -
100%	Ctrl 0
Value Display Mode	

- 1) Zoom In: Shows the diagram displayed on the screen bigger in 10% increments. (Maximum 200%)
- 2) Zoom Out: Shows the diagram displayed on the screen bigger in 10% decrements. (Minimum 10%)
- 3) 100%: Changes the diagram displayed on the screen to its original size.
- 4) Value Display Mode: Changes the parameter information displayed on the screen by the parameter name and value expression.

WIZARD

This section describes the Wizard, which is a feature that allows you to set up important parameters step by step during initial drive installation. Access the parameter wizard from the Tools tab on the menu bar.



STEP-BY-STEP SETTINGS

Set the parameter using the 10 steps of the wizard. To move between steps, you can go to the previous step or the next step by clicking the button corresponding to each step or by clicking the Previous Next button.

The steps and the step-by-step parameter types may vary by model.

- 1) Motor & Control: Set the main parameters for motor & control. Torque Control is only allowed in IM Sensorless mode. You can edit each parameter by clicking the setting value column in the list. Depending on whether Torque Control is set to Yes or No, the next step is changed to the Torque settings or the Speed settings.

[[IronHorse] 1. Motor & Control

Step 1/9

Control Mode: V/F

Parameter	Default	Max	Min	Value	Unit
60/50 Hz Sel	60Hz	50Hz	60Hz	60Hz	
Pole Number	4	48	2	4	
Rated Slip	40	3000	0	40	rpm
Rated Curr	3.6	1000.0	1.0	3.6	A
No-load Curr	1.6	1000.0	0.0	1.6	A
Rated Volt	0	480	100	0	V
Efficiency	72	100	64	72	%
Inertia Rate	0	8	0	0	
AC Input Volt	220	480	0	220	V

Next > Cancel Help

- 2) Speed & Torque: If Torque Boost is Manual, you can set it to Fwd Boost and Rev Boost.

[[IronHorse] 2. Speed & Torque

Step 2/9

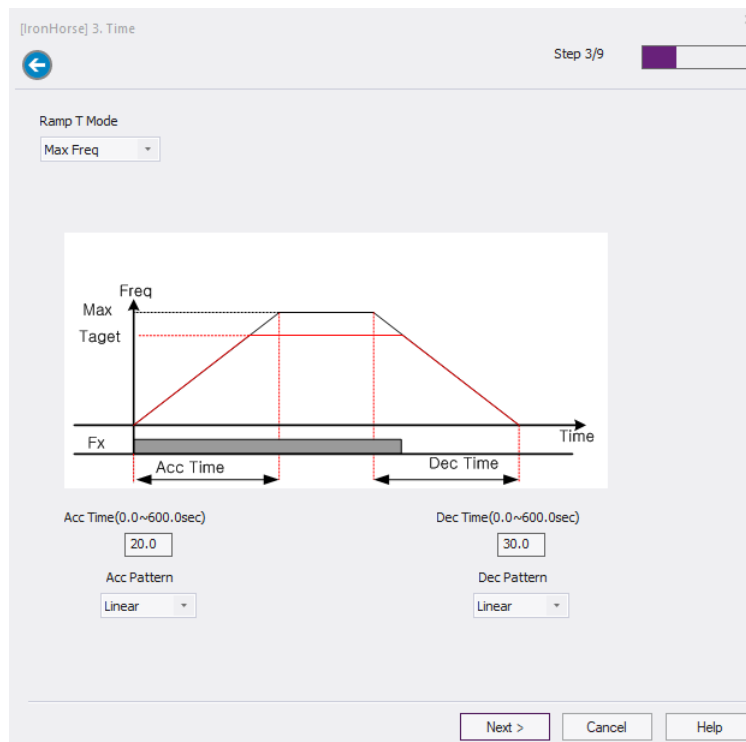
Torque Control: No(Speed)

Parameter	Default	Max	Min	Value	Unit
Cmd Frequency	0.00	400.00	0.00	0.00	Hz
Freq Ref Src	Keypad-1	I4	Keypad-1	Keypad-1	
Base Freq	60.00	400.00	30.00	60.00	Hz
Start Freq	0.50	10.00	0.01	0.50	Hz
Max Freq	60.00	400.00	40.00	60.00	Hz
Torque Boost	Manual	Auto 2	Manual	Manual	
Fwd Boost	2.0	15.0	0.0	2.0	%
Rev Boost	2.0	15.0	0.0	2.0	%

Torque Control: Yes(Torque)

Parameter	Default	Max	Min	Value	Unit
Cmd Torque	0.0	180.0	-180.0	0.0	%
Trq Ref Src	Keypad-1	I4	Keypad-1	Keypad-1	
Torque Lmt Src	Keypad-1	I4	Keypad-1	Keypad-1	
Speed Lmt Src	Keypad-1	I4	Keypad-1	Keypad-1	
FWD Speed Lmt	60.00	400.00	0.00	60.00	Hz
REV Speed Lmt	60.00	400.00	0.00	60.00	Hz
Speed Lmt Gain	500	5000	100	500	%

- 3) Xcel Time: Xcel Time related parameters are output with the graph. The graph changes according to the parameter value selected in the dropdown. The time range can be changed in the edit window.



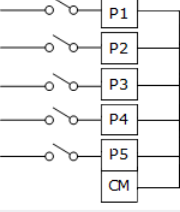
- 4) Start & Stop: Set the parameters corresponding to Start & Stop. If DC-Start is selected from Start Mode, "Dc-Start Time" will be displayed. IF DC-Brake is selected in Stop Mode, the Dc-Block Time, Dc-Brake Time, and Dc-Brake Freq parameters will be displayed.

The screenshot shows the 'IronHorse' 4. Start & Stop configuration window. At the top, it says 'Step 4/9'. Below that, there's a table of parameters. The table has columns for Parameter, Default, Max, Min, Value, and Unit. The parameters are: Cmd Source (Fx/Rx-1), Start Mode (Acc), Stop Mode (Dec), Run Prevent (None), Power-on Run (No), Dc-Start Time (0.00), Dc Inj Level (50), Dc-Block Time (0.10), Dc-Brake Time (1.00), Dc-Brake Level (50), and Dc-Brake Freq (5.00). At the bottom, there are 'Next >', 'Cancel', and 'Help' buttons.

Parameter	Default	Max	Min	Value	Unit
Cmd Source	Fx/Rx-1	UserSeqLink	Keypad	Fx/Rx-1	
Start Mode	Acc	Dc-Start	Acc	Acc	
Stop Mode	Dec	Power Braking	Dec	Dec	
Run Prevent	None	Reverse Prev	None	None	
Power-on Run	----- No -----	----- Yes -----	----- No -----	----- No -----	
Dc-Start Time	0.00	60.00	0.00	0.00	sec
Dc Inj Level	50	200	0	50	%
Dc-Block Time	0.10	60.00	0.00	0.10	sec
Dc-Brake Time	1.00	60.00	0.00	1.00	sec
Dc-Brake Level	50	200	0	50	%
Dc-Brake Freq	5.00	60.00	0.00	5.00	Hz

- 5) Digital Input: Set the parameters corresponding to Digital Input.

[IronHorse] 5. Digital Input Step 5/9

P1 Define: 


P2 Define:

P3 Define:

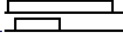
P4 Define:

P5 Define:


Out Freq



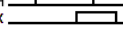
FX



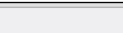
Speed-L



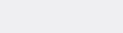
Speed-M



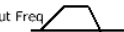
Speed-H




Speed-X



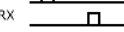
Out Freq



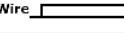
FX



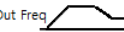
RX



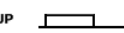
3Wire



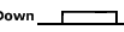
Out Freq



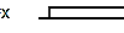
UP



Down

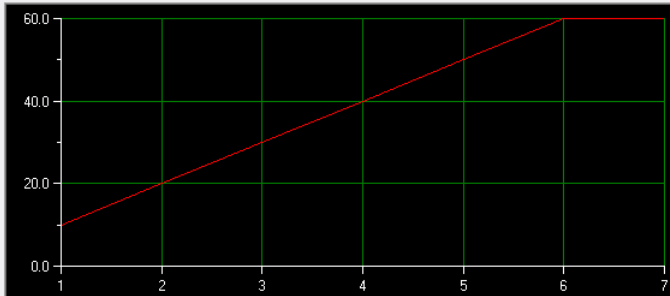


FX



- 6) Multi-Step Speed: Set the parameters corresponding to Set Multi-Step Speed.

[IronHorse] 6. Multi-Step Speed Step 6/9



Parameter	Default	Max	Min	Value	Unit
Step Freq- 1	10.00	400.00	0.00	10.00	Hz
Step Freq- 2	20.00	400.00	0.00	20.00	Hz
Step Freq- 3	30.00	400.00	0.00	30.00	Hz
Step Freq- 4	40.00	400.00	0.00	40.00	Hz
Step Freq- 5	50.00	400.00	0.00	50.00	Hz
Step Freq- 6	60.00	400.00	0.00	60.00	Hz
Step Freq- 7	60.00	400.00	0.00	60.00	Hz

7) Digital Output: Set the parameters corresponding to Digital Output.

[IronHorse] 7. Digital Output

Step 7/9

Relay 1: Trip

Q1 Define: Run

Q1 Define Diagram: Q1 (Transistor) connected to CM (Common) and Ground.

Parameter	Default	Max	Min	Value	Unit
FDT Frequency	30.00	400.00	0.00	30.00	Hz
FDT Band	10.00	400.00	0.00	10.00	Hz

Next > Cancel Help

8) V1 Analog Input: Set the parameters corresponding to V1 Analog Input.

[IronHorse] 8. V1 Analog Input

Step 8/9

Unipolar

Bipolar

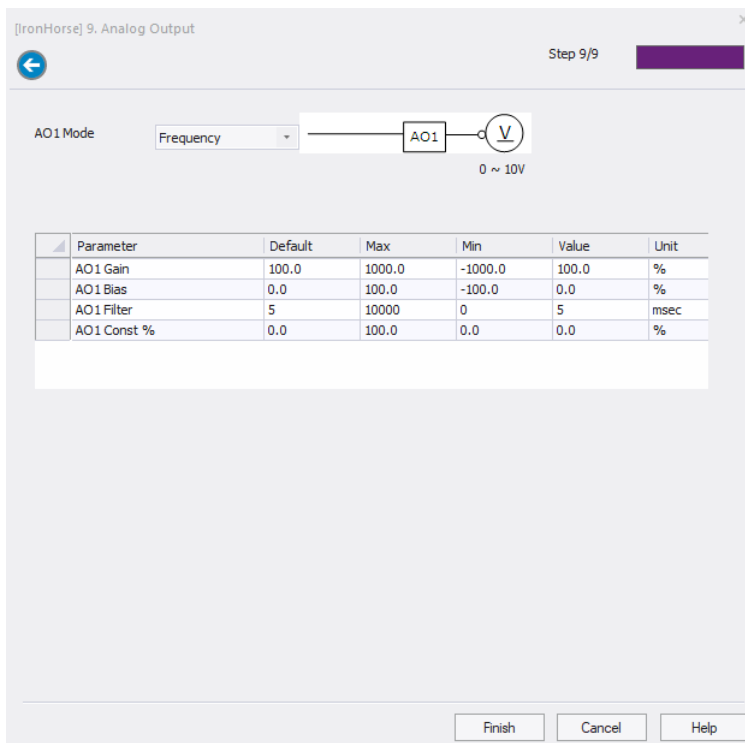
VR+
V1
5G

0V ~ +10V Input

Parameter	Default	Max	Min	Value	Unit
V1 Filter	100	10000	0	100	msec
V1 Volt x1	0.00	10.00	0.00	0.00	V
V1 Perc y1	0.00	100.00	0.00	0.00	%
V1 Volt x2	10.00	12.00	0.00	10.00	V
V1 Perc y2	100.00	100.00	0.00	100.00	%
V1 -Volt x1'	0.00	0.00	-10.00	0.00	V
V1 -Perc y1'	0.00	0.00	-100.00	0.00	%
V1 -Volt x2'	-10.00	0.00	-12.00	-10.00	V
V1 -Perc y2'	-100.00	0.00	-100.00	-100.00	%

Next > Cancel Help

9) Analog Output: Set the parameters corresponding to Analog Output.



[IronHorse] 9. Analog Output

Step 9/9

AO1 Mode: Frequency

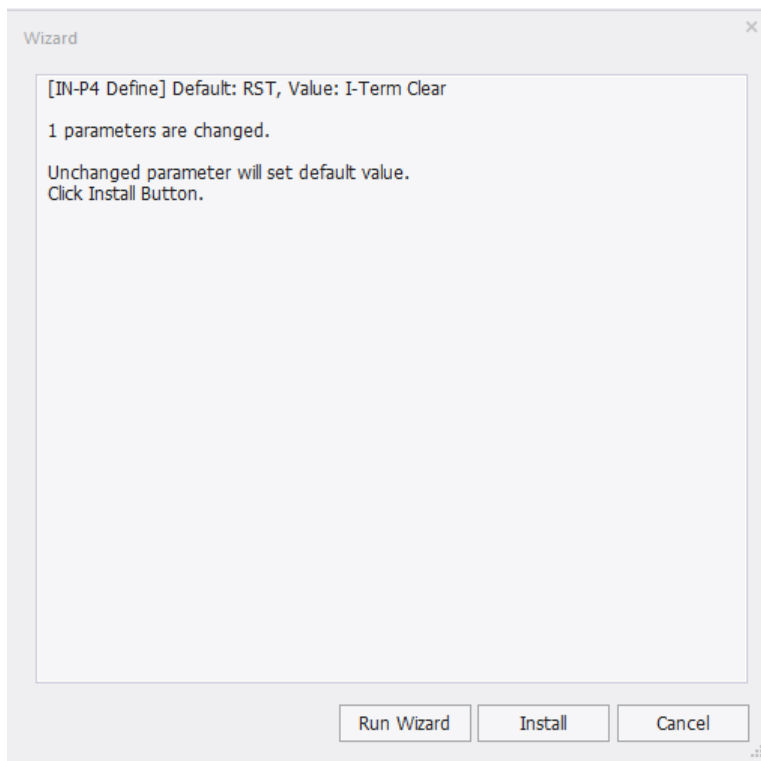
Diagram: AO1 output connected to a voltage source (0 ~ 10V).

Parameter	Default	Max	Min	Value	Unit
AO1 Gain	100.0	1000.0	-1000.0	100.0	%
AO1 Bias	0.0	100.0	-100.0	0.0	%
AO1 Filter	5	10000	0	5	msec
AO1 Const %	0.0	100.0	0.0	0.0	%

Buttons: Finish, Cancel, Help

10) Install: The content of the changed parameters is displayed.

- » Wizard Run Button: Converts to the Wizard Settings screen. Use this button to make additional changes.
- » Install Button: Saves the parameters set in the wizard to the project parameters. You can use the write function if you need to apply the parameter contents to the drive.



Wizard

[IN-P4 Define] Default: RST, Value: I-Term Clear

1 parameters are changed.

Unchanged parameter will set default value.
Click Install Button.

Buttons: Run Wizard, Install, Cancel