

Mitsubishi Adroit Process Suite

How to Create a Custom Template

COPYRIGHT

Copyright © 2022 Advanced Worx 112 (Pty) Ltd. All rights reserved.

Information in this document is subject to change without notice. The software described in this document is furnished under a license agreement or nondisclosure agreement. The software may be used or copied only in accordance with the terms of those agreements. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or any means electronic or mechanical, including photocopying and recording for any purpose other than the purchaser's personal use without the written permission of Advanced Worx 112 (Pty) Ltd.

Advanced Worx 112 (Pty) Ltd
20 Waterford Office Park
189 Witkoppen Road (c/o Waterford Drive)
Fourways
South Africa

www.adroittech.co.za

Version	Date	Author	Comment	Approval
1.0	21.08.2020	C. Swanepoel	Original	
2.0	10.08.2022	J. Duncan	Update Content and Flow; new Cover	

Contents

1.	How to Create a Custom Template	3
1.1.	Prerequisites.....	3
2.	GX Works2	4
2.1.	Create a New GX Works2 Project	4
2.2.	Create a Function Block.....	4
2.3.	Create DUT (Structured Data Type)	4
2.4.	Create a new FB	6
2.5.	Setup the Function Block Header	7
2.6.	Create Function Block Body	7
2.7.	Program to Create an Instance of the Function Block	11
2.8.	Convert for GX Works3.....	12
3.	Adroit Agent Server	16
3.1.	Create Agents.....	16
4.	MAPS Designer	20
4.1.	Create Template Project and Graphic Forms	20
4.2.	Add Controls and Vectors to the HOME Graphic Form.....	21
4.3.	HOME Graphic Form.....	22
4.4.	StartStop Wizard.....	32
4.5.	Commission Template	38
5.	Add New Template to MAPS Data Source.....	42
5.1.	Create Adroit Agent Templates	42
5.2.	Add Template	46
5.2.1.	GX Works2 Import.....	47
5.2.2.	Excel Import	48
5.2.3.	Configure Signals.....	50
5.2.4.	Add Signals Manually (Not required by default)	50
5.2.5.	Defining the Signals.....	51
5.2.6.	Configure Function Block Data (if Excel import was used).....	57
5.2.7.	Update Graphics	59
6.	Build a New Project	60
7.	Conclusion	60

1. How to Create a Custom Template

The purpose of this document is to help the user Create a custom template in the MAPS environment (database). To show how this is done you will be creating a basic MAPS Template which sends a Start and Stop signal to the PLC, the PLC will return a status depending on the inputs as well as an on and off count. You will be able to reset the counts from the SCADA.

This Document is divided into four main sections:

- GX Works2 and GX Works3 PLC Programming
 - Creation of the PLC function block if GX Works2 is used.
- MAPS SCADA
 - Create the necessary Adroit Agents for the custom template.
 - Create the graphic for the template.
 - Test the function block and graphic.
- MAPS Custom Template Data Source
 - Create the Agent Templates required for the template.
 - Create the Template and import the signals from GX Works, GX IEC or Excel
- MAPS Datasource
 - Create a new MAPS project to test the custom template.

1.1. Prerequisites

To complete this exercise you will need the following software installed.

1. GX Works2 (version 1.97 or later)
2. GX Works3 (version 1.057K or later)
3. MAPS (version 4.0.5)
4. SQL Compact (version 4.0)

Important: You will also need a full understanding of the environments for all the installed software.

2. GX Works2

2.1. Create a New GX Works2 Project

Run the GX Works2 program. Create a new project. You will then be prompted to select the Project type you will be working with; in the Project Type select Structured Project; PLC Series select QCPU (Q Mode); the PLC type is Q03UDE (Q Series Universal with Ethernet); Language type is Structured Ladder/FBD.

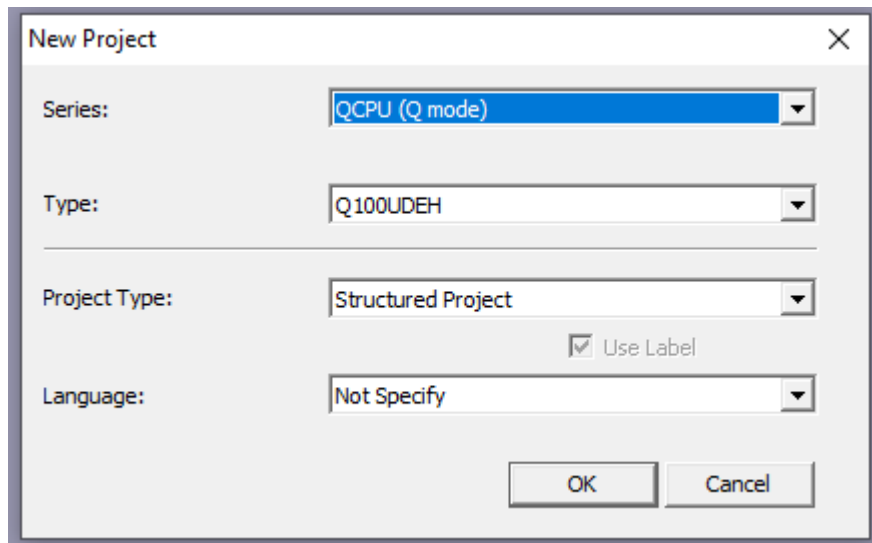


Figure 1 Select Project Settings

You will now need to install the MAPS library. Click on the User Library under the Navigation Pane and click on the Arrow next to the New Library button  and select Install. Browse to C:\ProgramData\Adroit Technologies\MAPS\Mitsubishi_P_S_LIB.sul and click OK.

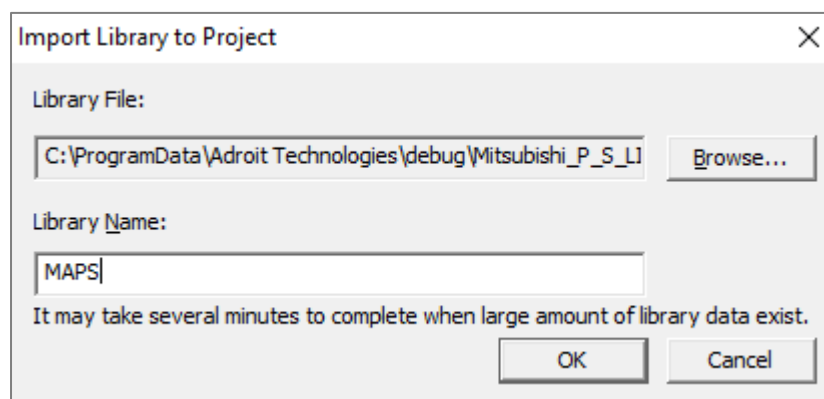


Figure 2 Install the MAPS Library

You will now need to install to create a new custom library. The library will be called as the MAPS Template name we will be creating. In this case "StartStop". Click on the Arrow next to the New Library button  and select Create. Enter the name of the library as "StartStop" and press OK. Save the newly created library by doing a right mouse click to open the context window and select Save. Browse to C:\ProgramData\Adroit Technologies\MAPS\Configurations\Default\Files\PLC and specify the file name to be "StartStop.sul" and click Save.

2.2. Create a Function Block

This section explains how create a new FB/FUN function block (FB) inside the StartStop Library.

2.3. Create DUT (Structured Data Type)

Expand the StartStop library, Right click and select open in the context menu.

Create a new Structured Data Type inside the StartStop Library, consisting of all the signals/IO required by the instance of the function block. On the New Data window select the Data Type: Structured Data Types; Data Name: StartStop_DUT.

Some basic rule to follow:

Signal names **MUST** start with the following prefixes and **MUST** be defined in the following order:

F_I = Field Digital Input (X Addresses)

F_O = Field Digital Outputs (Y Addresses)

F_AI = Field Analog Inputs

F_AO = Field Analog Outputs

S_CW = SCADA Control Words

S_SW = SCADA Status Words

The signal definitions are

	Identifier	Type	Initial	Comments
0	F_I_RunFeedBack	Bit	FALSE	Run feedback from the PLC
1	F_O_StartCommand	Bit	FALSE	Set by the S_CW1_0_Start
2	S_CW1_Marshal	Word[Signed]	0	Control word from the SCADA to the PLC
3	S_CW1_0_Start	Bit	FALSE	Start command from the SCADA
4	S_CW1_1_Stop	Bit	FALSE	Stop command from the SCADA
5	S_CW1_2_Reset	Bit	FALSE	Reset the start and stop counters
6	S_CW1_3_Spare	Bit	FALSE	Spare
7	S_CW1_4_Spare	Bit	FALSE	Spare
8	S_CW1_5_Spare	Bit	FALSE	Spare
9	S_CW1_6_Spare	Bit	FALSE	Spare
10	S_CW1_7_Spare	Bit	FALSE	Spare
11	S_CW1_8_Spare	Bit	FALSE	Spare
12	S_CW1_9_Spare	Bit	FALSE	Spare
13	S_CW1_10_Spare	Bit	FALSE	Spare
14	S_CW1_11_Spare	Bit	FALSE	Spare
15	S_CW1_12_Spare	Bit	FALSE	Spare
16	S_CW1_13_Spare	Bit	FALSE	Spare
17	S_CW1_14_Spare	Bit	FALSE	Spare
18	S_CW1_15_Spare	Bit	FALSE	Spare
19	S_SW1_Marshal	Word[Signed]	0	Status word from the PLC to the SCADA
20	S_SW1_0_Stopped	Bit	FALSE	FB in the stopped state
21	S_SW1_1_Starting	Bit	FALSE	FB in the starting state
22	S_SW1_2_Running	Bit	FALSE	FB in the running state
23	S_SW1_3_Stopping	Bit	FALSE	FB in the stopping state
24	S_SW1_4_Spare	Bit	FALSE	Spare
25	S_SW1_5_Spare	Bit	FALSE	Spare
26	S_SW1_6_Spare	Bit	FALSE	Spare
27	S_SW1_7_Spare	Bit	FALSE	Spare
28	S_SW1_8_Spare	Bit	FALSE	Spare
29	S_SW1_9_Spare	Bit	FALSE	Spare
30	S_SW1_10_Spare	Bit	FALSE	Spare
31	S_SW1_11_Spare	Bit	FALSE	Spare
32	S_SW1_12_Spare	Bit	FALSE	Spare
33	S_SW1_13_Spare	Bit	FALSE	Spare

34	S_SW1_14_Spare	Bit	FALSE	Spare
35	S_SW1_15_Spare	Bit	FALSE	Spare
36	S_SW2_StartCount	Word[Signed]	0	Increment every time the Start command is given
37	S_SW3_StopCount	Word[Signed]	0	Increment every time the Stop command is given

Table 1 StartStop DUT Data

2.4. Create a new FB

In the StartStop library select the FB/FUN section right click and select Add New Data from the context menu. Select Data Type: Function Block; Data Name : StartStop; Program Language: Structured Ladder/FBD.

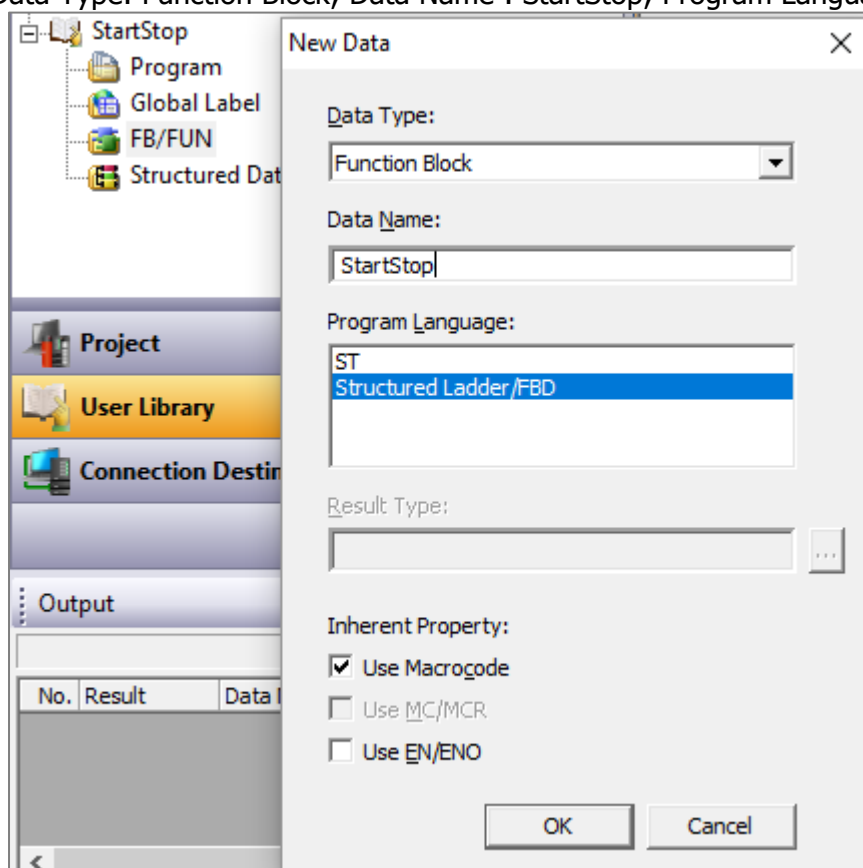


Figure 3 New FB Data Dialog

2.5. Setup the Function Block Header

Open the Local Label of the FB and create the following header variables.

	Class	Identifier	Type	Initial
0	VAR_INPUT	F_I_RunFeedBack	Bit	FALSE
1	VAR_INPUT	S_CW1_Marshal	Word[Signed]	0
2	VAR_OUTPUT	F_O_StartCommand	Bit	FALSE
3	VAR_OUTPUT	S_SW1_Marshal	Word[Signed]	0
4	VAR_OUTPUT	S_SW2_StartCount	Word[Signed]	0
5	VAR_OUTPUT	S_SW3_StopCount	Word[Signed]	0
6	VAR	S_CW	CV_Word_To_Bits	
7	VAR	Start_REQ	Bit	FALSE
8	VAR	Stop_REQ	Bit	FALSE
9	VAR	Reset_REQ	Bit	FALSE
10	VAR	StartLatch	Bit	FALSE
11	VAR	Starting	Bit	FALSE
12	VAR	Started	Bit	FALSE
13	VAR	Stopping	Bit	FALSE
14	VAR	Stopped	Bit	FALSE
15	VAR	S_SW	CV_Bits_To_Word	

StartStop DUT Data

2.6. Create Function Block Body

Open the Program of the function block. Create 12 Networks.

- In the first network create the function block CV_Words_To_Bits from the MAPS library. Define the input word as S_CW1_Marshal; Bit00 as Start; Bit01 as Stop; and Bit02 as Reset. This function block will split the SCADA control word in to its individual bits.

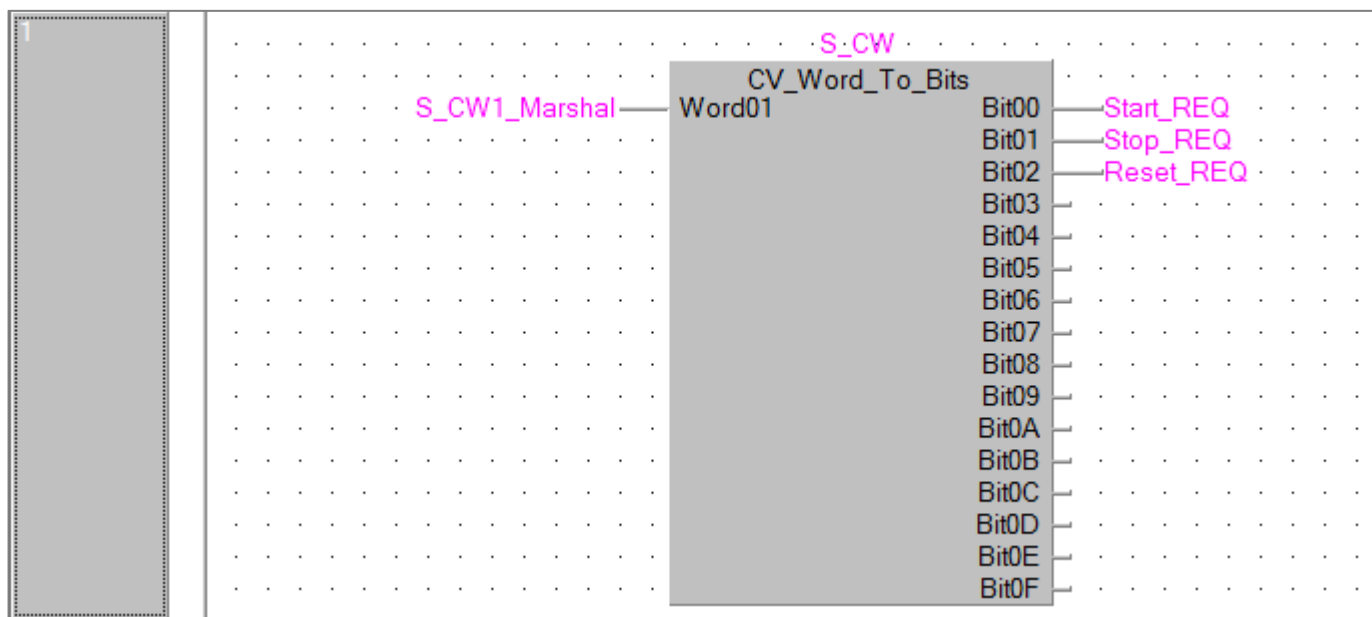


Figure 4 FB SCADA Control word to Control Bits

- In the Second network create the following logic to latch the start.

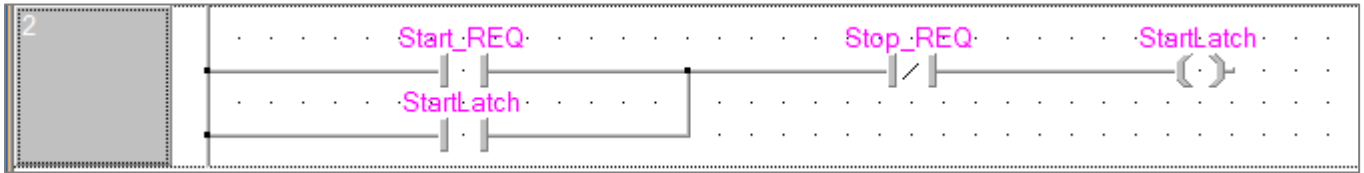


Figure 5 Latch the Start Bit

- In the Third network set the F_O_StartCommand.

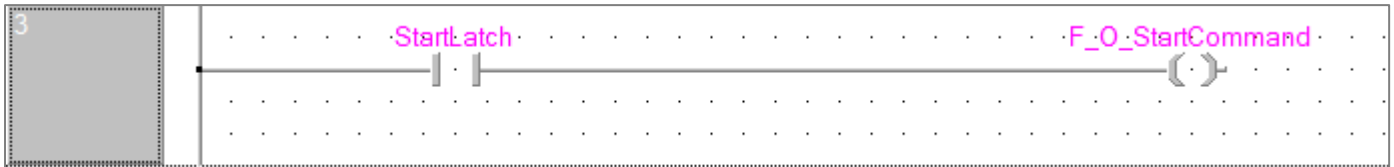


Figure 6 Set the F_O_StartCommand

- The Fourth network will set the Starting status bit in the SCADA status word.

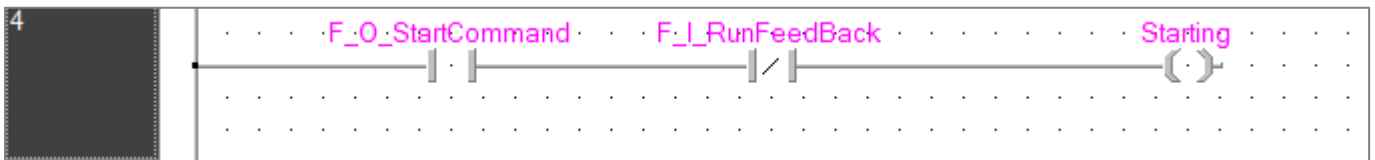


Figure 7 Set the Starting status bit

- The Fifth network will set the Started status bit in the SCADA status word.

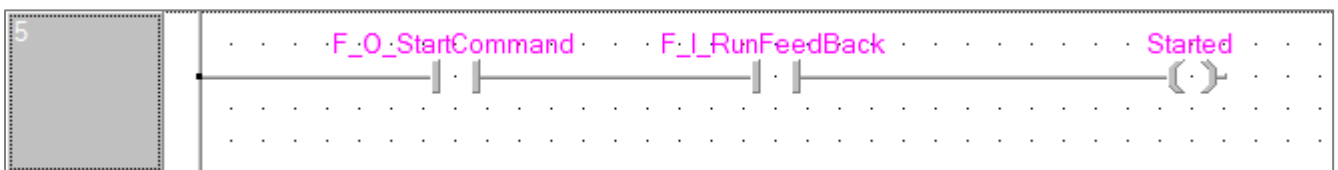


Figure 8 Set the Started status bit

- The Sixth network will set the Stopping status bit in the SCADA status word.

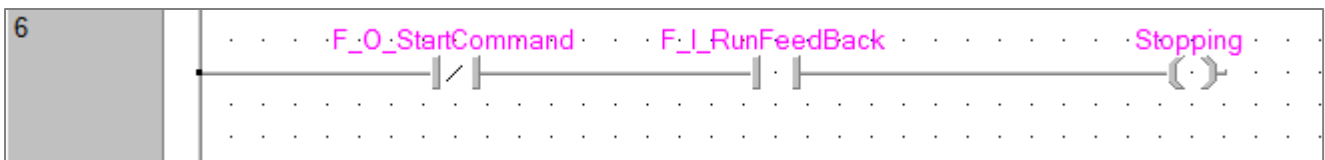


Figure 9 Set the Stopping status bit

- The Seventh network will set the Stopped status bit in the SCADA status word.

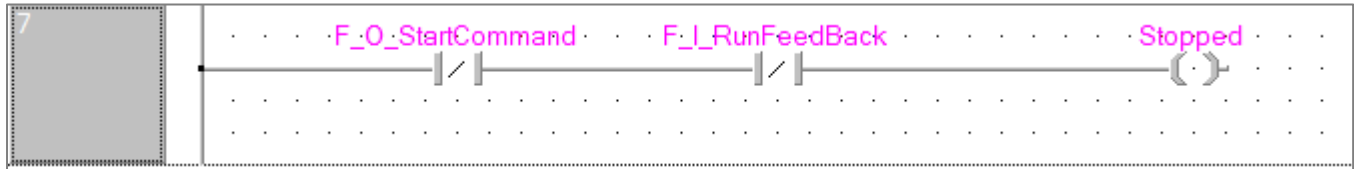


Figure 10 Set the Stopped status bit

- The Eighth network will use the INCP_M function from the MAPS library to increment an integer every time the start bit is set to true, it will then pass the result to the S_SW2_StartCount var.

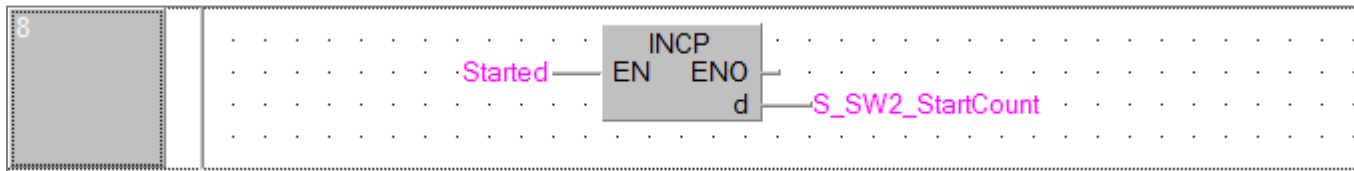


Figure 11 Increment the S_SW2_StartCount variable

- The Ninth network will use the RST_M function from the MAPS library to reset the S_SW2_StartCount var every time the Reset bit is true.

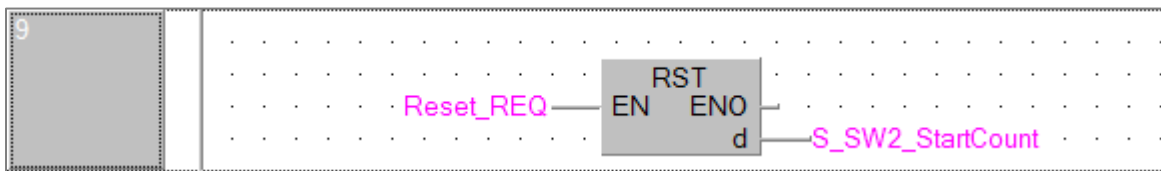


Figure 12 Reset the S_SW2_StartCount variable

- The Tenth network will use the INCP_M function from the MAPS library to increment an integer every time the Stopped bit is set to true, it will then pass the result to the S_SW3_StopCount var.

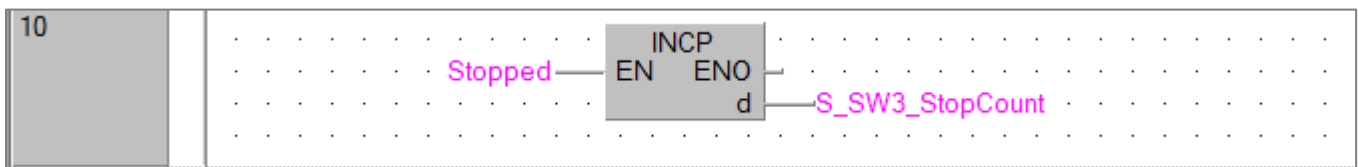


Figure 13 Increment the S_SW3_StopCount variable

- The Eleventh network will use the RST_M function from the MAPS library to reset the S_SW3_StopCount var every time the Reset bit is true.

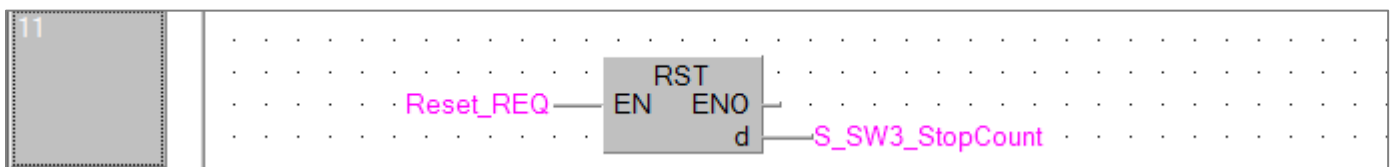


Figure 14 Reset the S_SW3_StopCount variable

- Create the function block CV_Bits_To_Word from the MAPS library. Define the output word as S_SW1_Marshal; Bit00 as Stopped; Bit01 as Starting; Bit02 as Started; and Bit03 as Stopping. This function block will combine the individual status bits into a word.

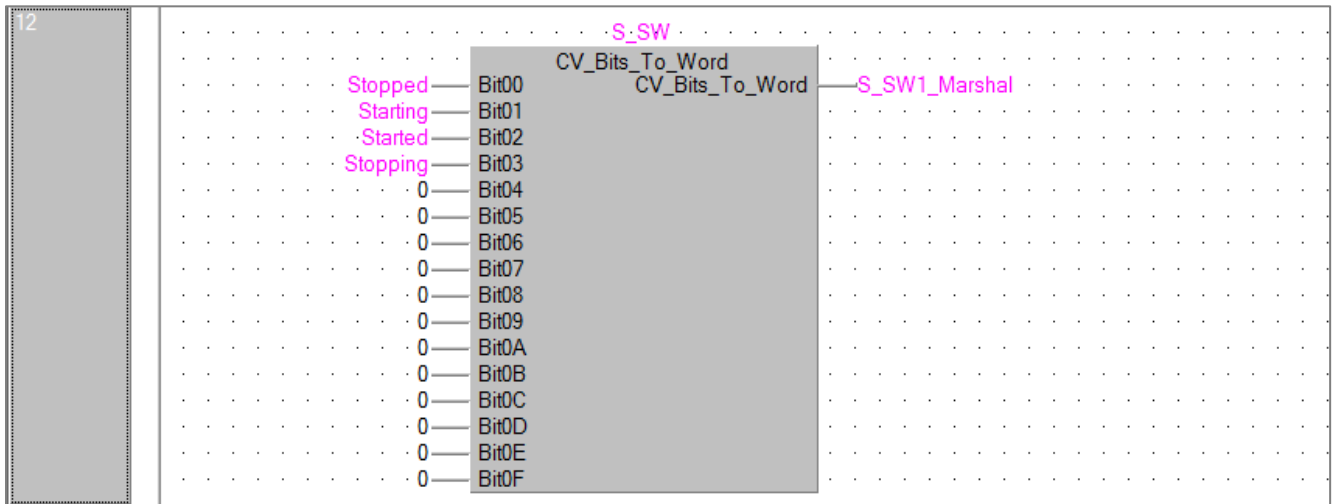


Figure 15 FB Scada Status word from status bits

2.7. Program to Create an Instance of the Function Block

- Create a new Program in the POU Pool and call it POU_01.
- Click on the Project under the Navigation Pane and expand POU, Program, POU_01.
- Double click the Local Label.
- Name the Instance of the FB to FB_Starter1. This will add the Instance name in the Header of your program.

	Class	Label Name	Data Type	
1	VAR	FB_Starter1	StartStop	...

Figure 16 Project Header variable

- Open the Global variables in the project. Create a new Variable called Starter1 set the Type to the created DUT Type. Open the Data unit variables addresses and set the MIT-Addresses as below.

Name	Type	MIT-Addr.
F_I_RunFeedBack	Bit	X0
F_O_StartCommand	Bit	Y20
S_CW1_Marshal	Word[Signed]	D1000
S_CW1_0_Start	Bit	D1000.0
S_CW1_1_Stop	Bit	D1000.1
S_CW1_2_Reset	Bit	D1000.2
S_CW1_3_Spare	Bit	D1000.3
S_CW1_4_Spare	Bit	D1000.4
S_CW1_5_Spare	Bit	D1000.5
S_CW1_6_Spare	Bit	D1000.6
S_CW1_7_Spare	Bit	D1000.7
S_CW1_8_Spare	Bit	D1000.8
S_CW1_9_Spare	Bit	D1000.9
S_CW1_10_Spare	Bit	D1000.A
S_CW1_11_Spare	Bit	D1000.B
S_CW1_12_Spare	Bit	D1000.C
S_CW1_13_Spare	Bit	D1000.D
S_CW1_14_Spare	Bit	D1000.E
S_CW1_15_Spare	Bit	D1000.F
S_SW1_Marshal	Word[Signed]	D2000
S_SW1_0_Stopped	Bit	D2000.0
S_SW1_1_Starting	Bit	D2000.1
S_SW1_2_Running	Bit	D2000.2
S_SW1_3_Stopping	Bit	D2000.3
S_SW1_4_Spare	Bit	D2000.4
S_SW1_5_Spare	Bit	D2000.5
S_SW1_6_Spare	Bit	D2000.6
S_SW1_7_Spare	Bit	D2000.7
S_SW1_8_Spare	Bit	D2000.8
S_SW1_9_Spare	Bit	D2000.9
S_SW1_10_Spare	Bit	D2000.A
S_SW1_11_Spare	Bit	D2000.B
S_SW1_12_Spare	Bit	D2000.C

S_SW1_13_Spare	Bit	D2000.D
S_SW1_14_Spare	Bit	D2000.E
S_SW1_15_Spare	Bit	D2000.F
S_SW2_StartCount	Word[Signed]	D2001
S_SW3_StopCount	Word[Signed]	D2002

Figure 17 StartStop Global Variable Data

- Click on the Project under the Navigation Pane and expand POU, Program, POU_01.
- Double click the Program
- Add the StartStop Function block and link the Global Variable Data

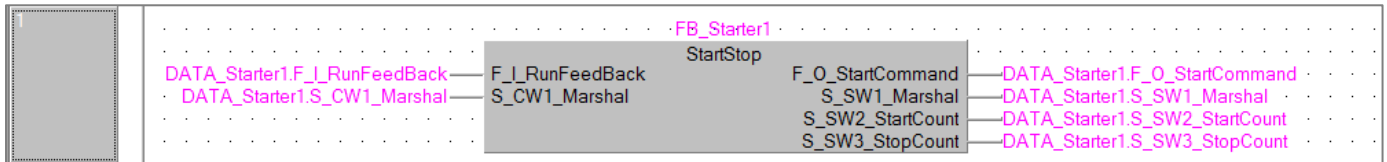


Figure 18 Function Block Instance

- Save the Project as StartStop.gxw.
- Transfer the Project to the PLC.
- Save the project and close.

2.8. Convert for GX Works3

- Open GX Works3.
- Open the existing GX Works2 project just saved, into GX Works3 by the following command. File -> Open Other Format file -> GX Works2 Format File -> Open Project, and then select the GX Works StartStop.gxw file saved before.
- Once GX Works3 has converted the project, the following layout will be shown.

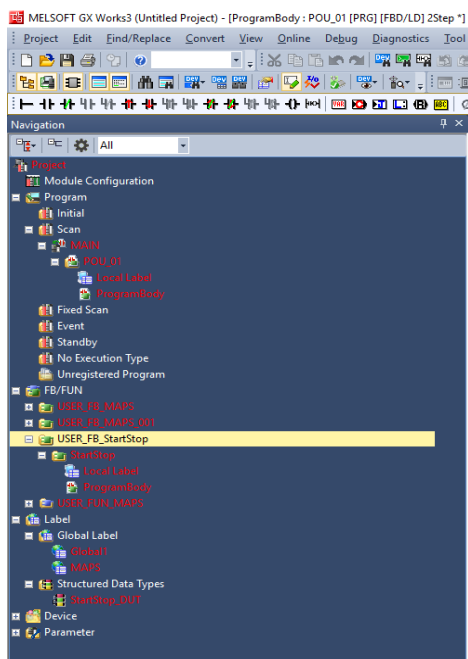


Figure 19 GX Work3 Project Layout

- In the project layout, underneath the FB/FUN section will be the USER_FB_StartStop. Rename the "USER_FB_StartStop" to "StartStop_FBD". Right Click on this node and select the "Properties" from the menu. In the properties dialog at the bottom is a property called ProgramType. It should be set to "macro type", change it to "Subroutine type". Inside this section is our StartStop Library as created in GX Works2, but just the FB and local variable. Open the Program Body of the StartStop POU by double clicking on the ProgramBody section.

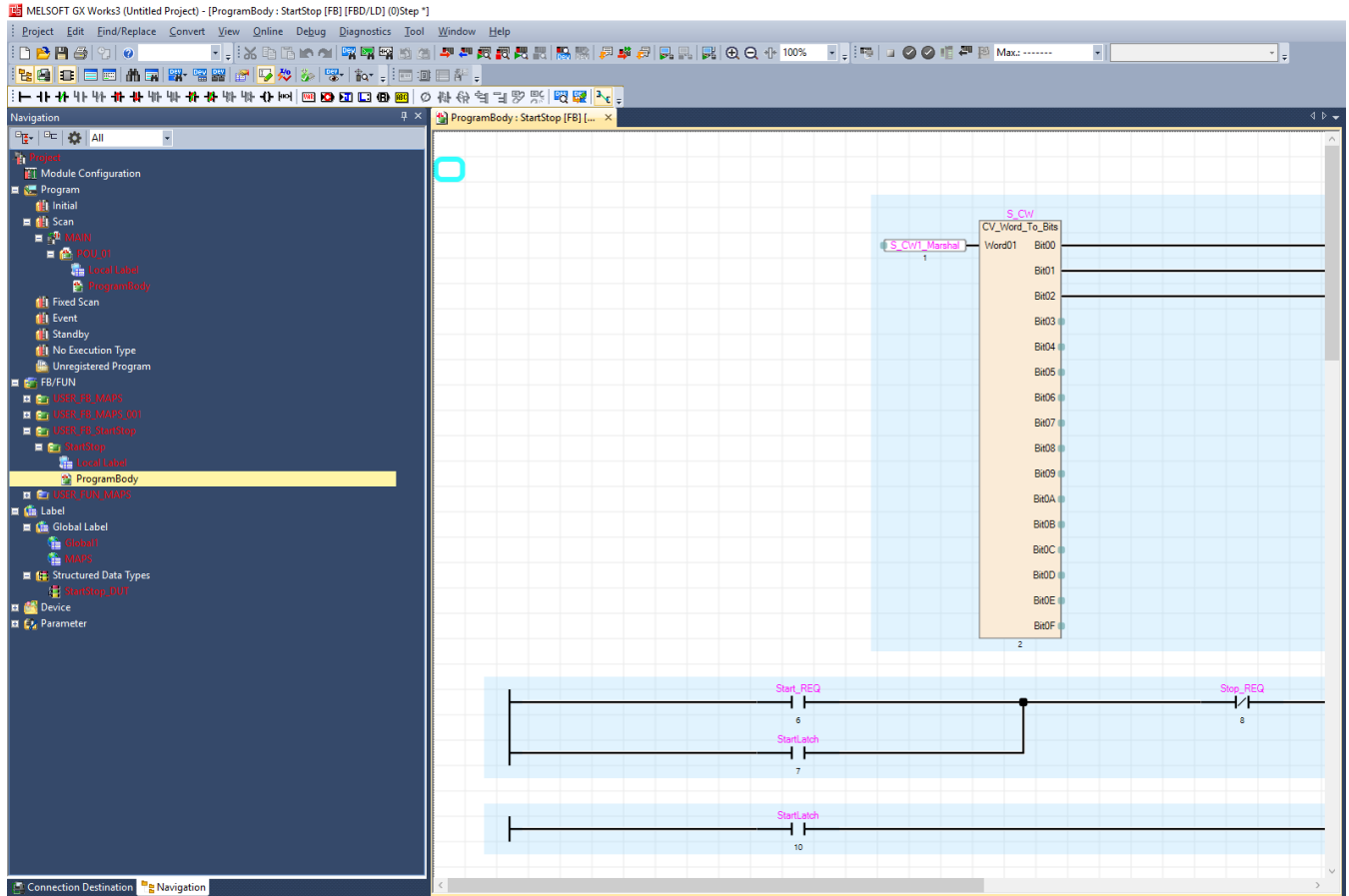


Figure 20 Program Body

- In the actual program body space, right mouse click to get the context menu and from the context menu select the Edit -> Batch Correction of layout in FBD Network Block.

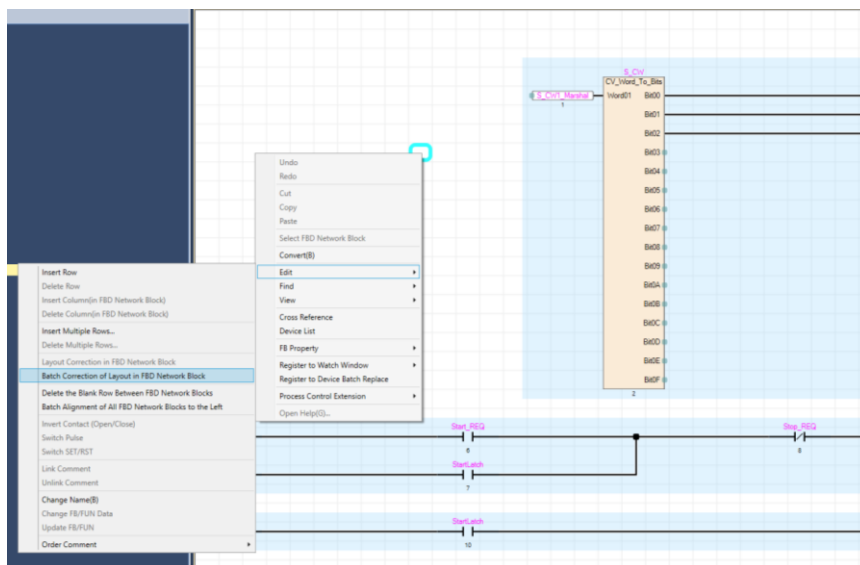


Figure 21 FB Correction

- Do the exact same step as above but from the context menu select the Edit -> Delete the Blank Row Between FBD Network Blocks as well as Edit -> Batch Alignment of All FBD Network Blocks.
- Now that the FB is corrected, the StartStop POU needs to be exported to XML. Right mouse click on the "StartStop_FBD" node to get the context menu and from the context menu select the Export to file option. Save this file to C:\ProgramData\Adroit Technologies\MAPS\Configurations\Default\Files\PLC\StartStop_FBD.xml where StartStop will always be the same as your template name.

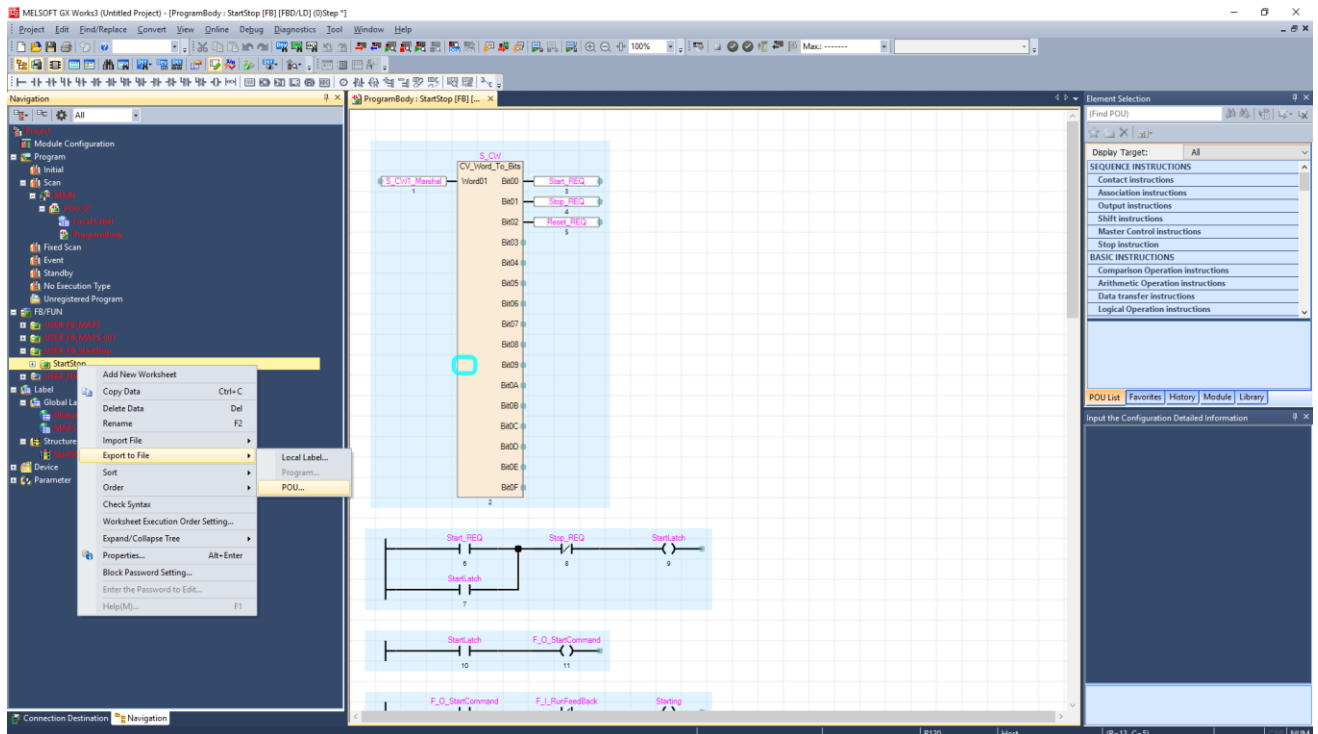


Figure 22 POU Export to XML

- The actual SDT also needs to be exported to XML. Expand the "label" section and then the "Structured Data types" section. In here you will find the StartStop_DUT, right mouse click on it to get the context menu and from the context menu select the "Export to file". Save this file as XML to C:\ProgramData\Adroit Technologies\MAPS\Configurations\Default\Files\PLC\StartStop_DUT.xml where StartStop will always be the same as your template name.

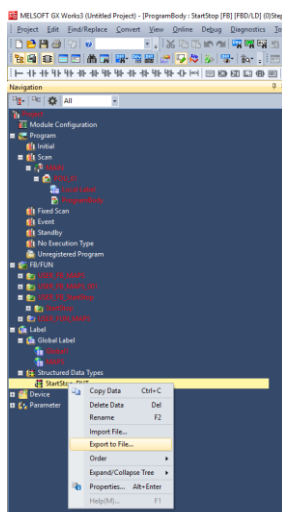


Figure 23 SDT Export to XML

- Lastly the POU Instance created for the Template needs to be exported to XML. In your navigation bar, expand the "Programs" section and then the "Scan" section, then the "Main" section. Here you will

find the POU called "POU_01" which needs to be exported. Before exporting, follow the same 3 "Edit" steps as done on the StartStop library FB as per below:

- In the actual program body space, right mouse click to get the context menu and from the context menu select the Edit -> Batch Correction of layout in FBD Network Block.
- Do the exact same step as above but from the context menu select the Edit -> Delete the Blank Row Between FBD Network Blocks as well as Edit -> Batch Alignment of All FBD Network Blocks.
- Right mouse click on the "POU_01" POU to get the context menu and from the context menu select the Export to file -> POU option. Save this file to C:\ProgramData\Adroit Technologies\MAPS\Configurations\Default\Files\PLC\StartStop_POU.xml where StartStop will always be the same as your template name.
- The POU XML file needs to be modified manually, so open the just saved XML file in notepad or textpad and modify accordingly:
- Remove all text before the line "<pou name="POU_01_PRG" pouType="program">".
- Remove all text after the line "</pou>".
- Replace the line "<pou name="POU_01_PRG" pouType="program">" with "<pou name="<Device>_PRG" pouType="program">".
- Replace all instances of "Starter1" with "<Device>".
- Save and close the modified XML file.
- Save and Close the GX Works3 project.

3. Adroit Agent Server

To configure the Agent Server (AS), you will need to run and login to the MAPS Designer. Open the Enterprise view. Right click on the Adroit data source and open the configurator.

3.1. Create Agents

- We will now create all the SCADA tags for the Variables created in the DUT.
- Create a new agent type Marshal. Give the marshal a name of EQUIPMENT_CW1 and a description of 'Scada Control Word for the Start Stop Command'. Edit the agents set the following properties.

Bit	Description	State1	Pulse	Delay
0	Start	Start	TRUE	2000
1	Stop	Stop	TRUE	2000
2	Reset	Reset	TRUE	2000

StartStop Control Word 1 Data

Leave the reset of the Agent as default.

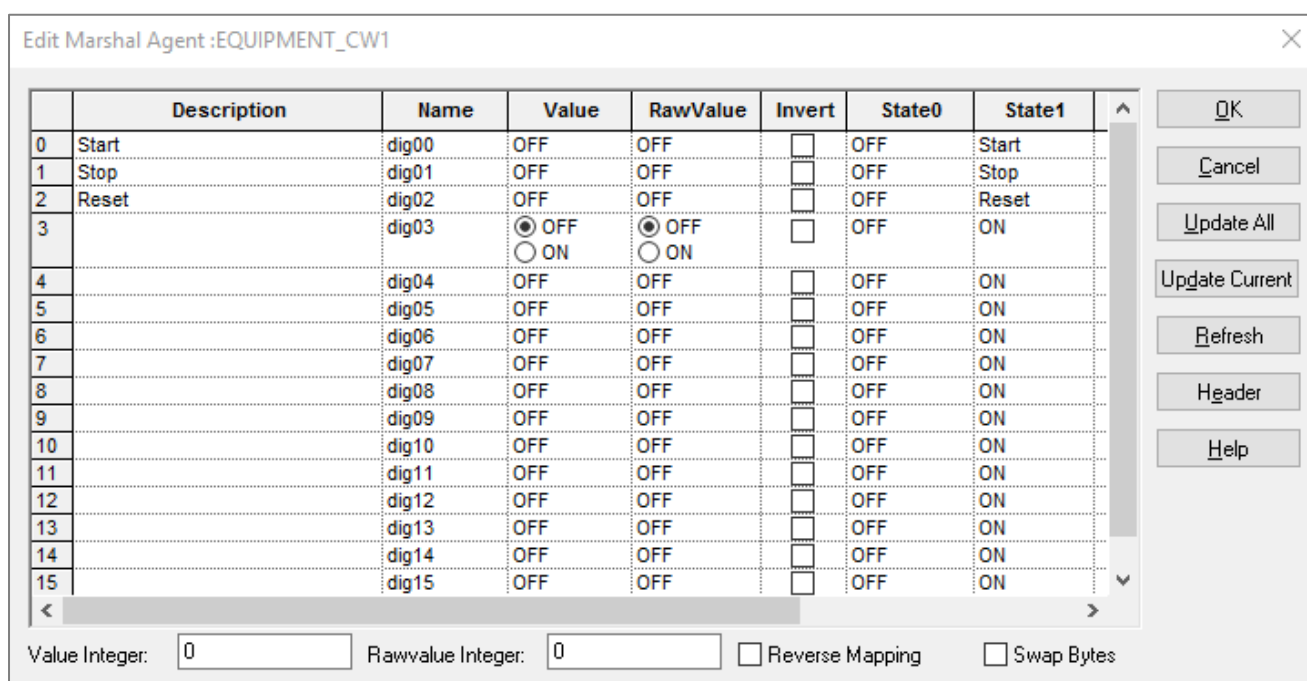


Figure 17 Marshal Agent EQUIPMENT_CW1

- Create a new agent type Marshal. Give the marshal a name of EQUIPMENT_SW1 and a description of 'Scada Control Word for the Start Top Command'. Edit the agents set the following properties.

Bit	Description	State1
0	Stopped	Stopped
1	Starting	Starting
2	Started	Started
3	Stopping	Stopping

StartStop Status Word 1 Data

Leave the reset of the Agent as default.

Create a new agent Type Analog. Give the analog a name of EQUIPMENT_SW2 and a description of 'Start Count'. Edit the agent set the following properties.

Slot	Value
Device Minimum	0
Device Maximum	32767
Engineering Minimum	0
Engineering Maximum	32767
Alarms High-high	32767
Alarms High	32767

StartStop Status Word 2 Data

Leave the reset of the agent as default.

- Create a new agent Type Analog. Give the analog a name of EQUIPMENT_SW3 and a description of 'Stop Count'. Edit the agent set the following properties.

Slot	Value
Device Minimum	0
Device Maximum	32767
Engineering Minimum	0
Engineering Maximum	32767
Alarms High-high	32767
Alarms High	32767

StartStop Status Word 23Data

Leave the reset of the agent as default.

- Run the Adroit Configuration Setup program. Click on the Driver Tab, create a new Mitsubishi Q/QnA Series Ethernet device called PLCA (If the PLCA device does not exist).
- Scan the newly created agents to the PLC,

Tag	Address	Scan Rate	Output Enabled
EQUIPMENT_CW1.rawValue	D1000	500	True
EQUIPMENT_SW1.rawValue	D2000	500	False
EQUIPMENT_SW2.rawValue	D2001	500	False
EQUIPMENT_SW3.rawValue	D2002	500	False

StartStop Scan Data

Start the PLCA Device.

Tag scanning configuration : PLCA

Device: PLCA ☒ Started ☐ Stopped

Agent: EQUIPMENT_SW3 ... Find

Slot: ☐ Header slots

rawValue

Address: D 2002 ... Find

Scan rate (ms): 500 Deadband: 0

☐ Input disabled ☐ Output enabled ☐ Output initialize

Currently scanned tags: Scan Unscan

Tag	Address	Rate	Deadband	IO flags
EQUIPMENT_...	D 1000	500	0	3
EQUIPMENT_...	D 2000	500	0	1
EQUIPMENT_...	D 2001	500	0	1
EQUIPMENT_...	D 2002	500	0	1

Figure 18 PLCA Device Configuration

- Close and Save the Adroit Configurator.
- Open the adroit driver Monitor application. In the drop down select the MITQJE71 Driver. You should see the PLC device listed in the Device name list.

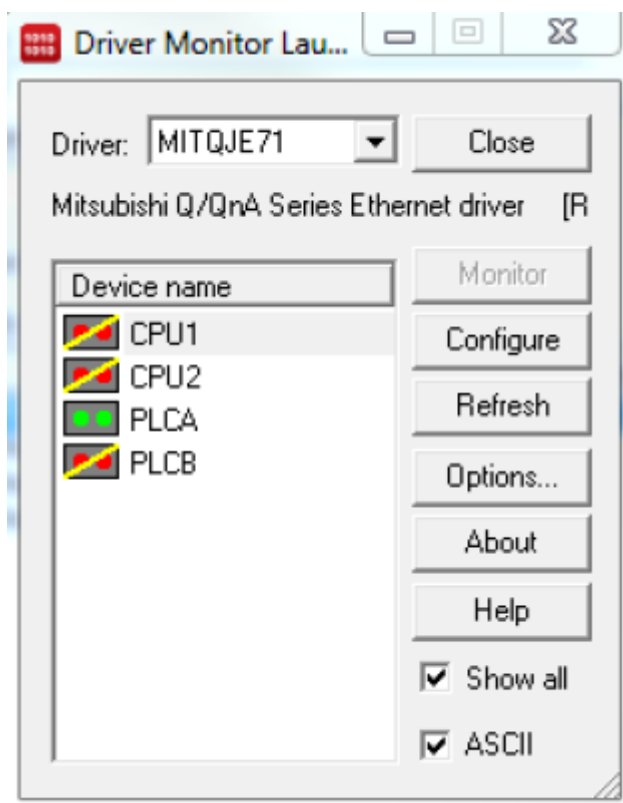


Figure 19 Adroit Driver monitor

Double click on the PLCA icon; Select the Data scope option by typing 1 on your key board. You should see a screen which displays the physical communication to the PLC without any errors.

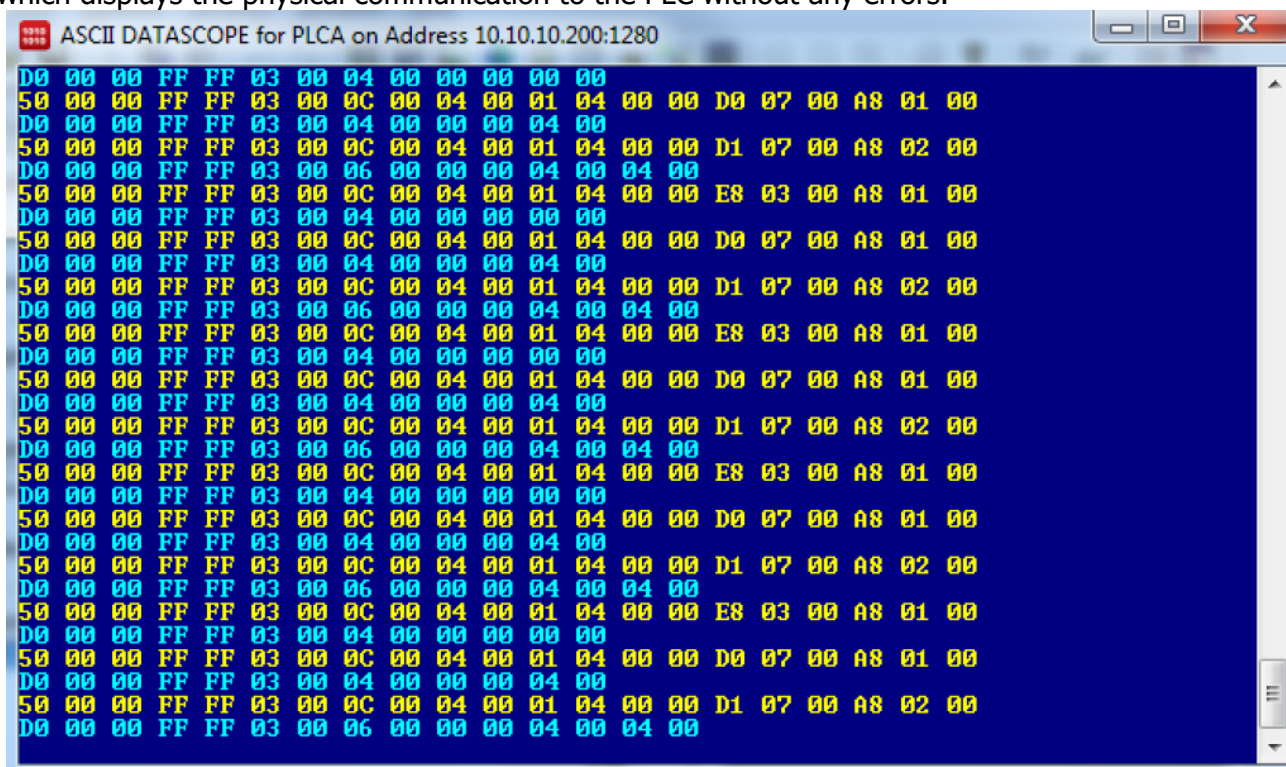


Figure 20 PLCA Datascope

4. MAPS Designer

4.1. Create Template Project and Graphic Forms

- Decide which signal from the FB DUT created in the PLC will be used on the MAPS Template Graphics, from now on referred to as AGENTS.
- Go to the enterprise manager, expand the 'Projects' item. Browse into the "Shapes Wizards and Examples" project and drop down into "Templates -> Process Suite" folder. Right click and create a new folder called StartStop.
- Create another folder underneath, that is called 'Control'. In the 'Control' Folder create a new Graphic Forms (GF) Called Home.



Figure 21 Enterprise Manager Template Project

The HOME graphic form will represent your faceplate.

4.2. Add Controls and Vectors to the HOME Graphic Form

- Open the Toolbox view from the menu bar, you will be working with the Vector controls.

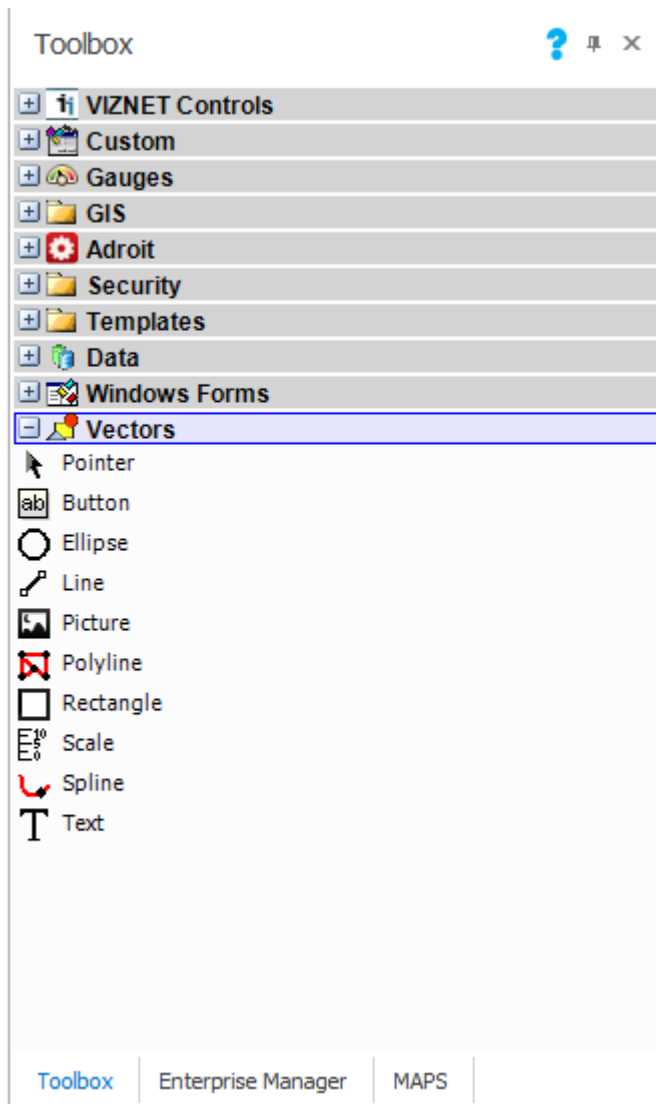
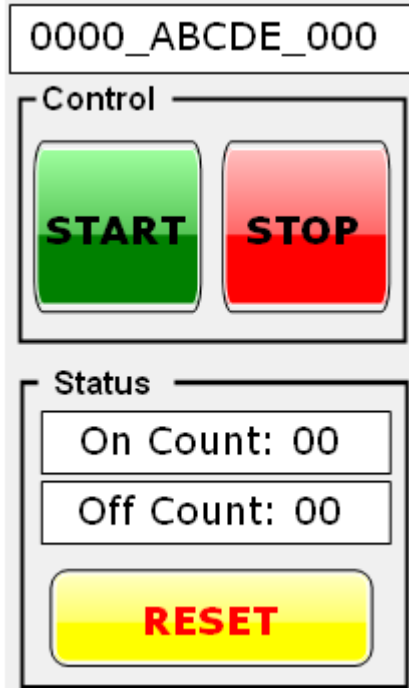


Figure 22 Toolbox

4.3. HOME Graphic Form

Build the HOME graphic form as per the image below and the corresponding setting specified below.



The image shows a HOME Graphic Form with the following components:

- Header:** A text box containing "0000_ABCDE_000".
- Control Section:** A container with two buttons: a green "START" button and a red "STOP" button.
- Status Section:** A container with two text boxes: "On Count: 00" and "Off Count: 00", and a yellow "RESET" button.

Figure 25 HOME graphic form

- Place three text Vectors on the Graphic form.
- The first text will display the equipment name and has the following properties.

Description	Value
Name	Equipment_ID
Font	Verdana, 14pt
Text	0000_ACBDE_000
TextAlign	MiddleCenter

- The second text will display the on count and has the following properties.

Description	Value
Name	On_Count
Font	Verdana, 14pt
Text	On Count: 00
TextAlign	MiddleCenter

- The third text will display the off count and has the following properties.

Description	Value
Name	Off_Count
Font	Verdana, 14pt
Text	Off Count: 00
TextAlign	MiddleLeft

- Place three button vectors on the graphic form.
- The first button will raise the click event to send the start bit to the PLC. Set the following properties of the object.

Description	Value
Name	On_Button
BackColor	Green (ff00ff00)
Font	Verdana, 14pt, Bold
TextScaling	False
Text	START

- The second button will raise the click event to send the stop bit to the PLC. Set the following properties of the object.

Description	Value
Name	Off_Button
BackColor	Red (ffff0000)
Font	Verdana, 14pt, Bold
TextScaling	False
Text	STOP

- The third button will raise the click event to send the reset bit to the plc. This bit will reset the on and off counts. Set the following properties of the object.

Description	Value
Name	Reset _Button
BackColor	Yellow (ffffff00)
Font	Verdana, 14pt, Bold
TextScaling	False
Text	STOP
ForeColor	Red (ffff0000)

- See the image below 'Home Graphic Form Design' for approximate layout and placement of the objects. Place all objects in the upper left hand corner of the Form. Set the graphic forms properties.

Description	Value
BackColor	Control
Size	203, 296

Once done press the "Optimize Graphic Form"

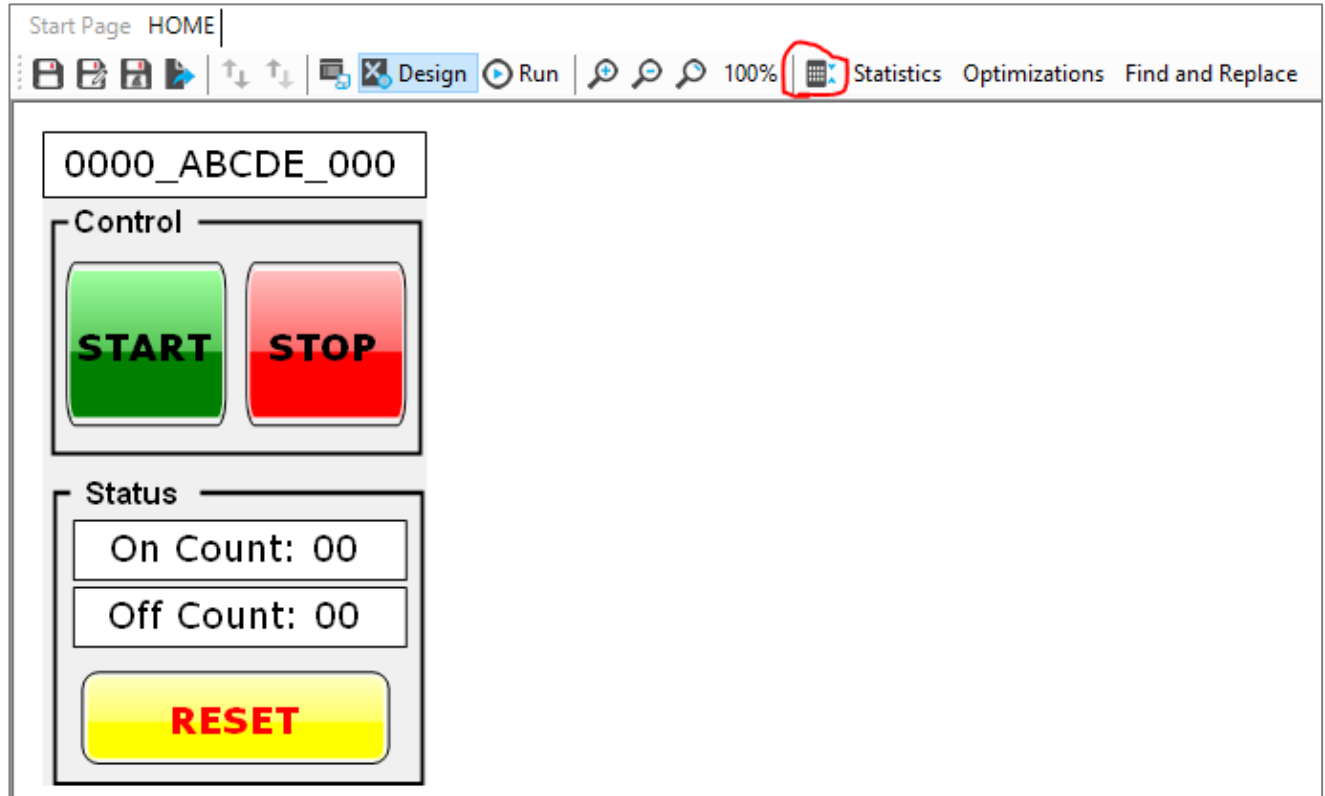


Figure 26 Optimize Graphic Form

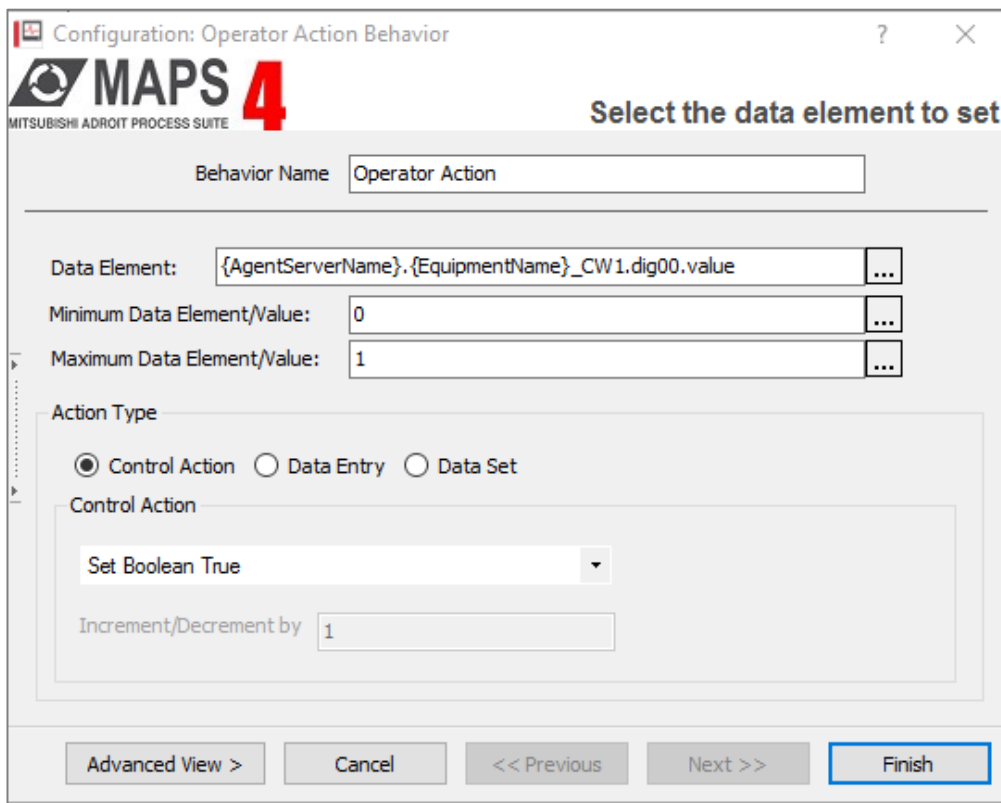
Now that the contents of the HOME graphic form is completed, the graphic form needs to be automated and behaviours needs to be added to all the objects.

Being a faceplate the graphic form needs to be templated. For this we will use 2 Aliases (Placement Holders) as in:

AgentServerName – Contains the name of the Adroit Agent Server Datasource.

EquipmentName – Contains the name of the actual piece of equipment.

- Add behaviours to the Start Button (Start_Button) object as follows:
- **Operator Action** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_CW1.dig00.value" data element which is the Start bit in the scada control word. Specify the "Set Boolean True" control action. To templatzize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Operator Action Behavior

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Select the data element to set

Behavior Name: Operator Action

Data Element: {AgentServerName}. {EquipmentName}_CW1.dig00.value

Minimum Data Element/Value: 0

Maximum Data Element/Value: 1

Action Type

☒ Control Action ☐ Data Entry ☐ Data Set

Control Action

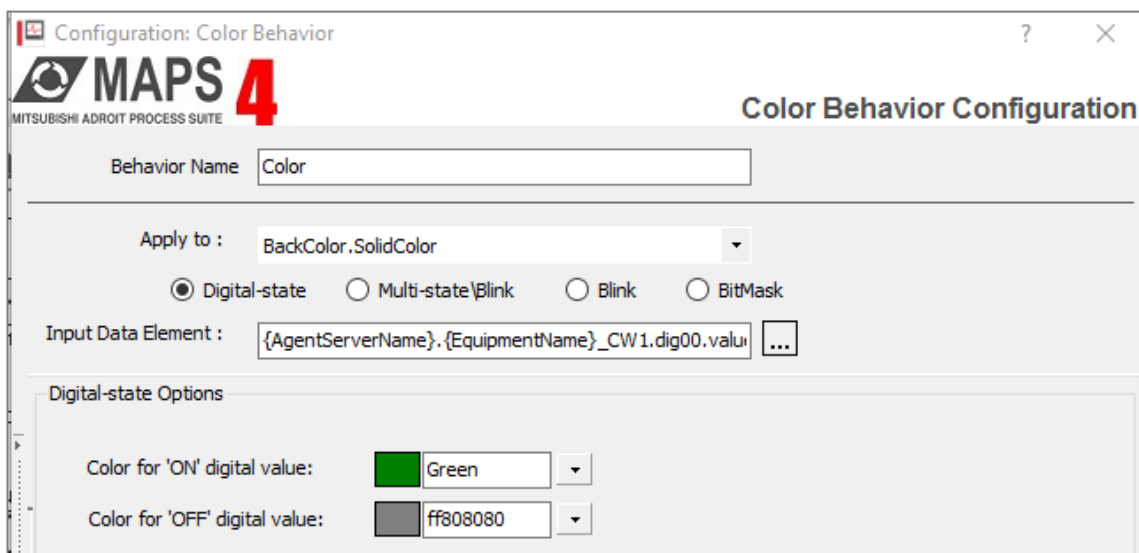
Set Boolean True

Increment/Decrement by: 1

Advanced View > Cancel << Previous Next >> Finish

Figure 27 Start Operator Action Behaviour

- **Color** Behaviour - Browse for the "Adroit.Marshall.EQUIPMENT_CW1.dig00.value" data element which is the Start bit in the scada control word. Select the "Digital State" option. To templatzize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}". Select the ON colot to be Green and OFF Color to be Grey.



Configuration: Color Behavior

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Color Behavior Configuration

Behavior Name: Color

Apply to: BackColor.SolidColor

☒ Digital-state ☐ Multi-state\Blink ☐ Blink ☐ BitMask

Input Data Element: {AgentServerName}. {EquipmentName}_CW1.dig00.valu

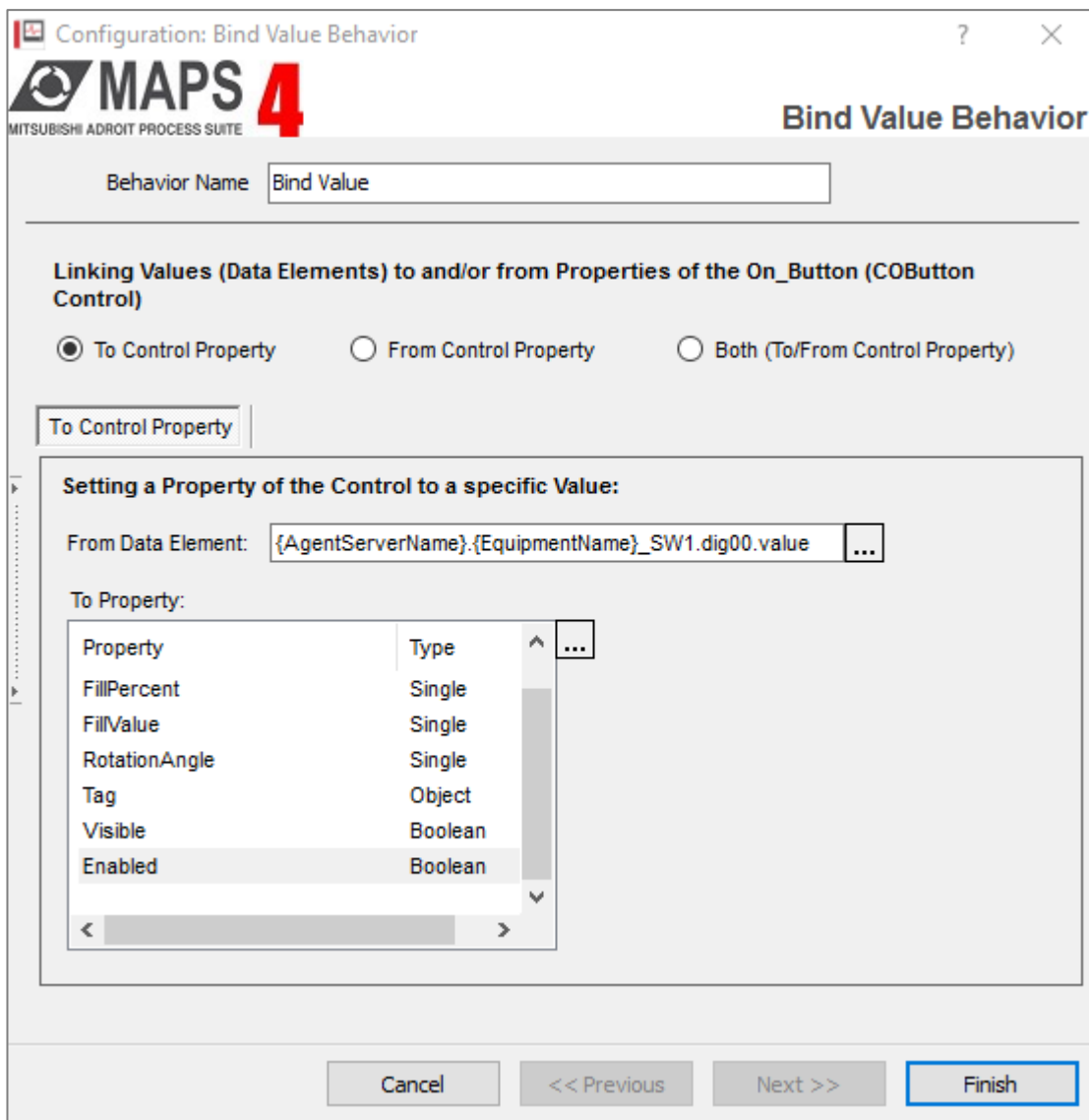
Digital-state Options

Color for 'ON' digital value: Green

Color for 'OFF' digital value: ff808080

Figure 28 Start Color Behaviour

- **Bind** Behaviour - Browse for the "Adroit.Marshall.EQUIPMENT_SW1.dig00.value" data element which is the Stopped bit in the scada status word. Select the "Enabled" property. To templatzize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Bind Value Behavior

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Bind Value Behavior

Behavior Name:

Linking Values (Data Elements) to and/or from Properties of the On_Button (COButton Control)

☒ To Control Property
 ☐ From Control Property
 ☐ Both (To/From Control Property)

To Control Property

Setting a Property of the Control to a specific Value:

From Data Element: ...

To Property:

Property	Type
FillPercent	Single
FillValue	Single
RotationAngle	Single
Tag	Object
Visible	Boolean
Enabled	Boolean

Figure 29 Start Bind Behaviour

- Add behaviours to the Stop Button (Stop_Button) object as follows:
- **Operator Action** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_CW1.dig01.value" data element which is the Stop bit in the scada control word. Specify the "Set Boolean True" control action. To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".

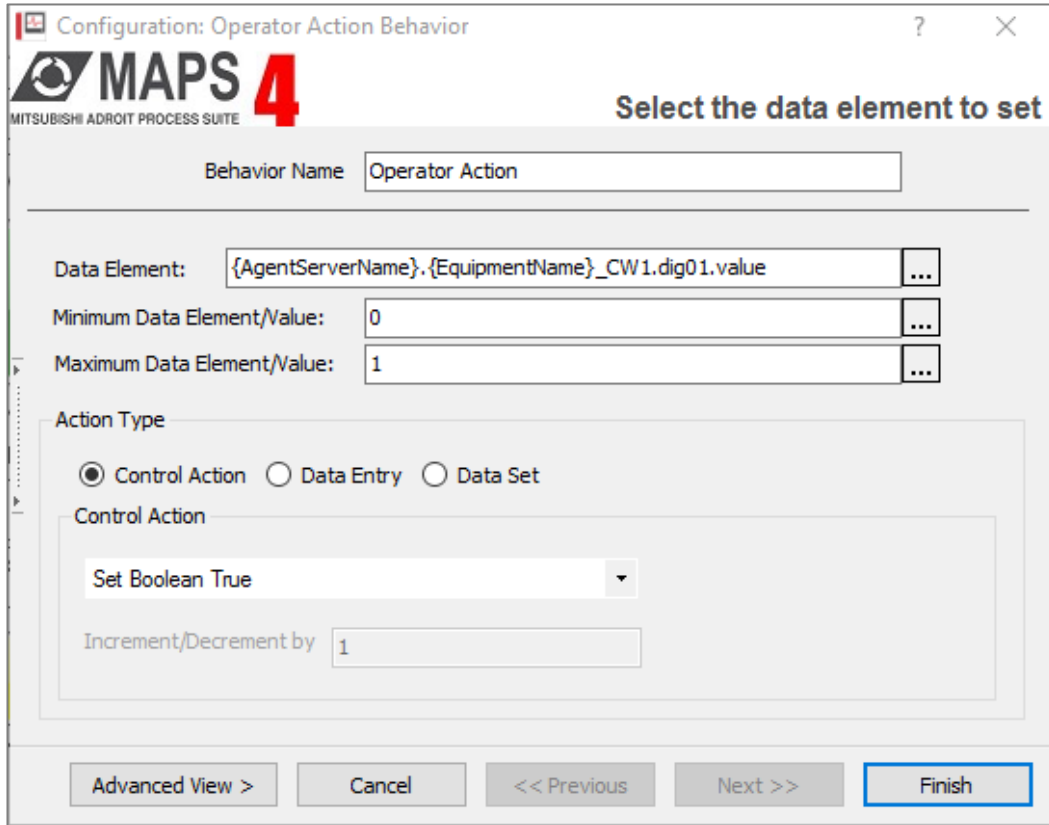


Figure 30 Stop Operator Action Behaviour

- **Color** Behaviour - Browse for the "Adroit.Marshall.EQUIPMENT_CW1.dig01.value" data element which is the Stop bit in the scada control word. Select the "Digital State" option. To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}". Select the ON color to be Green and OFF Color to be Grey.

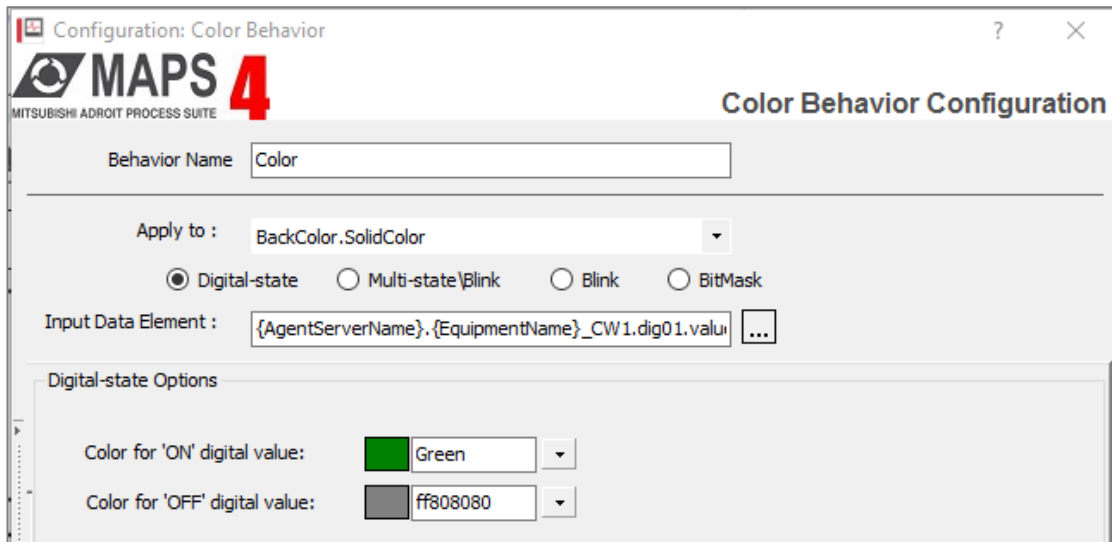
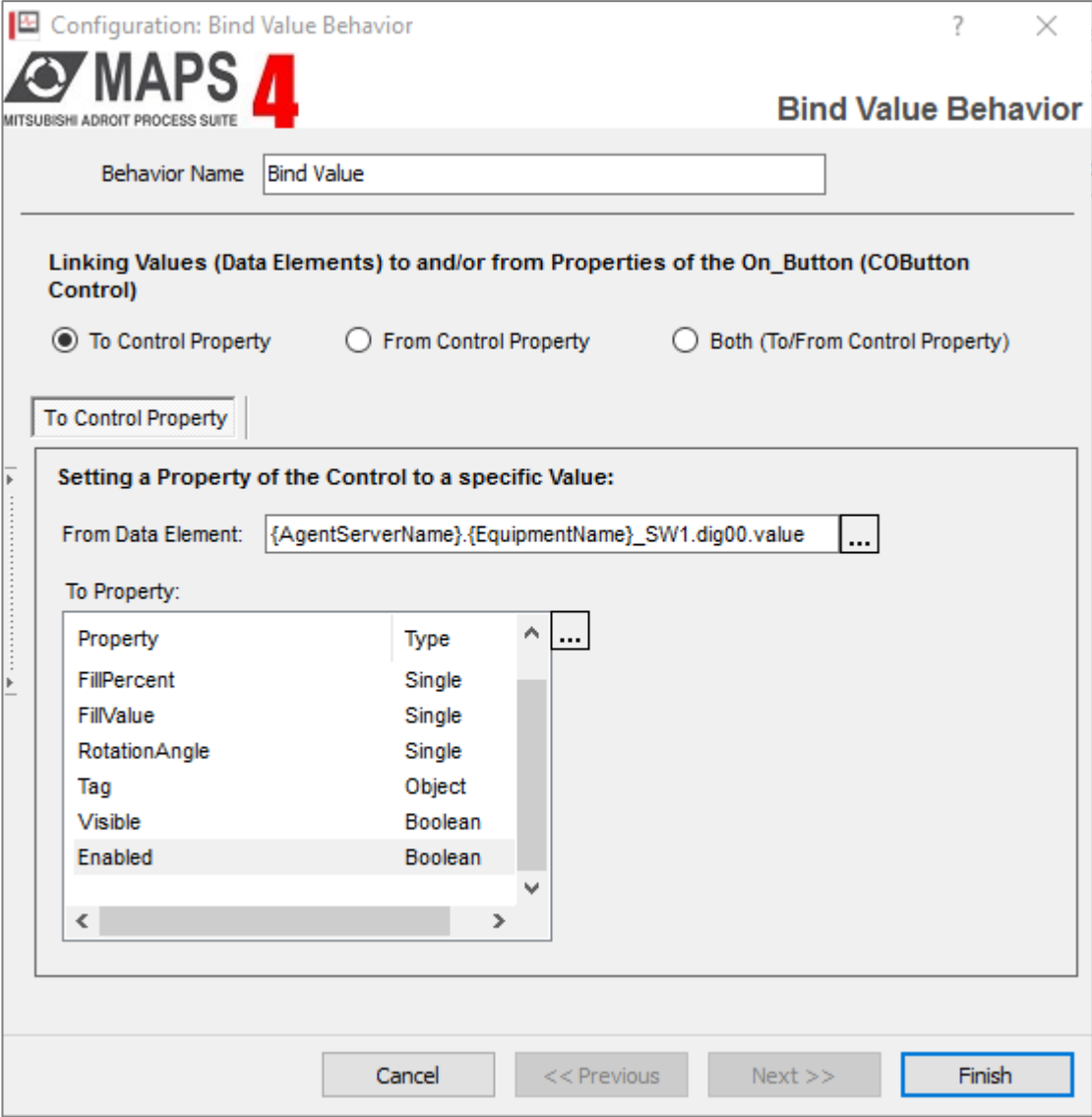


Figure 31 Stop Color Behaviour

- **Bind** Behaviour - Browse for the "Adroit.Marshall.EQUIPMENT_SW1.dig02.value" data element which is the Running bit in the scada status word. Select the "Enabled" property. To templatzize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Bind Value Behavior

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Bind Value Behavior

Behavior Name:

Linking Values (Data Elements) to and/or from Properties of the On_Button (COButton Control)

☒ To Control Property
 ☐ From Control Property
 ☐ Both (To/From Control Property)

To Control Property

Setting a Property of the Control to a specific Value:

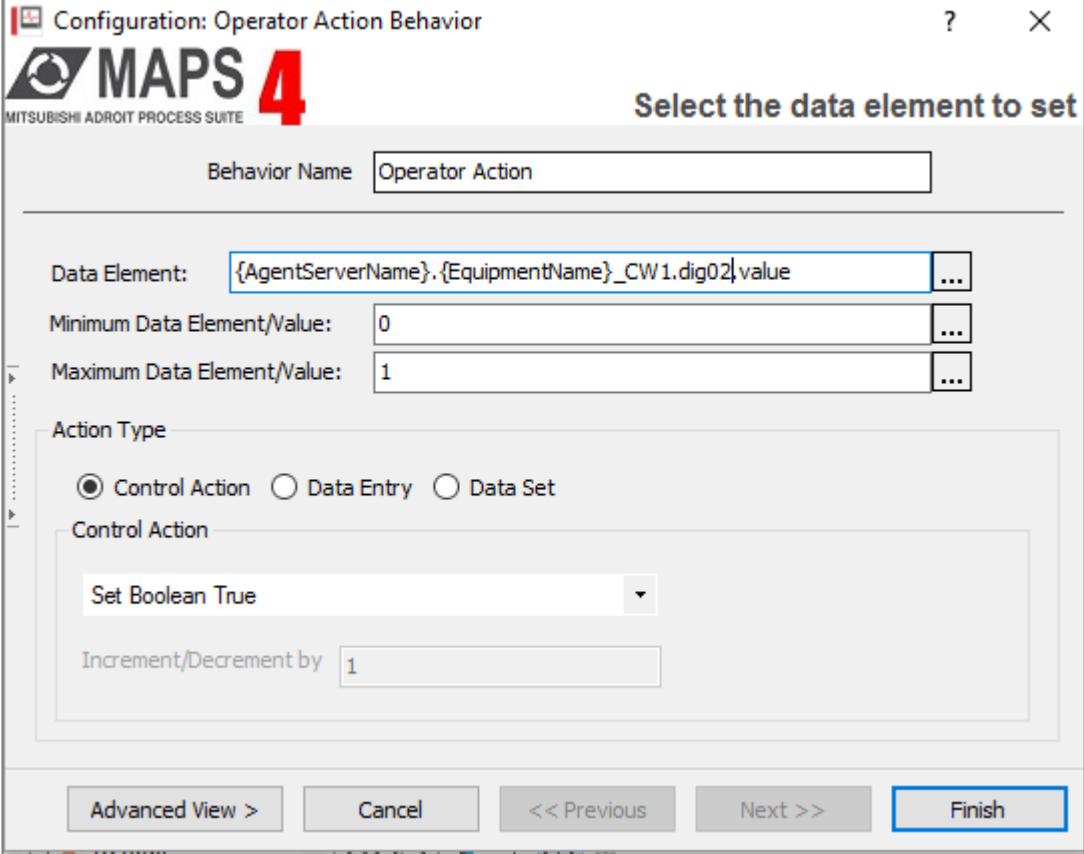
From Data Element: ...

To Property:

Property	Type
FillPercent	Single
FillValue	Single
RotationAngle	Single
Tag	Object
Visible	Boolean
Enabled	Boolean

Figure 32 Stop Bind Behaviour

- Add behaviours to the Reset Button (ResetButton) object as follows:
- **Operator Action** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_CW1.dig02.value" data element which is the Reset bit in the scada control word. Specify the "Set Boolean True" control action. To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Operator Action Behavior

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Select the data element to set

Behavior Name: Operator Action

Data Element: {AgentServerName}. {EquipmentName}_CW1.dig02.value

Minimum Data Element/Value: 0

Maximum Data Element/Value: 1

Action Type

☒ Control Action ☐ Data Entry ☐ Data Set

Control Action

Set Boolean True

Increment/Decrement by: 1

Advanced View > Cancel << Previous Next >> Finish

Figure 33 Reset Operator Action Behaviour

- **Color Behaviour** - Browse for the "Adroit.Marshall.EQUIPMENT_CW1.dig02.value" data element which is the Reset bit in the scada control word. Select the "Digital State" option. To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}". Select the ON color to be Yellow and OFF color to be Grey.

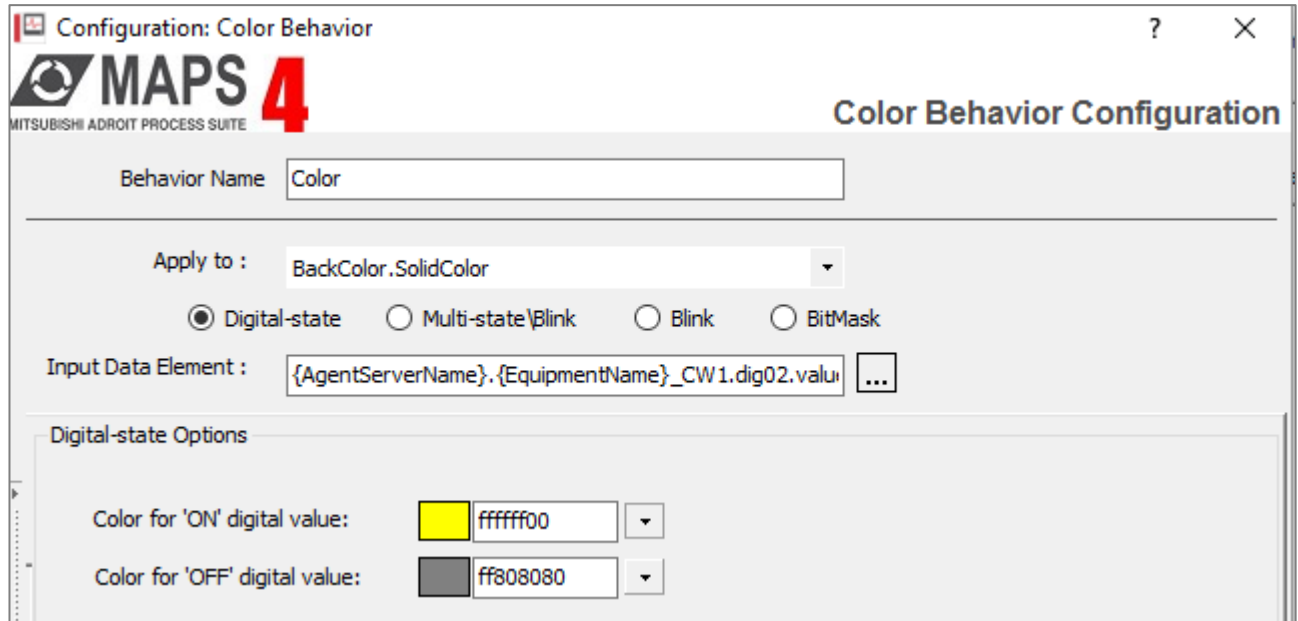


Figure 34 Reset Color Behaviour

- Add behaviours to the On Count Text (On_Count) object as follows:
- **Display Value** behaviour– Browse for the "Adroit.Analog.EQUIPMENT_SW2.value" data element. Specify the string formatting to be "On Count: {0:F0}". To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".

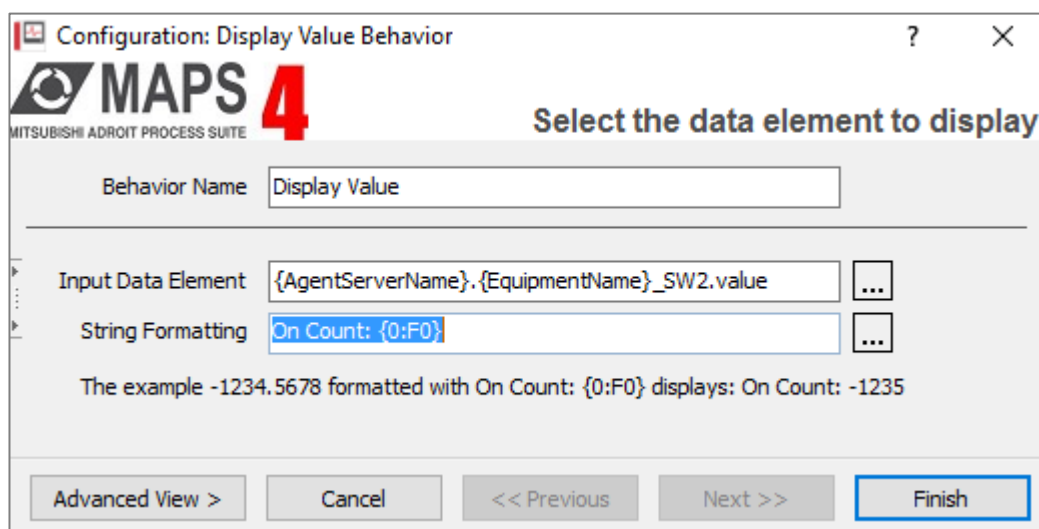
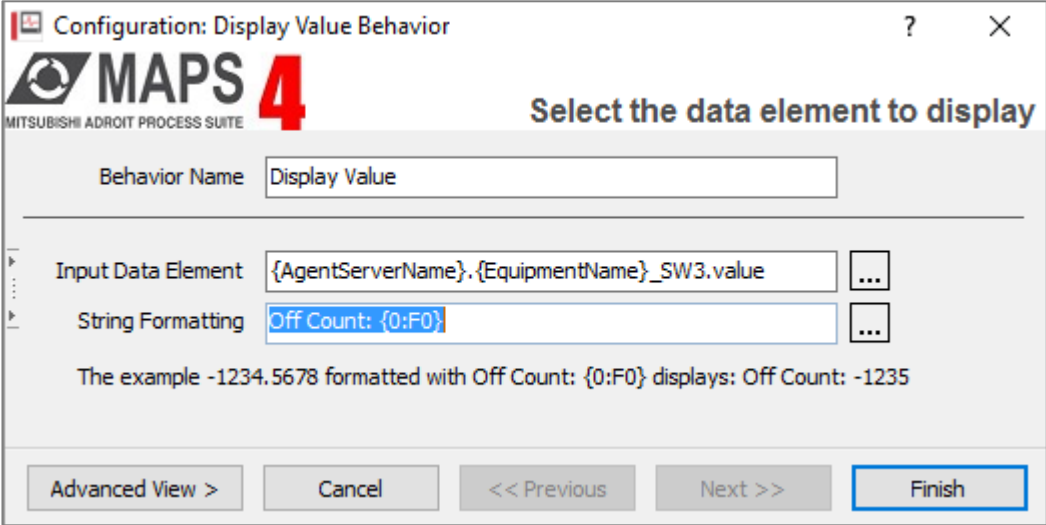


Figure 35 On Count Display Value Behaviour

- Add behaviours to the Off Count Text (Off_Count) object as follows:
- **Display Value** behaviour– Browse for the "Adroit.Analog.EQUIPMENT_SW3.value" data element. Specify the string formatting to be "Off Count: {0:F0}". To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Display Value Behavior

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Select the data element to display

Behavior Name: Display Value

Input Data Element: {AgentServerName}. {EquipmentName}_SW3.value

String Formatting: Off Count: {0:F0}

The example -1234.5678 formatted with Off Count: {0:F0} displays: Off Count: -1235

Advanced View > Cancel << Previous Next >> Finish

Figure 36 Off Count Display Value Behaviour

- Lastly the Equipment Name needs to be displayed at the top. Replace the TEXT property of the Equipment_ID text object which is "0000_ABCDE_000" with "{EquipmentName}". You will be asked if you want to create a form alias for it and press 'Yes'.
- Save and Close the HOME graphic form.

4.4. StartStop Wizard

Build the StartStop wizard, which will be used to represent the instance of your template. On the StartStop folder, press right click and select "New Wizard". Call the wizard "wzdStartStop".

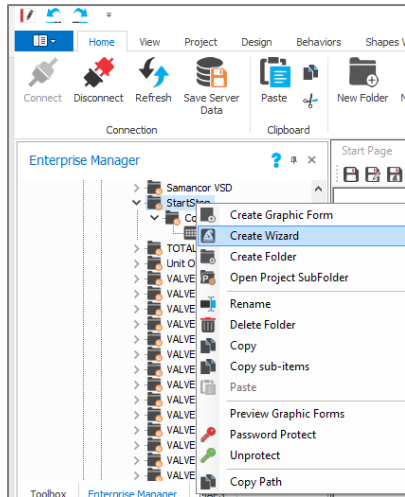


Figure 37 New StartStop wizard.

In the Wizard form, create the following objects.

- Place five text Vectors on the Graphic form.
- The First text will display the equipment name and has the following properties.

Description	Value
Name	Equipment_ID
Font	Verdana, 6.75pt
Text	0000_ACBDE_000
TextAlign	MiddleCenter
Size	110,12
Location	0,0
BackColor	ControllLight

- The Second text will display the STARTING state and has the following properties.

Description	Value
Name	Starting_Status
Font	Verdana, 9.75pt
Text	STARTING
TextAlign	MiddleCenter
Size	110,15
Location	0,15
BackColor	Light Green(ffc0ffc0)

- The Third text will display the STARTED state and has the following properties.

Description	Value
Name	Started_Status
Font	Verdana, 9.75pt
Text	STARTED
TextAlign	MiddleCenter
Size	110,15
Location	0,15
BackColor	Bright Green(ff00ff00)

- The Fourth text will display the STOPPING state and has the following properties.

Description	Value
Name	Stopping_Status
Font	Verdana, 9.75pt
Text	STOPPING
TextAlign	MiddleCenter
Size	110,15
Location	0,15
BackColor	Light Red (ffff8080)

- The Fifth text will display the STOPPED state and has the following properties.

Description	Value
Name	Stopped_Status
Font	Verdana, 9.75pt
Text	STOPPED
TextAlign	MiddleCenter
Size	110,15
Location	0,15
BackColor	Red (ffff0000)

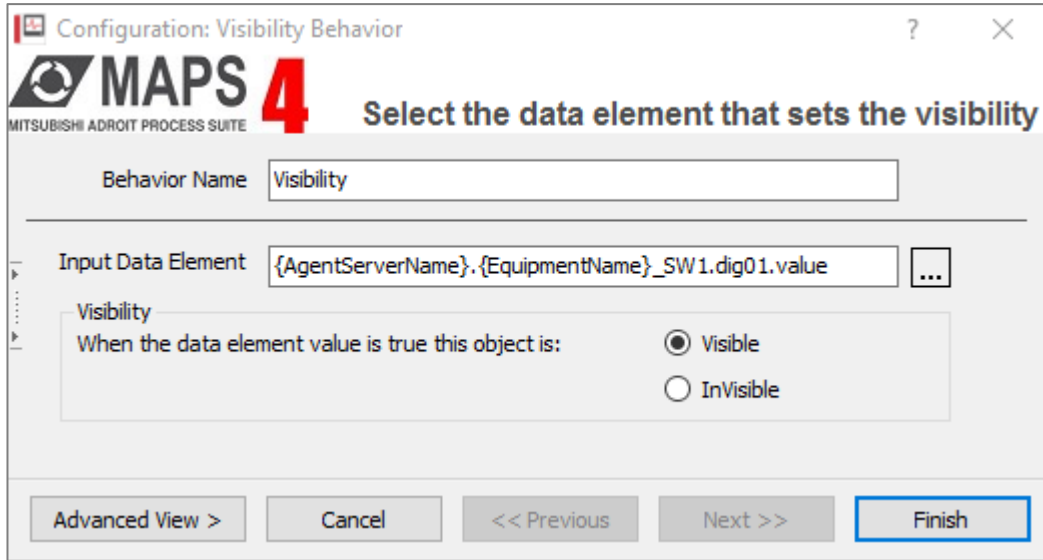
Now that the contents of the StartStop wizard form is completed, it needs to be automated and behaviours needs to be added to all the objects.

Being a wizard we will use 2 Aliases (Placement Holders) as in:

AgentServerName – Contains the name of the Adroit Agent Server Datasource.

EquipmentName – Contains the name of the actual piece of equipment.

- Add behaviour to the STARTING text (Starting_Status) object as follows:
- **Visibility** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_SW1.dig01.value" data element which is the Starting bit in the scada status word. Select the "Visible" radio option. To templatzize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Visibility Behavior

MAPS 4 Select the data element that sets the visibility

Behavior Name: Visibility

Input Data Element: {AgentServerName}. {EquipmentName}_SW1.dig01.value

Visibility

When the data element value is true this object is:

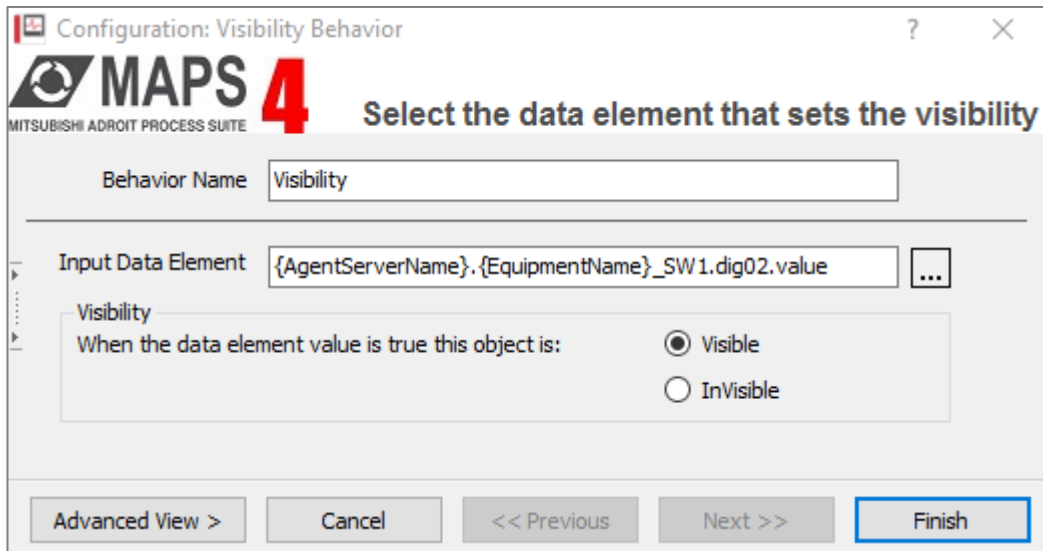
☒ Visible

☐ InVisible

Advanced View > Cancel << Previous Next >> Finish

Figure 38 Starting Status Visibility behaviour.

- Add behaviour to the STARTED text (Started_Status) object as follows:
- **Visibility** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_SW1.dig02.value" data element which is the Started bit in the scada status word. Select the "Visible" radio option. To templatzize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Visibility Behavior

MAPS 4 Select the data element that sets the visibility

Behavior Name: Visibility

Input Data Element: {AgentServerName}. {EquipmentName}_SW1.dig02.value

Visibility

When the data element value is true this object is:

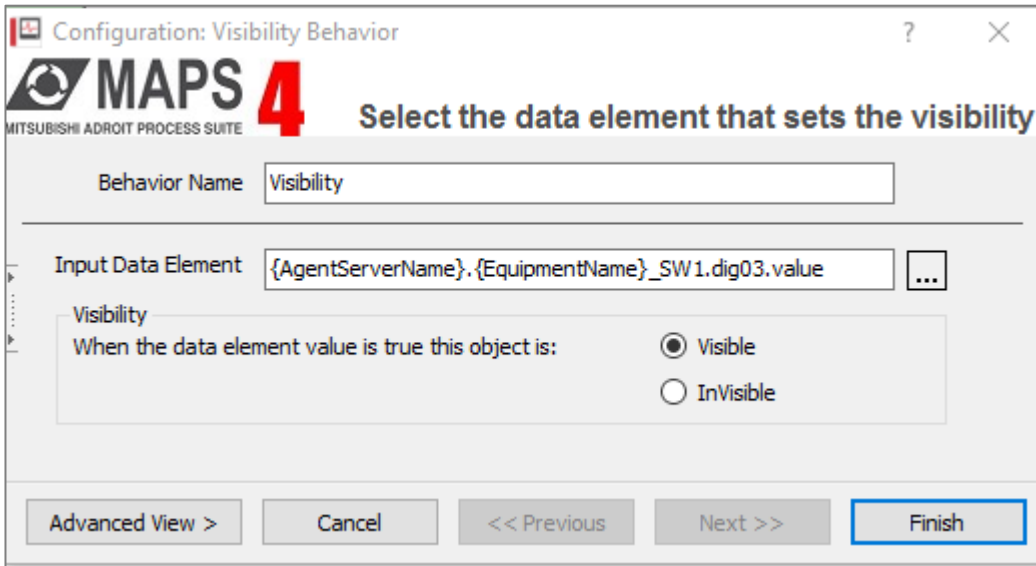
☒ Visible

☐ InVisible

Advanced View > Cancel << Previous Next >> Finish

Figure 39 Started Status Visibility behaviour.

- Add behaviour to the STOPPING text (Stopping_Status) object as follows:
- **Visibility** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_SW1.dig03.value" data element which is the Stopping bit in the scada status word. Select the "Visible" radio option. To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Visibility Behavior

MAPS 4 Select the data element that sets the visibility

Behavior Name:

Input Data Element: ...

Visibility

When the data element value is true this object is:

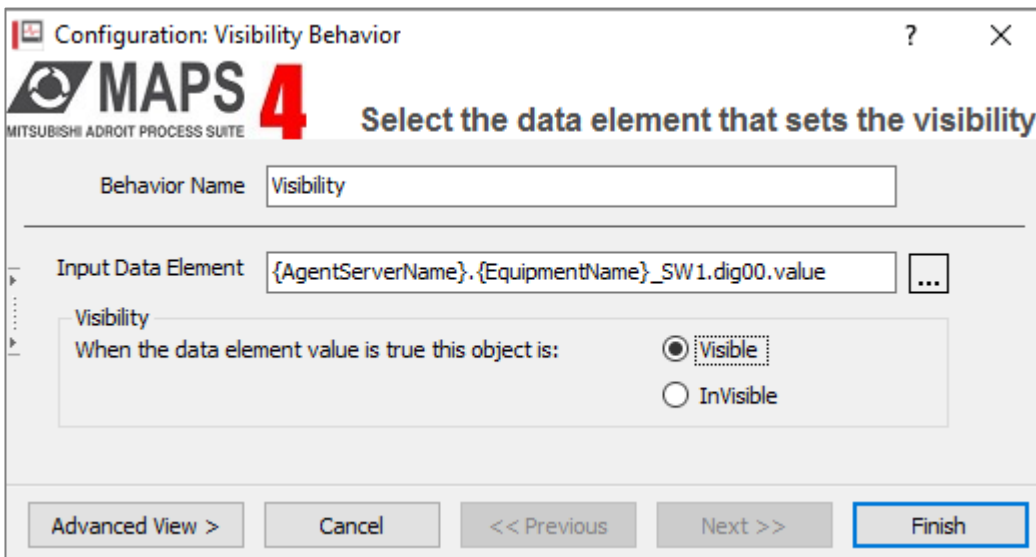
☒ Visible

☐ InVisible

Advanced View > Cancel << Previous Next >> Finish

Figure 40 Stopping Status Visibility behaviour.

- Add behaviour to the STOPPED text (Stopped_Status) object as follows:
- **Visibility** behaviour– Browse for the "Adroit.Marshall.EQUIPMENT_SW1.dig00.value" data element which is the Stopped bit in the scada status word. Select the "Visible" radio option. To templatize the behaviour, replace the "Adroit" with "{AgentServerName}" and replace "EQUIPMENT" with "{EquipmentName}".



Configuration: Visibility Behavior

MAPS 4 Select the data element that sets the visibility

Behavior Name:

Input Data Element: ...

Visibility

When the data element value is true this object is:

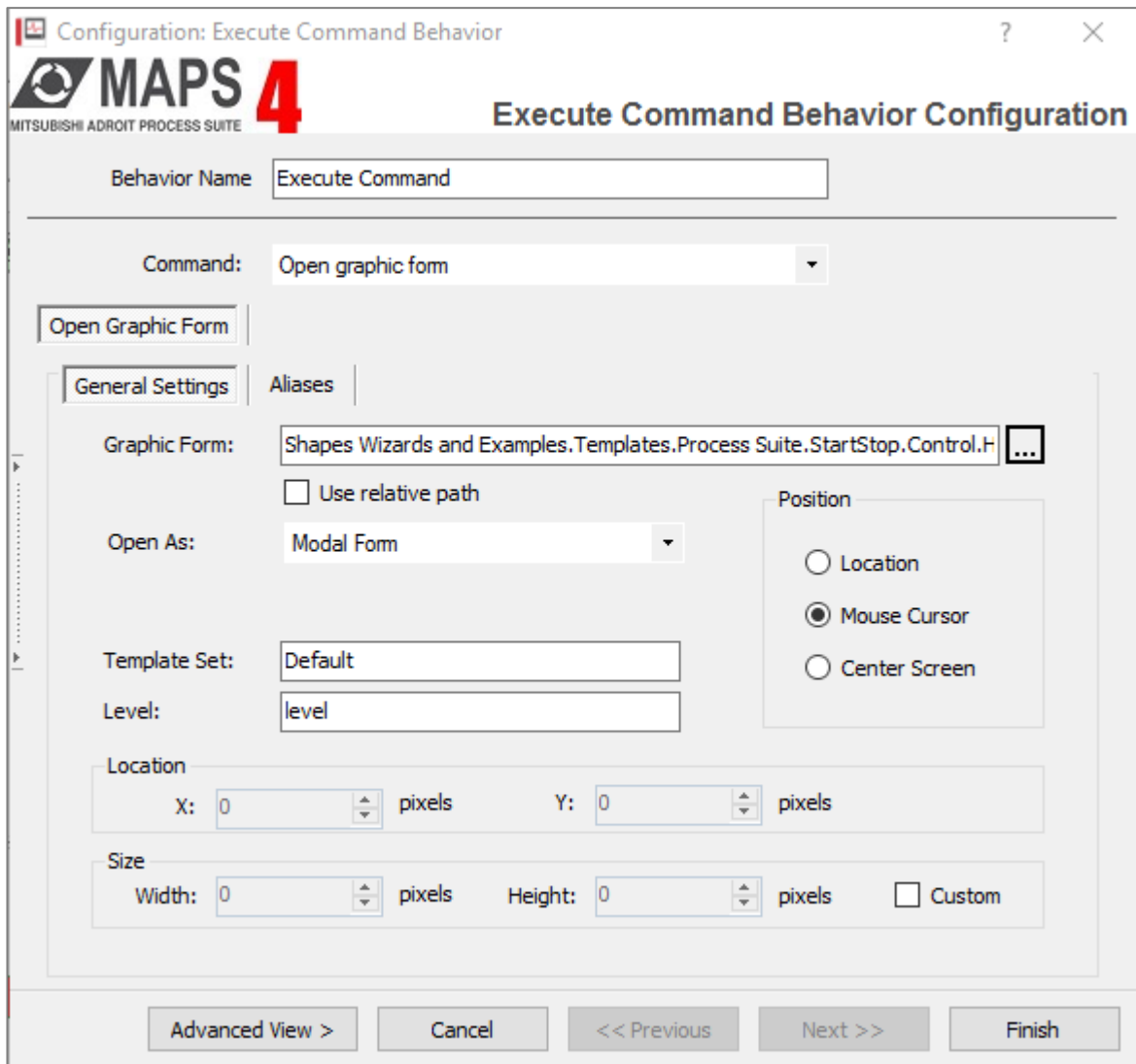
☒ Visible

☐ InVisible

Advanced View > Cancel << Previous Next >> Finish

Figure 41 Stopped Status Visibility behaviour.

- Lastly the Equipment Name needs to be displayed at the top. Replace the TEXT property of the Equipment_ID text object which is "0000_ABCDE_000" with "{EquipmentName}". You will be asked if you want to create a form alias for it and press 'Yes'.
- Select all the objects on the wizard by using CTRL + A.
- On the 'Design' menu, press the 'Create Vector Group' button, to create a vector group.
- Name this group "HomePage_Button" in the properties.
- Add a new **Execute Command** behaviour to this HomePage_Button group which will open the previously created HOME graphic form when clicked in a modal form at the Mouse Cursor. See below image.
- Then select the "Advanced View >" button in the behaviour which will enable the tab called "Alias". Select this tab and specify the "Aliases" as follows. "EquipmentName" -> "{EquipmentName}" and "AgentServerName" -> "{AgentServerName}". See Image below.



Configuration: Execute Command Behavior

MAPS 4 MITSUBISHI ADROIT PROCESS SUITE

Execute Command Behavior Configuration

Behavior Name:

Command:

General Settings | Aliases

Graphic Form:

☐ Use relative path

Open As:

Template Set:

Level:

Position:

- ☐ Location
- ☒ Mouse Cursor
- ☐ Center Screen

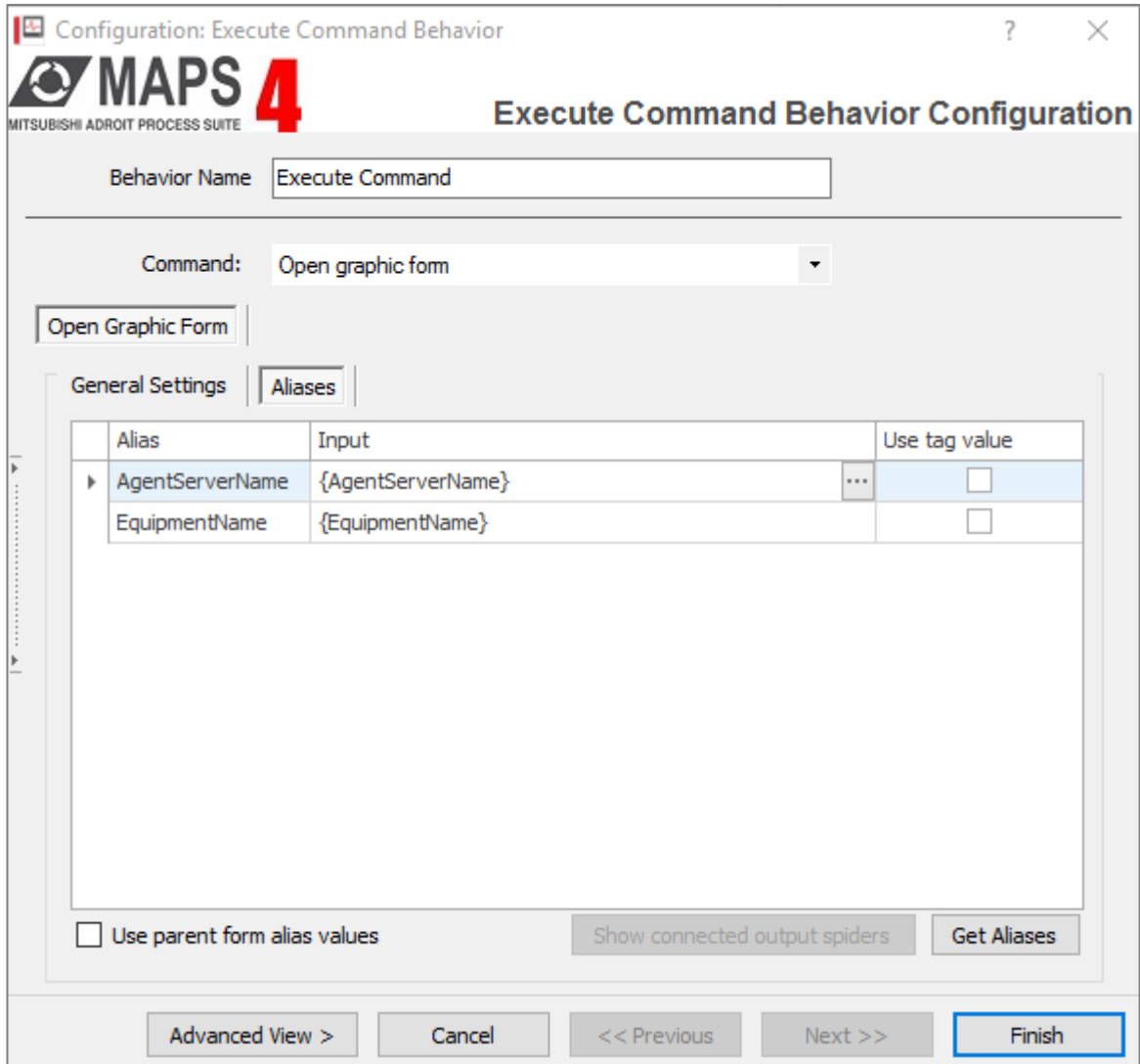
Location:

X: pixels Y: pixels

Size:

Width: pixels Height: pixels ☐ Custom

Figure 42 Execute Command behaviour.



Configuration: Execute Command Behavior

MAPS 4

Execute Command Behavior Configuration

Behavior Name:

Command:

Open Graphic Form

General Settings | **Aliases**

Alias	Input	Use tag value
AgentServerName	{AgentServerName}	☐
EquipmentName	{EquipmentName}	☐

☐ Use parent form alias values

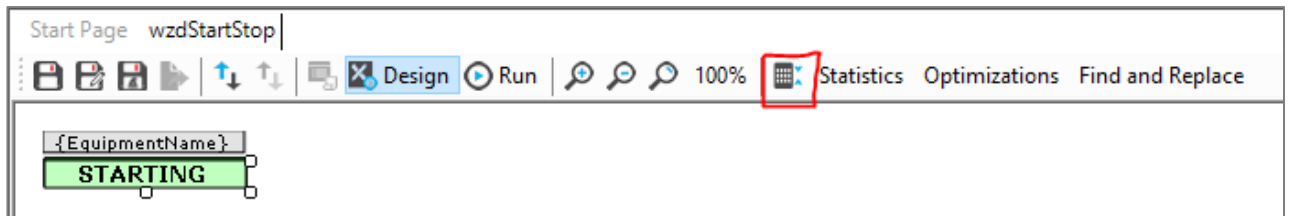
Show connected output spiders

Get Aliases

Advanced View > Cancel << Previous Next >> **Finish**

Figure 43 Execute Command behaviour Aliases.

- Once done press the "Optimize Graphic Form"



Start Page wzdStartStop

Design Run 100% **Statistics** Optimizations Find and Replace

{EquipmentName}

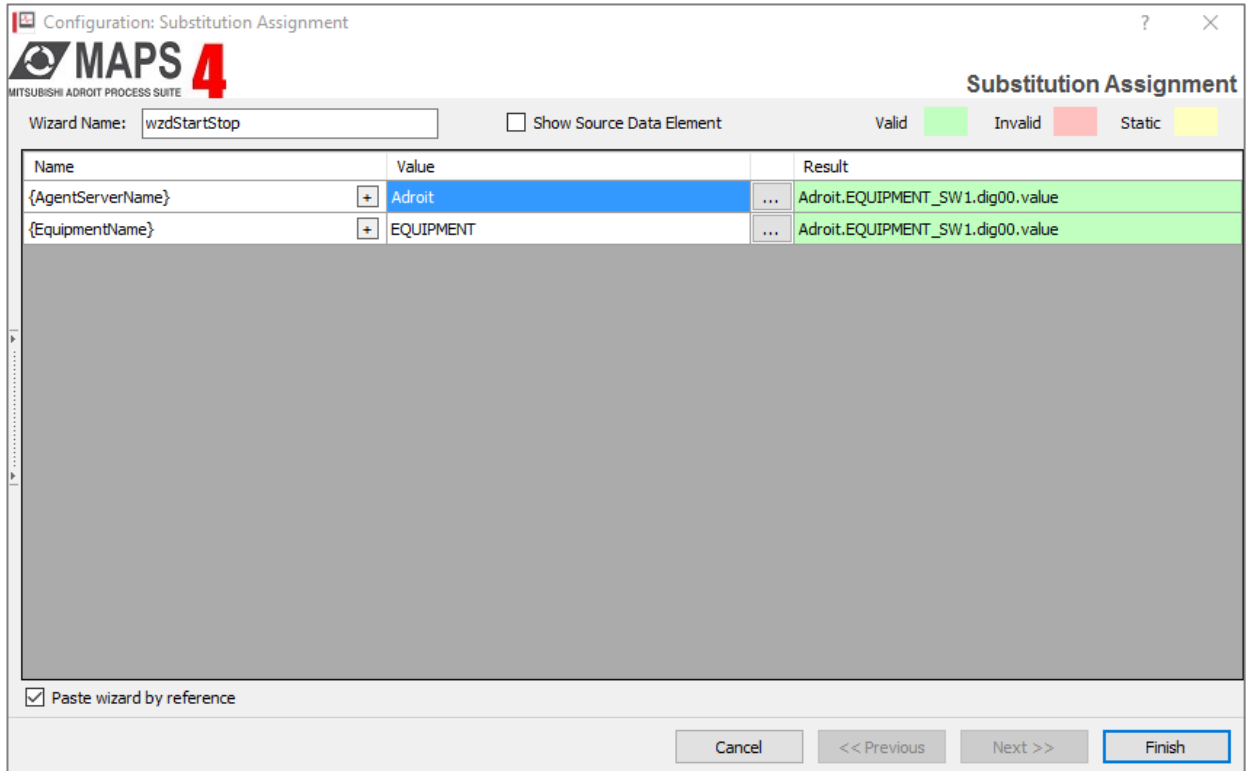
STARTING

Figure 44 Optimize Wizard Form

- Save and Close the wizard form.

4.5. Commission Template

- Run the GX Works2 program and make sure the project is downloaded to the PLC or simulator. Open the Body of the main program and enable the monitoring of the program that was down loaded to the plc.
- Run the MAPS Designer create a new project called "Template". Create a new Graphic Form called "Test".
- On this new graphic form, place the wzdStartStop on it and replace the values as below:
- AgentServerName - > Adroit
- EquipmentName -> EQUIPMENT



Configuration: Substitution Assignment

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Substitution Assignment

Wizard Name: ☐ Show Source Data Element

Valid Valid Invalid Invalid Static Static

Name	Value	Result
{AgentServerName}	Adroit	Adroit.EQUIPMENT_SW1.dig00.value
{EquipmentName}	EQUIPMENT	Adroit.EQUIPMENT_SW1.dig00.value

☒ Paste wizard by reference

Cancel << Previous Next >> Finish

Figure 45 Wizard Instance Replacement.

- Make sure it all GREEN/VALID then press "Finish."
- Save the Test graphic form and launch the Operator. Open the Test graphic form in the Operator.
- Make sure that you can open the HOME graphic form by clicking on the Object.
- On startup the Starter1 should be in STOPPED state.
- Click the Start Button the State will change to Starting.

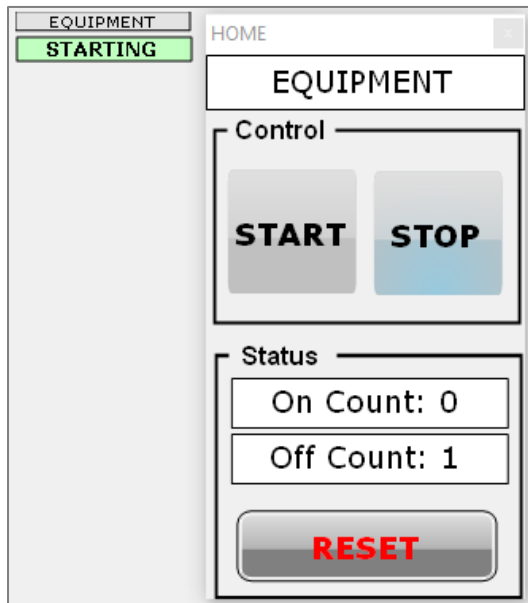


Figure 46 PLC FB in Starting State

- In the GX Works2 toggle the Variable F_I_RunFeedBack Boolean device to true. This will change the Equipment Status to Started

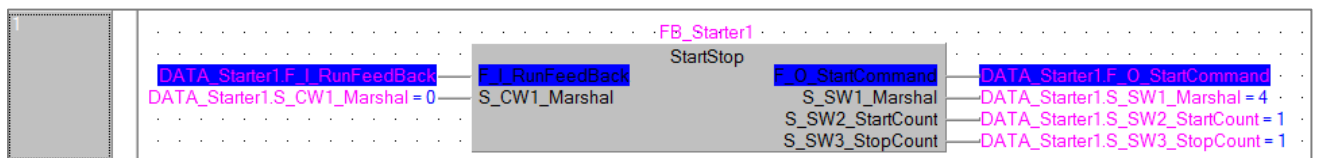


Figure 47 FB_Start1 in the started state

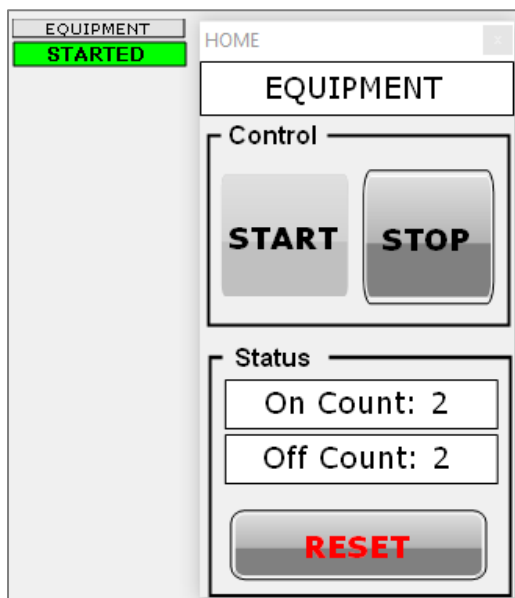


Figure 48 Equipment in the started state

- Click on the Off button this will change the Equipment status to Stopping.

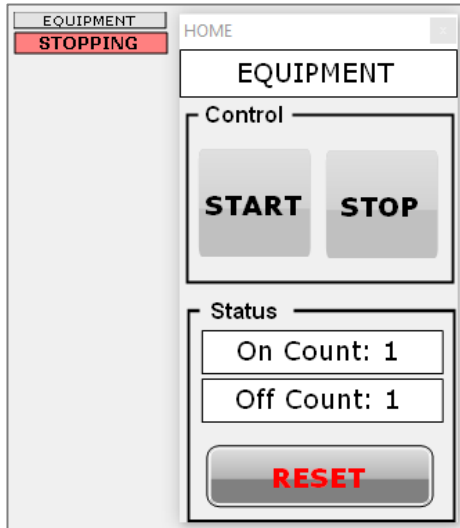


Figure 49 Equipment in the stopping state

- In the GX Works2 toggle the Variable F_I_RunFeedBack Boolean device to False. This will change the Equipment Status to Stopped.

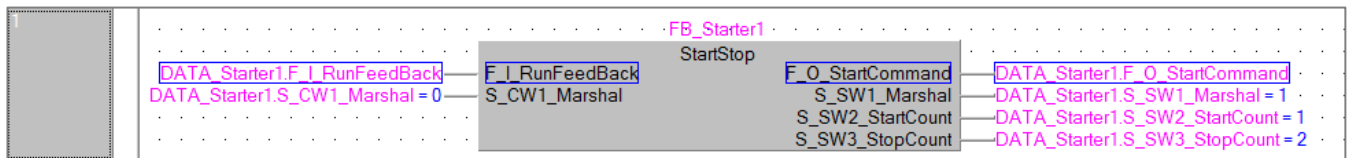


Figure 23 FB_Start1 in the stopped state

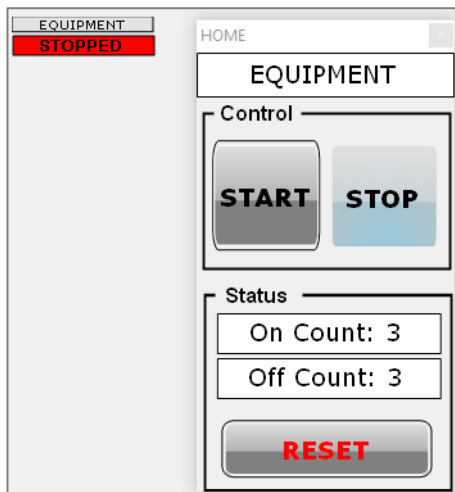


Figure 50 Equipment in the stopped state

- Click on the Reset button to reset the count values.

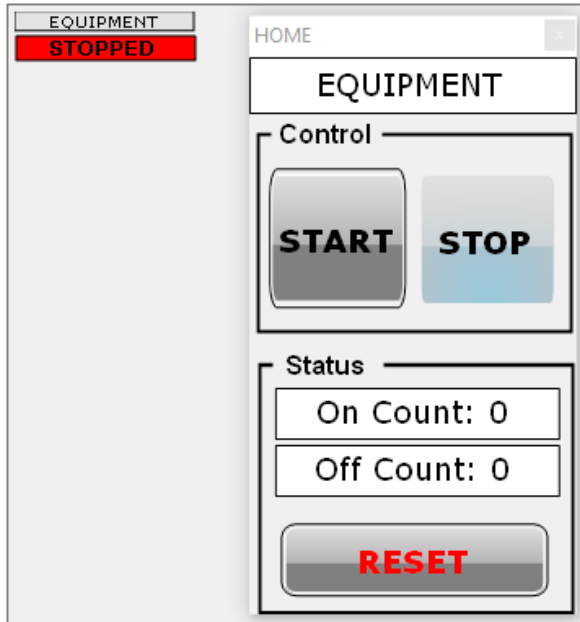
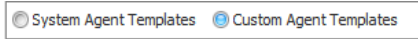


Figure 51 Counter Reset

5. Add New Template to MAPS Data Source

In the Enterprise manager you will need to create a new data source. Right click on the Datasources and add new, select the MAPS Template datasource click finish. Name the maps template datasource MAPS_TEMPLATES.

5.1. Create Adroit Agent Templates

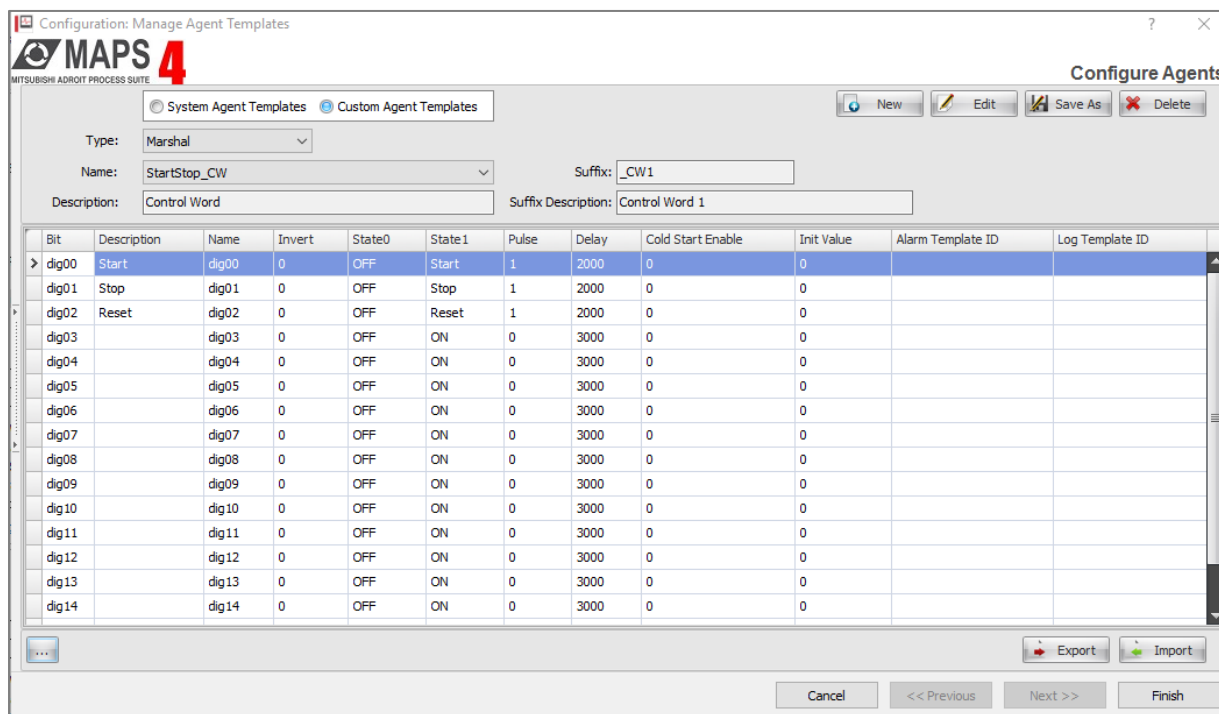
- You will need to define the Adroit agent templates. These templates will be assigned to the signals which you create in the next step. The adroit agent templates should be as generic as possible.
- Right Click on Custom Templates in the MAPS_TEMPLATES datasource and select Manage agents in the context menu.
- Select the Custom Agent Templates. 
- Select the Marshal in the Type drop down box
- Click on the new button on the right hand side of the Manage agent dialog box to add a new Marshal template. 
- In the pop up dialog fill in the following data.

Agent Type:	Marshal
Name:	StartStop_CW
Description:	Control Word
Suffix:	_CW1
Suffix Description:	Control Word 1

- Click finish.
- Then click on the browse button in the bottom left of the Manage Agent Templates dialog. 
- This will bring up a dialog box which will allow you to use agent that already exist in the Adroit Agent Server.

Agent Type:	Marshal
Name:	EQUIPMENT_CW1

- Click OK.



Configuration: Manage Agent Templates

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Configure Agents

☐ System Agent Templates ☒ Custom Agent Templates

New Edit Save As Delete

Type: Marshal

Name: StartStop_CW Suffix: _CW1

Description: Control Word Suffix Description: Control Word 1

Bit	Description	Name	Invert	State0	State1	Pulse	Delay	Cold Start Enable	Init Value	Alarm Template ID	Log Template ID
dig00	Start	dig00	0	OFF	Start	1	2000	0	0		
dig01	Stop	dig01	0	OFF	Stop	1	2000	0	0		
dig02	Reset	dig02	0	OFF	Reset	1	2000	0	0		
dig03		dig03	0	OFF	ON	0	3000	0	0		
dig04		dig04	0	OFF	ON	0	3000	0	0		
dig05		dig05	0	OFF	ON	0	3000	0	0		
dig06		dig06	0	OFF	ON	0	3000	0	0		
dig07		dig07	0	OFF	ON	0	3000	0	0		
dig08		dig08	0	OFF	ON	0	3000	0	0		
dig09		dig09	0	OFF	ON	0	3000	0	0		
dig10		dig10	0	OFF	ON	0	3000	0	0		
dig11		dig11	0	OFF	ON	0	3000	0	0		
dig12		dig12	0	OFF	ON	0	3000	0	0		
dig13		dig13	0	OFF	ON	0	3000	0	0		
dig14		dig14	0	OFF	ON	0	3000	0	0		

Export Import

Cancel << Previous Next >> Finish

Figure 52 StartStop Control Word Adroit Agent Template

- Click on the new button on the right hand side of the Manage Agent dialog box to add a new Marshal template. 
- In the pop up dialog fill in the following data.

Agent Type:	Marshal
Name:	StartStrop_SW
Description:	Status Word
Suffix:	_SW1
Suffix Description:	Status Word 1

- Click Finish.
- Then click on the browse button in the bottom left of the Manage Agent Templates dialog. 
- This will bring up a dialog box which will allow you to use Adroit agent that already exist in the Adroit Agent Server to use as a template.

Agent Type:	Marshal
Name:	EQUIPMENT_SW1

- Click OK.
- Select the Analog in the Type drop down box.
- Click on the new button on the right hand side of the Manage agent dialog box to add a new Analog template. 

- In the pop up dialog fill in the following data.

Agent Type:	Analog
Name:	StartStrop_OnCount
Description:	On Count
Suffix:	_SW2
Suffix Description:	Status Word 2

- Click Finish.
- Then click on the browse button in the bottom left of the Manage Agent Templates dialog. 
- This will bring up a dialog box which will allow you to use Adroit agent that already exist in the Adroit Agent Server to use as a template.

Agent Type:	Analog
Name:	EQUIPMENT_SW2

- Click Ok.
- Click on the Save As Button on the Right hand side of the Manage Agent Templates dialog. 
- In the pop up dialog fill in the following data.

Agent Type:	Analog
Name:	StartStrop_OffCount
Description:	Off Count
Suffix:	_SW3
Suffix Description:	Status Word 3

- Click on the OK button.

Configuration: Manage Agent Templates

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Configure Agents

☐ System Agent Templates
 ☒ Custom Agent Templates

Type: Analog
 Name: StartStop_OffCount
 Description: Off Count
 Suffix: _SW3
 Suffix Description: Status Word 3

New Edit Save As Delete

Raw Min	Raw Max	Eng Min	Eng Max	HiHi	Hi	Lo	Lolo	init Value
> 0	32767	0	32767	32767	32767	0	0	0

Export Import

Cancel << Previous Next >> Finish

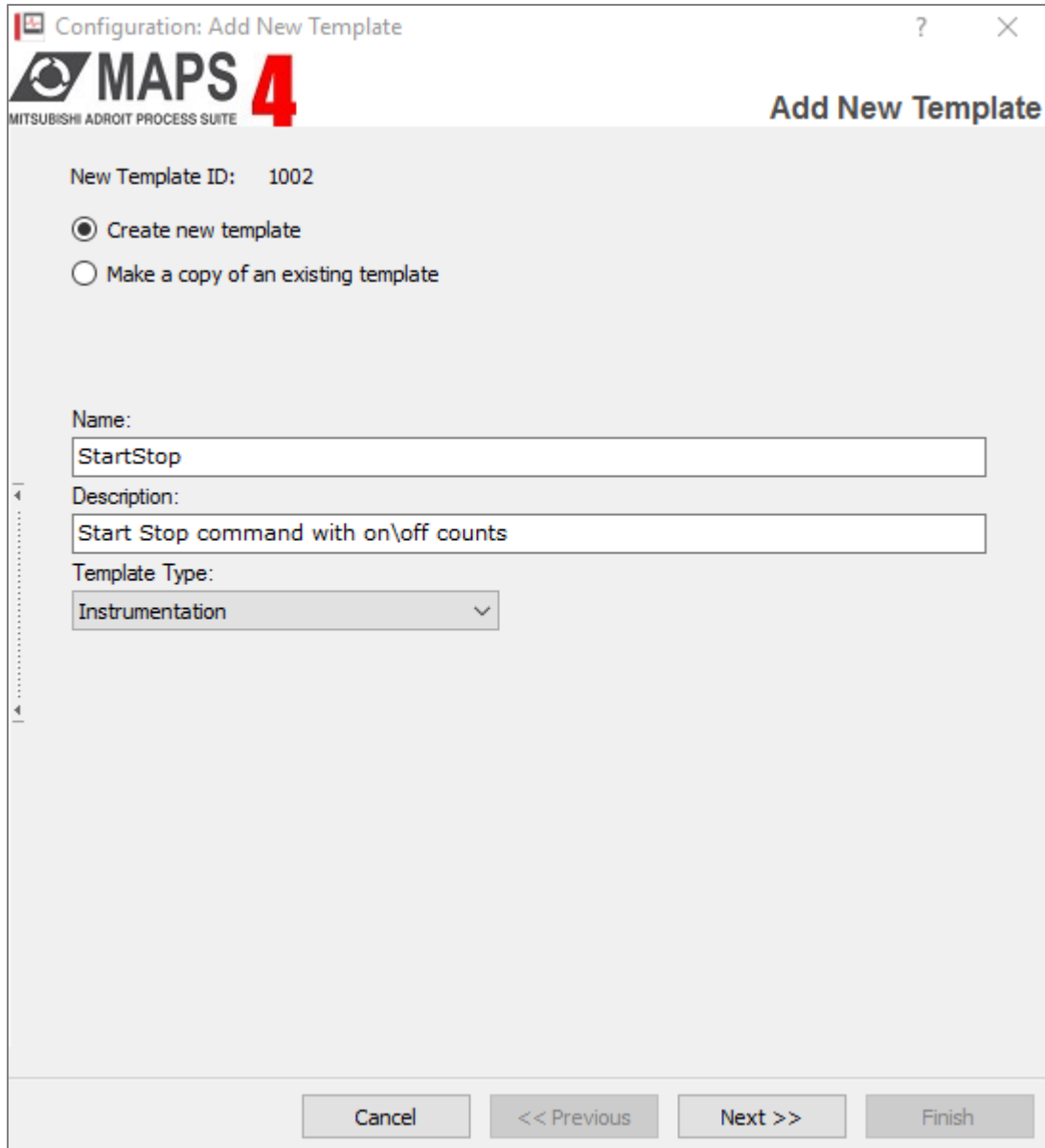
Figure 53 StartStop Off Count Adroit Agent Template

- Click on the Finish Button

5.2. Add Template

On the MAPS Template Data Source right click on custom templates and select Add New Template.

- Select Create new template.
- Give the new template the Name StartStop.
- A description 'Start Stop command with on\off counts'
- Select the Template Type. Instrumentation.
- Click Next.



Configuration: Add New Template

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Add New Template

New Template ID: 1002

☒ Create new template
☐ Make a copy of an existing template

Name:

Description:

Template Type:

Cancel << Previous Next >> Finish

Figure 54 Add New Template Wizard

Make a note of the Template ID. The template id should be 1001

- Click on the Import button. 
- Select one of the following.



Figure 55 Import Selection

5.2.1. GX Works2 Import

- Select the GX Works2 Project created in Section 2 of this document.

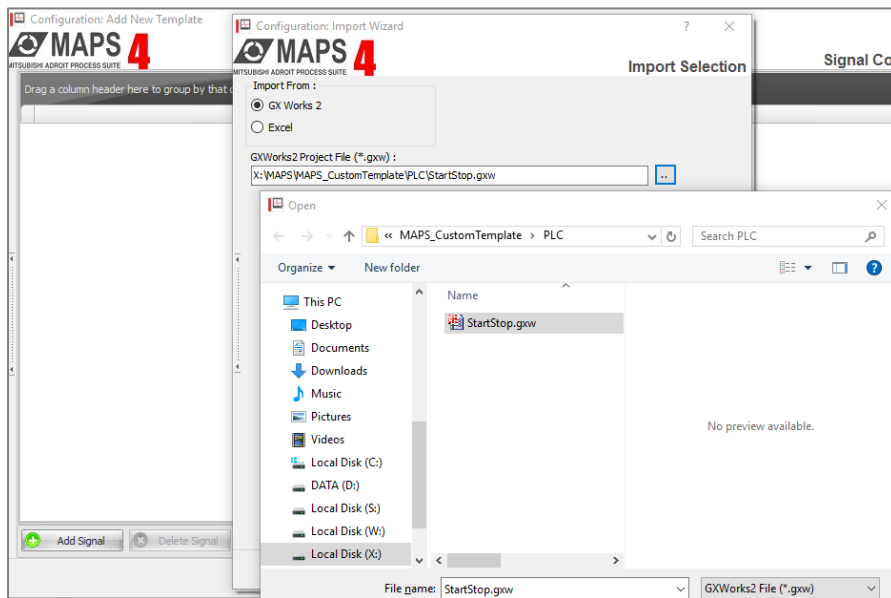


Figure 56 GX Works2 Project Selection

- Click Next.
- Complete the GX Works2 Import Wizard by selection the following.
 - The Name of the POU that contains the instance of the StartStop Function Block.
 - The User Library that contains the StartStop Function Block and DUT.
 - The Global Variable List that contains the Instance of the DUT.
 - The Global Variable (The instance of the StartStop DUT).
 - The Function Block. (The instance of the StartStop Function Block).

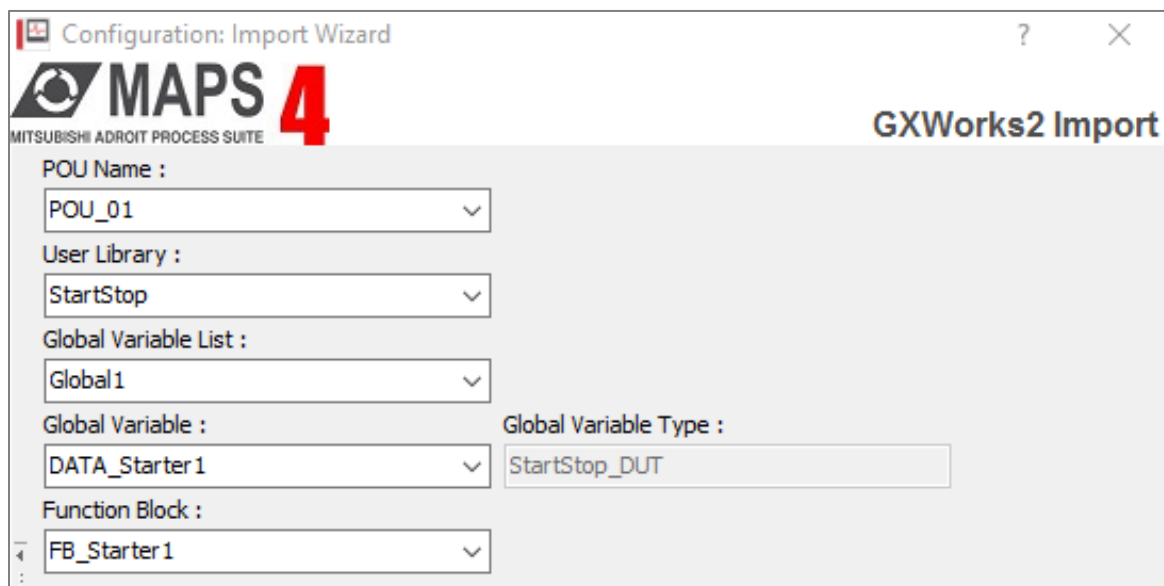


Figure 57 GX Works2 Import Selection

- Click Finish.
- Go to Section – “Configure Signals” below to continue.

5.2.2. Excel Import

- Creating the Excel Import Sheet to bulk create the signals in the Configure signals wizard.
- Create a new excel spread sheet named SampleStart.xls Rename one of the Sheets to DUT.
- Create four new headers with the names: SCADA; TSID; PLC; Comments.
- You will need to transfer the data from the DUT STARTSTOP_DUT to this spread sheet by selecting all the rows in the DUT in IEC and pressing Ctrl+C and then pressing Ctrl+V on the spread sheet. The TSID entries are used as references in the data base as such each signal will need a unique TSID value. The TSID values are created using a Prefix, the Template ID, followed by a unique signal number. If the Signal is a bit of a word then a bit number is required.

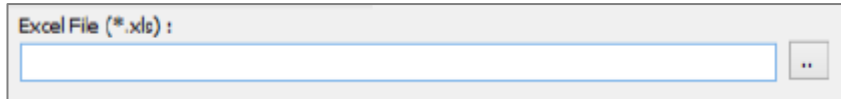
Prefix	Template ID	Signal Number	Bit number in word
TSID	1001	01	.00

Signal ID Table Sample

SCADA	TSID	PLC	Comment
	TSID100101	F_I_RunFeedBack: BOOL:=FALSE;	
	TSID100102	F_O_StartCommand: BOOL:=FALSE;	
	TSID100103	S_CW1_Marshal: INT:=0;	
	TSID100103.00	S_CW1_0_Start: BOOL:=FALSE;	
	TSID100103.01	S_CW1_1_Stop: BOOL:=FALSE;	
	TSID100103.02	S_CW1_2_Reset: BOOL:=FALSE;	
	TSID100103.03	S_CW1_3_Spare: BOOL:=FALSE;	
	TSID100103.04	S_CW1_4_Spare: BOOL:=FALSE;	
	TSID100103.05	S_CW1_5_Spare: BOOL:=FALSE;	
	TSID100103.06	S_CW1_6_Spare: BOOL:=FALSE;	
	TSID100103.07	S_CW1_7_Spare: BOOL:=FALSE;	
	TSID100103.08	S_CW1_8_Spare: BOOL:=FALSE;	
	TSID100103.09	S_CW1_9_Spare: BOOL:=FALSE;	
	TSID100103.10	S_CW1_10_Spare: BOOL:=FALSE;	
	TSID100103.11	S_CW1_11_Spare: BOOL:=FALSE;	
	TSID100103.12	S_CW1_12_Spare: BOOL:=FALSE;	
	TSID100103.13	S_CW1_13_Spare: BOOL:=FALSE;	
	TSID100103.14	S_CW1_14_Spare: BOOL:=FALSE;	
	TSID100103.15	S_CW1_15_Spare: BOOL:=FALSE;	
	TSID100104	S_SW1_Marshal: INT:=0;	
	TSID100104.00	S_SW1_0_Stopped: BOOL:=FALSE;	
	TSID100104.01	S_SW1_1_Starting: BOOL:=FALSE;	
	TSID100104.02	S_SW1_2_Running: BOOL:=FALSE;	
	TSID100104.03	S_SW1_3_Stopping: BOOL:=FALSE;	
	TSID100104.04	S_SW1_4_Spare: BOOL:=FALSE;	
	TSID100104.05	S_SW1_5_Spare: BOOL:=FALSE;	
	TSID100104.06	S_SW1_6_Spare: BOOL:=FALSE;	
	TSID100104.07	S_SW1_7_Spare: BOOL:=FALSE;	
	TSID100104.08	S_SW1_8_Spare: BOOL:=FALSE;	
	TSID100104.09	S_SW1_9_Spare: BOOL:=FALSE;	
	TSID100104.10	S_SW1_10_Spare: BOOL:=FALSE;	
	TSID100104.11	S_SW1_11_Spare: BOOL:=FALSE;	
	TSID100104.12	S_SW1_12_Spare: BOOL:=FALSE;	
	TSID100104.13	S_SW1_13_Spare: BOOL:=FALSE;	
	TSID100104.14	S_SW1_14_Spare: BOOL:=FALSE;	
	TSID100104.15	S_SW1_15_Spare: BOOL:=FALSE;	
	TSID100105	S_SW2_StartCount: INT:=0;	
	TSID100106	S_SW3_StopCount: INT:=0;	

Signal ID Table.

- On the Import Selection window select Excel.
- Select the Excel file to Import from.

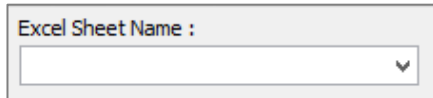


Excel File (*.xls) :

[Text Field] [Browse Button]

Figure 58 Excel Import File selection

- Click Next.
 - a. Select the DUT Sheet to import from.



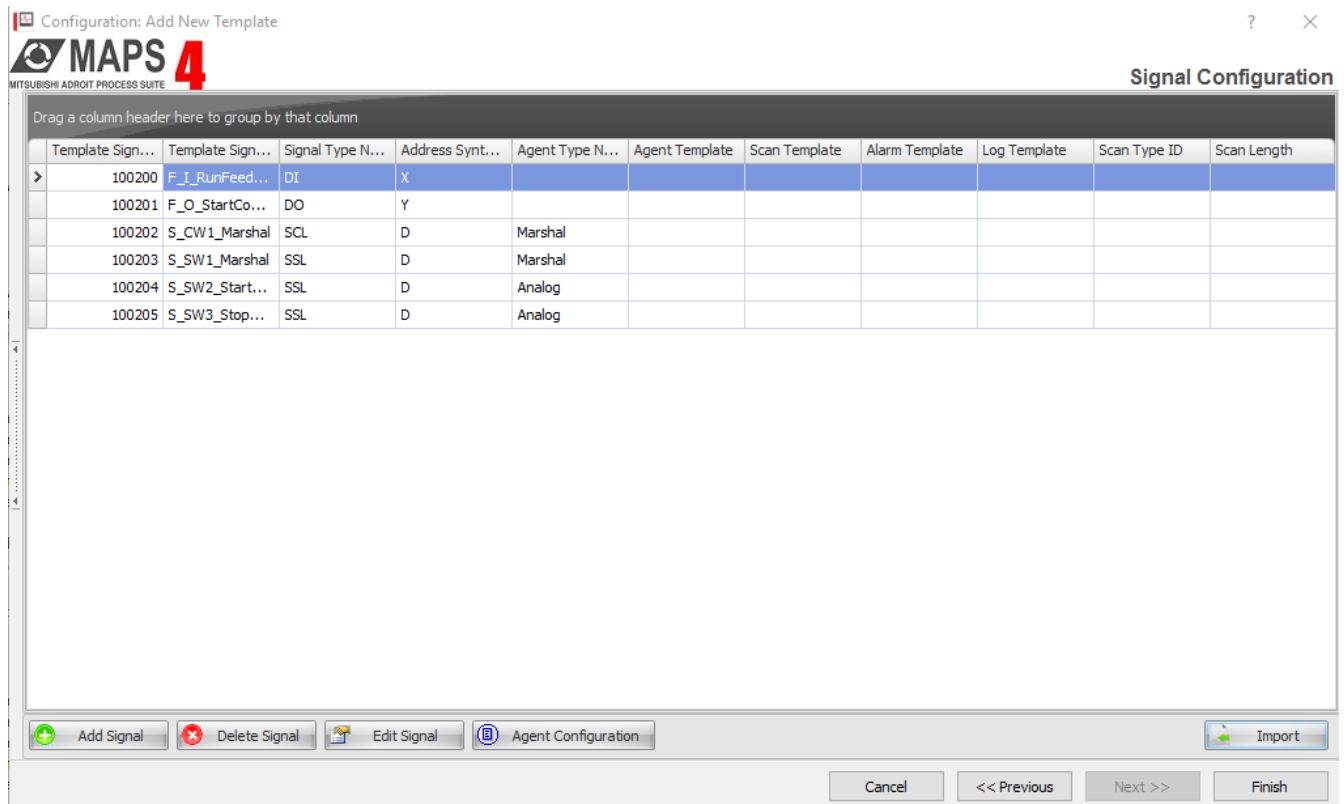
Excel Sheet Name :

[Dropdown Menu]

Figure 59 Select Excel Sheet to Import from

- Click Finish.
- Go to Section – “Configure Signals” below to continue.

5.2.3. Configure Signals



Configuration: Add New Template

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Signal Configuration

Drag a column header here to group by that column

Template Sign...	Template Sign...	Signal Type N...	Address Synt...	Agent Type N...	Agent Template	Scan Template	Alarm Template	Log Template	Scan Type ID	Scan Length
100200	F_I_RunFeed...	DI	X							
100201	F_O_StartCo...	DO	Y							
100202	S_CW1_Marshal	SCL	D	Marshal						
100203	S_SW1_Marshal	SSL	D	Marshal						
100204	S_SW2_Start...	SSL	D	Analog						
100205	S_SW3_Stop...	SSL	D	Analog						

[Add Signal] [Delete Signal] [Edit Signal] [Agent Configuration] [Import]

[Cancel] [Previous] [Next] [Finish]

Figure 240 Configure Signal Definitions

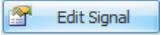
5.2.4. Add Signals Manually (Not required by default)

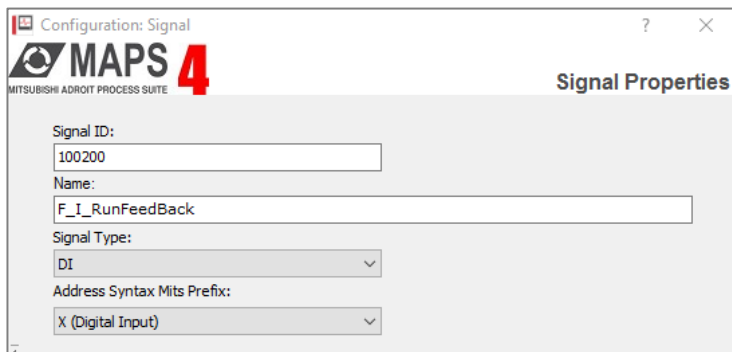
- In the Signal configuration Window click the Add Signal button to add the new signals for the template.
- Specify the Signal Name, Type and address Syntax.
- Click Next.
- Repeat the steps above for all signals required for the template.

- If the signal being added is of type SCL, SCH, SSL or SSH you also need to select the agent Type and define an Agent Template by selecting an already configure Agent template. Or by clicking on the Agent Management button to configure a new or copy an existing Agent template and saving it as some other Agent template. Also select a Scan, Alarm and Log template.
- Click Finish.

5.2.5. Defining the Signals

Once you have created the necessary signals for the template you will then need to define which Adroit Agent and scanning templates each signal will use.

- Select the F_I_RunFeedback Template Signal in the signal Configuration dialog. Then click on the Edit Signal button. 
- Specify the properties of the signal as per the image below.



Configuration: Signal

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Signal Properties

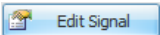
Signal ID: 100200

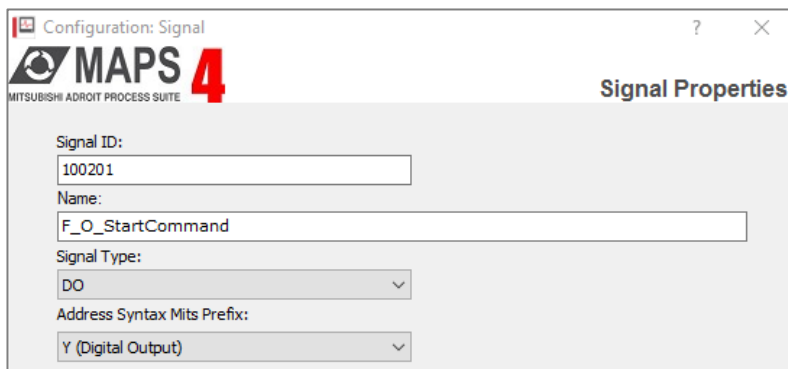
Name: F_I_RunFeedBack

Signal Type: DI

Address Syntax Mits Prefix: X (Digital Input)

Figure 251 Digital Input Signal Properties.

- Click Finish.
- Select the F_O_StartCommand Template Signal in the signal Configuration dialog. Then click on the Edit Signal button. 
- Specify the properties of the signal as per the image below.



Configuration: Signal

MAPS 4
MITSUBISHI ADROIT PROCESS SUITE

Signal Properties

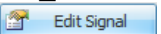
Signal ID: 100201

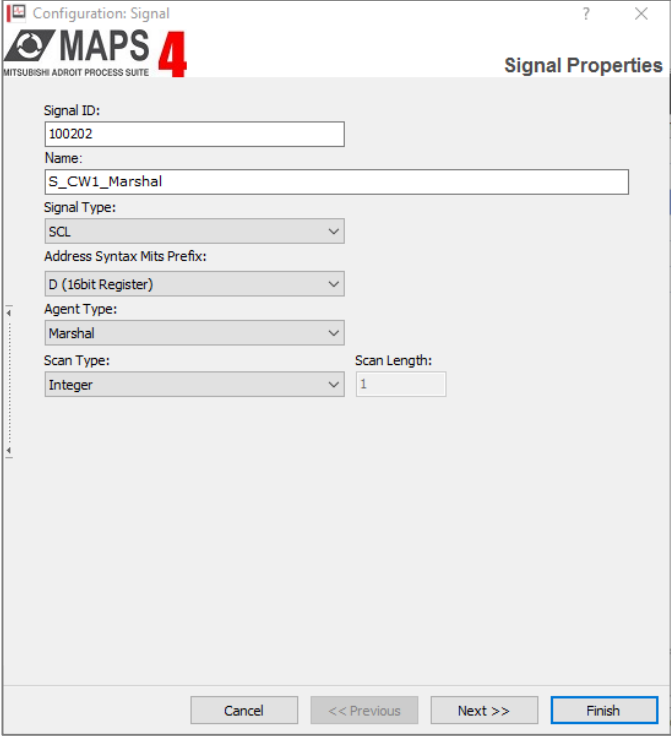
Name: F_O_StartCommand

Signal Type: DO

Address Syntax Mits Prefix: Y (Digital Output)

Figure 262 Digital Output Signal Properties.

- Click Finish.
- Select the S_CW1_Marshall Template Signal in the signal Configuration dialog. Then click on the Edit Signal button. 
- Specify the properties of the signal as per the image below.



Configuration: Signal

MAPS 4

Signal Properties

Signal ID: 100202

Name: S_CW1_Marshal

Signal Type: SCL

Address Syntax Mits Prefix: D (16bit Register)

Agent Type: Marshal

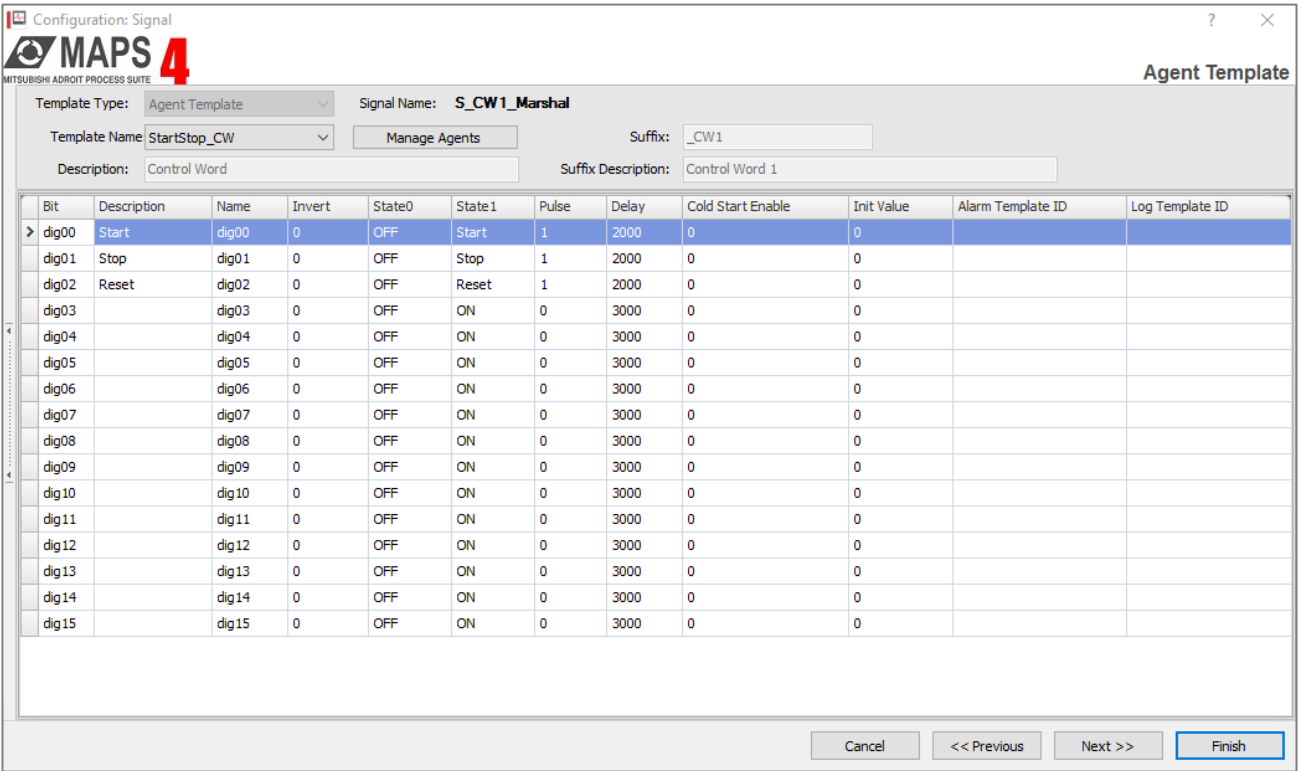
Scan Type: Integer

Scan Length: 1

Cancel << Previous Next >> Finish

Figure 273 Control Word Marshal Signal Properties.

- Click next.
- The Signal Agent Template dialog will now appear. In the Agent Name drop down box select the Adroit Agent Template StartStop_CW. Then click next.



Configuration: Signal

MAPS 4

Agent Template

Template Type: Agent Template

Signal Name: S_CW1_Marshal

Template Name: StartStop_CW

Manage Agents

Suffix: _CW1

Description: Control Word

Suffix Description: Control Word 1

Bit	Description	Name	Invert	State0	State1	Pulse	Delay	Cold Start Enable	Init Value	Alarm Template ID	Log Template ID
> dig00	Start	dig00	0	OFF	Start	1	2000	0	0		
dig01	Stop	dig01	0	OFF	Stop	1	2000	0	0		
dig02	Reset	dig02	0	OFF	Reset	1	2000	0	0		
dig03		dig03	0	OFF	ON	0	3000	0	0		
dig04		dig04	0	OFF	ON	0	3000	0	0		
dig05		dig05	0	OFF	ON	0	3000	0	0		
dig06		dig06	0	OFF	ON	0	3000	0	0		
dig07		dig07	0	OFF	ON	0	3000	0	0		
dig08		dig08	0	OFF	ON	0	3000	0	0		
dig09		dig09	0	OFF	ON	0	3000	0	0		
dig10		dig10	0	OFF	ON	0	3000	0	0		
dig11		dig11	0	OFF	ON	0	3000	0	0		
dig12		dig12	0	OFF	ON	0	3000	0	0		
dig13		dig13	0	OFF	ON	0	3000	0	0		
dig14		dig14	0	OFF	ON	0	3000	0	0		
dig15		dig15	0	OFF	ON	0	3000	0	0		

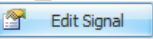
Cancel << Previous Next >> Finish

Figure 284 Control Word Marshal Agent Template Configuration.

- The Signal Scan Template dialog will now appear. In the Agent Name drop down box select the CW_Scan_rawValue. This is a predefined scanning template for all control words.



Figure 295 Control Word SCAN Template Configuration.

- Click Finish.
- Select the S_SW1_Marshall Template Signal in the signal Configuration dialog. Then click on the Edit Signal button. 
- Specify the properties of the signal as per the image below.

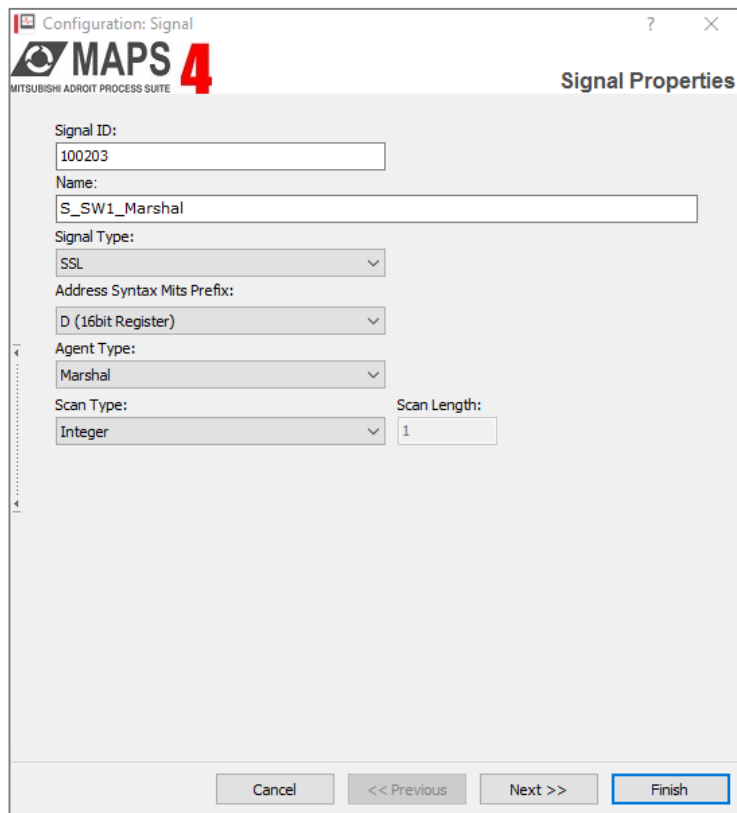


Figure 306 Status Word Marshal Signal Properties.

- Click next.
- The Signal Agent Template dialog will now appear. In the Agent Name drop down box select the Adroit Agent Template StartStop_SW. Then click next.

Configuration: Signal

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Agent Template

Template Type: Agent Template Signal Name: S_SW1_Marshall

Template Name: StartStop_SW Manage Agents Suffix: _SW1

Description: Status Word Suffix Description: Status Word 1

Bit	Description	Name	Invert	State0	State1	Pulse	Delay	Cold Start Enable	Init Value	Alarm Template ID	Log Template ID
> dig00	Stopped	dig00	0	OFF	Stopped	0	3000	0	0		
dig01	Starting	dig01	0	OFF	Starting	0	3000	0	0		
dig02	Started	dig02	0	OFF	Started	0	3000	0	0		
dig03	Stopping	dig03	0	OFF	Stopping	0	3000	0	0		
dig04		dig04	0	OFF	ON	0	3000	0	0		
dig05		dig05	0	OFF	ON	0	3000	0	0		
dig06		dig06	0	OFF	ON	0	3000	0	0		
dig07		dig07	0	OFF	ON	0	3000	0	0		
dig08		dig08	0	OFF	ON	0	3000	0	0		
dig09		dig09	0	OFF	ON	0	3000	0	0		
dig10		dig10	0	OFF	ON	0	3000	0	0		
dig11		dig11	0	OFF	ON	0	3000	0	0		
dig12		dig12	0	OFF	ON	0	3000	0	0		
dig13		dig13	0	OFF	ON	0	3000	0	0		
dig14		dig14	0	OFF	ON	0	3000	0	0		
dig15		dig15	0	OFF	ON	0	3000	0	0		

Cancel << Previous Next >> Finish

Figure 317 Status Word Marshal Agent Template Configuration.

- The Signal Scan Template dialog will now appear. In the Agent Name drop down box select the SW_Scan_rawValue. This is a predefined scanning template for all status words.

Configuration: Signal

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Scan Template

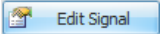
Template Type: Scan Template Signal Name: S_SW1_Marshall

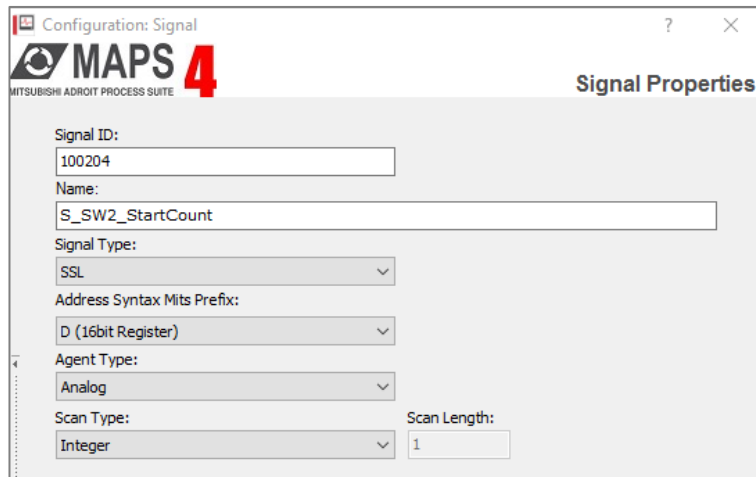
Template Name: SW_Scan_rawValue Manage Agents

Description: Status Word Scan Template

Slot	Rate	Deadband	Inhibit	Output Enabled
> rawValue	500	0	0	0

Figure 328 Status Word SCAN Template Configuration.

- Click Finish.
- Select the S_SW2_StartCount Template Signal in the signal Configuration dialog. Then click on the Edit Signal button. 
- Specify the properties of the signal as per the image below.



Configuration: Signal

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Signal Properties

Signal ID: 100204

Name: S_SW2_StartCount

Signal Type: SSL

Address Syntax Mits Prefix: D (16bit Register)

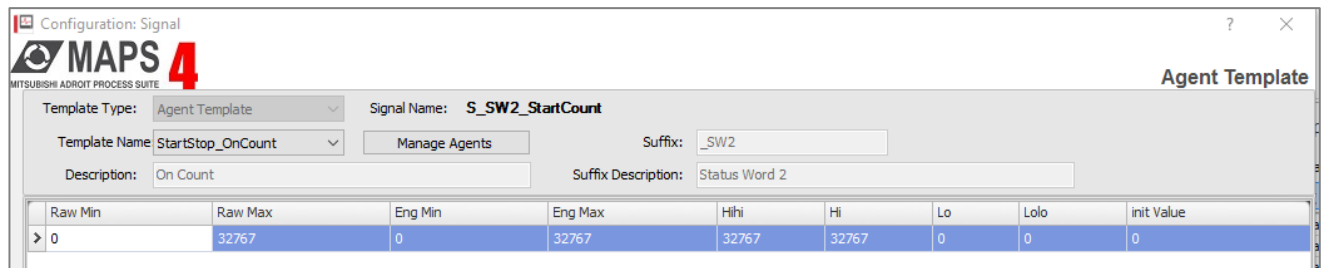
Agent Type: Analog

Scan Type: Integer

Scan Length: 1

Figure 339 Start Count Signal Properties.

- Click next.
- The Signal Agent Template dialog will now appear. In the Agent Name drop down box select the Adroit Agent Template StartStop_OnCount. Then click next.



Configuration: Signal

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Agent Template

Template Type: Agent Template

Signal Name: S_SW2_StartCount

Template Name: StartStop_OnCount

Description: On Count

Suffix: _SW2

Suffix Description: Status Word 2

Raw Min	Raw Max	Eng Min	Eng Max	HiHi	Hi	Lo	Lolo	Init Value
0	32767	0	32767	32767	32767	0	0	0

Figure 70 Start Count Analog Agent Template Configuration.

- The Signal Scan Template dialog will now appear. In the Agent Name drop down box select the SW_Scan_rawValue. This is a predefined scanning template for all status words.



Configuration: Signal

MAPS 4

MITSUBISHI ADROIT PROCESS SUITE

Scan Template

Template Type: Scan Template

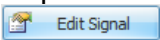
Signal Name: S_SW2_StartCount

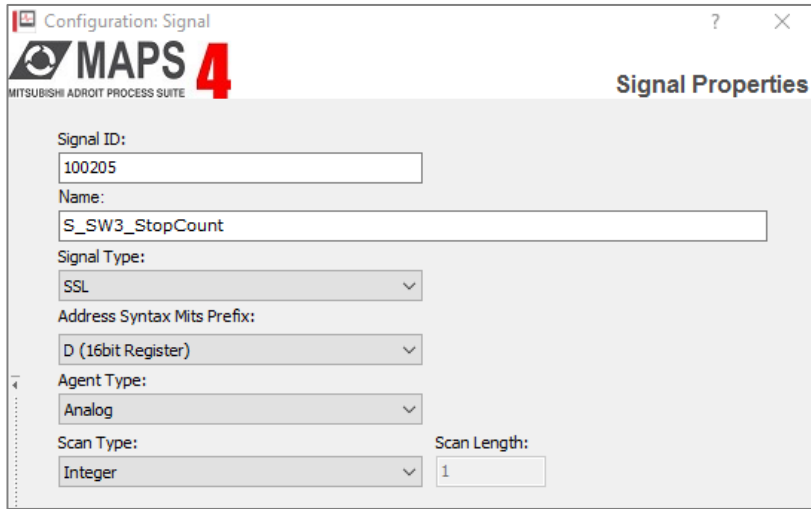
Template Name: SW_Scan_rawValue

Description: Status Word Scan Template

Slot	Rate	Deadband	Inhibit	Output Enabled
rawValue	500	0	0	0

Figure 71 Start Count SCAN Template Configuration.

- Click Finish.
- Select the S_SW2_StopCount Template Signal in the signal Configuration dialog. Then click on the Edit Signal button. 
- Specify the properties of the signal as per the image below.



Configuration: Signal

MAPS 4

Signal Properties

Signal ID: 100205

Name: S_SW3_StopCount

Signal Type: SSL

Address Syntax Mits Prefix: D (16bit Register)

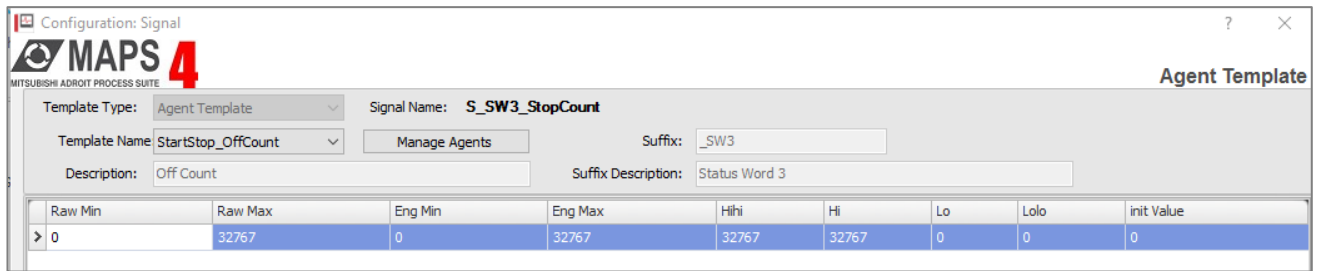
Agent Type: Analog

Scan Type: Integer

Scan Length: 1

Figure 72 Stop Count Signal Properties.

- Click next.
- The Signal Agent Template dialog will now appear. In the Agent Name drop down box select the Adroit Agent Template StartStop_OffCount. Then click next.



Configuration: Signal

MAPS 4

Agent Template

Template Type: Agent Template

Signal Name: S_SW3_StopCount

Template Name: StartStop_OffCount

Manage Agents

Suffix: _SW3

Description: Off Count

Suffix Description: Status Word 3

Raw Min	Raw Max	Eng Min	Eng Max	Hihi	Hi	Lo	Lolo	init Value
0	32767	0	32767	32767	32767	0	0	0

Figure 73 Stop Count Analog Agent Template Configuration.

- The Signal Scan Template dialog will now appear. In the Agent Name drop down box select the SW_Scan_rawValue. This is a predefined scanning template for all status words.



Configuration: Signal

MAPS 4

Scan Template

Template Type: Scan Template

Signal Name: S_SW3_StopCount

Template Name: SW_Scan_rawValue

Manage Agents

Description: Status Word Scan Template

Slot	Rate	Deadband	Inhibit	Output Enabled
rawValue	500	0	0	0

Figure 74 Stop Count SCAN Template Configuration.

- Click Finish.
- Your Signals have now been configured.
- Click on the finish button.

5.2.6. Configure Function Block Data (if Excel import was used)

Right click on the newly created template select properties; click the next button till you reach the GLO VAR Data dialog. This is where you will enter the global variables for the template which you will find in the global variables of the **GX Works2** project.

- Global VAR Data Window
- Open the **GX Works2** Project for the StartStop-Command.
- Open the Global Variables of the project. Select the global variable by click on the left hand side of the Global variable window. Copy the variables and paste them into a text editor (e.g. Notepad) you should get the following string.

```
VAR_GLOBAL
```

```
DATA_Start1 AT
```

```
@'%IX0,%QX32,%MW0.1000,%MX0.1000.0,%MX0.1000.1,%MX0.1000.2,%MX0.1000.3,%MX0.1000.4,%MX0.1000.5,%MX0.1000.6,%MX0.1000.7,%MX0.1000.8,%MX0.1000.9,%MX0.1000.10,%MX0.1000.11,%MX0.1000.12,%MX0.1000.13,%MX0.1000.14,%MX0.1000.15,%MW0.2000,%MX0.1001.0,%MX0.1001.1,%MX0.1001.2,%MX0.1001.3,%MX0.1001.4,%MX0.1001.5,%MX0.1001.6,%MX0.1001.7,%MX0.1001.8,%MX0.1001.9,%MX0.1001.10,%MX0.1001.11,%MX0.1001.12,%MX0.1001.13,%MX0.1001.14,%MX0.1001.15,%MW0.2001,%MW0.2002': StartStop_DUT;
```

```
END_VAR
```

- Rename the instance name DATA_Start1 to DATA_<Device>. Replace the IEC addresses with the corresponding signal id as seen from Signal ID Table. As seen above.
- Your global var string should look like this.

```
VAR_GLOBAL
```

```
DATA_<Device> AT
```

```
@'TSID100101,TSID100102,TSID100103,TSID100103.00,TSID100103.01,TSID100103.02,TSID100103.03,TSID100103.04,TSID100103.05,TSID100103.06,TSID100103.07,TSID100103.08,TSID100103.09,TSID100103.10,TSID100103.11,TSID100103.12,TSID100103.13,TSID100103.14,TSID100103.15,TSID100104,TSID100104.00,TSID100104.01,TSID100104.02,TSID100104.03,TSID100104.04,TSID100104.05,TSID100104.06,TSID100104.07,TSID100104.08,TSID100104.09,TSID100104.10,TSID100104.11,TSID100104.12,TSID100104.13,TSID100104.14,TSID100104.15,TSID100105,TSID100106': StartStop_DUT;
```

```
END_VAR
```

- Copy the new global var string into the Global VAR wizard.
- Click next.
- FB VAR Data Window
- Open the Header of the main program. Select the instance and copy it.
- Open a text editor (e.g. Notepad) and paste the Header string.

```
VAR
```

```
FB_Start1: StartStop;
```

```
END_VAR
```

- Change the name of the identifier from FB_Start1 to FB_<Device>.

```
VAR
```

```
FB_<Device>: StartStop;
```

```
END_VAR
```

- Paste the edited Header string in to the FB VAR wizard without the VAR and END_VAR.

- FB Data Window
- Open the Body of the Main program. Select the POU of the function block instance and copy it.
- Open a text editor (e.g. Notepad) and paste the POU string.

```
BODY
WORKSPACE
NETWORK_LIST_TYPE := NWTYPELD ;
ACTIVE_NETWORK := 0 ;
END_WORKSPACE
NET_WORK
NETWORK_TYPE := NWTYPELD ;
NETWORK_LABEL := ;
NETWORK_TITLE := ;
NETWORK_HEIGHT := 8 ;
NETWORK_BODY
B(B_VAROUT,,DATA_Start1.S_SW3_StopCount,41,5,43,7,)[32988];
B(B_VAROUT,,DATA_Start1.S_SW2_StartCount,41,4,43,6,)[32988];
B(B_VAROUT,,DATA_Start1.S_SW1_Marshal,41,3,43,5,)[32988];
B(B_VARIN,,DATA_Start1.F_I_RunFeedBack,18,3,20,5,)[32988];
B(B_VAROUT,,DATA_Start1.F_O_StartCommand,41,2,43,4,)[32988];
B(B_VARIN,,DATA_Start1.S_CW1_Marshal,18,2,20,4,)[32988];
B(B_FB,StartStop,FB_Start1,20,1,41,7,,?BS_CW1_Marshal?BF_I_RunFeedBack?AF_O_StartComma
nd?AS_SW1_Marshal?AS_SW2_StartCount?AS_SW3_StopCount)[32988];
L(1,0,1,8);
END_NETWORK_BODY
END_NET_WORK
END_BODY
```

- Replace the name of the tag in the POU string DATA_Start1 with DATA_<Device>
- Replace FB_Start1 with FB_<Device>

BODY

WORKSPACE

NETWORK_LIST_TYPE := NWTYPELD ;

ACTIVE_NETWORK := 0 ;

END_WORKSPACE

NET_WORK

NETWORK_TYPE := NWTYPELD ;

NETWORK_LABEL := ;

NETWORK_TITLE := ;

NETWORK_HEIGHT := 8 ;

NETWORK_BODY

B(B_VAROUT,,DATA_<Device>.S_SW3_StopCount,41,5,43,7,)[32988];

B(B_VAROUT,,DATA_<Device>.S_SW2_StartCount,41,4,43,6,)[32988];

B(B_VAROUT,,DATA_<Device>.S_SW1_Marshal,41,3,43,5,)[32988];

B(B_VARIN,,DATA_<Device>.F_I_RunFeedBack,18,3,20,5,)[32988];

B(B_VAROUT,,DATA_<Device>.F_O_StartCommand,41,2,43,4,)[32988];

B(B_VARIN,,DATA_<Device>.S_CW1_Marshal,18,2,20,4,)[32988];

B(B_FB,StartStop,FB_<Device>,20,1,41,7,,?BS_CW1_Marshal?BF_I_RunFeedBack?AF_O_StartCommand?AS_SW1_Marshal?AS_SW2_StartCount?AS_SW3_StopCount)[32988];

L(1,0,1,8);

END_NETWORK_BODY

END_NET_WORK

END_BODY

- Paste the edited POU string in to the FB Data wizard starting at NET_WORK to END_NET_WORK only.
- Click finish.

5.2.7. Update Graphics

Go into MAPS Designer and make sure the MAPS tree view is open. Right click on the MAPS and select refresh. From the list of templates, select the new StartStop template under the instrumentation section. Right click on it and select 'Template Graphics' option. This will open another window with all the various representations of the template. Press the 'UPDATE' button to update the changes done to the graphics and at the same time populate it in the Database.

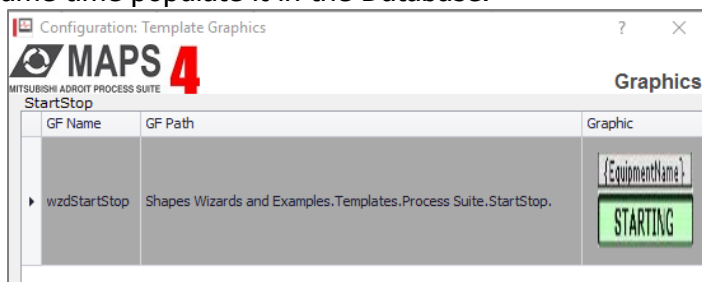


Figure 75 Update Template Graphics.

6. Build a New Project

You can now use this in any of your projects.

Please follow the instruction in the MAPS Quick Start Guide on how to build a MAPS Project and then use the newly created Template.

7. Conclusion

The rest of MAPS is about getting to know the MAPS Enterprise Manager and Smart Client Design environment and Adroit itself. Building on what we have covered in this guide and then understanding which Adroit Agents you should be using to achieve your project needs.

You are now ready to continue your own journey into this great product.

Other resources that will help you along the way are:

- Adroit Quick Start Guide
- The Training Manual
- Technical Description Document
- Context sensitive on-line help.
- Knowledge Base (on the website)
- Adroit Help desk on **support@adroit.co.za**