



Machine Controls Traceability Interface  
Labview TCP Adaptor

Global Common

SD-1058

ISSUED  
REVISED

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## 1 Scope and Purpose

### 1.1 Scope

- 1.1.1 This specification describes the traceability application configuration and Labview design requirements for Nexteer Automotive facilities utilizing Nexteer's traceability System.
- 1.1.2 This specification applies to the equipment requiring traceability communication for process flow, electronic error proofing, and data collection. Refer to the Manufacturing Engineer's written specification for details regarding traceability requirements.
- 1.1.3 This specification has associated Labview VIs and screens that reflect the requirements of this specification. In addition, the Labview VIs provide the required examples that may be applied to new equipment designs. All files are available at [www.nexteerdatabase.com](http://www.nexteerdatabase.com).
- 1.1.4 The use of the word "shall" indicate requirements and the use of the word "should" indicates recommendations. The use of the word "may" indicates permission or allowance and the use of the word "can" indicate a possibility.

### 1.2 Purpose and Objectives

- 1.2.1 The purpose of this specification is to provide Nexteer requirements and guidance to Original Equipment Manufacturers (OEM) for use in their Labview logic designs to interface with Nexteer's traceability System.
- 1.2.2 The objective of this specification is to provide common, maintainable, and cost-effective traceability controls systems that enhance both the productivity and ease-of-use of the system, while ensuring the quality of Nexteer products produced. The application of this specification will result in common traceability controls systems.
- 1.2.3 The Nexteer traceability systems are integrated at the machine, cell (group of machines), or asynchronous assembly line level. Depending on the configuration of the traceability system, it may cover multiple cells and / or multiple asynchronous assembly lines.
- 1.2.4 The Nexteer traceability system uses a traceability computer, which runs the Nexteer traceability application and interfaces with the SQL Server traceability database.

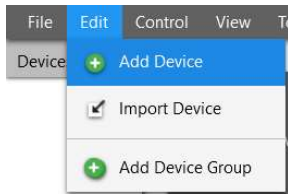
## 2 Labview Traceability

This section describes how to configure TCP traceability plugins and corresponding Labview VI templates.

### 2.1 Traceability Application Configuration

#### 2.1.1 Add a device connection.

1. Create a new device by clicking menu Edit > Add Device , or by right clicking the Devices list on the left side of the app and using the context menu.

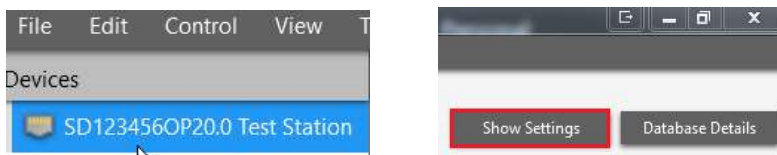


2. A dialog that is used to configure the new device connection will appear.
  - a. Enter a name for the device. (For example: SD123456OP20.0 Test Station)
  - b. Set the device type to TCP Adaptor v2.0 .
  - c. Click OK to finish adding the device connection.

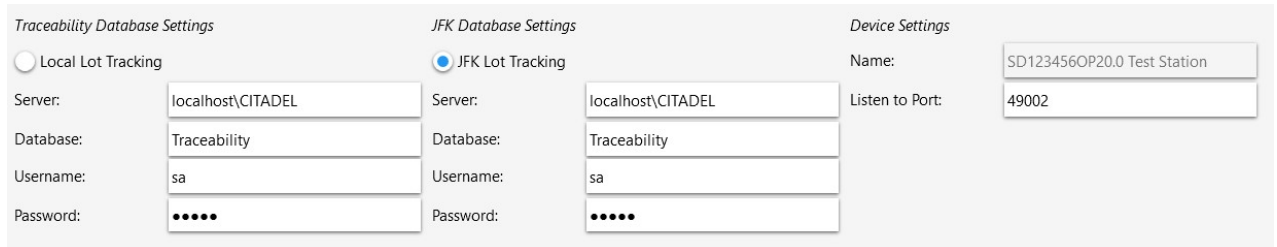


#### 2.1.2 Device settings panel.

1. Ensure that the newly added device connection is selected by clicking on it in the Devices list on the left side of the app. Click the Show Settings button to display the device settings.



- The following panel will be displayed. It is used to configure the database and Labview connection settings.



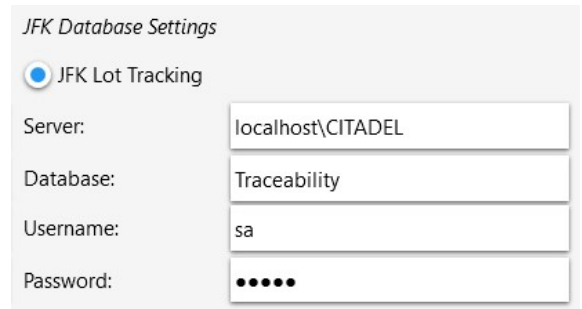
The configuration panel is divided into three sections:

- Traceability Database Settings:** Local Lot Tracking (selected), Server: localhost\CITADEL, Database: Traceability, Username: sa, Password: ....
- JFK Database Settings:** JFK Lot Tracking (selected), Server: localhost\CITADEL, Database: Traceability, Username: sa, Password: ....
- Device Settings:** Name: SD123456OP20.0 Test Station, Listen to Port: 49002

### 2.1.3 Configure Database Settings

- Make sure the JFK Lot Tracking is box is checked and set the credentials as follows. (Note: These credentials are for using a Traceability Laptop during MQ1. During MQ2 these settings need to be changed to use the JFK database in the Plant.)

- Server:** The default Microsoft SQL server name is "localhost\CITADEL" which contains the standard Nexteer traceability database.
- Database :** The default database name is "Traceability".
- Username/Password :** This contains the credentials for the authorized database user. The default username is "sa" and password is "admin".



JFK Database Settings

- ☒ JFK Lot Tracking
- Server: localhost\CITADEL
- Database: Traceability
- Username: sa
- Password: ....

### 2.1.5 Set the TCP Port

- Listen to Port :** Set the Listen to Port to a Unique numerical value. This port number will match the port number set in the Labview machine program. Valid range to use is 49000-49999.

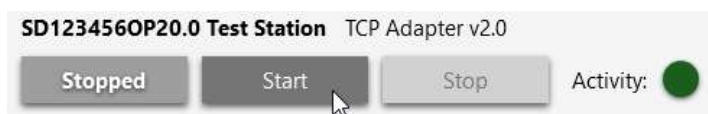


Device Settings

- Name: SD123456OP20.0 Test Station
- Listen to Port: 49002

### 2.1.6 Start the TCP Adaptor Plugin

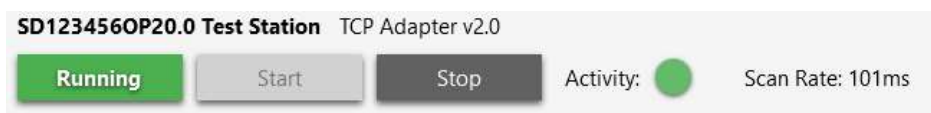
- Select the Start button on the top of the Station



SD123456OP20.0 Test Station TCP Adapter v2.0

Stopped Start Stop Activity: ●

- The Activity light will blink and a Scan Rate will be displayed



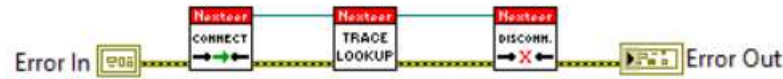
SD123456OP20.0 Test Station TCP Adapter v2.0

Running Start Stop Activity: ● Scan Rate: 101ms

## 2.2 Labview Application Configuration

### 2.2.1 Most applications will utilize three VIs to perform a function.

1. Connect, Traceability Function, and Disconnect.

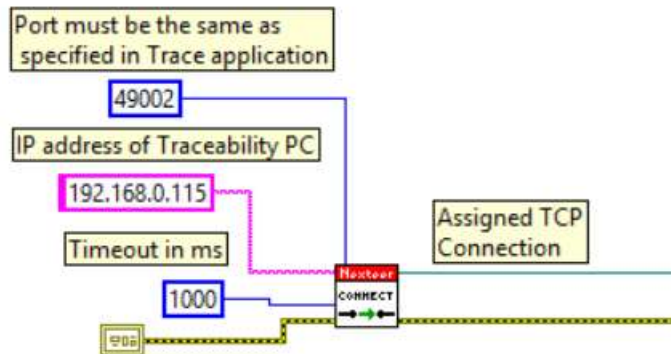


### 2.2.2 The Traceability Functions can be any one of the following.

1. Lookup Function : Used to lookup information from the Plant Database on a specified serial number.
2. In Process Function : Used to send an In-Process record to the Plant Database (Part Status of 9000).
3. Results Function : Used to send Results information and Process Data to the Plant Database.
4. Serial Generation Function : Used to request a unique serial number that can be assign to a component.
5. Ford Serial Generation Function : Used to request a unique serial number that can be assigned to a component specific to our FORD customer.
6. Get LOT Function : Used to lookup information from the Plant Database on a specified JFK LOT serial number. Run this VI at the beginning of cycle to determine if there enough LOT quantity to allow the cycle to start.
7. Decrement LOT Function : Used to decrement the JFK LOT quantity of a LOT component.



### 2.2.3 Step 1: Open TCP connection



1. Port Number (dint): Set port number to match port setting in Traceability Application.
2. Traceability PC IP (string): Set IP address to match IP address of Traceability PC.
3. Timeout (dint): Set Timeout to a default of 1000 ms.
4. Assigned TCP Connection: This wire must be connected to the Traceability Function and Disconnect Vis as shown in the examples.





## 2. VI OUTPUTS

- a. Serial (string): Echo of the serial number sent during request.
- b. Records Found (bool): True if a record was found; otherwise, false.
- c. Record Data (cluster[][]): Data for all records returned by lookup request, each row being a record and, if procedures are unedited, the columns will come in the following order:

Col(0) = Timestamp	Col(1) = PLCID	Col(2) = StationID	Col(3) = DataFunction
Col(4) = Serial	Col(5) = Status	Col(6) = Model	Col(7) = StationName
Col(8) = Name000	Col(9) = Data000	...	

Col (string): The column header from the database.

Val (string): The value for the requested serial that relates to the matched column.

- d. Blacklisted (bool): True if the serial is blacklisted, false otherwise.
- e. Blacklist Data (cluster): Data from the blacklist system, if the part has been added to an active blacklist.

Title (string): Short name for blacklist.

Message (string): Message describing why all serials on this blacklist cannot be used anymore.

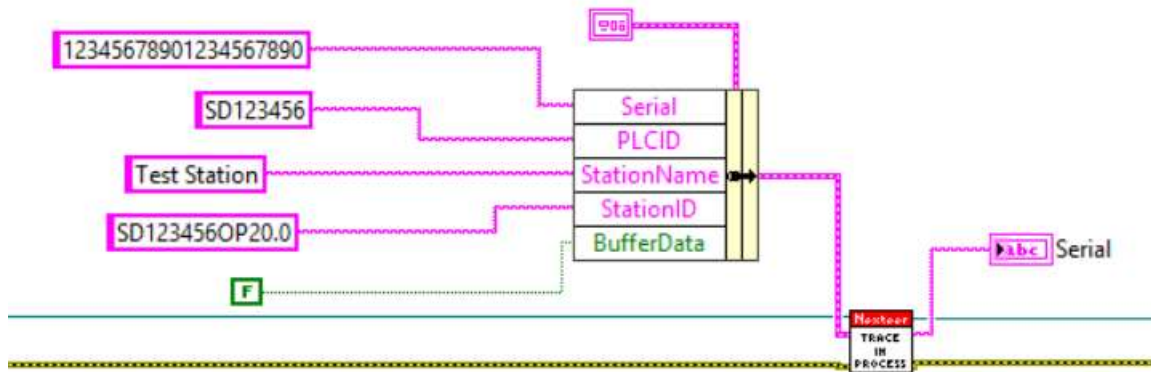
Guid (string): Unique ID for the blacklist.

CreatedBy (string): Name of computer used to create blacklist.

AddedBy (string): Name of computer used to add serial number to blacklist.

AddedTimestamp (string): Time serial was added to blacklist.

## 2.2.5 Step 2: Add Traceability Function (In Process Function)



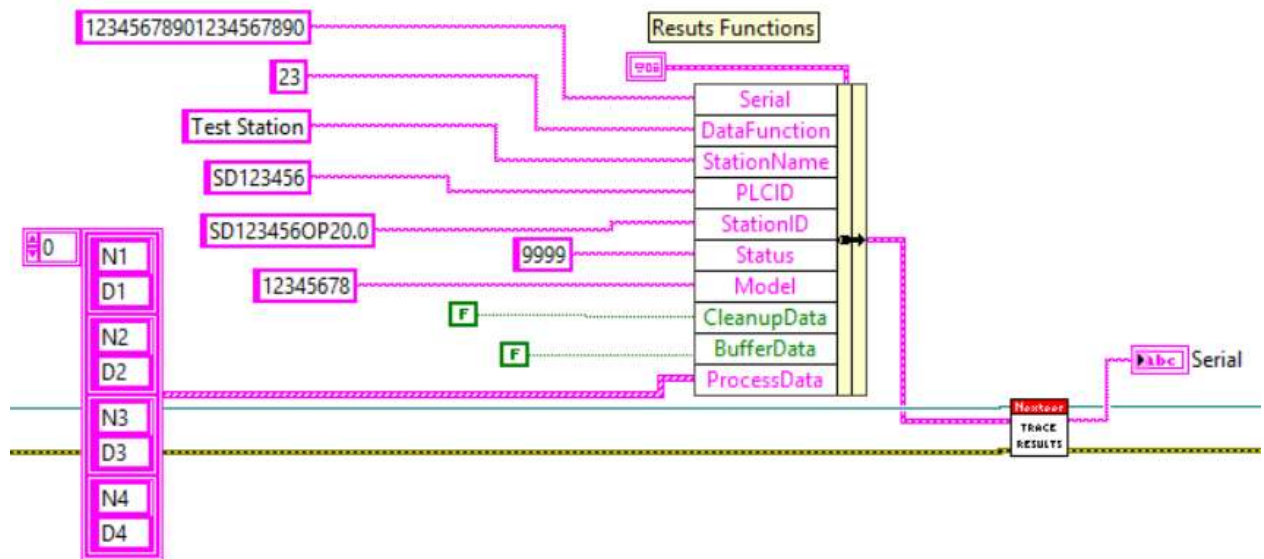
### 1. VI INPUTS

- Serial (string): Serial number you wish to perform an In-Process Function for.
- PLCID (string): PLCID of the station performing this function.
- StationName (string): Name of the station performing this function.
- StationID (string): ID of the station performing this function, this may be used for permissions downstream.
- BufferData (bool): If true, inserts record into `_status_buffer` table as well as the standard tables, used mostly if records will be moved to downstream database.

### 2. VI OUTPUTS

- Serial (string): Echo of the serial number sent during request.

## 2.2.6 Step 2: Add Traceability Function (Results Function)



### 1. VI INPUTS

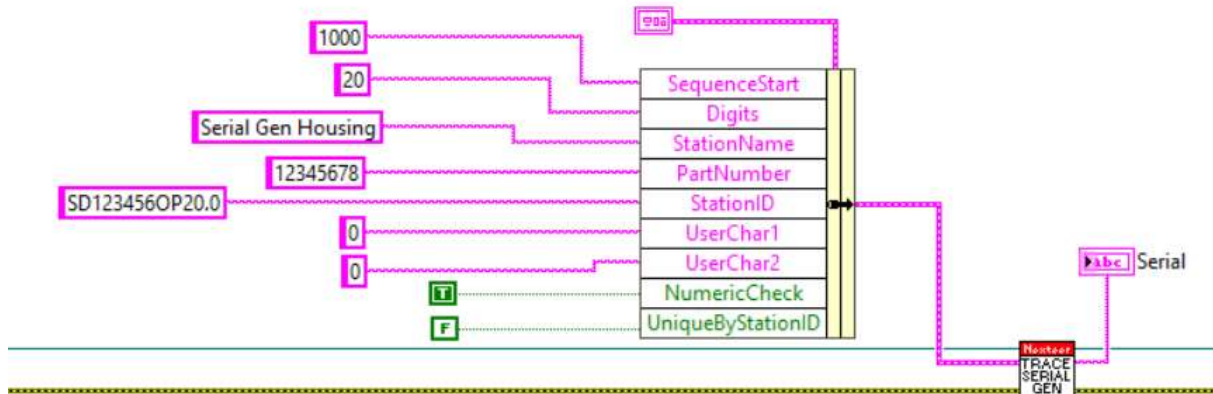
- a. Serial (string): Serial number you wish to perform a Results Function for.
  - b. Data Functions (string):
    - 10 - Write to `_status` table only (150 Name/Data Pairs Max)
    - 12 - Write to `_status` table only Marriage Record (150 Name/Data Pairs Max)
    - 20 - Write header to `_status` table and full record to `_nextrace_data` table (700 Name/Data Pairs Max) (Separate Name/Data Columns)
    - 21 - Write full record to `_nextrace_data` table only (700 Name/Data Pairs Max) (Separate Name/Data Columns)
    - 22 - Write header to `_status` and full record to `_nextrace_data` table (700 Name/Data Pairs Max) (One Name/Data Column interlaced)
    - 23 - Write full record to `_nextrace_data` table only (700 Name/Data Pairs Max) (One Name/Data Column interlaced)
- Note: if Name/Data pairs exceed 700 write another record using a different Station ID ex.  
Ex. If we have a total of 1800 Name/Data Pairs write 700 to Station ID SD12345OP10.0, Write 700 to SD123456OP10.1, and 400 to SD123456OP10.2

- c. StationName (string): Human readable descriptor for station performing this function.
- d. PLCID (string): ID of the machine performing this function.
- e. StationID (string): ID of the station performing this function, this ID may be used for permissions downstream.
- f. Status (string): Status of the part being inserted, 9999 = "Good", 1000 = "Bad".
- g. Model (string): Model of the part being processed.
- h. CleanupData (bool): This function is no longer used. Feature disabled.
- i. BufferData (bool): If true, inserts record into \_status\_buffer table as well as the standard tables, used mostly if records will be moved to downstream database.
- j. ProcessData (cluster[]): Array of all data for part that needs to be inserted.
  - Name (string): Short name describing the corresponding data value.
  - Data (string): Data described by Name.

## 2. VI OUTPUTS

- a. Serial (string): Echo of the serial number sent during request.

## 2.2.7 Step 2: Add Traceability Function (Nexteer Serial Generation)



### 1. VI INPUTS

- SequenceStart (string): Initial value for the sequence number.
- Digits (string): Number of digits generated serial number should have, shall be either "20" or "14".
- StationName (string): Human readable descriptor for station performing this function.
- StationID (string): ID of the machine performing this function.
- PartNumber (string): 8-digit number identifying the type of part that serial numbers are being generated for.
- UserChar1 (string): Character as specified in serial number specification.
- UserChar2 (string): Character as specified in serial number specification.
- NumericCheck (bool): If true, runs check to make sure serial number only contains numbers, returns error if non-numbers in serial.
- UniqueByStationID (bool): If true, stores sequence number based on StationID instead of part number.

### j. VI OUTPUTS

- Serial ( string): Generated unique serial number from the Traceability Application.

Note: The Serial number is constructed using the standard 20-character Serial Number format PPPPPPPYYJJSSSSUU where:

- PPPPPPP = 8-digit part number (supplied by the PLC)
- YY = 2-digit year (calculated by the Trace PC)
- JJJ = 3-digit Julian day (calculated by the Trace PC)
- SSSSS = 5-digit sequence (calculated by the Trace PC)
- UU = User specified characters (supplied by the PLC)

- StationName (string): Human readable descriptor for station performing this function.
- Prefix (string): 3-character code globally unique to the Plant.
- StationID (string): ID of the station performing this function.

## 2. VI OUTPUTS

- a. Serial ( string ): Generated unique FORD serial number from the Traceability Application.

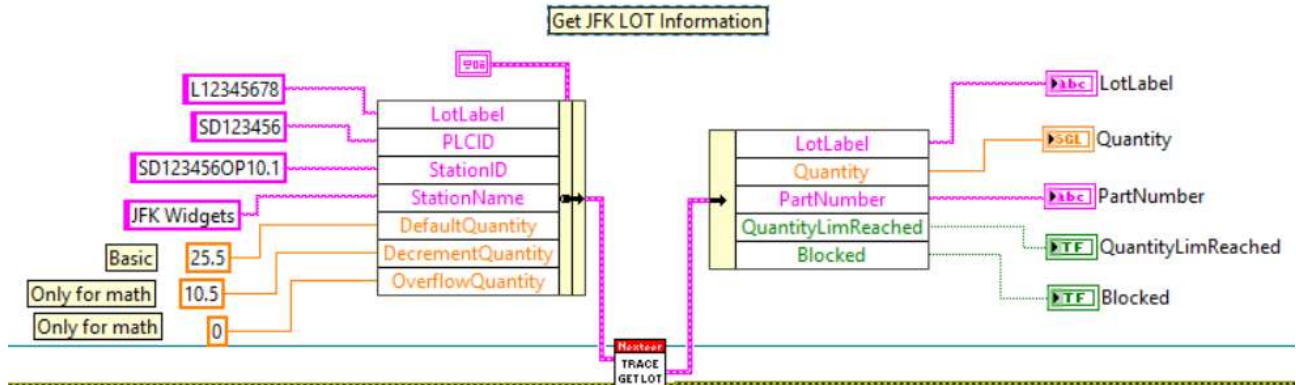
Note: The Serial number is constructed using the standard 8-character Serial Number format PPPSSSSS where:

- PPP = 3-digit plant identifier (supplied by FORD)
- SSSSS = 5-digit base 36 sequence starting at 10000 (calculated by the Trace PC)

The Values should increment like this:

- 10001
- 10002
- 10003
- ...
- 10009
- 1000A
- 1000B
- 1000C
- ...
- 1000X
- 1000Y
- 1000Z
- 10010
- 10011
- 10012
- ....
- ect

## 2.2.9 Step 2: Add Traceability Function (Get JFK LOT Information)



### 1. VI INPUTS

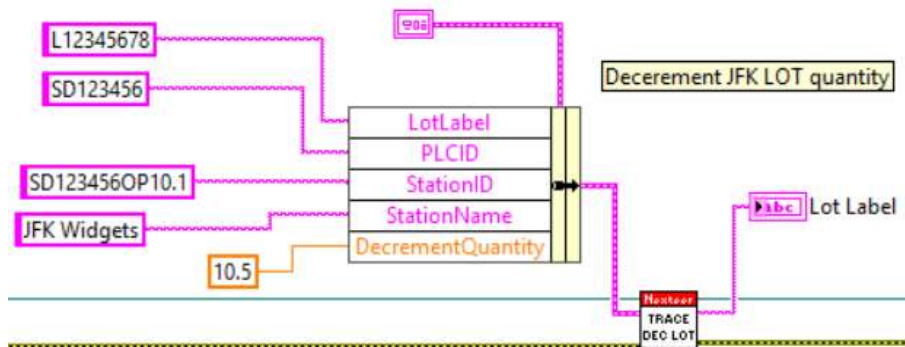
- LotLabel (string): LOT Serial number you wish to look up information on.
- PLCID (string): ID of machine performing this function.
- StationID (string): ID of station performing this function.
- StationName (string): Human readable descriptor for station performing this function.
- DefaultQuantity (real): Not used for JFK LOT Tracking. Quantity is read from JFK Database.
- DecrementQuantity (real): Used for Calculation. Should be the same as DecrementQuantity in DEC LOT VI.
- OverflowQuantity (real): Used for Calculation. Overflow amount allowed before not allowing a cycle.

### h. VI OUTPUTS

- LotLabel (string): Echo of the LOT serial number sent during the request.
- Quantity (real): Remaining quantity left in the current LOT.
- Part Number (string): Part Number of current LOT.
- QuantityLimReached (bool): If the remaining quantity in the LOT minus the Decrement Quantity plus the Overflow Quantity is greater or equal to zero than this will be true. This bit should be used to allow the next cycle to run.
- OverflowQuantity (real): Used for calculation. Overflow amount that is added to the current LOT.



## 2.2.10 Step 2: Add Traceability Function (Decrement JFK LOT Quantity)



### 1. VI INPUTS

- LotLabel (string): LOT Serial number you wish decrement count on.
- PLCID (string): ID of station performing this function.
- StationID (string): ID of station performing this function.
- StationName (string): Human readable descriptor for station performing this function.
- DecrementQuantity (real): Decrements the remaining quantity of the LOT amount by this value.

### 2. VI OUTPUTS

- LotLabel (string): Echo of the LOT serial number sent to the function.

## 2.2.11 Step 3: Close TCP Connection



### 1. VI INPUTS

- Abort Connection (bool): Set this to True.

## RECORD OF REVISIONS

Revision No	Date	Section	Description
001	27AU21	All	Original Approval & Issue Date
002			
003			
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