

PLC as MQTT client

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1. Common application library

You have to use a physical PLC. This will not work with FT Logix Eco.

You can see the results on this video

https://youtu.be/Y6_UtErWmb4






This belongs to Common application library to be download from Rockwell download page.

<https://compatibility.rockwellautomation.com/pages/search.aspx?crumb=117&q=Common%20Application%20Libraries%20-%20April%202023>







The screenshot shows the Rockwell Automation website's search results page. The top navigation bar includes the Rockwell Automation logo and links for Products, Services, Industries & Solutions, Support, and Sales & Partners. Below the navigation bar, there are icons for lightning bolt, RSS, Import, and Views. The main content area displays search results for "Common Application Libraries - April 2023". The results show a single item with the title "Common Application Libraries - April 2023" and a description: "[Download] - Applies to Studio 5000 Application Code Manager 4.03.00, Machine Builder Libraries Current, Power Device Library 3.02.00, Independent Cart Technology Libraries Current, Common Application Libraries Current, Robotics Libraries Current". There are two buttons: a yellow "Download" button and a red "Add To Download Cart" button. On the right side, there is a "Results" sidebar with a list of filters: All (1), Products (0), Downloads (1), Features (0), Related Products (0), Categories (0), Families (0), and Standard Views (0).

DOWNLOADS ?

SELECTIONS COMPARE LEGEND

show all versions	Downloads	35.00.02	34.02.01	34.01.00	34.00.00	33.02.01	33.01.01	33.00.02	32.04.00	32.03.01
Machine Builder Libraries ▲ Current Tested, documented and life-cycle managed library objects and faceplates for use with Studio 5000 Application Code Manager (ACM). Machine Builder Libraries contains application objects for a variety of commonly used functions. Content is available for Logix processors, FactoryTalk View SE/ME, and View Designer.	 <input type="checkbox"/> Select Files <input type="checkbox"/> Firmware Only	✓	✓	✓	✓	✓	✓	✓	✓	✓
Independent Cart Technology Libraries ▲ Current Tested, documented and life-cycle managed Independent Cart Technology Libraries for iTRAK and MagneMotion including MagneMover LITE and QuickStick in Studio 5000 Application Code Manager (ACM). The Independent Cart Library also provides pre-configured status and diagnostic HMI faceplates for FactoryTalk View ME.	 <input type="checkbox"/> Select Files <input type="checkbox"/> Firmware Only	✓	✓	✓	✓	✓	✓	✓	✓	✓
Common Application Libraries ▲ Current Commonly used application library objects and faceplates for use with Studio 5000 Application Code Manager (ACM).	 <input checked="" type="checkbox"/> Select Files <input type="checkbox"/> Firmware Only	✓	✓	✓	✓	✓	✓	✓	✓	✓
Studio 5000 Application Code Manager ▲ 4.03.01  <input type="checkbox"/> Select Files <input type="checkbox"/> Firmware Only	 <input type="checkbox"/> Select Files <input type="checkbox"/> Firmware Only	✓	✓	✓	✓	✓	✓	✓	✓	✓

You will get these content on C:\RA










	ApplicationCodeManagerLibraries	4/14/2023 9:44 PM	File folder	
	GeneralDocuments	4/14/2023 9:33 PM	File folder	
	ReferenceManuals	4/14/2023 9:44 PM	File folder	
	CommonApplicationLibraries_20230415	7/29/2023 5:38 PM	ZIP archive	15,609 KB
	ReadMe	8/24/2022 7:26 PM	Text Document	1 KB
	Setup	8/24/2022 7:25 PM	Windows Command ...	5 KB

First install ACM, then run Setup.

The library will be installed on your ACM environment.

You can find this AOI RM-raC_Opr_MQTT on this library “CommonApplicationLibraries_20230415”

Windows (C:) > RA > Common application libraries > ReferenceManuals

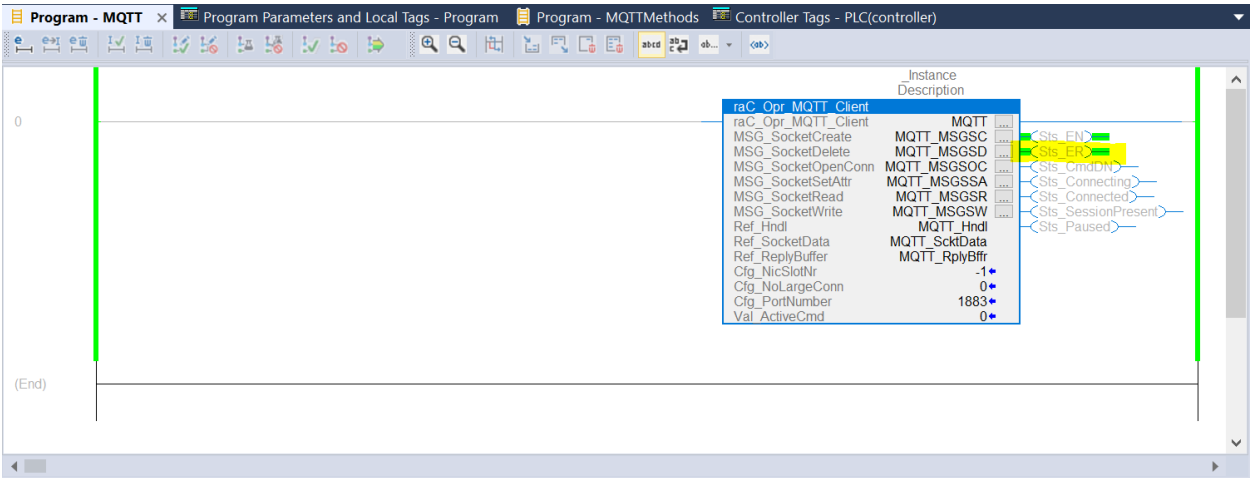
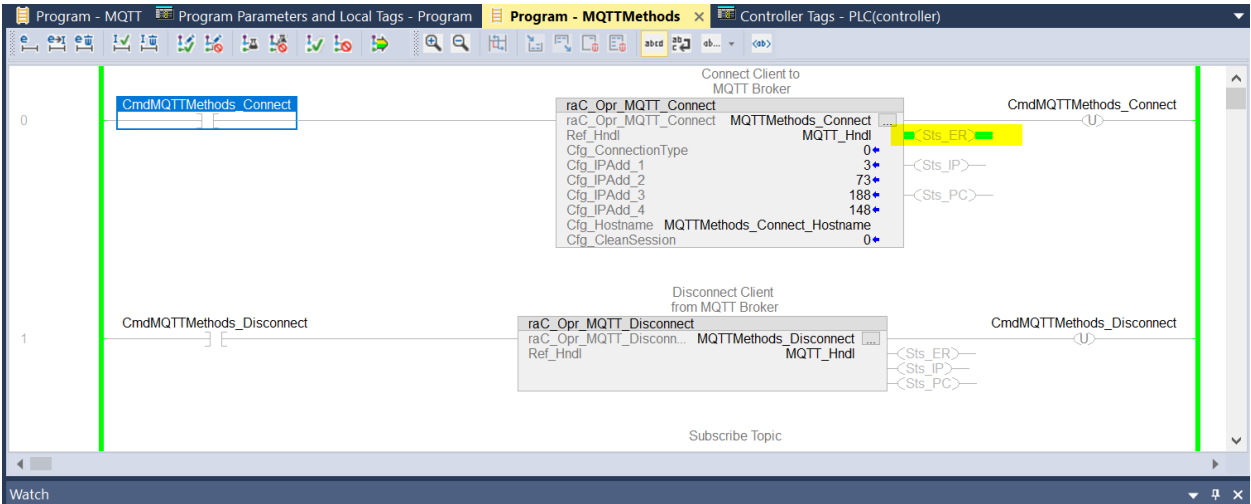
Name	Date modified	Type	Size
 RM-raC_Opr_CapturePV_REAL	8/24/2022 7:05 PM	Documento Adobe A...	607 KB
 RM-raC_Opr_HTTP	4/14/2023 9:08 PM	Documento Adobe A...	1,273 KB
 RM-raC_Opr_MQTT	4/14/2023 9:08 PM	Documento Adobe A...	1,471 KB
 RM-raC_Tec_CnvtLen	8/24/2022 7:05 PM	Documento Adobe A...	630 KB
 RM-raC_Tec_CnvtVel_LinLin	8/24/2022 7:05 PM	Documento Adobe A...	695 KB
 RM-raC_Tec_CnvtVel_LinRot	8/24/2022 7:05 PM	Documento Adobe A...	735 KB
 RM-raC_Tec_DeadTime	8/24/2022 7:05 PM	Documento Adobe A...	762 KB
 RM-raC_Tec_DINTCompress	8/24/2022 7:05 PM	Documento Adobe A...	484 KB
 RM-raC_Tec_DINTExpand	8/24/2022 7:05 PM	Documento Adobe A...	484 KB

Create the program with ACM following the instructions manuals

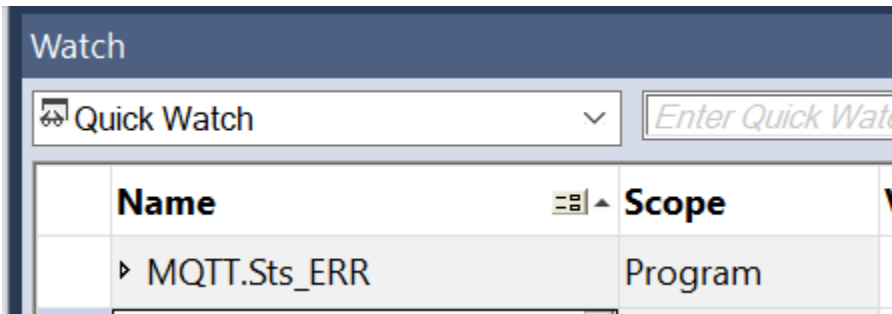
You have to use a physical PLC. This will not work with FT Logix Eco.

When testing the application you will probably get some error codes.

Toggle the Connect contact bit. You get an error



To see the error you can check



First of all is code 1015 “Unable to create Socket” on page 8 of manual

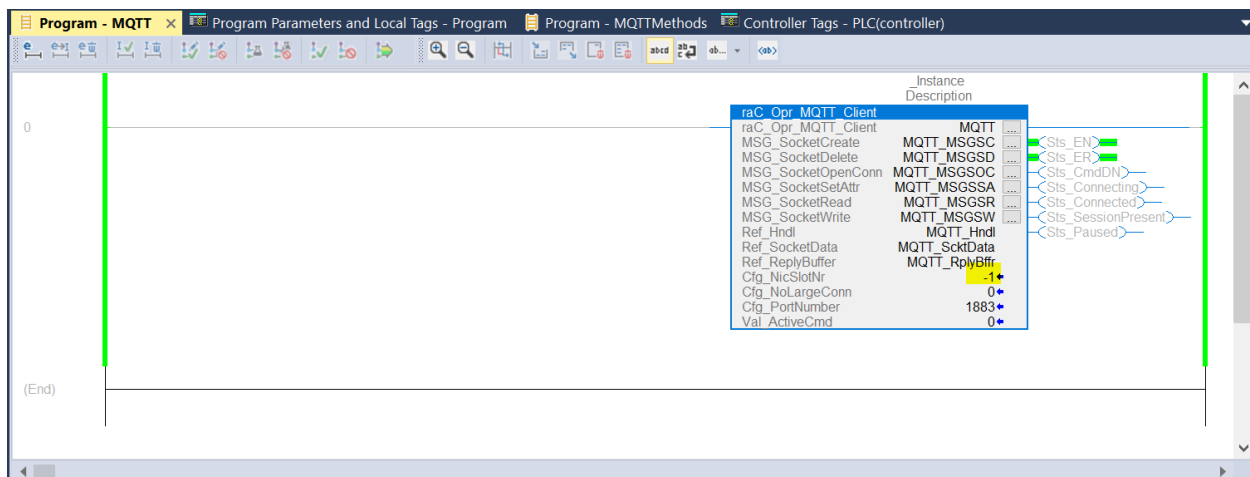
Common Libraries

ERR value	Description
1009	Cfg_KeepAliveTime is greater than 65536 or less than 0
1010	Unsupported command in Cmd_CPT
1011	Command Timed out
1012	Payload too big to send
1014	Received more data than payload can contain
1015	Unable to create socket. Refer Socket Create Message Error Code.
1016	Unable to connect to server. Refer Socket Open Connection Message Error Code.
1017	Failed to write. Refer Socket Write Message Error Code.

We can change the NIC slot number from PLC as stated on page 7

2.5 Input Data

Input	Function / Description	Datatype
Cfg_NicSlotNr	Logix slot number of the sockets capable network interface. For 1769 slot number is 0. For 5069 and 1756-L8x the slot number is -1. When using a 1756-ENxT(R), EWEB this is the slot number of the ethernet card.	DINT



Let's save the project and download to reset the fault.

You can also reset the fault with MQTT_Hndl.Cmd_Reinit, setting to 1

The screenshot shows a PLC program with a variable declaration for `raC_Opr_MQTT_Client` and a Watch window. The variable declaration lists various MQTT-related variables and their values. The Watch window shows the current values of `MQTT.Sts_ERR` and `MQTT_Hndl.Cmd_Reinit`.

Name	Scope	Value	Force Mask	Description
MQTT.Sts_ERR	Program	0		_Instance Description Instruction Error Code - See Instruction Help for Code Definition
MQTT_Hndl.Cmd_Reinit	Program	0		Data Handle Set to reset, hold high to block the MQTT code

Toggle connect bit again

Now you will get another error message 1017

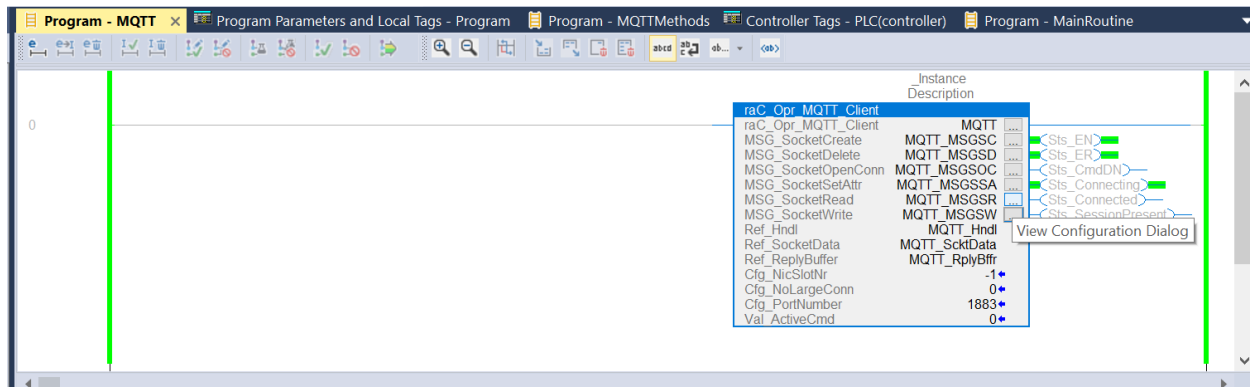
The screenshot shows a PLC program with a variable declaration for `raC_Opr_MQTT_Connect` and a Watch window. The variable declaration lists various MQTT-related variables and their values. The Watch window shows the current values of `MQTT.Sts_ERR` and `MQTT_Hndl`.

Name	Scope	Value	Force Mask	Description
MQTT.Sts_ERR	Program	1017		_Instance Description Instruction Error Code - See Instruction Help for Code Definition

ERR value	Description
1009	Cfg_KeepAliveTime is greater than 65536 or less than 0
1010	Unsupported command in Cmd_CPT
1011	Command Timed out
1012	Payload too big to send
1014	Received more data than payload can contain
1015	Unable to create socket. Refer Socket Create Message Error Code.
1016	Unable to connect to server. Refer Socket Open Connection Message Error Code.
1017	Failed to write. Refer Socket Write Message Error Code.

Next you have to setup read and write socket path

Hardware			MQTT Client Cfg		Socket Read and Write MSG Setting			
Controller	Backplane CommCard	CommCard SlotNumber	NICSlotNr	NoLargeConn	Path	Connected	Cached	Large Connection
1756-L8x	Not Used	Not Applicable	-1	0	THIS	0	0	0
1756-L8x	1756-Enxx	6	6	0	1,6	1	1	1
1756-L8x	1756-EWEB	6	6	1	1,6	0	0	0
1756-L7x	1756-ENxx	6	6	0	1,6	1	1	1
1756-L7x	1756-EWEB	6	6	1	1,6	0	0	0
5069	Not Applicable	NA	-1	0	THIS	0	0	0
1769	Not Applicable	NA	0	1	1,0	0	0	0



Message Configuration - MQTT_MSGSR



Configuration
Communication
Tag

☒ Path: THIS Browse...
THIS
☐ Broadcast: ▼

Communication Method
☒ CIP ☐ DH+ Channel: 'A' ▼ Destination Link: 0 ▲▼
☐ CIP With Source ID Source Link: 0 ▲▼ Destination Node: 0 ▲▼ (Octal)

☐ Connected ☐ Cache Connections + ☐ Large Connection

☐ Enable ☐ Enable Waiting ☐ Start ☐ Done Done Length: 0
☒ Error Code: 16#00ff Extended Error Code: 16#0000_0036 ☐ Timed Out +
Error Path: THIS
Error Text: General Error

OK Cancel Apply Help

Message Configuration - MQTT_MSGSW ✕

Configuration Communication Tag

☒ Path:

THIS

☐ Broadcast:

Communication Method

☒ CIP ☐ DH+ Channel: Destination Link:

☐ CIP With Source ID Source Link: Destination Node: (Octal)

☐ Connected ☐ Cache Connections ☐ Large Connection

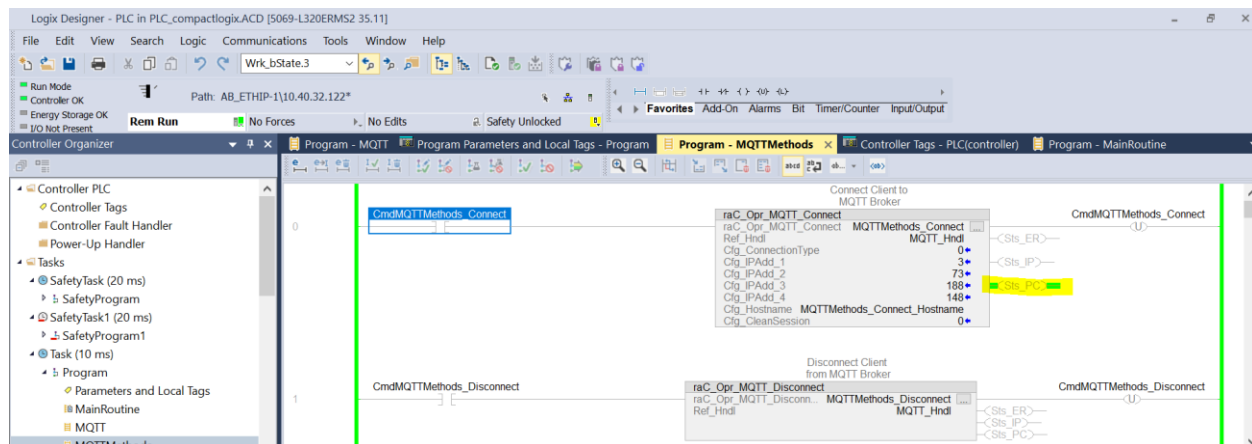
☐ Enable ☐ Enable Waiting ☐ Start ☒ Done Done Length: 4

☐ Error Code: Extended Error Code: ☐ Timed Out

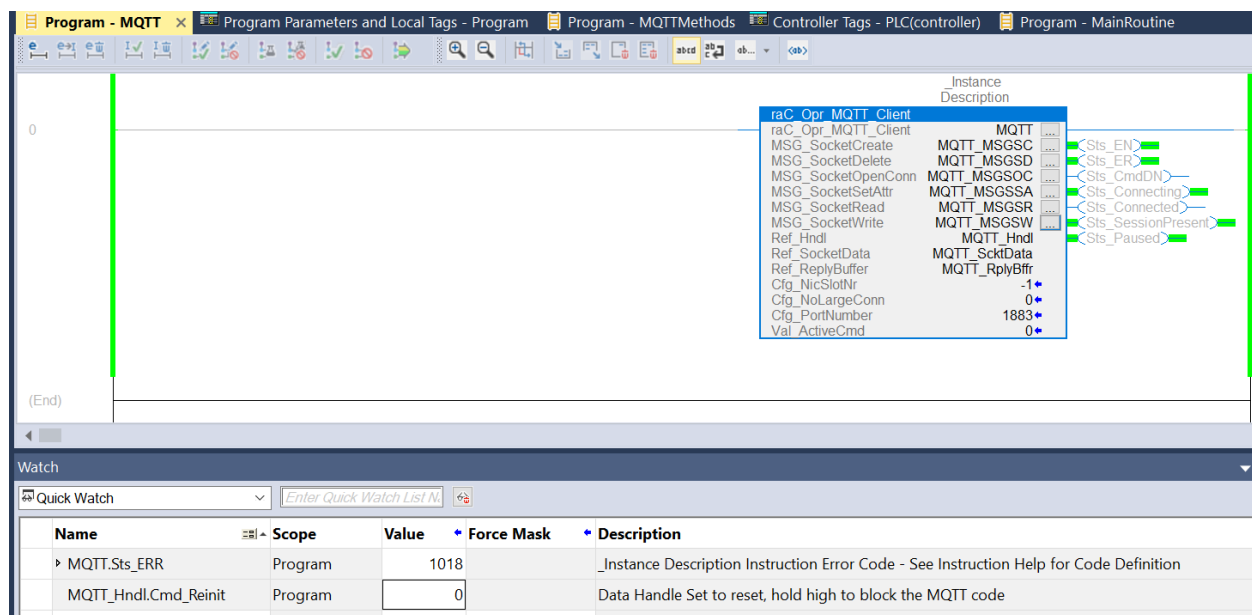
Error Path: THIS

Error Text:

Success on connecting



But error



Name	Scope	Value	Force Mask	Description
MQTT.Sts_ERR	Program	1018		_Instance Description Instruction Error Code - See Instruction Help for Code Definition
MQTT_HndI.Cmd_Reinit	Program	0		Data Handle Set to reset, hold high to block the MQTT code

1016	Unable to connect to server. Refer Socket Open Connection Message Error Code.
1017	Failed to write. Refer Socket Write Message Error Code.
1018	Failed to read. Refer Socket Read Message Error Code.
1019	Error in stream, disconnecting
1020	Unable to set socket buffer size. Refer Socket Set Attribute Message Error Code.

Message Configuration - MQTT_MSGSR

Configuration Communication Tag

Message Type: CIP Generic

Service Type: ReadSocket

Source Element: ?TT_ScktData.Src[0]

Service Code: 4d (Hex) Class: 342 (Hex) Source Length: 8 (Bytes)

Instance: 27277 Attribute: 0 (Hex) Destination Element: ?TT_ScktData.Dst[0]

New Tag...

☐ Enable ☐ Enable Waiting ☐ Start ☐ Done Done Length: 0

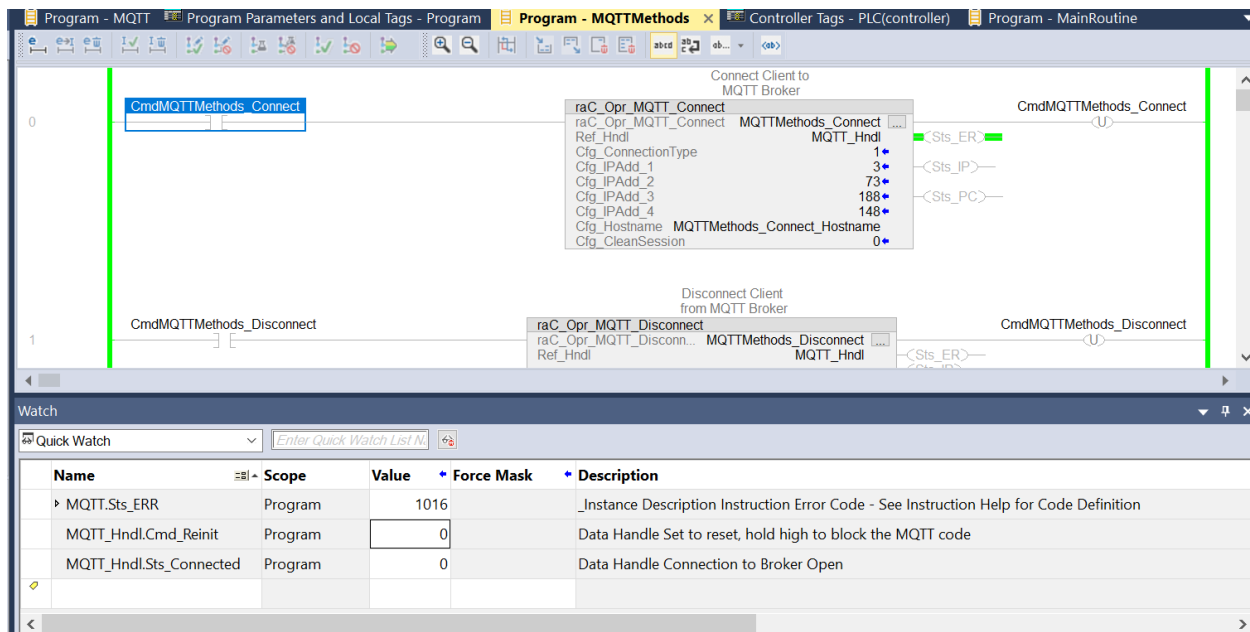
☒ Error Code: 16#00ff Extended Error Code: 16#0000_0036 ☐ Timed Out

Error Path: THIS

Error Text: General Error

OK Cancel Apply Help

Let's try Connection type to use server address name instead of server address IP.



Common Libraries

ERR value	Description
1009	Cfg_KeepAliveTime is greater than 65536 or less than 0
1010	Unsupported command in Cmd_CPT
1011	Command Timed out
1012	Payload too big to send
1014	Received more data than payload can contain
1015	Unable to create socket. Refer Socket Create Message Error Code.
1016	Unable to connect to server. Refer Socket Open Connection Message Error Code.

Let's try with a local broker

2. Mosquitto local broker

You have to use a physical PLC. This will not work with FT Logix Eco.

Let's use the wifi IP address of computer as the mosquito local broker

For instance

10.40.32.117

Let's use this config file

```
listener 1883 10.40.32.117
allow_anonymous true
```

Let's start mosquito

```
mosquitto -c localip.conf -v
```

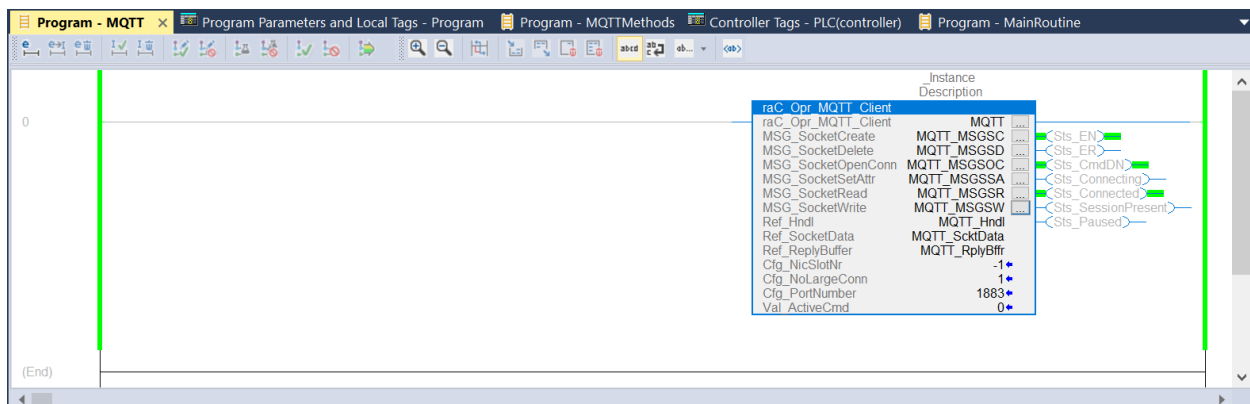
```

C:\> Command Prompt - mosquitto -c localip.conf -v

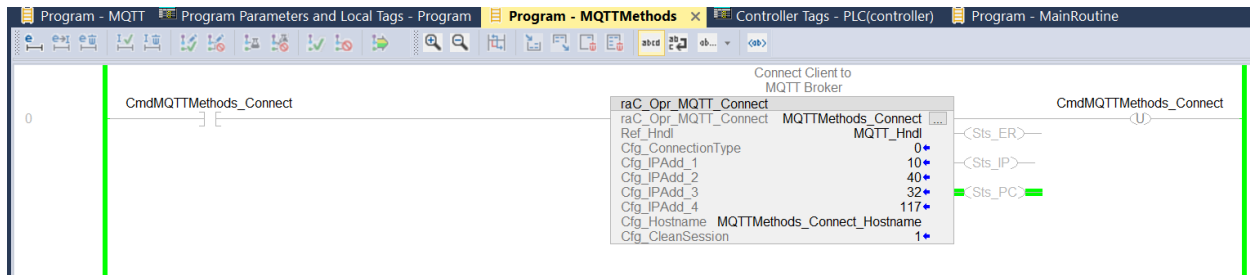
C:\> mosquitto -c localip.conf -v
1693317758: mosquitto version 2.0.10 starting
1693317758: Config loaded from localip.conf.
1693317758: Opening ipv4 listen socket on port 1883.
1693317758: mosquitto version 2.0.10 running
1693317788: New connection from 10.40.32.117:62236 on port 1883.
1693317788: New client connected from 10.40.32.117:62236 as nodered_dd5d462a7517895e (p2, c1, k60).
1693317788: No will message specified.
1693317788: Sending CONNACK to nodered_dd5d462a7517895e (0, 0)
1693317788: Received SUBSCRIBE from nodered_dd5d462a7517895e
1693317788:   plc (QoS 2)
1693317788: nodered_dd5d462a7517895e 2 plc
1693317788: Sending SUBACK to nodered_dd5d462a7517895e
1693317796: Received PUBLISH from nodered_dd5d462a7517895e (d0, q0, r0, m0, 'plc', ... (11 bytes))
1693317796: Sending PUBLISH to nodered_dd5d462a7517895e (d0, q0, r0, m0, 'plc', ... (11 bytes))
1693317856: Received PINGREQ from nodered_dd5d462a7517895e
1693317856: Sending PINGRESP to nodered_dd5d462a7517895e
1693317872: New connection from 10.40.32.122:56181 on port 1883.
1693317916: Received PINGREQ from nodered_dd5d462a7517895e
1693317916: Sending PINGRESP to nodered_dd5d462a7517895e
1693317962: Client <unknown> has exceeded timeout, disconnecting.
1693317976: Received PINGREQ from nodered_dd5d462a7517895e
1693317976: Sending PINGRESP to nodered_dd5d462a7517895e
1693318036: Received PINGREQ from nodered_dd5d462a7517895e
1693318036: Sending PINGRESP to nodered_dd5d462a7517895e
1693318069: New connection from 10.40.32.122:62886 on port 1883.
1693318069: New client connected from 10.40.32.122:62886 as MQTT (p2, c1, k1000).
1693318069: No will message specified.
1693318069: Sending CONNACK to MQTT (0, 0)
1693318096: Received PINGREQ from nodered_dd5d462a7517895e
1693318096: Sending PINGRESP to nodered_dd5d462a7517895e
1693318113: Received UNSUBSCRIBE from nodered_dd5d462a7517895e
1693318113:   plc
1693318113: nodered_dd5d462a7517895e plc
1693318113: Sending UNSUBACK to nodered_dd5d462a7517895e
1693318113: Received DISCONNECT from nodered_dd5d462a7517895e
1693318113: Client nodered_dd5d462a7517895e disconnected.
1693318113: New connection from 10.40.32.117:63135 on port 1883.
1693318113: New client connected from 10.40.32.117:63135 as nodered_e8bf7c5a27b22329 (p2, c1, k60).
1693318113: No will message specified.
1693318113: Sending CONNACK to nodered_e8bf7c5a27b22329 (0, 0)

```

Let's use the instruction configuration



And this connect configuration



Let's use this socket configuration

Message Configuration - MQTT_MSGSR

☒ Configuration
 ☐ Communication
 ☐ Tag

☒ Path:

THIS

☐ Broadcast:

Communication Method

☒ CIP
 ☐ DH+
 Channel:

☐ CIP With Source ID
 Source Link:

Destination Link:

Destination Node: (Octal)

☐ Connected
 ☐ Cache Connections
 ☐ Large Connection

☒ Enable
 ☐ Enable Waiting
 ☒ Start
 ☐ Done
 Done Length: 0

☐ Error Code:
 Extended Error Code:
 ☐ Timed Out

Error Path: THIS

Error Text:

Message Configuration - MQTT_MSGSW ✕

Configuration Communication Tag

☒ Path:

THIS

☐ Broadcast:

Communication Method

☒ CIP ☐ DH+ Channel: Destination Link:

☐ CIP With Source ID Source Link: Destination Node: (Octal)

☐ Connected ☐ Cache Connections ☐ Large Connection

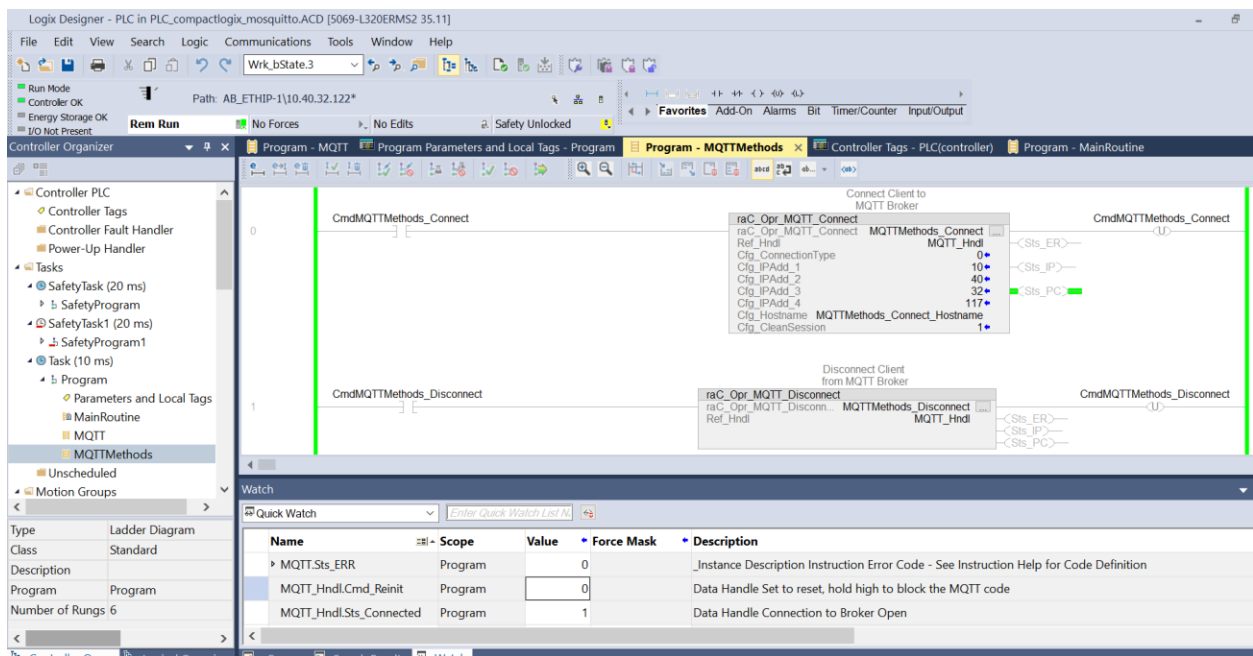
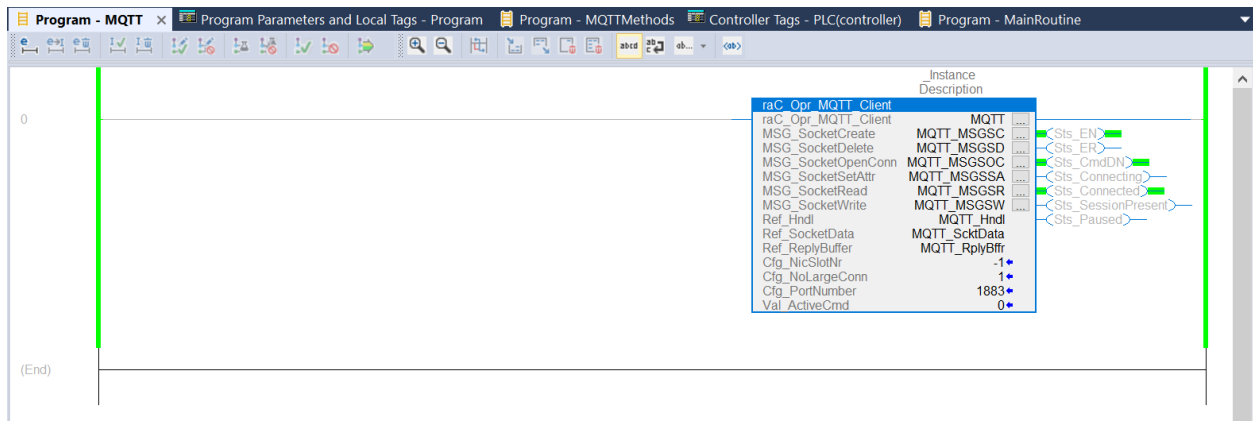
☐ Enable ☐ Enable Waiting ☐ Start ☒ Done Done Length: 4

☐ Error Code: Extended Error Code: ☐ Timed Out

Error Path: THIS

Error Text:

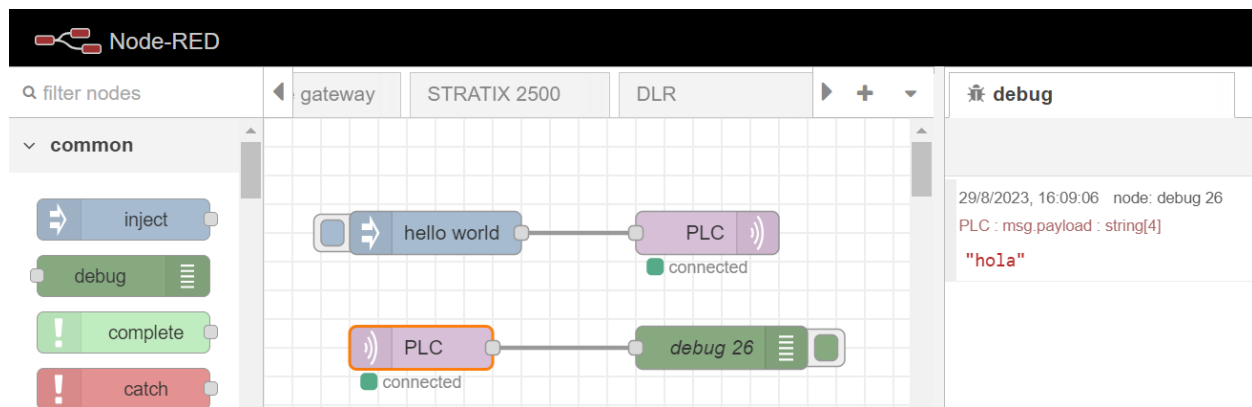
We are connected with no errors



Let's use this publish configuration

Name	Usage	Value	Force Mask	Style	Data Type	Class	Description
MQTTMethods_Connect_Hostname	Local	'broker.hivemq.com'	{...}	{...}	STRING	Standard	
MQTTMethods_Disconnect	Local	{...}	{...}	{...}	raC_Opr_MQTT_Di...	Standard	Disconnect
MQTTMethods_Monitor	Local	{...}	{...}	{...}	raC_Opr_MQTT_M...	Standard	Monitor To
MQTTMethods_Monitor_Payload	Local	"	"	{...}	raC_STR_Opr_MQT...	Standard	MQTT payl
MQTTMethods_Monitor_Topic	Local	"	"	{...}	STRING	Standard	
MQTTMethods_Publish	Local	{...}	{...}	{...}	raC_Opr_MQTT_Pu...	Standard	Publish Top
MQTTMethods_Publish_Payload	Local	'hola'	{...}	{...}	raC_STR_Opr_MQT...	Standard	MQTT payl
MQTTMethods_Publish_Topic	Local	'PLC'	{...}	{...}	STRING	Standard	
MQTTMethods_Subscribe	Local	{...}	{...}	{...}	raC_Opr_MQTT_Su...	Standard	Subscribe T
MQTTMethods_Subscribe_Topic	Local	"	"	{...}	STRING	Standard	

Let's toggle the publish bit



This is the MQTT node configuration

The image shows the 'Edit mqtt in node' configuration dialog box. It has a 'Delete' button on the left, and 'Cancel' and 'Done' buttons on the right. The 'Properties' tab is selected, showing the following configuration:

- Server:** 10.40.32.117:1883
- Action:** Subscribe to single topic
- Topic:** PLC
- QoS:** 2
- Output:** auto-detect (parsed JSON object, string or buf)
- Name:** Name

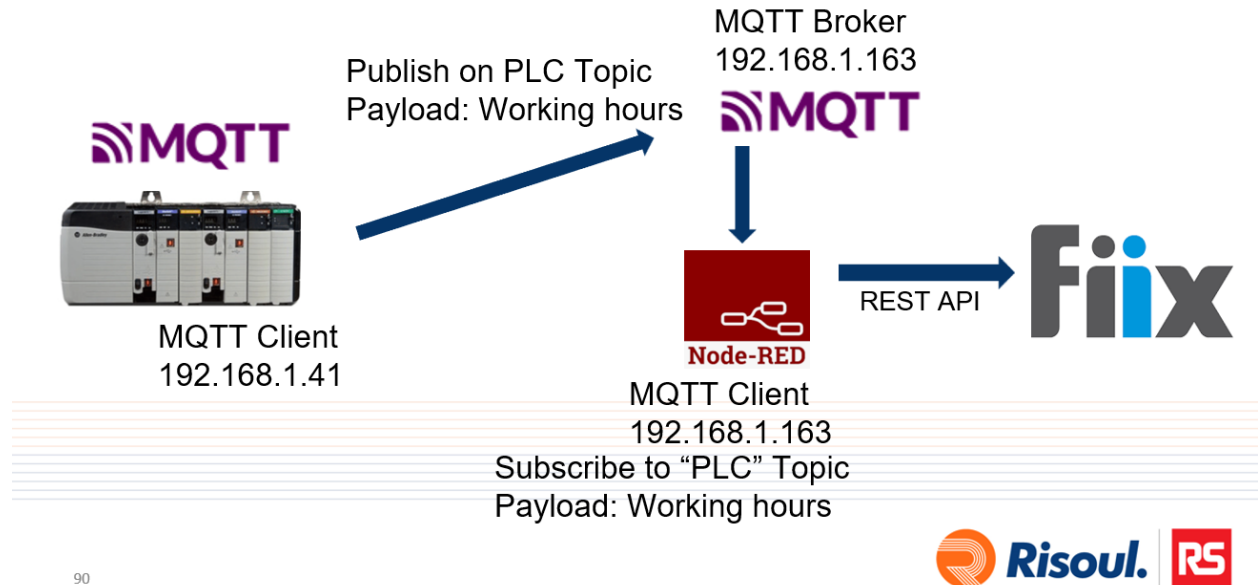
As you can see on this video

https://youtu.be/Y6_UtErWmb4

3. Sending MQTT PLC client data to Fiix

Now that you master MQTT on a PLC you are ready to perform this test

Demo: MQTT / API REST



As you can see on this video

<https://youtu.be/jvmQ0zi50cg>