

Torque Control Verifier Ethernet 2

2.4GHz FM TCVe2 User Manual

Part Number 857414 Rev A



Sturtevant Richmond

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Quick Start Guide

This quick start will guide you through the process of configuring the unit for first time use. Plug the provided power cable into the unit and 100-240 VAC power and turn on the power switch. The LEDs illuminate and the beeper sounds a series of quick beeps. "TVC E2" and the firmware version number are displayed when the unit boots up.

To use a tool with the TCV e2, you must first learn the tool to the TCV e2.

- Press ◀ or ▶ until the Tool screen is displayed.
- Press ▲ or ▼ to highlight an open tool slot (ie. "Tool 1 None"). Press ENT.
- Enter Password (0104) by pressing ▲ or ▼ to change the number. Press ▶ to move to the next position. When all four positions have been set, press ENT to submit the password. An incorrect password entry will display "Invalid Password".
- Press ENT.
- "Learn" is displayed on the screen.
- Press ◀ or ▶ to change which interface to learn the tool in to.
- Click or power on the tool.
- The interface blue BATCH and green Torque/Angle LEDs light. The screen displays the Tool Number, Tool Type, Radio ID, and Tool Serial Number.
- Press ESC to go back.

To define the parameter settings for the tool:

- Press ▲ or ▼ to highlight the desired tool. Press ENT.
- Press ◀ or ▶ until "Edit" is displayed on the screen. Press ENT.
- Press ◀ or ▶ to cycle through the parameter settings. Press ENT to start modifying the values.
 - Use the arrow keys to toggle between values.
 - Press ▲ or ▼ to change numerical values; press ◀ or ▶ to switch to another digit.
- Press ENT to save the value or ESC to cancel without saving.
- Press ESC twice to back out to the main menu.

Overview

Warnings



Do not disassemble the unit for repair or modifications. There is a high electrical voltage inside the unit that could cause electric shock.



Do not allow any type of liquid to come into contact with any part of the unit.



Insert all fittings fully into their mating receptacles. Failure to do so could result in injury.



Do not fold, bend or apply excessive force to any cable or fitting.

Cautions

Please use caution when handling this or any other electrical appliance.

- This unit accepts an AC input voltage from 100-240 VAC. Trying to operate this unit with a voltage outside that range may cause damage to the unit.
- Avoid placing or storing this unit in a location where it may become wet or dust covered.
- Do not place or mount this unit in an unstable area.
- Dropping this unit may result in personal injury or damage to the unit.
- Before performing any maintenance on the unit, make sure to turn it off and remove the power plugs.
- There are no user serviceable parts inside the main enclosure of the unit.

Unit Overview

The TCV e2 is equipped with a main display, two segment displays (one for each interface), navigation keys, enter and escape buttons. The beeper and LEDs provide an indication for any combination of accepts, rejects, and batch completions.

The TCV e2 has one RJ-45 Ethernet port for network connectivity.

Two USB-A connectors are provided for firmware updates, results downloads, or connection to barcode scanners.

The 13-pin I/O connector provides discrete I/O capabilities to define up to 4 inputs and 6 outputs using the discrete I/O capabilities of the TCV e2.

The power plug accepts 100-240 VAC at 50-60 Hz.

Compatible Tools

The TCV e2 works with the following models of tools:

- SLTC-FM 2.4 GHz preset clicker-type torque wrenches (CLK)
- TAC Torque/Angle Control 2.4 GHz Preset Wireless Click Wrench (TAC)

The TCV e2 can associate with up to 10 Sturtevant Richmond radio torque tools across two interfaces.

To use a tool with the TCV e2, you must first “learn” the tool to the qualifier. The process to do this is described in the Quick Start section. Tools are activated directly by the unit.

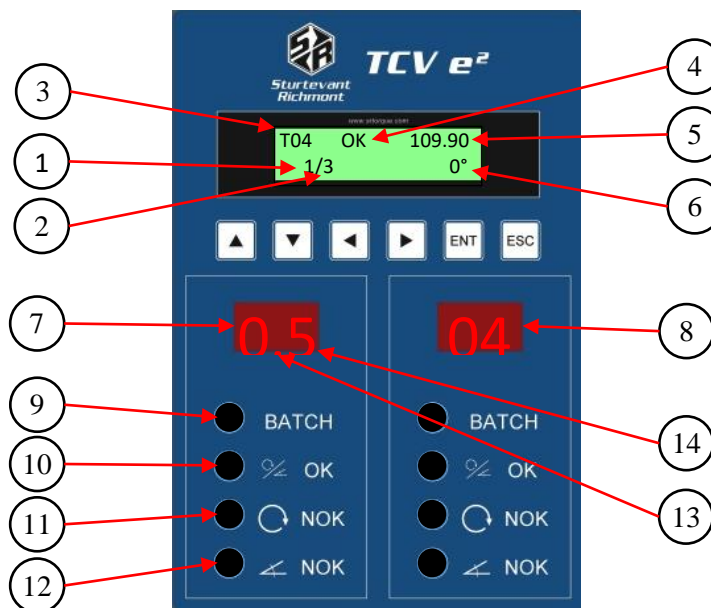
Using The Unit

Concepts

Interfaces - The TCV e2 has 2 interfaces. Interfaces within the TCV e2 work almost like having 2 logical qualifiers inside the single physical qualifier. Some settings, such as IP Address, are shared between the interfaces. Each interface has its own tightening log and can be controlled separately by a plant control system.

Tools - The TCVe2 can associate with up to 10 Sturtevant Richmond radio torque tools. Tools are assigned to a single interface, which may be changed at any time.

Run Screen



1. Count – The number of tightenings completed in the current batch.
2. Batch – The number of tightenings required for the current batch.
3. Tool Number – The number of the tool used.
4. Tightening Status – The status of the last tightening.
5. Torque Value – Value of the last torque received (for TAC only).
6. Angle Value – Value of the last angle received (for TAC only).
7. Interface 1 Tool Indicator – Displays tool number that is active on Interface 1.
 - “-” indicates the interface is suspended.
 - “00” indicates the interface has no active parameter
8. Interface 2 Tool Indicator – Displays tool number that is active on Interface 2.
 - “-” indicates the interface is suspended.
 - “00” indicates the interface has no active parameter
9. Interface 1 Batch Status – Illuminates blue when complete.

- 10. Interface 1 Torque/Angle Status OK – Illuminates green when accepted.
- 11. Interface 1 Torque Status NOK – Illuminates red when rejected.
- 12. Interface 1 Angle Status NOK – Illuminates red when rejected.
- 13. Tool Status Indicator – This decimal point indicates the tool has not communicated with the controller or the radio signal strength is below the recommended minimum level for use.
- 14. Programming Indicator – This decimal point indicates the controller is trying to program the tool.

NOTE: Interface 2 status indicators operate in the same manner as the Interface 1 status indicators.

The run screen for an SLTC-FM tool displays

- Tool Number
- Tightening Status
- Batch Count

T04	OK
1/3	

The run screen for a TAC tool can display the following:

- Tool Number
- Tightening Status
- Peak Torque
- Batch Count/Click Torque
- Angle

T04	OK	109.90
1/3		0°

T04	OK	P 109.90
C 105.6		0°

Pressing ENT while on the run screen will replace the batch count with the click torque value.
Pressing ESC will return to the previous format.

Configuring The Unit

The top level screens are:

- Tool Info Group
- Status Info Group
- Network Connection Info Group
- IP Info Group

Pressing ◀ or ▶ cycles through the groups.

Pressing ▲ or ▼ cycles through the items within that group.

Tool Info Group

The Tool Info Group provides all details about the tools learned into the TCV e2. Pressing ▲ or ▼ cycles through the 10 Tool screens. Each screen displays:

- Tool #
- Tool Type
- Tool Serial Number
- Radio ID
- Radio Signal Strength

To access the available functions for the displayed tool, press ENT.

Enter the password as described in the Quick Start section.

The functions available for each tool include:

- Select – select the current tool for use.
 - Press ENT. With “Select” displayed on the screen, press ENT again to activate the tool.
- Forget – removes the tool from the unit.
 - Press ENT.
 - Press ENT again to confirm deleting the tool from the unit.
- Edit – edit the current tool parameters.
 - Press ENT.
 - Press ◀ or ▶ to cycle through the parameter settings. Press ENT to start modifying the values.
 - Use the arrow keys to toggle between values. Press ▲ or ▼ to change numerical values; press ◀ or ▶ to switch to another digit.
 - Press ENT to save the value or ESC to cancel without saving.
 - Press ESC twice to back out to the main menu.

Common Fields

Interface

Default: 1

Range: 1 to 2

This field indicates the interface to which the tool is currently assigned.

Each tool can only be assigned to one interface.

Batch

Default: 1

Range: 1 to 255

This setting determines how many good tightenings must be performed in the parameter to complete a batch.

Lock on batch

Default: no

This setting determines if the unit will lock or restart the parameter when a batch is completed. When set to yes, the qualifier will stop when a batch is completed and transition to a no active parameter state. When set to no, the qualifier will restart the parameter when a batch is completed.

TAC Fields

Mode

Default: Peak

Values: Peak, TAM

This setting controls the mode the tool uses to determine the torque.

Autoclear Time

Default: 1

Range: 0.0 to 9.9 seconds

Available Modes: all

This setting controls the amount of time the torque must be steady before it is reported.

Dwell Time

Default: 5.0

Range: 0.0 to 25.5 seconds

Available Modes: all

This setting controls the amount of time permitted for reseating the tool or ratcheting.

Head Length

Default: 36.50 mm

Values: 0 to 100 mm

Available Modes: all

This setting defines the common centerline length of the head used with the tool. If this value is not entered correctly, torque measurements will be invalid.

Some standard head lengths based on capacity and head type are:

Torque Unit

Default: in.lb

Values: in.lb, ft.lb, N.m, cm.kg, m.kg, cNm

Available Modes: all

This setting controls the units of Min Torque and Max Torque, as well as the torque reported with each tightening.

Snug Torque

Default: 10% of tool capacity

Range: 0 to Min Trq

Available Modes:TAM

This setting controls the torque threshold at which the tool starts measuring the angle.

Min Torque

Default: 10% of tool capacity

Range: 0 to tool capacity

Available Modes: all

This setting controls the minimum required torque for a valid tightening. This value must be less than Max Torque.

Target Torque

Default: 10% of tool capacity

Range: Min Trq to Max Trq

Available Modes: all

This setting controls the target torque for the tool.

Max Torque

Default: 99% of tool capacity

Range: 0 to tool capacity

Available Modes: all

This setting controls the maximum allowed torque for a valid tightening. This value must be greater than Min Torque.

Min Angle

Default: 0

Range: 0 to 9999

Available Modes: TAM

This setting controls the minimum required angle for a valid tightening. This value must be less than Max Ang.

Max Angle

Default: 0

Range: 0 to 9999

Available Modes: TAM

This setting controls the maximum allowed angle for a valid tightening. This value must be greater than Min Ang.

Click Tool Fields

Timer Min

Default: 0

Range: 0 to 2.55 seconds

This setting controls the minimum amount of time the tool must be held in the clicked position for a valid tightening. This value must be less than Timer Max.

Timer Max

Default: 1.00 seconds

Range: 0 to 2.55 seconds

This setting controls the maximum amount of time the tool may be held in the clicked position for a valid tightening. This value must be greater than Timer Min.

TBC (Time between cycles)

Default: 0

Range: 0 to 9999 seconds

This setting controls the minimum amount of time after an accepted tightening before another tightening should be accepted. Any additional tightenings performed within this time after an accepted tightening will be automatically considered a reject.

TBB (Time between batches)

Default: 0

Range: 0 to 9999 seconds

This setting controls the minimum amount of time after a batch completion before another tightening should be accepted. Any additional tightenings performed within this time after a batch completion will be automatically considered a reject.

Serial Number

Default: 0000000000

Range: 0000000000 to 9999999999

This setting controls the serial number of the tool. The tool serial number is reported to the network with tightenings performed by the tool.

Status Info Group

Pressing ▼ cycles through these screens:

- VIN 1= – This screen will display the VIN associated to Interface 1.
- VIN 2= – This screen will display the VIN associated to Interface 2.
- Last Tightening – This screen will display the last torque event logged.

Network Connection Info Group

If no connections are active there will only be one sub-screen:

No active connections

IP Info Group

The IP Info Group provides the configuration options for the TCV e2. Pressing ▲ or ▼ cycles through these screens:

- Unit IP Address
- Subnet Mask
- Gateway
- MAC Address
- Qualifier Radio Info

Pressing ENT while on the Unit IP Address, Subnet Mask, or Gateway screens will activate the PROGRAMMING screen which provides additional options. (The MAC address is assigned by the factory and cannot be changed.) Changes to these settings only apply after the qualifier is restarted. The settings in this page apply to all interfaces.

IP Address

Default: 192.168.1.67

This setting controls the IP address of the qualifier for Ethernet networks.

Subnet Mask

Default: 255.255.255.0

This setting controls the subnet mask for Ethernet networks.

Gateway

Default: 192.168.1.113

This setting controls the default gateway setting for Ethernet networks.

Edit Password

Default: 0104

The password is 4 numbers.

XBEE Channel

Default: 1

Range: 1 to 12

This setting controls which channel is used by the qualifier radio. All tools learned to the qualifier will be set to this channel automatically as part of the learn process. In general, this setting does not have to be changed, but if tool communication is not working reliably, changing this setting may improve communication.

Reset Defaults

Default: All

Range: All, Configuration, Jobs, Tools, Events,

The Reset Defaults screen allows you to restore the unit to the factory defaults. You may select some or all parts of the configuration to reset.

Open Protocol

This chapter describes the support for the Open Protocol in the TCV e2. Command MIDs and revisions referred to in this document are from the Open Protocol Specification Release 1.3 Revision 1. The setup menu for ACOP is located under the IP Info Group programming menu.

Port Number

Range: 0 to 65535

Default: 04545

This setting controls the network port on which the unit listens for Open Protocol connections to interface 1. The network port used for interfaces 2 will be the following ports For example, the default setup listens for interface 1 connections on port 4545 and interface 2 connections on port 4546. If this setting were changed to 5000, the qualifier would listen for interface 1 connections on port 5000 and interface 2 connections on port 5001.

Message Timeout

Range: 0 to 3600 seconds

Default: 10 seconds

This setting controls how long the qualifier will wait for a response from the client when sending a subscription notification packet, such as MID 0015 or MID 0061. If no response is received within the specified ack timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ACOP connection is considered broken and will have to be re-established. This will terminate all subscriptions that were established on that connection, regardless of which one did not receive a response.

Resend Attempts

Range: 0 to 10

Default: 3

This setting controls how many times the qualifier will resend a subscription notification packet, such as MID 0015 or MID 0061, to the client. If no response is received within the specified ack timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ACOP connection is considered broken and will have to be reestablished. This will terminate all subscriptions that were established on that connection, regardless of which one did not receive a response.

Keep Alive:

Range: 0 to 3600 seconds

Default: 30

This setting controls how long in seconds the unit will keep a connection open without any commands. This value is recommended to be more than twice the rate at which the client will send keep alive packets to ensure the connection is not closed due to a single missed keep alive packet. For example, if the client is configured to send keep alive packets at a 20 second interval, the keep alive setting on the unit should be more than 40 seconds. The keep alive function can be disabled by setting the keep alive to 0. When set keep alive is set to 0, the unit will not close an Open Protocol connection due to inactivity.

OP Cmd Enable

Default: Yes

This setting determines if the unit will respond to “Open Protocol control” commands. These commands are generally the ones that control unit operation or modify configuration. When this setting is set to yes, all supported commands listed below are handled. When set to no, the following MID commands will return an error:

- 0018 Parameter Select
- 0019 Parameter Batch Size
- 0020 Parameter Reset Batch
- 0038 Job Select
- 0039 Job Restart
- 0042 Tool Disable
- 0043 Tool Enable
- 0050 VIN Download
- 0082 Write Time
- 0127 Job Abort
- 0130 Job Off
- 0150 Multi ID Download
- 0156 Reset Latest Identifier
- 0157 Reset All Identifiers

Cell ID

Range: 0 to 9999

Default: 0000

This setting controls the value put in the Cell ID field of Open Protocol commands such as MID 0001 and 0061. The same Cell ID will be used for connections on all interfaces.

Channel ID

Range: 0 to 99

Default: 00

This setting controls the value put in the Channel ID field of Open Protocol commands such as MID 0001 and 0061. The same Channel ID will be used for connections on all interfaces.

ToolsNet

This chapter describes the support for the ToolsNet Open Protocol in the TCV e2. Implementation of the protocol is according to ToolsNet Open Protocol version 3.5. The TCV e2 reports System Type as 29 and System Name as "TCV e2". The setup menu for ToolsNet is located under the IP Info Group programming menu.

Int 1 Enabled

Default: Disabled

This setting determines if the qualifier will attempt to establish ToolsNet connections for the specified interface. Unlike the other network protocols supported by the qualifier, ToolsNet requires the controller to establish connections. Since the qualifier will repeatedly make network requests to attempt to establish network connections to the ToolsNet server, you should only enable ToolsNet if you have a server set up in the network and only for the interfaces that are in use.

Int 2 Enabled

Default: Disabled

This setting determines if the qualifier will attempt to establish ToolsNet connections for the specified interface. Unlike the other network protocols supported by the qualifier, ToolsNet requires the controller to establish connections. Since the qualifier will repeatedly make network requests to attempt to establish network connections to the ToolsNet server, you should only enable ToolsNet if you have a server set up in the network and only for the interfaces that are in use.

PIM Address

Default: 192.168.001.066

This setting controls the IP address the qualifier will use to establish a ToolsNet connection.

PIM Port

Default: 06575

Range: 0 to 65535

This setting controls the port the qualifier will use to establish a ToolsNet connection at the PIM server address.

PIM Retry Interval

Default: 60

Range: 0 to 3600 seconds

This setting controls how long the qualifier will wait after a failed attempt to establish a ToolsNet connection before it tries again.

Result Timeout

Default: 5

Range: 0 to 60 seconds

This setting controls how long the qualifier will wait for a response from the ToolsNet server when sending a tightening or keep alive packet. If no response is received within the specified result timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ToolsNet connection is considered broken and will have to be reestablished.

Keep Alive

Default: 30

Range: 0 to 3600 seconds

This setting controls how often the qualifier will send a keep alive packet to the ToolsNet server if no other packets are being sent. When set to 0, the qualifier does not send keep alive packets. This value is recommended to be less than half the inactivity timeout of the server to ensure the connection is not closed due to a single missed keep alive packet. For example, if the server is configured to timeout after 30 seconds of inactivity, the keep alive setting on the unit should be less than 15 seconds.

System Number

Default: 0001

Range: 0 to 9999

This setting controls the system number the qualifier reports to the ToolsNet server in identification and tightening packets. Each interface may be assigned its own System number.

Station Number

Default: 0001

Range: 0 to 9999

This setting controls the station number the qualifier reports to the ToolsNet server in identification and tightening packets. Each interface may be assigned its own Station number.

Retries

Default: 2

Range: 0 to 10

This setting controls how many times the qualifier will resend a tightening or keep alive packet to the ToolsNet server before considering the connection broken. If no response is received within the specified result timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ToolsNet connection is considered broken and will have to be re-established.

PFCS Setup

The setup menu for PFCS is located under the IP Info Group programming menu.

Int 1 Solicited
Default: Disabled

Int 1 Unsol
Default: Disabled

Int 1 Sol Auto
Default: Yes

Int 1 Sol Name
Default: ----

Int 1 Single ID
Default: Yes

Int 1 Unsol Auto
Default: Yes

Int 1 Unsol Name
Default: ----

Int 1 Sol Port
Default: 16101

Int 1 Unsol Port
Default: 16102

Int 2 Solicited
Default: Disabled

Int 2 Unsol
Default: Disabled

Int 2 Sol Auto
Default: Yes

Int 2 Sol Name
Default: ----

Int 2 Single ID
Default: Yes

Int 2 Unsol Auto
Default: Yes

Int 2 Unsol Name

Default: ----

Int 2 Sol Port

Default: 16103

Int 2 Unsol Port

Default: 16104

Server Address

Default: 192.168.001.069

This setting controls the IP address the qualifier will use to establish a PFCS connection.

ACK Timeout

Range: 0 to 3600 seconds

Default: 5

This setting controls how long the qualifier will wait for a response from the client. If no response is received within the specified ack timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the PFCS connection is considered broken and will have to be re-established.

Retries

Range: 0 to 10

Default: 3

This setting controls how many times the qualifier will resend a tightening or keep alive packet to the PFCS server before considering the connection broken. If no response is received within the specified result timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the PFCS connection is considered broken and will have to be re-established.

Keep Alive

Range: 0 to 3600 seconds

Default: 120

This setting controls how often the qualifier will send a keep alive packet to the PFCS server if no other packets are being sent. When set to 0, the qualifier does not send keep alive packets.

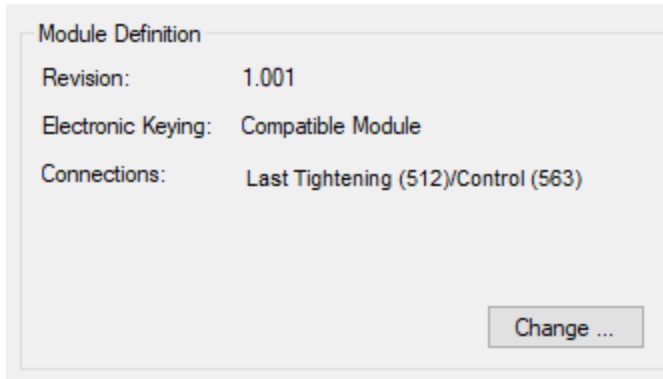
Parameter Name

Default: 1

EtherNet/IP™

Studio 5000 Add-On Instructions

The TCVe2 has Add-On Instructions compatible with Studio 5000 that can ease the use of the TCVe2 over EtherNet/IP. The add-on instructions are labeled by the connection point they are intended to be used with. When using the EDS file, you will see the connection point numbers in the Connection name.



Each add-on instruction will provide a data structure representing the data in that assembly instance for a single interface in the qualifier. You will need to make two copies of that structure, since the TCVe2 has two interfaces.

Connection Points

Output (O->T) Connection Points

The following connection points are used by the TCVe2 to take input data from the network. These connection points allow you to control the running operation of the qualifier.

563

Name	Data Type	Description
	ARRAY of STRUCT of:	Parameter selection for each of the 2 interfaces. Each array entry corresponds to an interface.
Item Number	SINT	Instance number of item to run on the interface. Deactivate any running parameter or job if 0.
Reserved	SINT	Reserved in this product. Set to 0.
Batch Reset	SINT	When this value changes, the batch count of the currently running parameter on the interface is reset.
Suspend	BOOL	When set, suspends on the interface without stopping a running parameter or job.
Batch	SINT	Sets the batch size for the selected parameter. If this value is 0, the parameter size stored in the TCVe2 will be used.

Total size: 10 bytes

572

Name	Data Type	Description
	ARRAY of STRUCT of:	Parameter selection for each of the 2 interfaces. Each array entry corresponds to an interface.
Item Number	SINT	Instance number of item to run on the interface. Deactivate any running parameter or job if 0.
Reserved	SINT	Reserved in this product. Set to 0.
Batch Reset	SINT	When this value changes, the batch count of the currently running parameter on the interface is reset.
Suspend	BOOL	When set, suspends on the interface without stopping a running parameter or job.
Batch	SINT	Sets the batch size for the selected parameter. If this value is 0, the parameter size stored in the TCVe2 will be used.
VIN	SINT[25]	The VIN to be used for tightenings performed on the interface

Total size: 60 bytes

Input (T->O) Connection Points

This section defines the connection points are used by TCVe2 to send output data to the network.

- 51x, 52x: Last tightening data
- 53x: Current qualifier status

Input Connection Points for Last Tightening Data

The connection points in this group will contain data about the last tightening. As such, they are not updated after a parameter or job selection until a tightening occurs.

512

Name	Data Type	Description
	ARRAY of STRUCT of:	Last tightening data for each of the 2 interfaces. Each array entry corresponds to an interface.
Tightening ID	DINT	ID number of the last tightening
Time	SINT[6]	Timestamp of the last tightening
Reserved	INT	Reserved in this product. Set to 0.
Reserved	SINT	Reserved in this product. Set to 0.
Parameter	SINT	Number of the parameter that produced the tightening
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	SINT	Number of results performed in the current batch for the parameter.
Batch	SINT	Number of results required for a batch in the parameter.

Total size: 34 bytes

Name	Data Type	Description
	ARRAY of STRUCT of:	Last tightening data for each of the 2 interfaces. Each array entry corresponds to an interface.
Tightening ID	DINT	ID number of the last tightening
Time	SINT[6]	Timestamp of the last tightening
Reserved	INT	Reserved in this product. Set to 0.
Reserved	SINT	Reserved in this product. Set to 0.
Parameter	SINT	Number of the parameter that produced the tightening
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	SINT	Number of results performed in the current batch for the parameter.
Batch	SINT	Number of results required for a batch in the parameter.
Torque Unit	INT	Unit used for torque fields
Torque	REAL	Torque of the tightening just performed.
Min Torque	REAL	Minimum torque required for a tightening in the parameter.
Max Torque	REAL	Maximum torque required for a tightening in the parameter.
Angle	DINT	Angle of the tightening just performed.
Min Angle	DINT	Minimum angle required for a tightening in the parameter.
Max Angle	DINT	Maximum angle required for a tightening in the parameter.
Prevailing Torque	REAL	Prevailing torque of the tightening just performed.
Min Prevailing Torque	REAL	Minimum prevailing torque required for a tightening in the parameter.
Max Prevailing Torque	REAL	Maximum prevailing torque required for a tightening in the parameter.
Click Torque	REAL	Click torque of the tightening just performed.
VIN	SINT[25]	The VIN associated with the tightening.

Total size: 168 bytes

Input Connection Points for Current Operation Status

The connection points in this group provide a view of the current operation status.

531

Name	Data Type	Description
	ARRAY of STRUCT of:	Current status for each of the 2 interfaces. Each array entry corresponds to an interface.
Parameter Number	SINT	Parameter number (0 means parameter not running.)
Reserved	SINT	Reserved in this product. Set to 0.
Suspend	BOOL	
Count	SINT	Number of tightenings performed in the current batch for the parameter.
Batch	SINT	Number of tightenings required for a batch in the parameter.
Status	SINT	Status of parameter 0 – None 1 – Cycle 2 – Batch 3 – Reject 4 – Batch NOK (batch complete with a counted reject)
Torque Unit	INT	Unit of torque for last result
Torque	REAL	Torque of last tightening performed by the parameter
Angle	DINT	Angle of the last tightening performed by the parameter
Last Tightening ID	DINT	ID number of the last tightening performed by the parameter

Total size: 40 bytes

532

Name	Data Type	Description
	ARRAY of STRUCT of:	Current status for each of the 2 interfaces. Each array entry corresponds to an interface.
Parameter Number	SINT	Parameter number (0 means parameter not running.)
Reserved	SINT	Reserved in this product. Set to 0.
Suspend	BOOL	
Count	SINT	Number of tightenings performed in the current batch for the parameter.
Batch	SINT	Number of tightenings required for a batch in the parameter.
Status	SINT	Status of parameter 0 – None 1 – Cycle 2 – Batch 3 – Reject 4 – Batch NOK (batch complete with a counted reject)
Torque Unit	INT	Unit of torque for last result
Torque	REAL	Torque of last tightening performed by the parameter
Angle	DINT	Angle of the last tightening performed by the parameter
Prevailing Torque	REAL	Prevailing torque of last tightening performed by the parameter
Click Torque	REAL	Click torque of last tightening performed by the parameter
Last Tightening ID	DINT	ID number of the last tightening performed by the parameter
VIN	SINT[25]	The VIN associated with the tightening.

Total size: 106 bytes

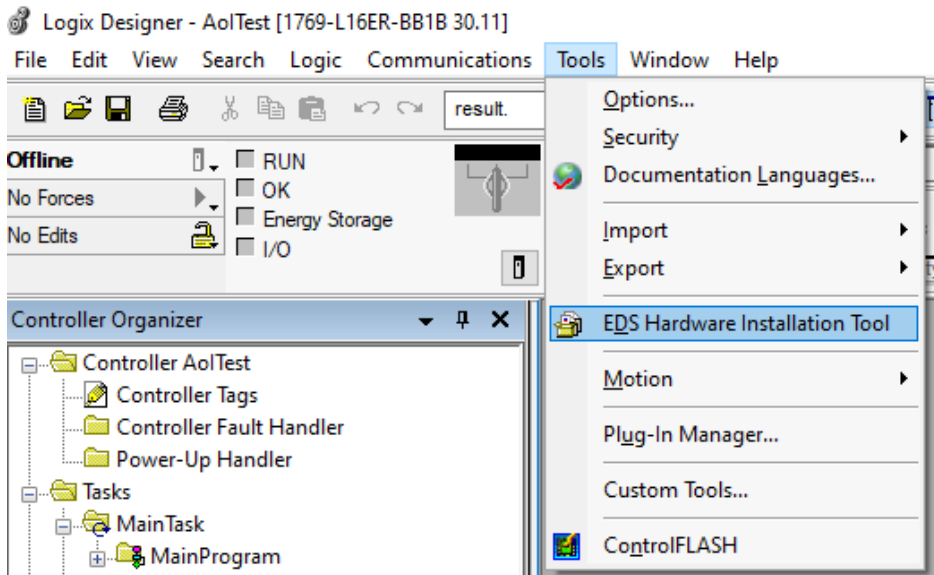
TCVe2 Setup in Studio 5000

This section describes the process of configuring Studio 5000 to be able to use the TCVe2 over EtherNet/IP with EDS file and add-on instructions of the TCVe2.

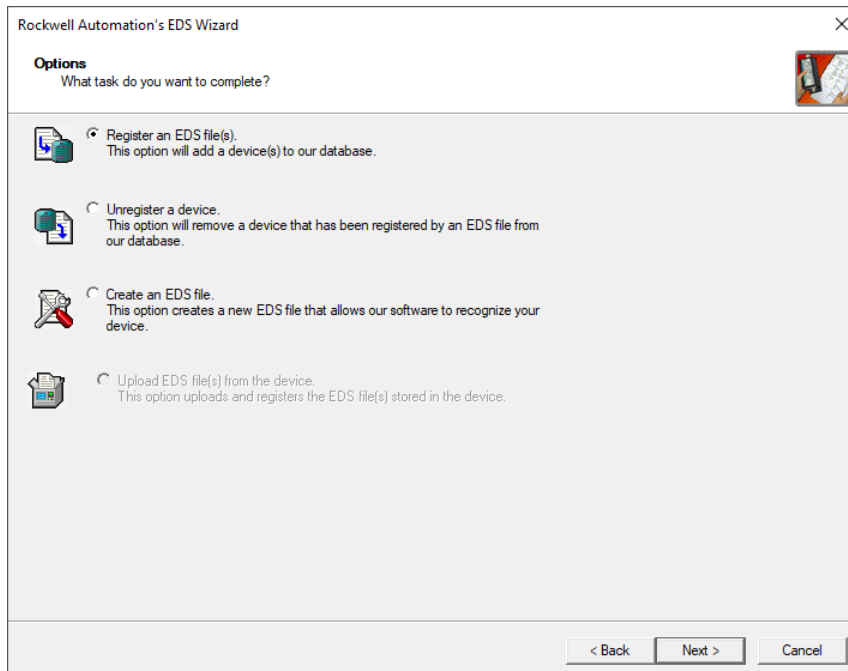
Importing the EDS file

For the first project using a TCVe2 on a given developer machine, you will need to import the EDS file into Studio 5000. Further projects on the same machine should be able to skip to Project Setup.

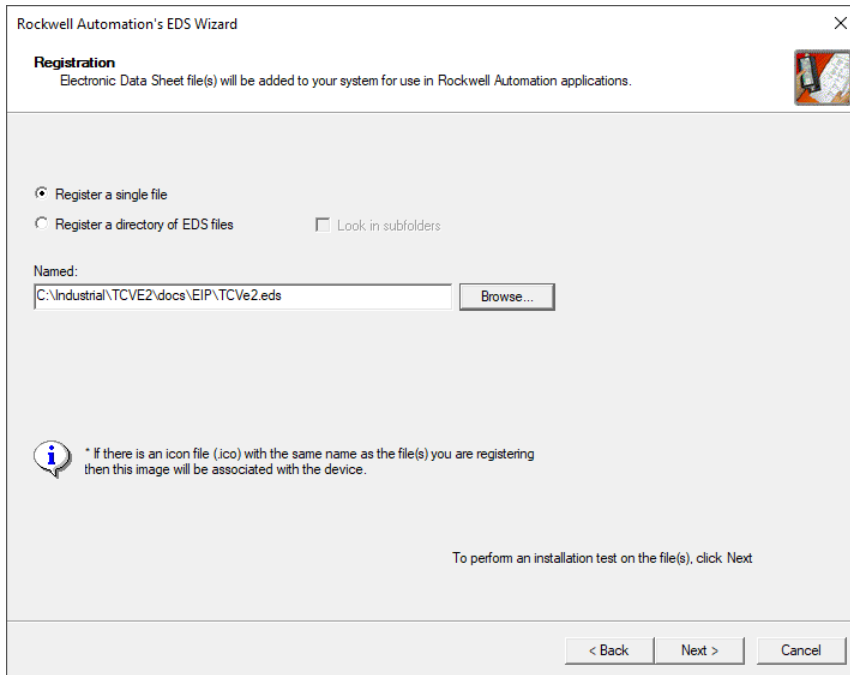
1. Start the EDS Hardware Installation Tool



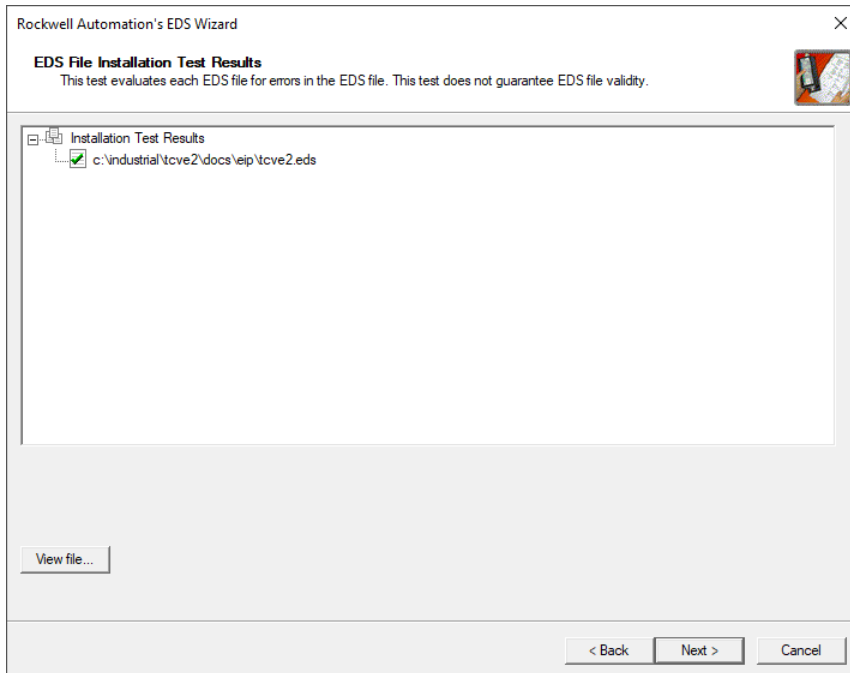
2. Select Register an EDS file and press Next.



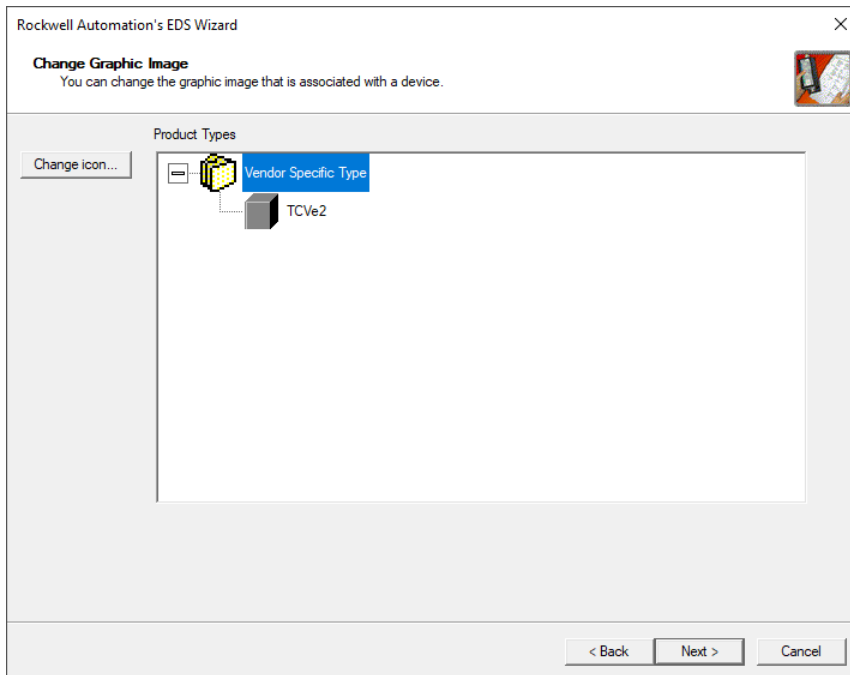
3. Select the EDS file to load by browsing to the location where you saved the file and selecting the TCVe2.ed5 file.



4. The file should be parsed successfully. Press Next.



5. Ensure that the TCVe2 device is shown on the next screen and Press Next.

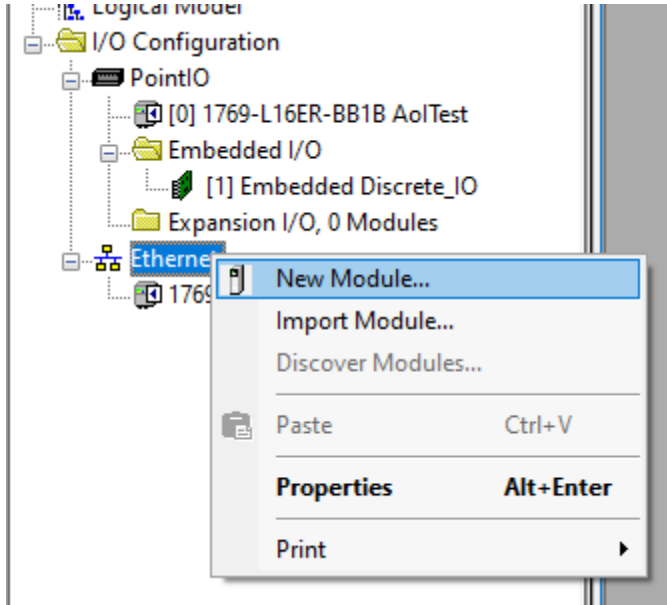


6. Follow the remainder of the on-screen prompts to complete the installation.

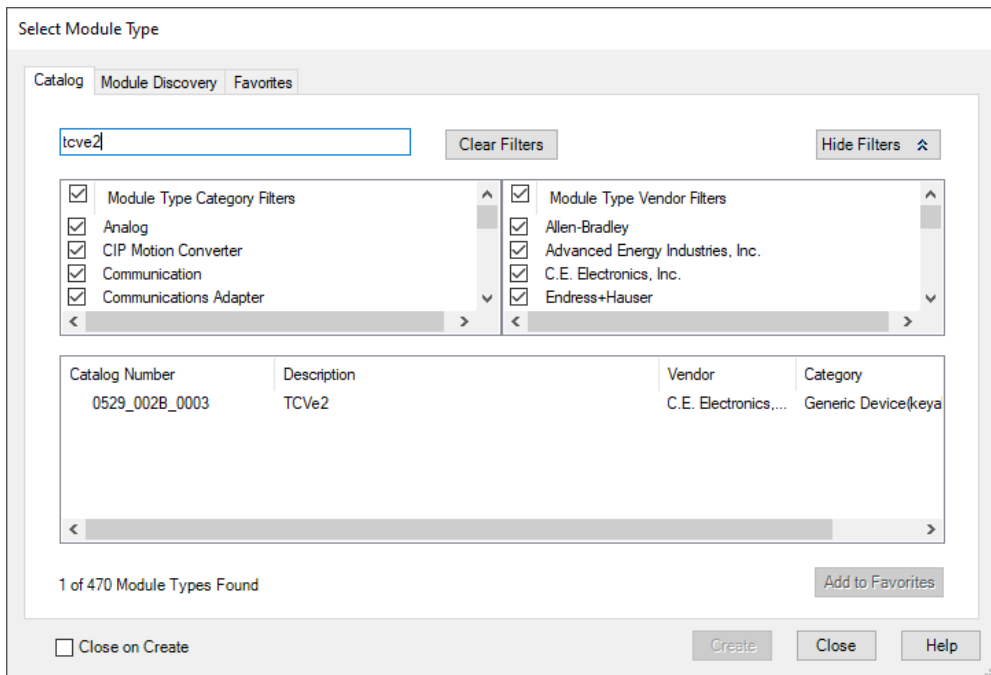
Project Setup

In each project, you will need to create and Ethernet module for the TCVe2, configure it, and add logic to handle the data.

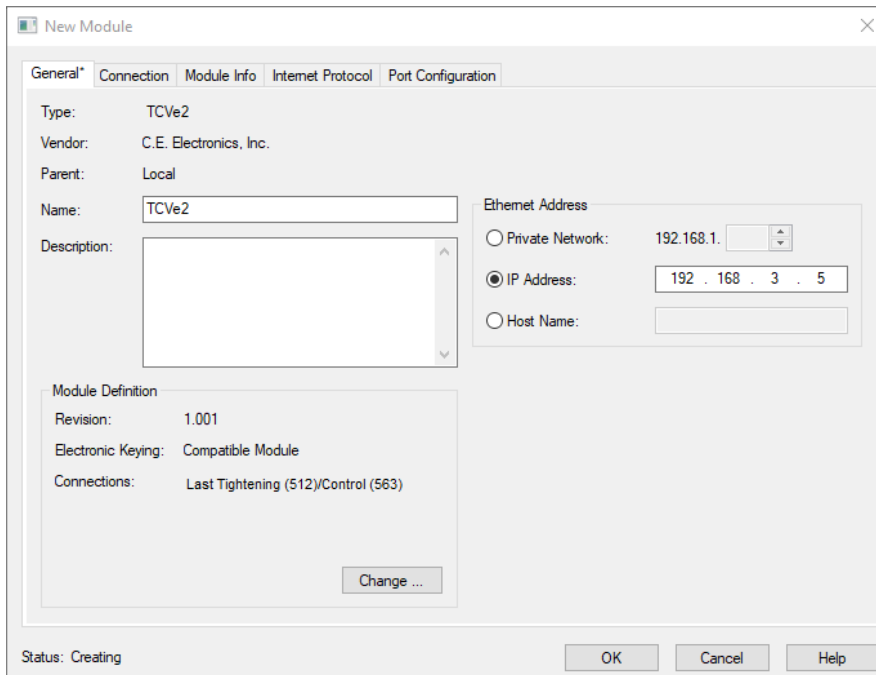
1. Create a new Ethernet module.



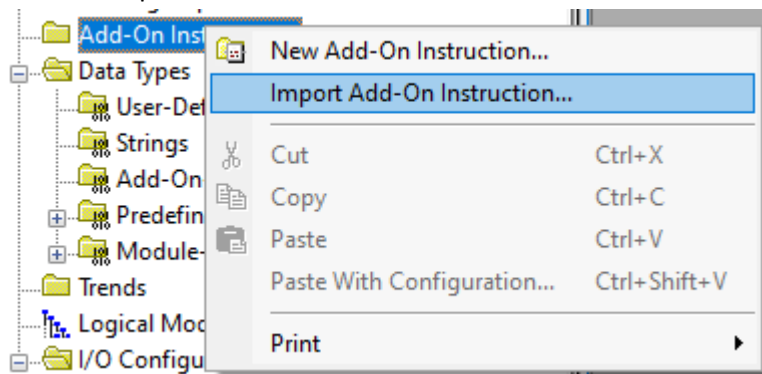
2. Select the TCVe2 from the module list.



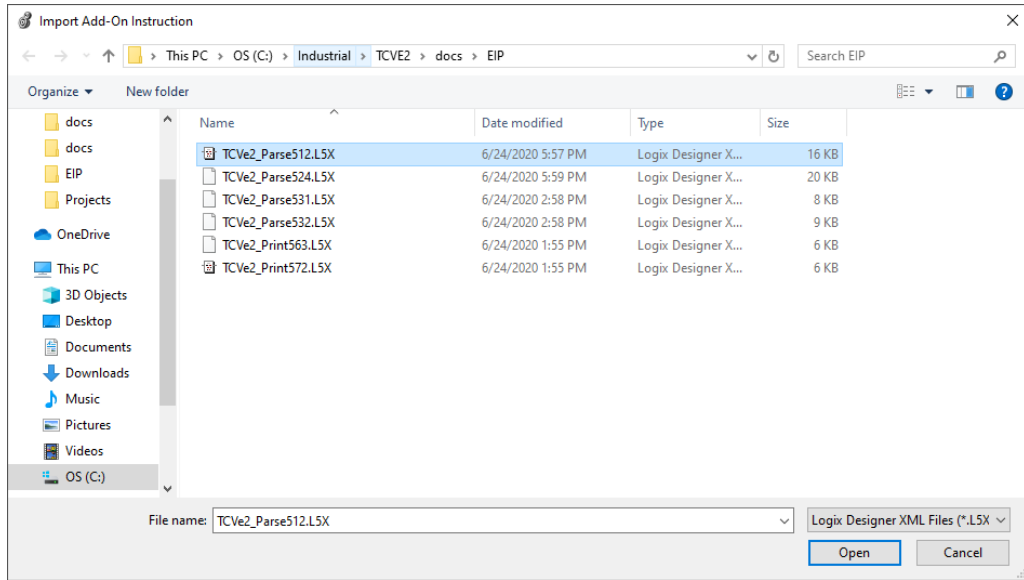
3. Set the name, description, and IP address as needed for your project.



4. Press **Change...** to select the connection to be used with the TCVe2. There are four different connections:
 - a. Last Tightening + Control (no VIN)
 - b. Last Tightening + Control (with VIN)
 - c. Current Status + Control (no VIN)
 - d. Current Status + Control (with VIN)
5. Import the add-on instructions associated with the assembly instances used by the connection you chose. The numbers in parentheses (512 and 563 in this example) indicate which AOIs you will need.
 - a. Start the import



b. Select the first add-on instruction file

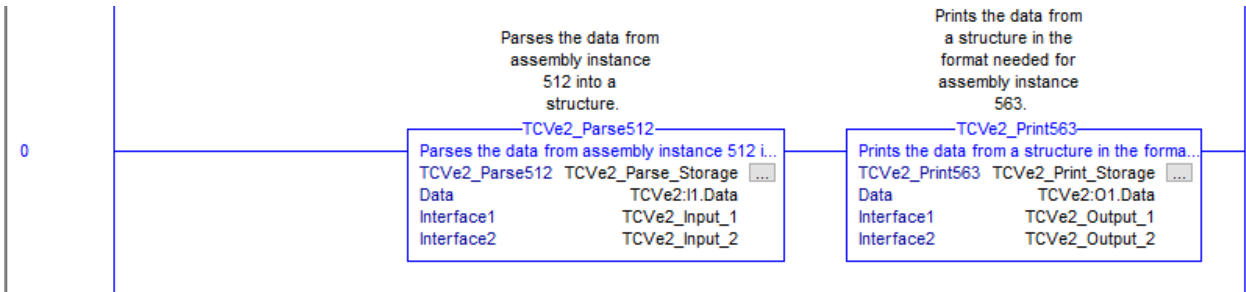


c. Repeat steps a and b for the second add-on instruction

6. Each add-on instruction imported will create its add-on processing structure along with a structure representing the parsed data in the EtherNet/IP assembly instance. Use these structures to create tags for the input and output data. You will need to create an instance of the processing structure and 2 instances of the data structure.

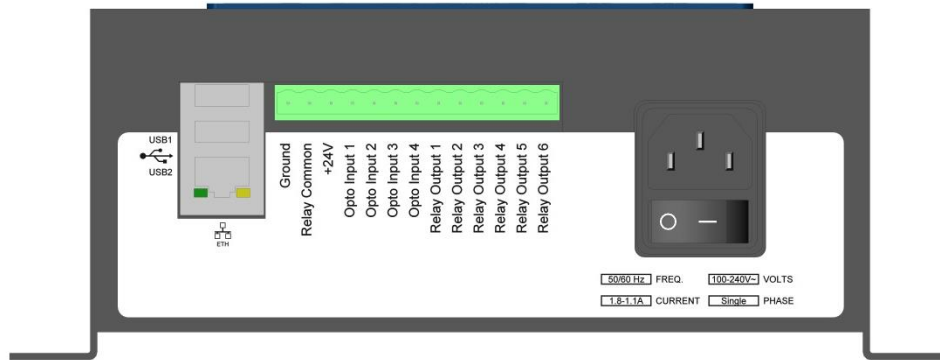
Name	Usage	Alias For	Base Tag	Data Type	Des
+TCVe2_Input_1	Local			TCVe2_512	
+TCVe2_Input_2	Local			TCVe2_512	
+TCVe2_Output_1	Local			TCVe2_563	
+TCVe2_Output_2	Local			TCVe2_563	
+TCVe2_Parse_Storage	Local			TCVe2_Parse512	Parse
+TCVe2_Print_Storage	Local			TCVe2_Print563	Print

7. Add the add-on instructions to your logic and select the appropriate parameters for each.



8. You can now set the fields in the output structures to control the TCVe2 and read the fields in the input structures to get data from the TCVe2.

Discrete I/O



The TCV e2 comes with a limited amount of discrete I/O that can be configured for various control and status reporting purposes.

Electrical Specifications

Opto-Isolated Inputs

Item	Value			Unit
	Min	Typ	Max	
Voltage	3.3	24	24	VDC
Current		20	60	mA
Impedance		1.5		k Ω

Relay Outputs

Item		Value	Unit
Dry Contact	Voltage	24	VDC
	Current (each)	2	A
Wet Contact	Voltage	24	VDC (fixed)
	Current (each)	2	A
	Current (total)	2	A (fixed)

Common Points

All inputs share a single common, which is tied to the TCV e2 ground. All relays share a common point. By default, the relays are configured in a dry contact configuration. To convert the unit to wet contacts, connect +24 VDC (pin 3) to Relay common (pin 2) on the I/O connector. This makes all outputs wet contacts; the unit does not support configurations with some wet and some dry contacts.

Assigning I/O Functions

The inputs and outputs ship in a default configuration which are shown in the following table. To configure the inputs and outputs differently, you will need to use the Global Manager PC software application.

I/O Label	I/O Function
Opto Input 1	Suspend Interface 1
Opto Input 2	Batch Reset Interface 1
Opto Input 3	Suspend Interface 2
Opto Input 4	Batch Reset Interface 2
Relay Output 1	Interface 1 Cycle
Relay Output 2	Interface 1 Reject
Relay Output 3	Interface 1 Batch
Relay Output 4	Interface 2 Cycle
Relay Output 5	Interface 2 Reject
Relay Output 6	Interface 2 Batch

Data Management

The TCV e2 can download results and event logs to and upload firmware from a USB drive. When a USB drive is plugged into USB1 of the unit, it will switch from whatever screen it is on to the USB Menu. The USB2 port does not support USB drives. Pressing ▲ or ▼ cycles through these screens:

- Read from USB
- Write to USB
- Barcode reader

Read/Write

Firmware (read only)

Firmware files have the extension “.bec”. If a file is found, the unit will validate the file before uploading it. If a firmware file is uploaded, the unit will reprogram itself with the new firmware and reboot.

Tightenings

One results file per interface will be saved to the USB drive as “res1.csv” and “res2.csv”. These files contain all tightening results saved in the unit’s memory for the interface in a CSV format.

Configuration

The configuration file will be saved to the USB drive with extension “g4t”. This file contains all the configuration settings for the unit, including tools, parameters, jobs, qualifier and network settings, and I/O settings. This file can be loaded into the PC application for viewing or editing

Network Log

The network log file will be saved to the USB drive as net.g4n”. This file contains the network log data in a binary format. This log does not persist across power cycles.

Barcode Reader

The USB ports on the TCV e2 provide barcode reading functionality. The barcode functionality of the TCV e2 was developed and tested against the Symbol LS2208 bar code reader, which uses CODE39 bar codes. This format starts and ends all bar codes with an asterisk “*”.

The TCV e2 further specifies a format of data within the bar code. The data is grouped into sections, separated by a percent symbol “%”. If the bar code data does not start and end with a percent symbol, it will be treated as a VIN number. The general structure for a command bar code is:

%<command>%<data>%

A VIN bar code is:

<VIN number>

The remainder of this chapter lists the bar code commands provided by the unit. Section headings are the command number followed by the command name.

Interface Selection

A barcode scanner connected to the front USB port reports to Interface 1. The rear port reports to Interface 2.

1. Cell ID

This command sets the Cell ID number reported by the unit in ACOP result messages.

Data: number of up to 4 digits (0-9999)

Example:

%01%4305%

This bar code would set the Cell ID of the unit to 4305.

2. Channel ID

This command sets the Channel ID number reported by the unit in ACOP result messages.

Data: number of up to 2 digits (0-99)

Example:

%02%19%

This bar code would set the Channel ID of the unit to 19.

3. Controller Name

This command sets the Controller Name of the unit.

Data: up to 25 characters

Example:

%03%air - bag%

This bar code would set the Controller name of the unit to "air - bag".

4. VIN

This command sets the VIN or Identifier part 1 (VIN characters 1-25) reported by the unit in tightening result messages, the ACOP MID 0052 Vehicle ID Number, and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

%04%VIN1234567%

As mentioned above, a bar code is assumed to be a VIN number if the data is not in the command format. As such, the same VIN could be provided as:

VIN1234567

6. Identifier part 2

This command sets the Identifier part 2 (VIN characters 26-50) reported by the unit in tightening result messages and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

%06%B23FJ9S3%

7. Identifier part 3

This command sets the Identifier part 3 (VIN characters 51-75) reported by the unit in tightening result messages and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

%07%GU49CN53%

8. Identifier part 4

This command sets the Identifier part 4 (VIN characters 76-100) reported by the unit in tightening result messages and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

%08%RU39CN53%

10. Reset batch count

This command resets the count of the running parameter on the interface corresponding to the barcode reader.

Data: none

Example:

%10%%

11. Start Parameter

This command instructs the unit to start a parameter. Any other running parameter or job will be stopped before starting the new parameter.

Data: number of up to 3 digits specifying the parameter number to select (1-100)

Example:

%11%73%

This bar code would select parameter 73.

13. Stop

This command instructs the unit to stop any running parameter or job.

Data: none

Example:

%13%%

30. Reset parameter batch count

This command resets the count of the specified parameter. If the specified parameter is not running, this bar code is ignored.

Data: number of up to 3 digits specifying the parameter number to reset the batch (1-100)

Example:

%30%35%

This bar code would reset the current batch count of parameter 35.

To reset all batch counts at once, use command 10. Reset batch count.

Firmware Updates

1. If the firmware update file was emailed to you, put it in the root folder of a USB drive. If you received the firmware update already on a USB drive, proceed to step 2.
2. Turn on power to the unit and let it go through the startup process.
3. Insert the USB drive into the front connector on the unit. This is USB1.
4. Wait for the unit to detect the USB drive. (This may take several seconds.) When the drive is detected, the display will show “USB Detected/Read from USB”. If the unit does not detect the drive, contact support. If the update was emailed to you, you may also try another USB drive.

USB Detected
Read from USB

5. Press ENT. When the unit changes to the “Finding Files” screen, it will search the root folder of the drive for the firmware update.

Read from USB
Finding files

6. If no valid update file is found, the screen will show “No file found”.

Read from USB
No file found

7. Otherwise, press ► to select “Firmware”, then press ENT to start the upload. The unit will display the current percentage loaded as it uploads the file.

Read from USB
All

Read from USB
All

Read from USB
Firmware xx%

8. When the upload is complete, the unit will restart. The front panel will light up and display the version number. Once the unit has completed the startup process, you may remove the USB drive.

Product Specification

Dimensions

	English		Metric	
	Value	Unit	Value	Unit
Height	9.16	In	233	mm
Width	8.75	In	222	mm
Depth	3.26	In	83	mm

Radio Information

Item	Value
Indoor/Urban range	300 ft./100 m
Outdoor line-of-sight range	1 mile / 1500 m
Transmit power	60 mW (18 dBm) conducted 100 mW (20 dBm) EIRP
Receiver sensitivity	-100 dBm (1% packet error)
FCC Part 15.247	OUR-XBEEPRO
Industry Canada	4214A XBEEPRO
Europe(CE)	ETSI

FCC Statement

Contains FCC ID: OUR-XBEE/OUR-XBEEPRO

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

Channel Frequencies

Channel	Frequency (GHz)
1	2.410
2	2.415
3	2.420
4	2.425
5	2.430
6	2.435
7	2.440
8	2.445
9	2.450
10	2.455
11	2.460
12	2.465