

# M580 Quick Start Training Manual

M580 Quick Start Version 1.0

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## **Quick Start Training Manual**

### **INTRODUCTION AND LEGAL NOTICE**

Your purchase of this official Quick Start Training Manual entitles you to undertake the Quick Start training course.

Satisfactory completion of the course evaluation is mandatory for you to obtain a Schneider Electric certificate of completion of the training course.

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### **Validity Note**

The present documentation is intended for qualified technical personnel responsible for the implementation, operation and maintenance of the products described. It contains information necessary for the proper use of the products.

### **About Us**

Members of Schneider Electric's team of Instructional Designers have tertiary qualifications in Education, Educational Course Development and are also experienced Instructors. Currently, the team is supporting a range of Schneider Electric courses in multiple languages and multiple software environments.

### **Authors**

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# Safety Information

## Important Information

### PLEASE NOTE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety alert messages that follow this symbol to avoid possible injury or death.

## **⚠ DANGER**

**DANGER** indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

## **⚠ WARNING**

**WARNING** indicates a potentially hazardous situation which, if not avoided, **could result in** death or serious injury.

## **⚠ CAUTION**

**CAUTION** indicates a potentially hazardous situation which, if not avoided, **could result in** minor or moderate injury.

## **NOTICE**

**NOTICE** is used to address practices not related to physical injury.

# Safety Information (cont.)

**Important  
Information  
(cont.)**

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**PLEASE NOTE**

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

## Safety Information (cont.)

### Before you Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

### WARNING

#### UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.



#### Note:

Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

## Safety Information (cont.)

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### Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

### **▲ CAUTION**

#### **EQUIPMENT OPERATION HAZARD**

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters and debris from equipment.

**Failure to follow these instructions can result in injury or equipment damage.**

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

**Software testing must be done in both simulated and real environments.**

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

## Safety Information (cont.)

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### Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

# Before the Course Begins

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## **Scope of this Training Manual**

This training manual is a supplement to the authorised training. In order to make proper use of the software students should also refer to the documentation that has been provided with the product such as the Help Files, User Guides or Knowledge Base.

The graphics displaying screen captures were taken using the Windows® 7 operating system. If students are running a different version of Windows then screen images may differ slightly from those shown in the training manual.

Some screen captures may have been taken from beta versions of the software and may vary slightly from release screen captures.

# Conventions Used in this Manual

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## Objectives

These are the skills to be achieved by the end of each chapter. An overview providing a brief synopsis of the topic begins each section. Often, examples are given to illustrate the conceptual overview.

### Example -

The configuration environment consists of several toolbars, browser windows and programming editors. This chapter introduces the user to the configuration environment using an example project with pre-defined elements.

### This Chapter Covers These Topics:

- Topic A ..... 1-2
- Topic B ..... 1-3
- Topic C ..... 1-5

---

## Exercises

After a concept is explained students will be given exercises that practice the skills just learned. These exercises begin by explaining the general concept of each exercise and then step-by-step procedures are listed to guide students through each exercise.

### Example -

Paste an object from a library onto a test page called **Utility**.

---

### Run the Milk\_Upgrade project then trigger and view some alarms.

. Use the following template settings:

---

## User Input

Whenever information is to be typed into a field or dialog box it will be written in this font:

`KETTLE_TEMP/25`

Note that some exercises will show a fragment of information already typed into a Unity Pro screen and then ask students to add extra lines of configuration. In this instance, the previously entered material will be given to the student as light grey italic text.

*KETTLE\_TEMP/25*

`OVEN_TEMP/5`

## Conventions Used in this Manual (cont.)

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### Hints & Tips

This heading will provide students with useful or helpful information that will make configuring the project easier.

#### Example -



#### Hints & Tips:

To go to the next field, use the mouse cursor or press the **TAB** key.

---

### Note

A note will refer to a feature which may not be obvious at first glance but something that should always be kept in mind.

#### Example -



#### Note:

Any events named **GLOBAL** are enabled automatically when events are enabled.

---

### Menus and Menu Options

Text separated by the double arrow symbol “»” indicates that students are to select a menu.

#### Example -

**File » New...**

Open a menu “**File**” then select the menu option “**New...**”

---

### Horizontal and Vertical Tabs

Text written this way indicates the **Horizontal** then the **(Vertical)** tab is to be selected.

#### Example -

**Appearance (General)**

## Conventions Used in this Manual (cont.)

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### See Also

Text written in this way indicates further references about the current topic.

#### Example -

---



#### See Also:

For further information about **Templates**, see *Quick Start Help - Using Page Templates*.

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### Further Training

This heading describes topics that are covered in more advanced courses.

#### Example -

---



#### Further Training:

Trend Table Maths is a topic in the **Customisation and Design Course**.

---



# Course Overview

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## What is Quick Start?

Quick Start is “hands on” oriented training that presents how to configure the common features of the M580. The training focuses on configuration, thus PLC programming is not taught in this course.

The training is divided into three chapters:

1. The first chapter will show how to create a basic configuration with local I/O.
2. The second chapter allows training on bigger architectures. As M580's have numerous types of I/O and modules, most of the training can be run in simulation mode. However, in case the exercises are required with Equipment this chapter is designed in such a way that allows for the use of Equipment.

The last chapter refers to the most advanced features of the M580, as these are more complex to implement, this chapter will only describe the features and not implement them.

---

## Course Objectives

By the completion of this training course the student will be able to:

- Connect Unity Pro to an M580 through USB and an Ethernet (RJ45) cable
- Describe the different types of I/O
- Configure local I/O
- Change the security features of the M580
- Describe the use of the M580 Ethernet ports
- Configure a DTM device
- Configure a Remote I/O drop
- Configure a local Premium I/O drop, extending a local M580 drop
- Configure a NOC
- Configure a basic M580 Hot Standby (HSBY) architecture
- Describe other features of the M580

## Course Overview (cont.)

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### Target Audience

Quick Start is designed for anyone having basic PLC programming skills and willing to discover the M580 features.

This includes people with no experience with the M580, people migrating from Premium/Quantum to the M580 as well as staff familiar with the M580 that want a “How to” guide.

---

### Prerequisite Knowledge

The only prerequisite knowledge is to be familiar with PLC programming through Unity Pro v8.1 or later.



#### Further Training:

For those not familiar with Unity Pro, the free eLearning “**Unity Pro - Click and Start**” will provide all the knowledge required to go through M580 Quick Start: [Link to Click and Start eLearning](#).

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### Equipment

A computer with a valid version of Unity Pro v8.0 or later (This includes demo versions).

Most exercises of this training can be carried out in Unity Pro’s **SimulationMode**. Nevertheless, the Equipment required to perform the training in **Standard Mode** is listed at the beginning of each exercise.

# Course Overview (cont.)

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**Support**

If support or additional information about any concepts or products in the course is required, students should ask the Instructor who will either address the question or obtain additional technical assistance as required.



# Table of Contents

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**CHAPTER 1: M580 BASICS ..... 1-1**

- Overview ..... 1-1
- Different Types of M580 I/O ..... 1-2
- M580 Embedded Ethernet Ports ..... 1-7
- Connect to the M580 ..... 1-9
- Exercise - Connect to the Simulation Mode..... 1-10
- Exercise - Connect Through USB ..... 1-11
- Exercise - Configure the Embedded Ethernet Ports..... 1-16
- Local I/O ..... 1-22
- Exercise - Configure Local I/O ..... 1-23
- Cyber Security..... 1-31
- Exercise – Cyber Security ..... 1-35
- Summary ..... 1-36
- Overview ..... 1-1

**CHAPTER 2: ADVANCED ARCHITECTURE CONFIGURATION..... 2-1**

- Overview ..... 2-2
- DIO..... 2-3
- Exercise - Install a DTM in Unity Pro ..... 2-4
- Exercise - Configure an Altivar Drive ..... 2-7
- Summary ..... 2-16
- NOC ..... 2-17
- Exercise - Configure an Altivar Drive (cont.)..... 2-19
- Summary ..... 2-20
- M580 Isolated Device Networks..... 2-21
- BME NOC Web Services..... 2-39
- Remote I/O (RIO)..... 2-56
- Summary ..... 2-67
- Exercise - Premium I/O..... 2-69
- Summary ..... 2-73
- M580 Hot Standby (HSBY)..... 2-74
- Exercise – HSBY ..... 2-80
- Summary ..... 2-82
- Advanced Cyber Security..... 2-83
- Exercise - Password Management (cont.) ..... 2-89
- Integrity Checking..... 2-91
- Summary ..... 2-95

**CHAPTER 3: MAKE THE MOST OF THE M580! ..... 3-1**

- Overview ..... 3-1
- SD Card ..... 3-2
- Weighing Module Overview ..... 3-4
- Web Pages ..... 3-6
- Summary ..... 3-9

**APPENDIX A: APPENDIX..... A-1**

- Answers to Questions..... A-1
- M580 Basics ..... A-2
- Device I/O ..... A-3
- NOC ..... A-4
- Remote I/O ..... A-5
- Premium I/O..... A-6
- M580 Hot Standby ..... A-7
- Advanced Cyber Security..... A-8
- Make the Most of the M580!..... A-9

# Chapter 1: M580 Basics

## Overview

### Introduction

---

This part of the training covers the basic features of the M580:

- An introduction to the different types of I/O.
- Two types of M580 CPU:
  1. Part Number Series \*\*20
  2. Part Number Series \*\*40
- The different types of I/O available between these CPU's
- Connection via Ethernet
- Connection via USB
- Configuring a local I/O device
- Cyber Security features of the M580.

At the end of this chapter the student will be able to configure a basic M580 architecture.

# Different Types of M580 I/O

**Introduction** M580's have three types of I/O.

---

**Topic Objectives** By the end of this section the student will be able to:

- Describe the three types of I/O
- 

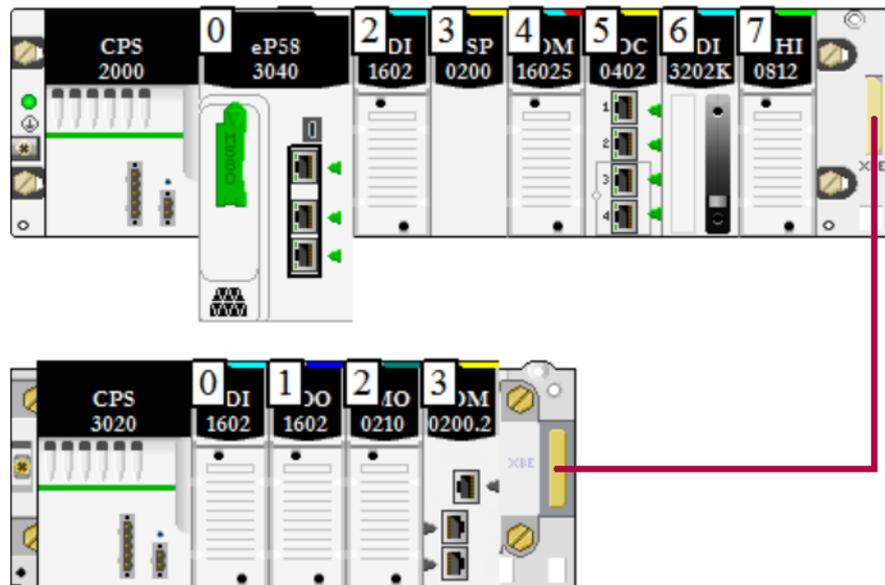
## Different Types of I/O

In Automation architecture, the heart of a system is a PAC. Information coming from the field (sensors, push buttons, etc.) and commands sent to the devices (motor control, variable speed drive references, etc.) are often **linked** to the PAC via digital or analogue inputs and outputs. These inputs and outputs are physically connected through wiring between field devices and input and output modules. These modules can be located in different positions: **Locally**, **Remotely**, or **Distributed**.

---

## Local I/O

Local I/O consists of input and output modules that are located in the local rack of the PAC. The internal **backplane** is used as a medium of communication. This structure can achieve very high performances in terms of response time.

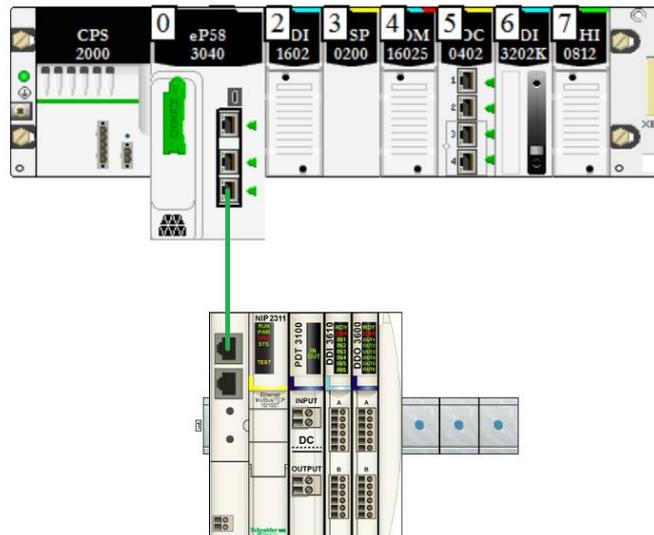


I/O modules located on **Extension** racks are also considered as **Local I/O**.

## Different Types of M580 I/O (cont.)

### Distributed I/O

To achieve greater distances and flexibility, Distributed I/O is a reasonable option. Distributed I/O consists of input and output modules but also specific modules (to better integrate devices) located on an island which communicate with the PAC over a **fieldbus** or **network**.

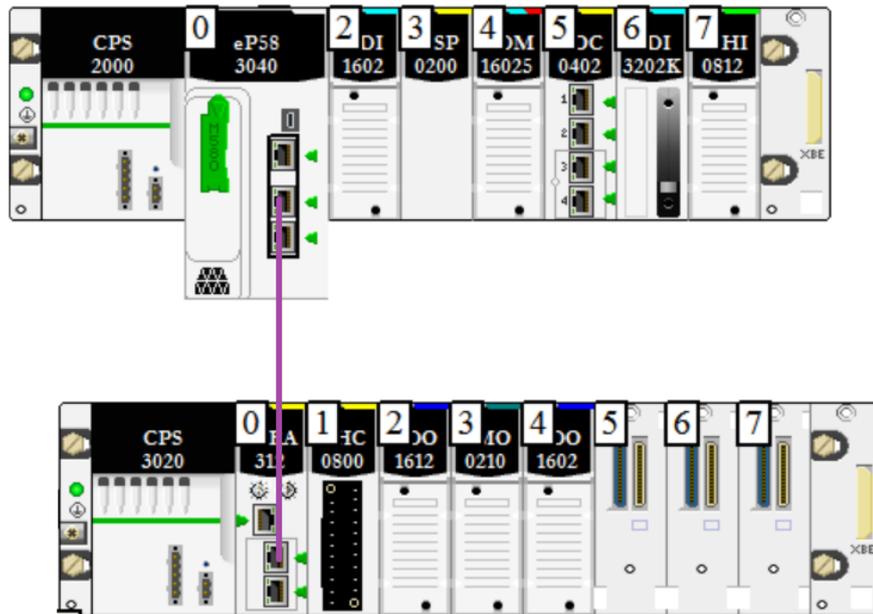


Due to the fieldbus communication over the network, Distributed I/O has a limitation in terms of performance depending on the medium used between them and the PAC.

# M580 Remote I/O

## Remote I/O

Remote I/O consists of input and output modules located separate to the Local PAC and Local I/O rack. Remote I/O uses specific / proprietary communications which allows for similar performance to Local I/O because data acquisition from them is asynchronous to the CPU scan. Remote I/O eliminates expensive point-to-point wires by networking just a few (or thousands) of process signals onto one digital communication link.

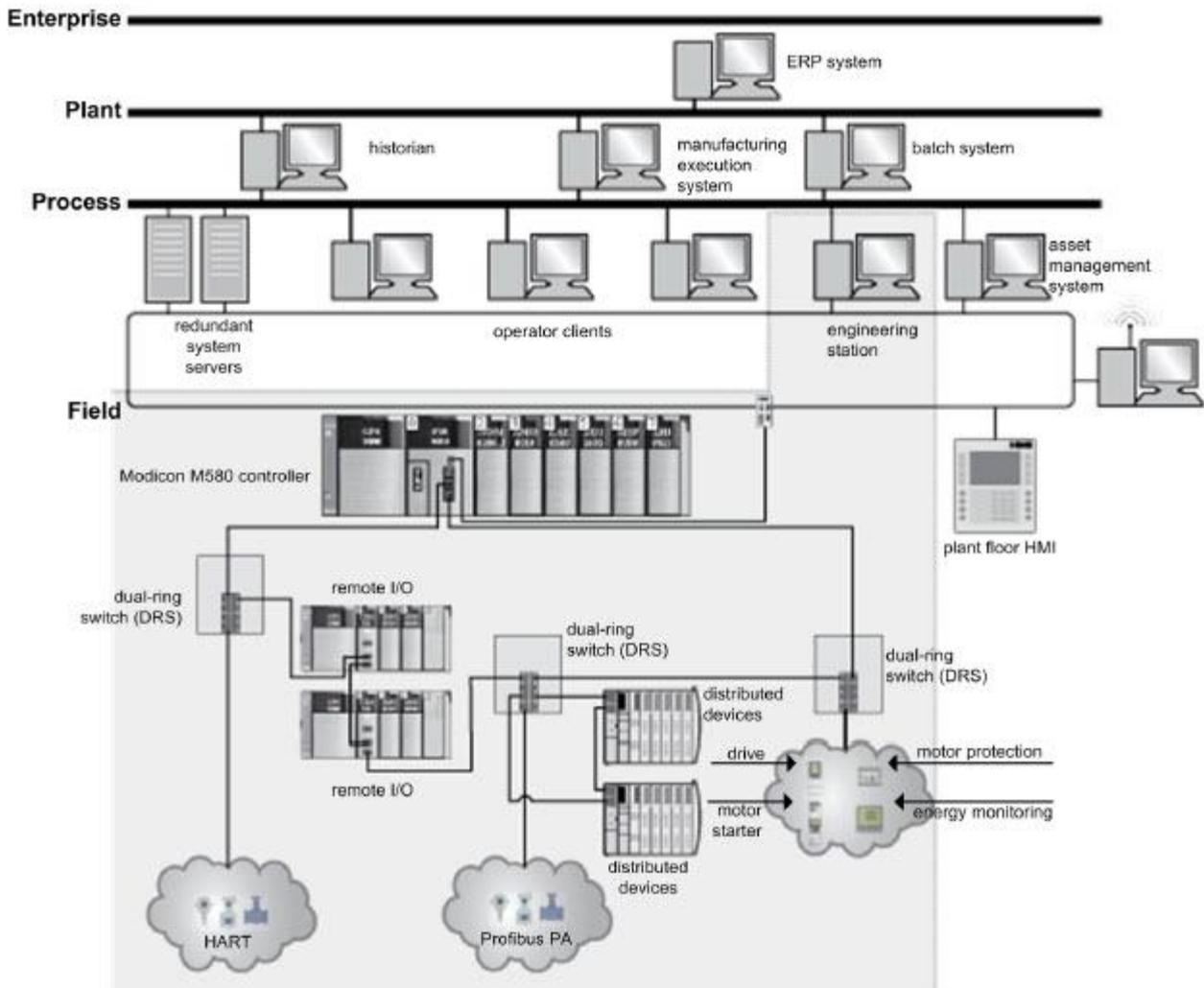


One of the main advantages of Remote I/O is that the entire configuration is often completed using one unique software tool.

## M580 Remote I/O (cont.)

### M580 Remote I/O

The M580 Remote I/O offer provides reliability and performance with the availability to integrate Distributed Remote I/O drops over the Ethernet network. The system uses Ethernet/IP technology based on the reliable CIP object model. The figure below shows an example of a PlantStruxure system with M580 as a global automation solution:



### Modicon X80 I/O Modules

The **M580** system uses **Modicon X80 I/O modules**, many of which are used in an M340 system. The system also supports several Ethernet-based **eX80 I/O modules**, which can be installed on both the main local rack and main remote racks. The local rack can also support an extension rack of Premium I/O modules.

# Exercise - Recognise the Different Types of I/O

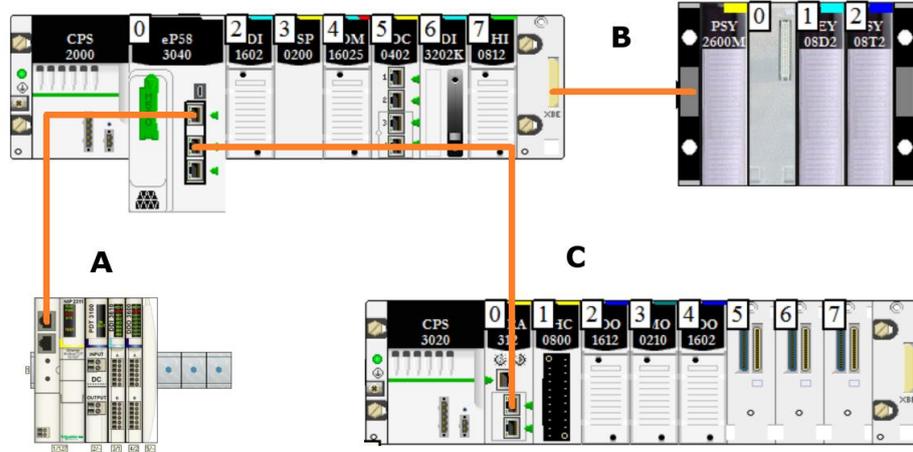
## Learning Outcomes

By the completion of this exercise the student will be able to:

- Identify the different types of I/O

### Identify the types.

- i. For each part of the following picture, select which kind of I/O is used:



**A:** Local / Remote / Distributed

**B:** Local / Remote / Distributed

**C:** Local / Remote / Distributed

# M580 Embedded Ethernet Ports

## Introduction

In the previous topic the different types of I/O were explained.

The M580 has 3 ports which, depending on the part number, allows for different types of I/O.

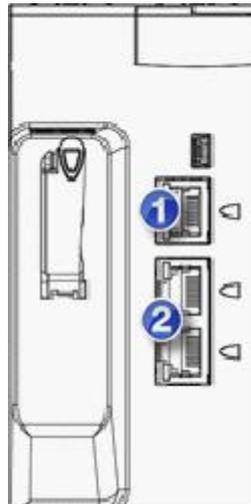
Thus this chapter will present the different ports of the M580, and which of these ports can be used for Remote I/O (RIO) or Distributed I/O (DIO).

**Topic Objectives** By the end of this section the student will be able to:

- Identify the different ports of the M580
- Describe their roles depending on the part number

**M580 Ports** First let's look at the M580 ports.

All M580s have two types of ports, the **Service Port** and the **Device Ports**.



3. The port at the top is the **Service Port**.

4. The two below are the **Device Ports**.

## Role of the Service Port

The **Service Port** is mainly used to connect to Unity Pro, a SCADA system, or any other external tool.

The **Service Port** may also be used to connect to a DIO drop.

Finally it can be used for port mirroring.

## M580 Embedded Ethernet Ports (cont.)

### Role of the Device Port

This is where there is a big difference between the 2 types of CPU.

If the CPU's type is \*\*20 then the **Device Ports** are used to connect DIO drops. A DIO drop can be composed of almost any device including non Schneider-Electric devices.

If the CPU's type is \*\*40 then the **Device Ports** are used to connect RIO drops.

In both cases the supported architectures are **wired star** or **ring**.

# Connect to the M580

---

## Introduction

We now know which port we can use to connect to the M580.

In this chapter the user will learn how to connect to the M580, via **Simulation Mode**, **USB** and of course **Ethernet**.

Connecting to the PLC will allow the project to be downloaded to the PLC and provide relevant information for troubleshooting.

Remember that unless specified, exercises can be done through both Simulation Mode or connected directly to a PLC (provided that the student has the required Equipment)

## Topic Objectives

By the end of this section the student will be able to:

- Connect to a simulator
- Connect to a PLC via USB
- Connect to a PLC via Ethernet
- Monitor the PLC status

# Exercise - Connect to the Simulation Mode

## Learning Outcomes

By the completion of this exercise the student will:

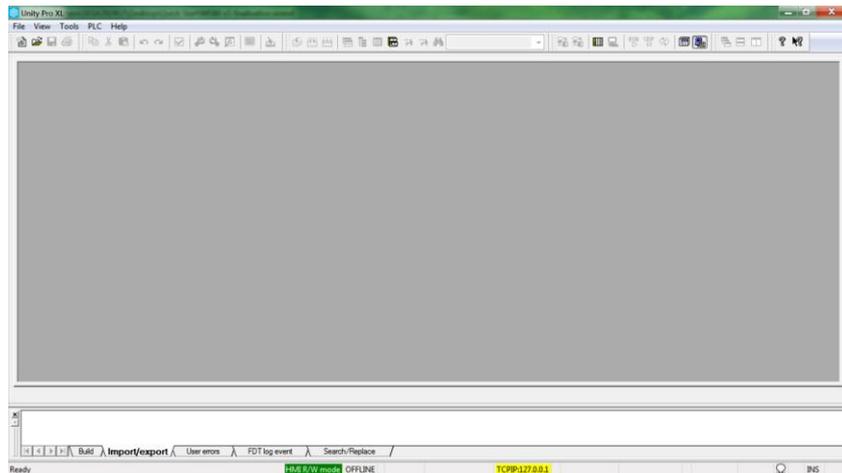
- Connect to an emulated M580

## Equipment Required

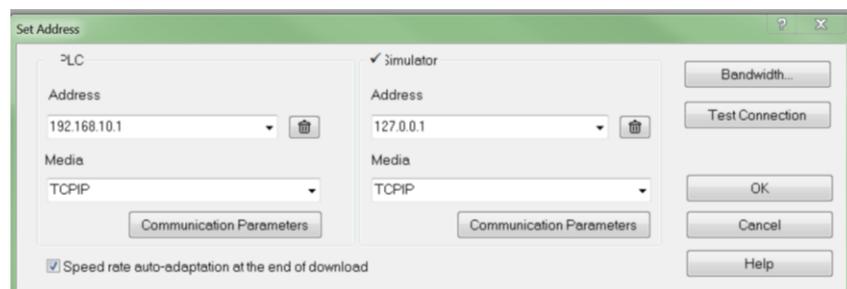
None

### Start Unity Pro

- The Unity Pro configuration window will pop-up



- Select PLC»Set Address then in the newly opened window, under **Simulator**, make sure that the **Media** is TCP/IP and the **Address** is 127.0.0.1.



- Click **OK**.

## Exercise - Connect to the Simulation Mode (cont.)

- iv. Select Simulation Mode



- v. Then click **Connect**



- vi. Note that the **OFFLINE** status has been replaced by **DIFFERENT** with a red background.



This means that the project in Unity Pro (which is now empty, as we did not create anything) is different from the one in the **Simulator**.

## Exercise - Connect Through USB

---

### Learning Outcomes

By the completion of this exercise the student will:

- Install M580 USB drivers
- Test the USB connection
- Connect to an M580 via USB

### Equipment Required

To complete this exercise on a PLC, the student will need

- One M580 PLC (any CPU)
- A BMX or BME rack
- A compatible power supply
- A mini USB cable (see picture below)



---

### Install the M580 USB drivers.

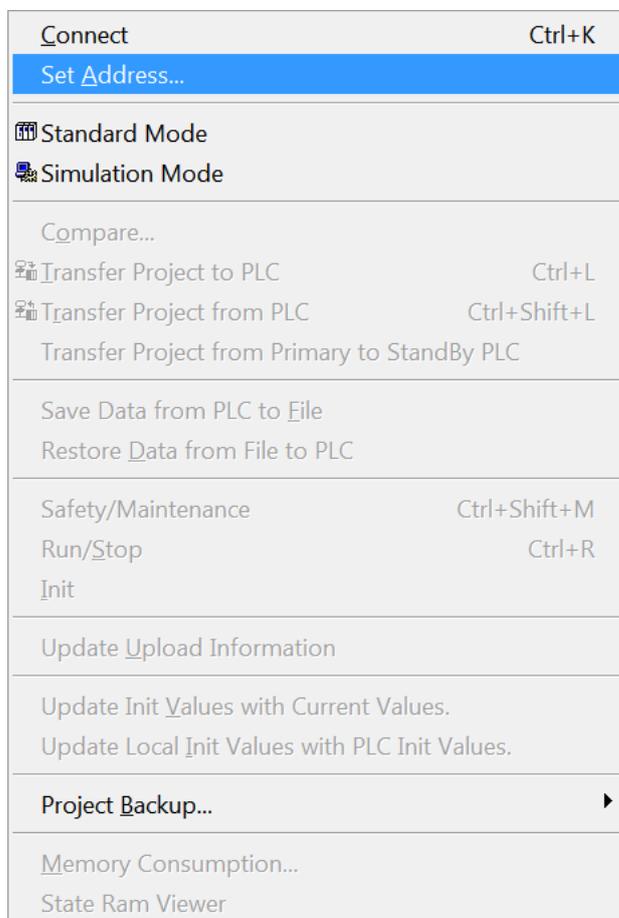
- i. Download the latest Schneider PLC USB driver Suite available on Schneider Electric Website:  
<http://www.schneider-electric.com/download/ww/en>
- ii. Double click the executable to install the drivers.

## Exercise - Connect Through USB (cont.)

---

### Test the USB connection

- i. If not already open, start **Unity Pro**.
- ii. Plug the USB cable into the computer and the PLC.
- iii. In Unity Pro's menu bar, select `PLC » Set Address`



## Exercise - Connect Through USB (cont.)

- iv. The **Set Address** window will pop-up:



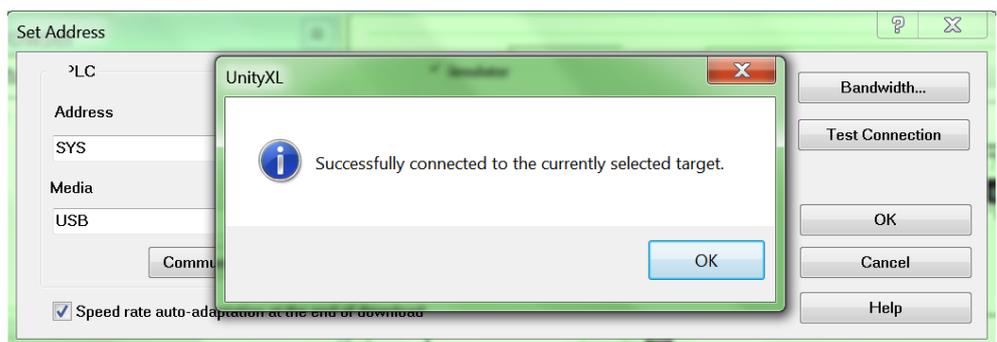
- v.

- vi. On the **PLC** side; Select the **Media** as **USB** from the drop down list, and type **SYS** in the **Address** field as shown below:



- vii.

- viii. Click the Button **Test Connection**. If successful, a message will confirm that the connection is working.



- ix. Close the pop-up and click **OK** to validate the changes.

## Exercise - Connect Through USB (cont.)

---

### Connect to the PLC

- i. Once the connection has been tested confirm **Standard Mode** operation by viewing the raised **PLC** icon in the Shortcut bar.



- ii. Then click the **Connect** button.



- iii. Note that the **Status** is now **ONLINE**, and the **Media** is **USB**.



# Exercise - Configure the Embedded Ethernet Ports

## Learning Outcomes

By the completion of this exercise the student will:

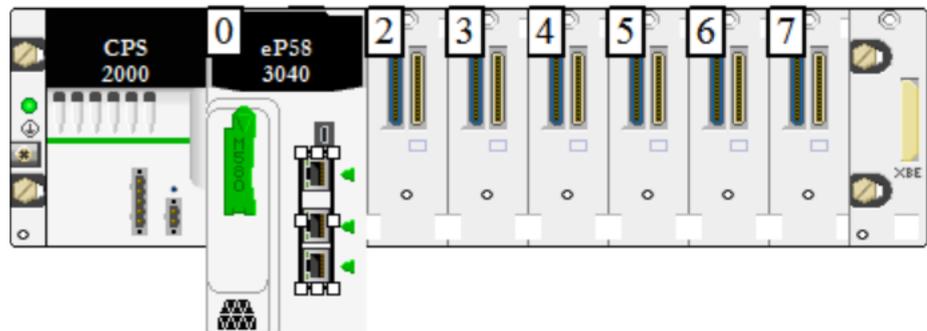
- Be able to configure the embedded Ethernet ports of the M580 CPU
- Use the default DDT to display data from the M580 CPU

### Create a new project.

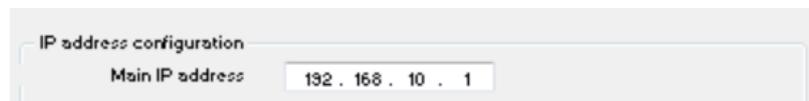
- If not already open, start **Unity Pro**
- Select File » New.
- Select any M580 CPU / rack then click **OK**.

### Configure the IP addresses.

- Expand **PLC bus**, and double click the **rack**, the **main rack** configuration should pop.
- Double click the embedded Ethernet modules of the CPU.



- In the **IPConfig** tab, enter the following **Main IP Address**: 192.168.10.1.



## Exercise - Configure the Embedded Ethernet Ports (cont.)

- iv. Set **IP Address A** to: 192.168.11. 1
- v. This is the Remote I/O (RIO) Scanner and will be used later in the course.
- vi. Set the Subnet Mask to: 255.255.0.0 **and** change the **Default Gateway** to 192.168.10. 1.
- vii. In the **Security** tab, click **Unlock Security**.
- viii. This will disable all **Cyber Security** features which will be covered in more detail in **Cyber Security** (page 2-1).

Global policy

Enforce Security      Unlock Security

Services

FTP :	Enabled	DHCP / BOOTP :	Enabled
TFTP :	Enabled	SNMP :	Enabled
HTTP :	Enabled	EIP :	Enabled

Access Control

Disabled

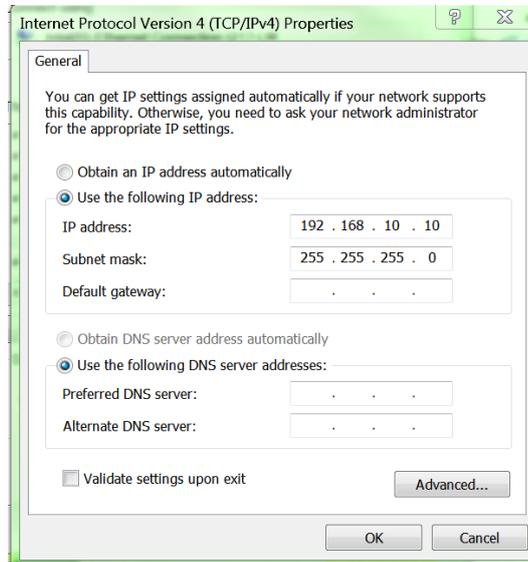
- ix. **Validate**  the changes.
- x. **Build** the application.
- xi. **Connect, Transfer** (using USB) and **Run** the application.
- xii. **Disconnect** from the PLC.

## Exercise - Configure the Embedded Ethernet Ports (cont.)

---

### Connect via Ethernet (Equipment is required for this step)

- i. Take the **RJ45** cable and connect it between the **PC** network adaptor and the **SERVICE** port of the M580.
- ii. Configure the IP Address of the PC to be: **192 . 168 . 10 . 10 .**



- iii. Open a **DOS Prompt**, by clicking the Windows **Start** button, selecting **Run** and entering the command `cmd`.

## Exercise - Configure the Embedded Ethernet Ports (cont.)

---

- iv. In the DOS Prompt, enter the command: `ping 192.168.10.1`.

```
C:\Users\SESA292457>ping 192.168.10.1
```

The M580 should respond.

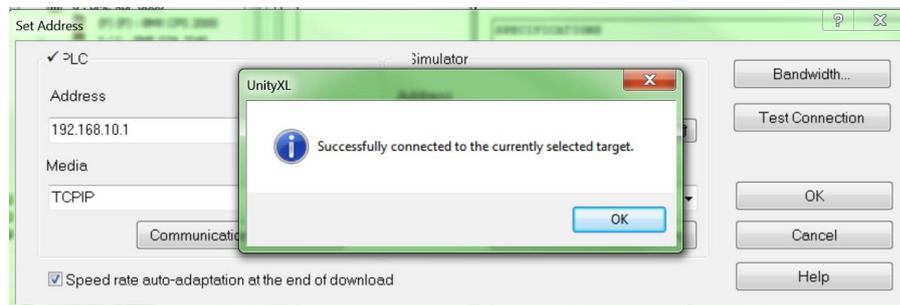
```
C:\Users\SESA292457>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:
Reply from 192.168.10.1: bytes=32 time=3ms TTL=64
Reply from 192.168.10.1: bytes=32 time<1ms TTL=64
Reply from 192.168.10.1: bytes=32 time<1ms TTL=64
Reply from 192.168.10.1: bytes=32 time=2ms TTL=64

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\Users\SESA292457>
```

- v. In **Unity Pro**, change the **Set Address** settings to connect via **TCPIP** with the new **IP Address** (192.168.10.1), **Test** the connection.



- vi. **Connect** to the PLC.

## Exercise - View the M580 State from Unity Pro

### Learning Outcomes

By the completion of this exercise the student will:

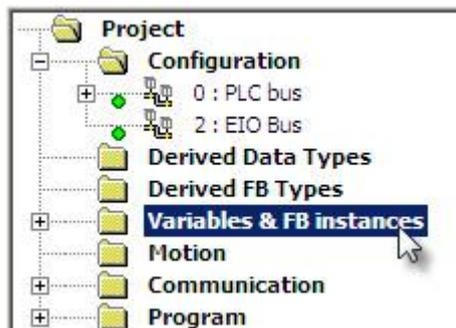
- Be able to monitor the **M580 CPU** from **Unity Pro**

### Connect to the PLC.

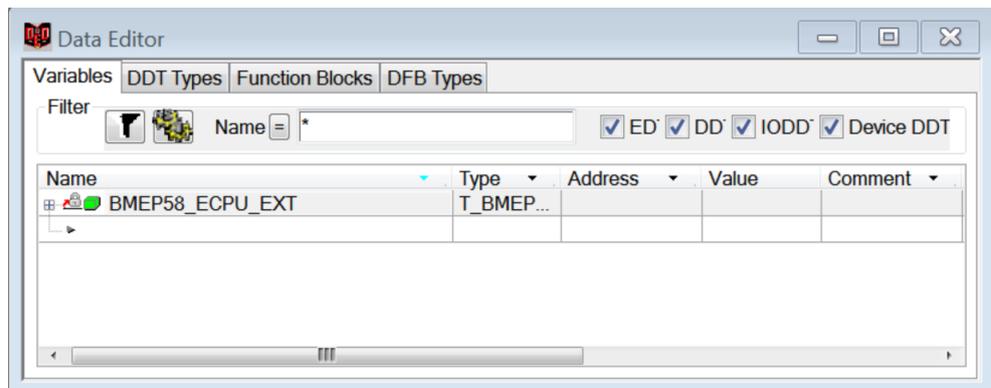
- Via USB, Ethernet or Simulation Mode.

### View data from the Device DDT.

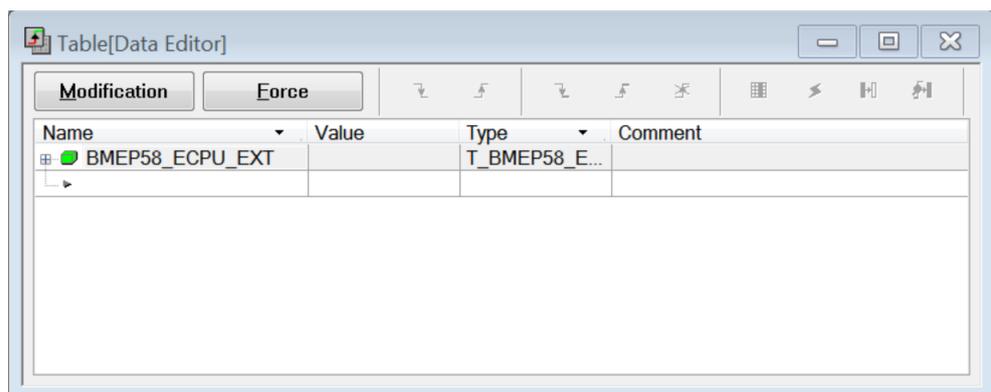
- From the **Project Browser**, double-click the **Variables & FB Instances** item.



The **Data Editor** opens and shows the **BMEP58\_ECPU** variable.



- Select the **BMEP58\_ECPU** variable. Press **CTRL + T** on the keyboard, this will open an **Animation Table** and add the **BMEP58\_ECPU** variable to it.



## Exercise - View the M580 State from Unity Pro (cont.)

- iii. Expand the variable, and inspect the available properties. The picture below has been taken in simulation mode; if connected to a PLC different values would be shown.

Name	Value	Type	Comment
BMEP58_ECPU_EXT		T_BMEP58_E...	
ETH_STATUS	0	WORD	Ethernet status
PORT1_LINK	0	BOOL	Link up/down for Ethernet port 1
PORT2_LINK	0	BOOL	Link up/down for Ethernet port 2
PORT3_LINK	0	BOOL	Link up/down for Ethernet port 3
ETH_BKP_PORT LI...	0	BOOL	Link up/down for Ethernet bac...
REDUNDANCY_ST...	0	BOOL	Redundancy status / backup p...
SCANNER_OK	0	BOOL	Scanner OK and scanning at l...
GLOBAL_STATUS	0	BOOL	0: one or more services not op...
SERVICE_STATUS	0	WORD	One bit for each user-observa...
RSTP_SERVICE	0	BOOL	0: service not operating normal...
PORT502_SERVICE	0	BOOL	0: service not operating normal...
SNMP_SERVICE	0	BOOL	0: service not operating normal...
MAIN_IP_ADDRES...	0	BOOL	Main IP address status (0 in c...
ETH_BKP_FAILURE	0	BOOL	Ethernet backplane hardware ...
ETH_BKP_ERROR	0	BOOL	Ethernet backplane error (0: er...
EIP_SCANNER	0	BOOL	0: service not operating normal...
MODBUS_SCANNER	0	BOOL	0: service not operating normal...
NTP_SERVER	0	BOOL	0: service not operating normal...
SNTP_CLIENT	0	BOOL	0: service not operating normal...
WEB_SERVER	0	BOOL	0: service not operating normal...
FIRMWARE_UPGR...	0	BOOL	0: service not operating normal...
FTP	0	BOOL	0: service not operating normal...
FDR_SERVER	0	BOOL	0: service not operating normal...
EIP_ADAPTER	0	BOOL	EIP adapter (server) service 0: ...
SERVICE_OBSERV...	0	WORD	One bit for each user-observa...
A_B_IP_ADDRESS...	0	BOOL	IP address A/B status (0 in ca...
LLDP_SERVICE	0	BOOL	LLDP service status
EVENT_LOG_STAT...	0	BOOL	0: event log service not operati...
LOG_SERVER_NO...	0	BOOL	1: No acknowledgement receiv...
ETH_PORT_1_2_S...	0	BYTE	Ethernet port 1 and 2 status
ETH_PORT3_BKP_...	0	BYTE	Ethernet port 3 and backplane...
FDR_USAGE	0	BYTE	% of FDR server usage
IN_PACKETS	0	UINT	Number of packets received o...
IN_ERRORS	0	UINT	Number of inbound packets th...
OUT_PACKETS	0	UINT	Number of packets sent on int...
OUT_ERRORS	0	UINT	Number of outbound packets t...
CONF_SIG	0	UDINT	Signature of all files on local m...
DROP_HEALTH		ARRAY[1..31]...	DROP health bits (Drop 1 to 31)
RIO_HEALTH		ARRAY[257.....	RIO health bits (1 bit per RIO ...
LS_HEALTH		ARRAY[1..3] ...	Local Slave health bits (Local ...
DIO_HEALTH		ARRAY[513.....	DIO health bits (1 bit per DIO ...
DROP_CTRL		ARRAY[1..31]...	DROP control bits (Drop 1 to 3...
RIO_CTRL		ARRAY[257.....	RIO control bits (1 bit per RIO ...
DIO_CTRL		ARRAY[513.....	DIO control bits (1 bit per DIO ...

- iv. For more information about the information displayed by the **M580 Device DDT**, have a look at the **M580** documentation.
- v. **Save** the project.



# Local I/O

---

## Introduction

This chapter provides information on how to create a new Project, connect to the PLC and download the Project to the PLC. This Project will include Local I/O.

Local I/O modules are on the same rack as the M580.

They are the most basic type of I/O and the easiest to configure.

To simplify I/O mapping most of the M580 I/O modules are configured via a Device DDT.

# Exercise - Configure Local I/O

---

## Learning Outcomes

By the completion of this exercise the student will:

- Create a new M580 application
- Configure a local I/O
- Name and use a Device DDT variable
- Check the status of the local I/O drop

## Equipment Required

To complete this exercise on a PLC the student will need

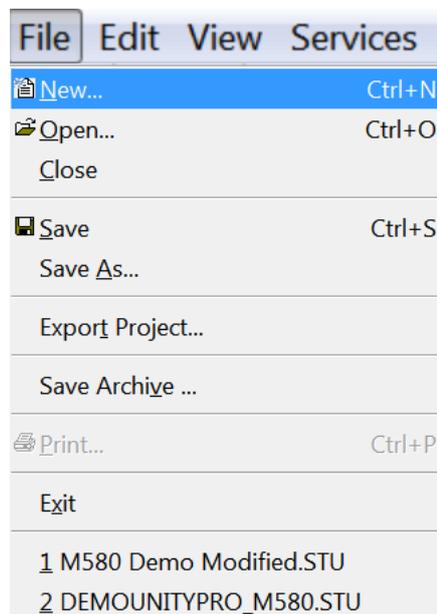
- One M580 PLC (any CPU)
  - A compatible rack and power supply
  - A DDO1602
- 

### Create a new Project

- i. Using the Windows Start Menu open **Unity Pro**:

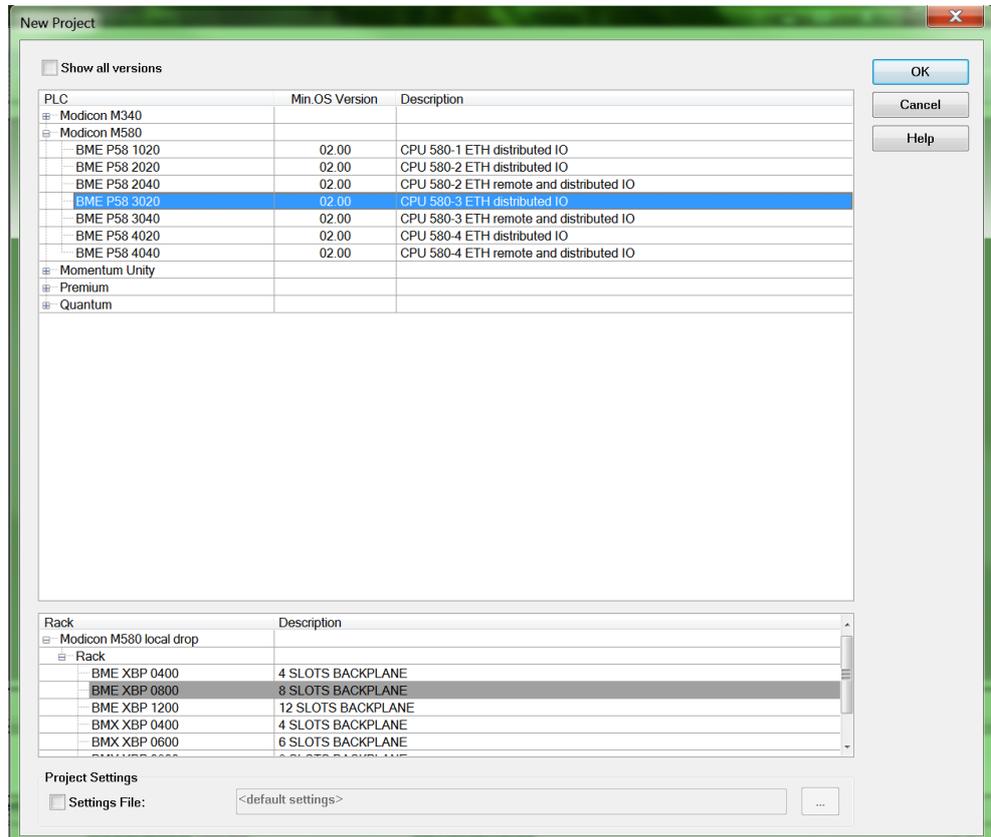
**Start » All Programs » Schneider Electric » So Collaborative » Unity Pro » Unity Pro XL**

- ii. Create a **New Project** by selecting **File » New** from the Unity Pro menu, or clicking the **New Project**  button on the toolbar.



## Exercise - Configure a Local I/O (cont.)

- iii. Select the appropriate **M580 Processor** and **Rack** according to the equipment available. Or select any option if there isn't an **M580 Processor** or **Rack** available.

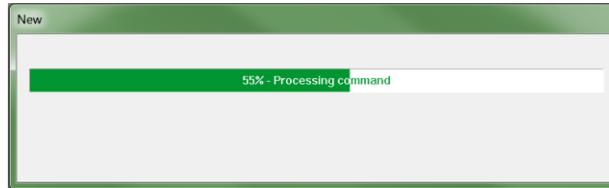


## Exercise - Configure a Local I/O (cont.)

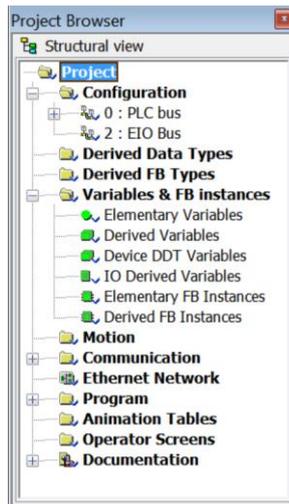
---

- iv. Click the **OK** button to create the application.

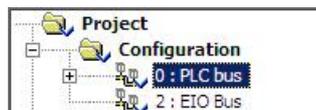
**Unity Pro** will create the new project and populate it with default items.



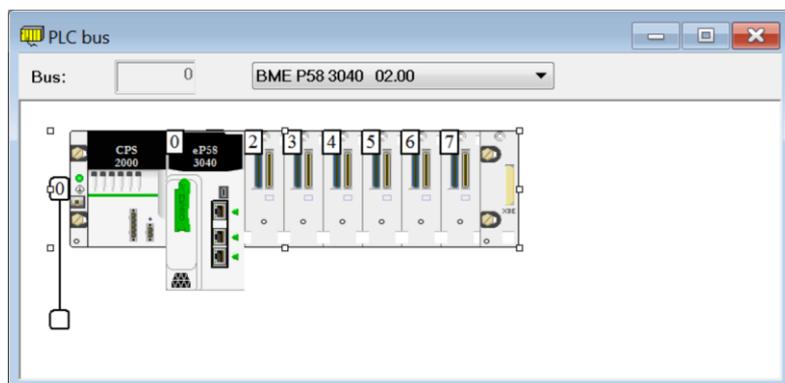
The **Project Browser** will display to show the project contents.



- v. Double-click the **0: PLC Bus** item from the **Project Browser**.



The Local Rack will be displayed, pre-populated with the CPU and the Power Supply.



---

### Hints & Tips

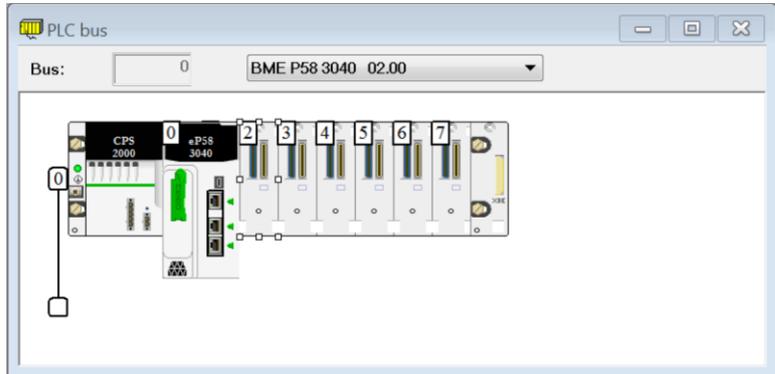
Note the addition of the new Ethernet slot in Blue on the image of the Rack.

---

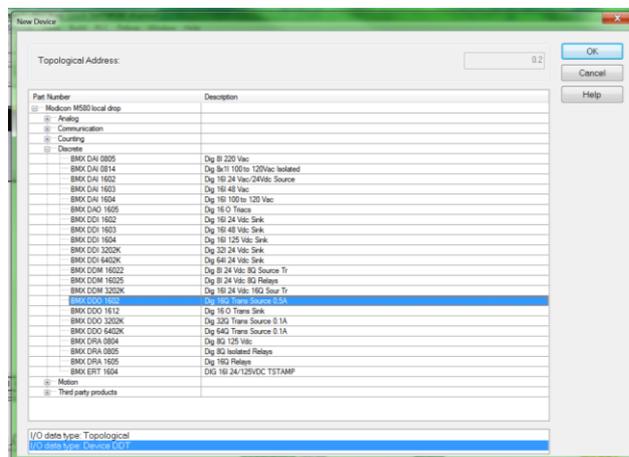
## Exercise - Configure a Local I/O (cont.)

### Add the DDO Module to the Local Rack.

- i. Double-click the spare slot representing the physical location of the **BMX DDO 1602** module.

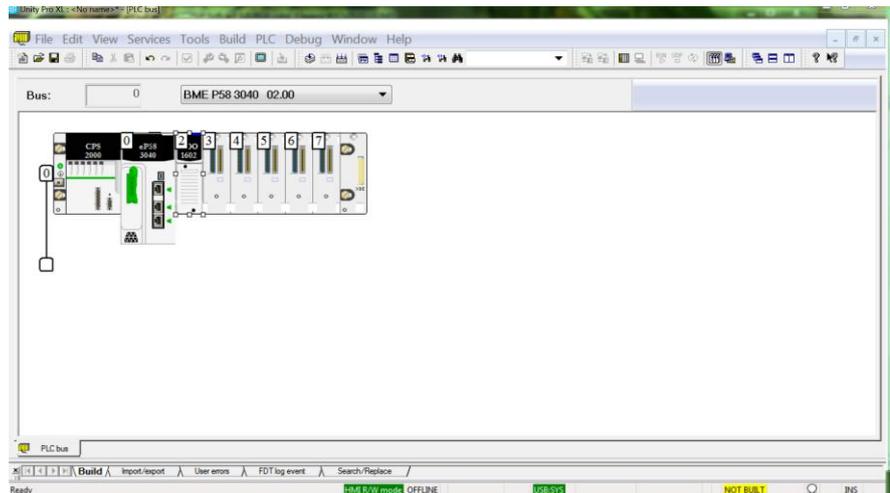


- ii. From the **New Device** window, select the **Discrete** group and then select the **BMX DDO 1602** module. Make sure that the **I/O data type is Device DDT** at the bottom.
- iii. Click the **OK** button.



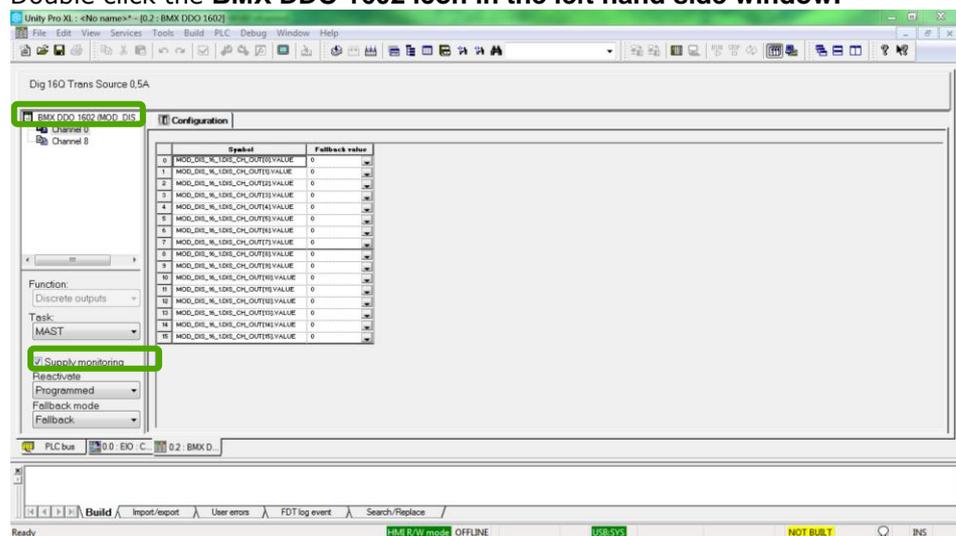
## Exercise - Configure a Local I/O (cont.)

The module appears in the Local Rack.



### Name the DDO 1602 Device DDT

- Double-click the **BMX DDO 1602** module.
- In the module's window, un-tick **Supply monitoring**.
- Double click the **BMX DDO 1602** icon in the left hand side window.



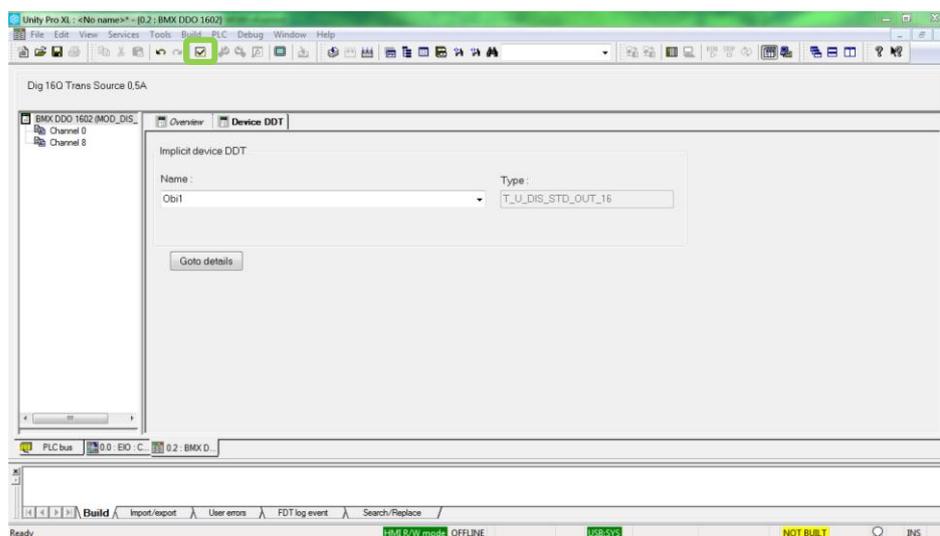
### Note:

Choose any name, it can be changed anytime.

## Exercise - Configure a Local I/O (cont.)

---

- iv. Select the **Device DDT** Tab, rename the module `Obi1`.
- v. Validate the changes, by clicking the tick box.



---

### Create a Test Section

- i. Create a new ST Section under the Master (MAST) Task called **test**.
- ii. Type in the following code:

```
FOR i:=0 TO 15 BY 2 DO
  Obi1.DIS_CH_OUT[i].VALUE := TRUE;
END_FOR;
```

(create the variable `i` as an Integer)
- iii. This code will turn on every even output.
- iv. Build the application.



**Note:** The syntax of device DDT outputs.

---

## Exercise - Configure a Local I/O (cont.)

### Observe the DDO 1602 Device DDT

- i. Transfer and run the application (either to Simulation mode or Standard mode if the equipment is available).
- ii. In the project browser, double click **Variables & FB instances**.
- iii. Right click **Obi1**, and initialise a new animation table.
- iv. Click the **+** to extend the structure.
- v. Extend the **DIS\_CH\_OUT** item.
- vi. Finally extend a few channels and check their states.
- vii. Odd numbers should be OFF, and even numbers should be ON, as on the picture:

Name	Value	Type	Comment
Obi1		T_U_DIS_STD...	
MOD_HEALTH	0	BOOL	Module health
MOD_FLT	0	BYTE	Module faults
DIS_CH_OUT		ARRAY[0..15] O...	
DIS_CH_OUT[0]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	1	EBOOL	Discrete output value
DIS_CH_OUT[1]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	0	EBOOL	Discrete output value
DIS_CH_OUT[2]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	1	EBOOL	Discrete output value

- viii. Save the project.

## Exercise - Configure a Local I/O (cont.)

---

### Check the DDO 1602 Device Outputs (Hardware Required)

- i. The Hardware described at the beginning of the exercise is required to complete this section.
- ii. Check that every other output is ON as in the picture:



**Note:**

If I/O is red, it probably means that Supply monitoring in “3 name your DDDT” is unchecked.

---

# Cyber Security

## Introduction

The project is now properly running in the PLC (or Simulator). This chapter explains how to make sure that someone will not disrupt its normal functioning via a Cyber Attack; such as Stuxnet?

The M580 is one of the first PLC with enabled security features that make it a harder target for cyber attacks.

This exercise explains how to enable these features and how they will affect the architecture.



### Further Training:

- 1) To make the system even more secure; refer to the cyber security topic in the second chapter.
  - 2) The Schneider Electric document; [Cyber Security for Automation Systems\(Unity Pro v8.0\)](#)
- 

## Topic Objectives

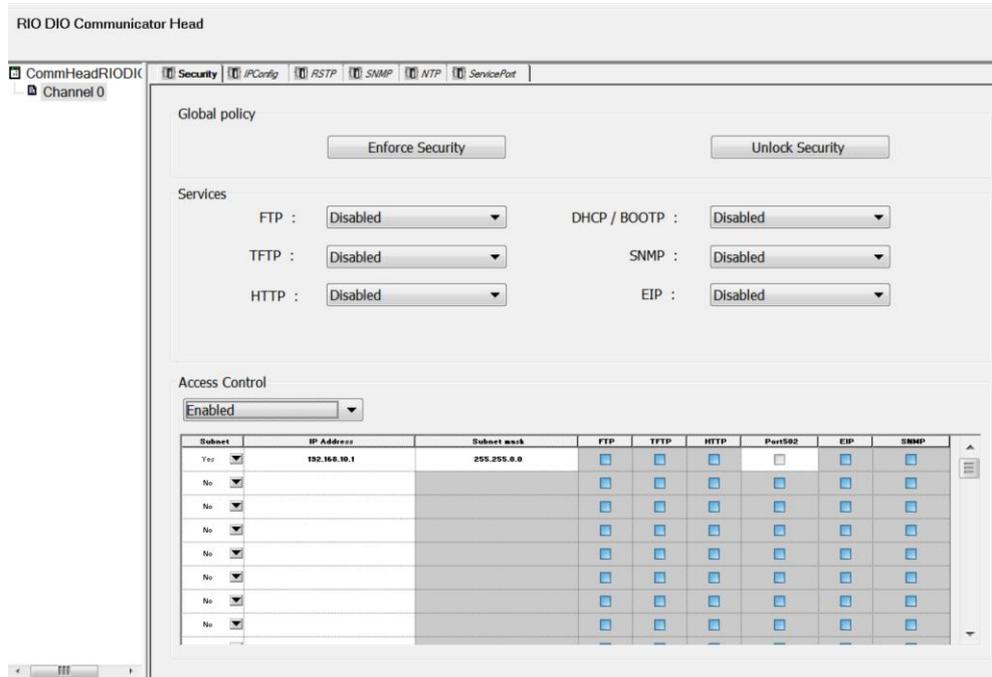
By the end of this chapter the student will be able to:

- Identify Cyber Security measures within the M580.
- Deploy Cyber Security measures in M580 architecture.

# Cyber Security (cont.)

**Securing Services** Along with the Achilles Level 2 implementation, a key feature of the M580 is the ability to prevent certain Ethernet based services from running.

The majority of settings are located on the CPU Embedded Ethernet port **Security** tab:



## Hints & Tips

The Schneider Electric recommendation is to **disable** all unused Services.

## Cyber Security (cont.)

### Restricting Connection to Some Devices

From this tab the student can also decide which IP addresses are allowed/not allowed to communicate with the M580.

Restricting access to some IP addresses makes hacking much more difficult.

### Summary of the M580's Security Tab

This table explains the functionality of the settings on the **Security** tab:

<b>FTP</b>	<p>Default value: <b>Disabled</b></p> <p>Schneider Electric recommends disabling this service when not in use. This setting disables:</p> <ul style="list-style-type: none"> <li>- firmware upgrade</li> <li>- SD memory card data storage</li> <li>- device configuration management using the FDR service</li> </ul>
<b>TFTP</b>	<p>Default value: <b>Disabled</b></p> <p>Schneider Electric recommends disabling this service when not in use. This setting disables:</p> <ul style="list-style-type: none"> <li>- the ability to read RIO drop configurations</li> <li>- the ability to manage device configurations using the FDR service</li> </ul>
<b>HTTP</b>	<p>Default value: <b>Disabled</b></p> <p>Schneider Electric recommends disabling this service when not in use. This setting disables Web access.</p>
<b>Achilles level 2</b>	<p>Default value: <b>Enabled</b></p> <ul style="list-style-type: none"> <li>- Setting the feature to Enabled increases Ethernet frame filtering to improve the level of security and robustness.</li> <li>- Setting the feature to Disabled increases system performance by reducing the Ethernet frame filtering capability.</li> </ul>
<b>Access Control</b>	<p>Default value: <b>Enabled</b></p> <p>When Enabled, you can restrict access from specific devices to specific devices and define the devices that allow traffic only.</p>
<b>Enforce Security</b>	<p>Click to set:</p> <ul style="list-style-type: none"> <li>- FTP, TFTP, and HTTP to Disabled</li> <li>- Achilles level 2 and Access Control to Enabled</li> </ul>
<b>Unlock Security</b>	<p>Click to set:</p> <ul style="list-style-type: none"> <li>- FTP, TFTP, and HTTP to Enabled</li> <li>- Achilles level 2 and Access Control to Disabled</li> </ul>
<b>Authorized addresses</b>	<p>Enter the addresses that you want the system to authorize:</p> <ul style="list-style-type: none"> <li>- IP Address: 0.0.0.0 ... 255.255.255.255</li> <li>- Subnet: Yes / No</li> <li>- Subnet mask: 0.0.0.0 ... 255.255.255.255</li> </ul> <p>NOTE: This field can be edited when <b>Access Control</b> is set to <b>Disabled</b>.</p>

## Cyber Security (cont.)



**Note:**

1) Be very careful when activating the security features, especially IP restriction because the PLC can become inaccessible: by IP, SD card and USB! In that case the PLC is useless. Thus be careful experimenting with these features at the same time.

2) It is advised that all protocols are disabled and Achilles 2 Cyber Security is enabled when a project is started. Unity Pro will then request protocols to be activated when they are required. Only the features the project requires are therefore enabled, which improves Cyber Security. Once the configuration is working access to specific IP addresses can then also be restricted.

---

### Cyber Secured NOC

Quite often NOCs are connected to a SCADA system, making them indirectly connected to an internet network and away from cyber attacks.



**Note:**

To avoid intrusion from the NOC a new secured NOC module will be released soon. It will include Cyber Security features similar to the ones of the M580.

---

# Exercise – Cyber Security

## Learning Outcomes

By the completion of this exercise the student will:

- Activate the Achilles level 2 feature
- Enable/disable services

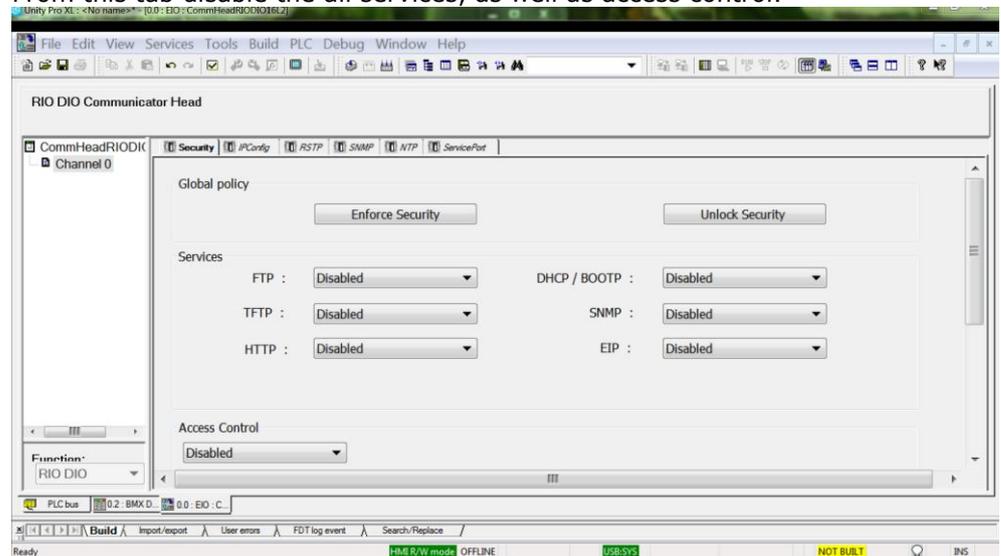
## Equipment Required

To complete this exercise on a PLC the student will need

- One M580 PLC (any CPU)
- A BMX or BME rack
- A compatible power supply
- A micro USB cable or an RJ45 cable

### Modify the cyber security settings.

- Open the main rack configuration window.
- Double click the **M580 ports**; making sure to not click the **PLC**.
- From the newly opened window, click the **Security** tab.
- From this tab disable the all services, as well as access control.



- Relevant services will now be activated for each exercise.

# Summary

## Summary

---

In this chapter the following topics have been covered:

- *The different types of IO*
  - *The M580 Ethernet ports*
  - *Connect to the M580*
  - *Configure a local I/O device*
  - *Device DDT*
  - *Cyber security*
- 

## Questions

The following questions will help to check understanding of the topics covered in this chapter:

- What are the three types of I/O? Which ones are faster to configure?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- What are the purposes of the **SERVICE** port?
  
- What is the advantage of Device DDT over topological addressing?
  
- What is the purpose of observing the M580 Device DDT?
  
- How to access the security parameters of the M580?
  
- To ensure higher cyber security; which services should be disabled?

# Chapter 2: Advanced Architecture Configuration

## Overview

### Introduction

---

The basics to design an architecture have now been carried out.

In this chapter we will reuse what we have previously learned to design more sophisticated M580 architectures, including the following:

- RIO
- DIO.
- Hot Standby

Migration paths from:

- Premium I/O
- Quantum PLC with X80 I/O (same case as RIO)

As well as configuration of NOCs and advanced security features.

This section is modular which means that you can carry out the exercises in any order, as long as the prerequisites are followed (represented by arrows).

See the chart below for more information:



**Note:**

Kindly note that the RIO exercise is similar to migration from a Quantum PLC with X80 modules to a M580 PLC with X80 modules.

You can click the different items to jump directly to the topic.

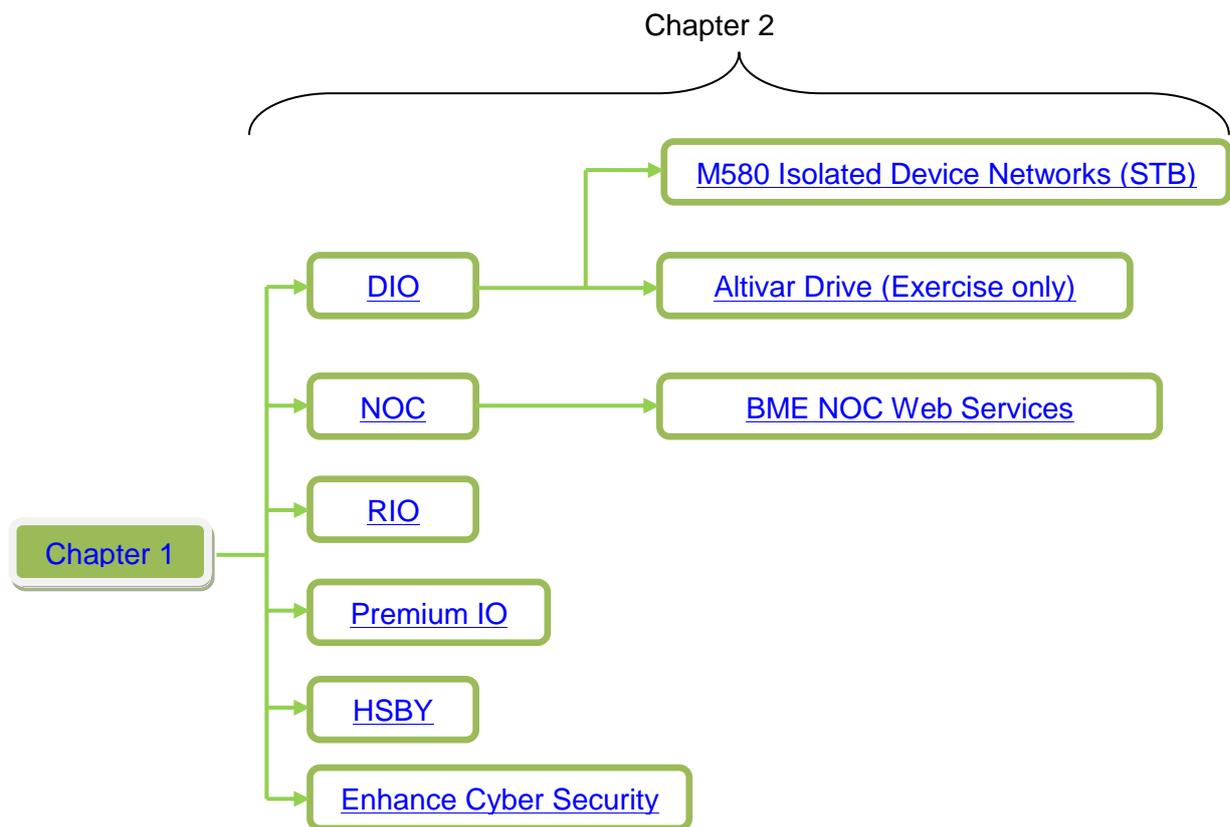
---

## Overview (cont.)

Use the same application for all exercises or base the new project on the one created in the first chapter.

Most exercises can be fulfilled in Simulation Mode; however some require the user to have some hardware to complete steps. When this is the case it will be stated at the beginning of the exercise.

Once familiar with the features of chapter two; you can discover the other possibilities of the M580 in Chapter 3. These features will only be mentioned, in case you want to implement them, you may go through the M580 configuration course.



# DIO

---

## Introduction

Device Type Manager (DTM) through Ethernet allows DIO drop integration with almost any device to the architecture.

Configuring a DTM device is done in two steps:

- Installing the DTM in Unity Pro common to all FDT/DTM devices
- Configuration of the device through Unity Pro's DTM window specific to each device.

As a generic configuration for all devices cannot be provided DTM configuration is illustrated through one of the most advanced examples of device integration: The integration of an Altivar drive through Unity Pro.

## Topic Objectives

By the end of this section the student will be able to:

- Install and add a DTM in Unity Pro
  - Configure the basic settings of an Altivar drive
  - Test the communication with an Altivar drive
-

## Exercise - Install a DTM in Unity Pro

---

### Learning Outcomes

By the completion of this exercise the student will:

- Install a DTM library in Unity Pro
- Add a DTM device in a Unity Pro project

### Equipment Required

This exercise is purely software based, so the student will only need Unity Pro v8.0 or later version, and an internet connection.

---

#### Install the DTM on the computer.

- i. Obtain the DTM from the device vendor.
- 



#### Note:

If using a Schneider-Electric device, its DTM can be obtained from the Schneider-Electric website.

For instance you can download the Altivar Process DTM [here](#).

---

- ii. Double click the file, and follow the instructions to install the DTM.
- iii. If **Unity Pro** was closed restart it.
- iv. If the install went well this message will be seen when Unity Pro starts.
- v.



- vi. Click **Yes**.
- vii. Note that the catalogue has been updated:
- viii.

---

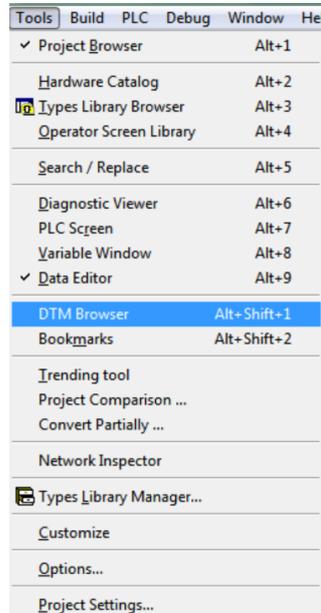
**Information: The Update of the Dtm catalog is finished**

---

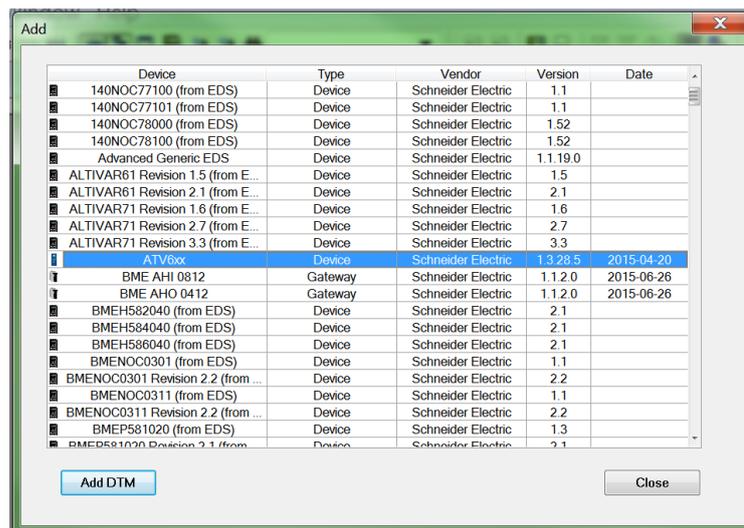
## Exercise - Install a DTM in Unity Pro (cont.)

Add the device in Unity Pro project.

- i. Open the DTM window by selecting **Tools DTM Browser**.



- ii. In the DTM window right click the M580, and click **Add**
- iii. The following window should pop-up, select the ATV6xx and click **Add DTM**.



- iv. If the Device does not appear in the list something probably went wrong when installing the DTM in Window.

## Exercise - Install a DTM in Unity Pro (cont.)



### Note:

The following points may be different if a different device is being configured.

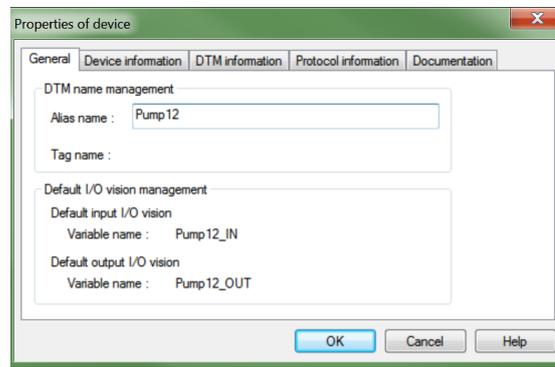
- v. In the case of the Altivar drive select which protocol will be used between the M580 and the drive
- vi. For this exercise select **Modbus over TCP**.
- vii. Call the device `Pump12`, and click **OK**.



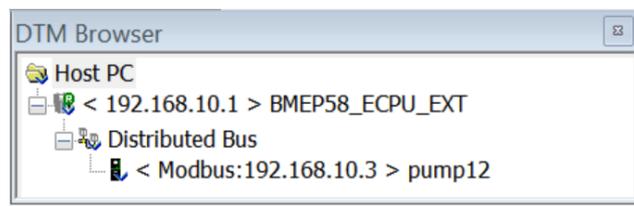
### Note:

It is recommended not to change the device name after configuration, so be careful when typing in the name.

- viii. The name of the variable will be used in the next exercise so make sure it is exactly `pump12` otherwise errors will be seen when importing the section.



- ix. The device now appears in the DTM browser, below the device it is connected to:



# Exercise - Configure an Altivar Drive

## Overview

The DTM is now installed in **Unity Pro**.

This means that the specific parameters of the device now need now need to be configured through Unity Pro.

The configuration of this drive will take less than 30 minutes, which is much shorter than the usual time to configure a drive.

## Learning Outcomes

By the completion of this exercise the student will:

- Configure an Altivar drive
- Test the functioning of an Altivar drive

## Equipment Required

To complete this exercise on a PLC the student will need

- One M580 PLC (any CPU)
- A compatible rack and power supply
- An Altivar drive
- An Ethernet cable

### Select the drive

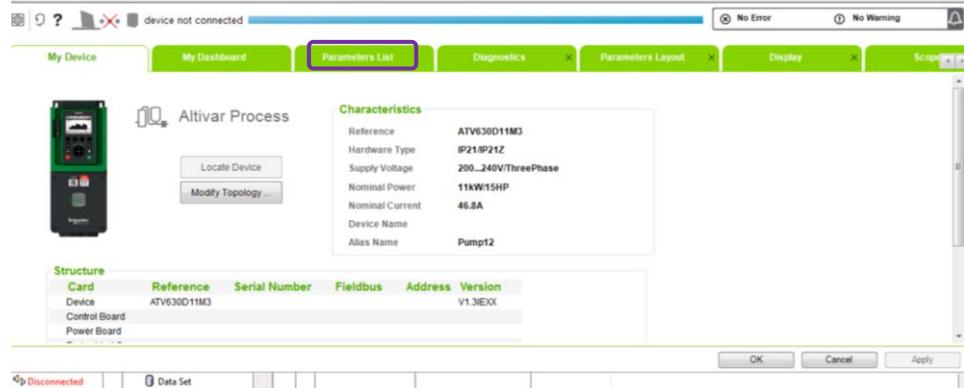
- i. Double click the device in the DTM browser.
- ii. Select the drive required using the various filters. (This can be changed later at any time).
- iii. For this exercise use an **ATV630D11M3**.
- iv. Click **OK**.



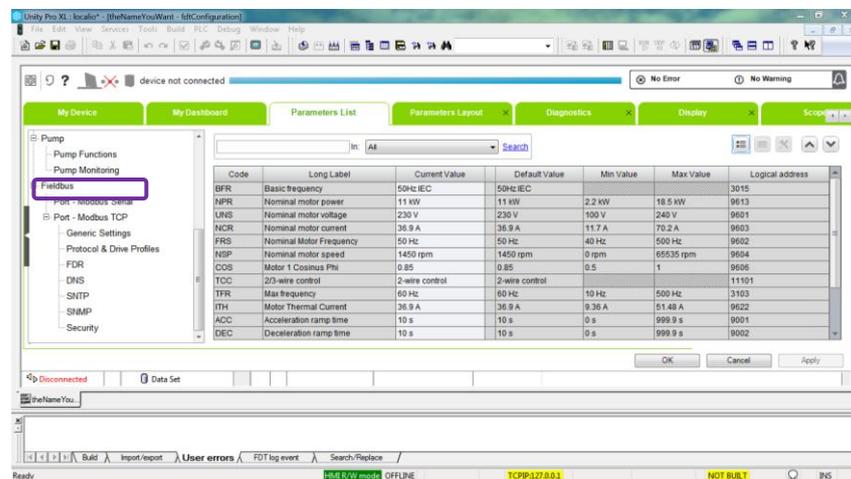
## Exercise - Configure an Altivar Drive (cont.)

### Create the DFB controlling the drive

- i. Double click the drive in the DTM window.
- ii. In the newly opened window click the Parameter List tab



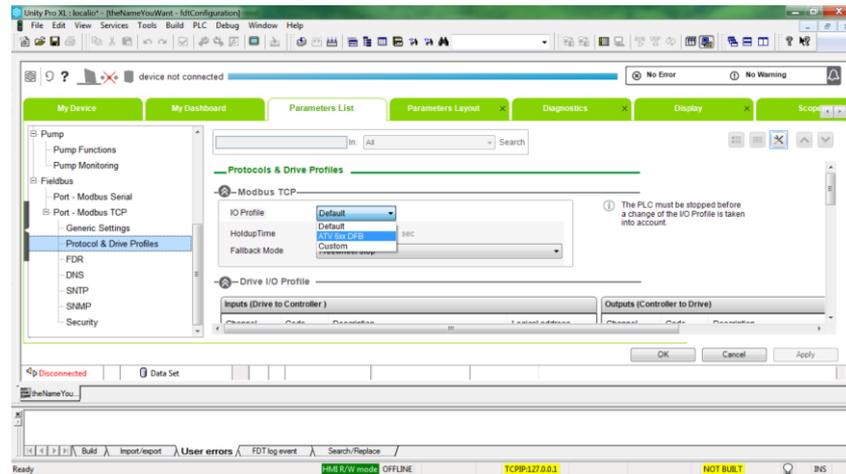
- iii. Scroll down the list on the left;
- iv. Expand Port – **Modbus TCP**
- v. Click Protocol and Drive Profiles:



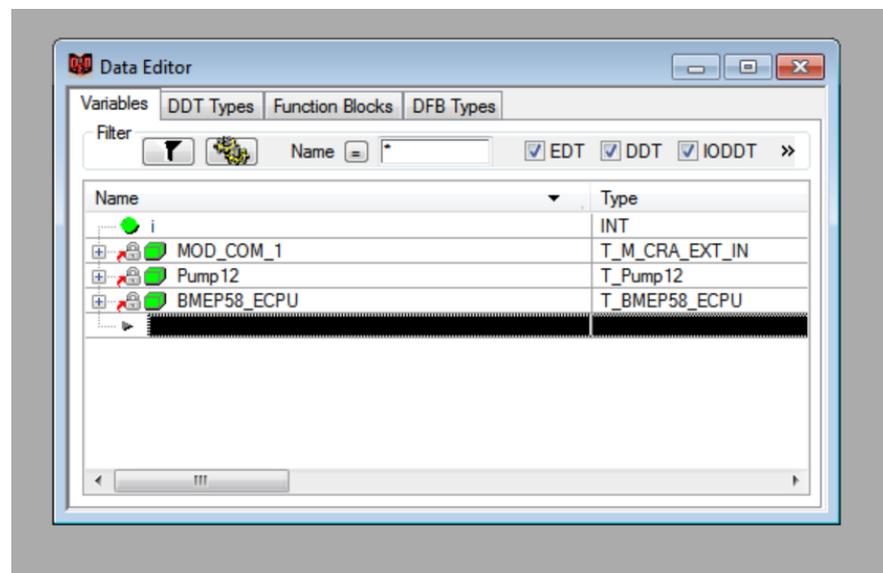
- vi. Select the I/O Profile drop down list and click Altivar DFB.
- vii. This will automatically create a DDT controlling the drive upon the next Building of the project.

## Exercise - Configure an Altivar Drive (cont.)

- viii. Click **OK** to validate the changes.



- ix. Build the project to instantiate the DDT.  
x. A DDT called `Pump12` has now been added to the variable list:



## Exercise - Configure an Altivar Drive (cont.)

### Transfer the project to the drive and the PLC

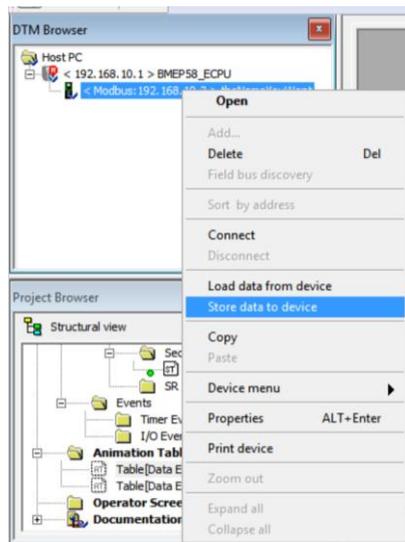
- i. Plug the Ethernet cable into the Drive and in a port of the M580 that allows connections to DIO drops.



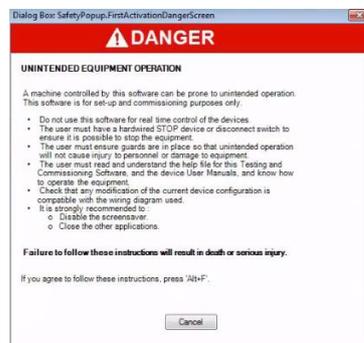
#### Note:

If you are un sure of which port is required, refer to M580 embedded Ethernet Prots in first chapter [p 25](#).

- ii. Build transfer and run the project to the PLC as usual.
- iii. We also need to transfer the project to the drive;
- iv. Right click the M580 in the DTM window, and select connect to the M580 via the FDT/DTM technology.
- v. Then right click the drive and select **store data to device**.



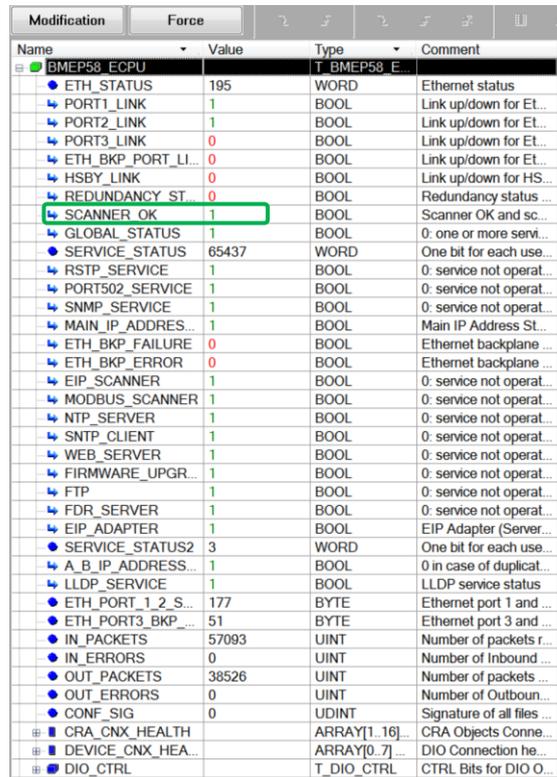
- vi. Read the following warning message and press the key combination asked in the message.



## Exercise - Configure an Altivar Drive (cont.)

Test the communication using the Device DDT (Hardware is required for this section)

- i. From the animation table make sure that the **SCANNER\_OK** has a value of 1. This means that the M58 is properly connected to a device.



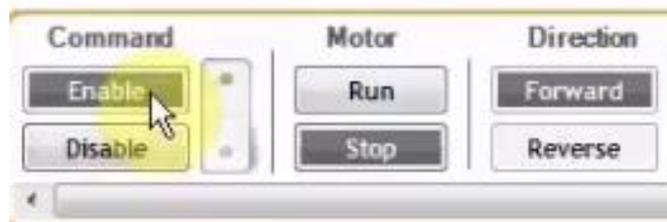
Name	Value	Type	Comment
BMEP58_ECPU		T_BMEP58_E	
ETH_STATUS	195	WORD	Ethernet status
PORT1_LINK	1	BOOL	Link up/down for Et...
PORT2_LINK	1	BOOL	Link up/down for Et...
PORT3_LINK	0	BOOL	Link up/down for Et...
ETH_BKP_PORT_LI...	0	BOOL	Link up/down for Et...
HSBY_LINK	0	BOOL	Link up/down for HS...
REDUNDANCY_ST...	0	BOOL	Redundancy status ...
SCANNER_OK	1	BOOL	Scanner OK and sc...
GLOBAL_STATUS	1	BOOL	0: one or more servi...
SERVICE_STATUS	65437	WORD	One bit for each use...
RSTP_SERVICE	1	BOOL	0: service not operat...
PORT502_SERVICE	1	BOOL	0: service not operat...
SNMP_SERVICE	1	BOOL	0: service not operat...
MAIN_IP_ADDRES...	1	BOOL	Main IP Address St...
ETH_BKP_FAILURE	0	BOOL	Ethernet backplane ...
ETH_BKP_ERROR	0	BOOL	Ethernet backplane ...
EIP_SCANNER	1	BOOL	0: service not operat...
MODBUS_SCANNER	1	BOOL	0: service not operat...
NTP_SERVER	1	BOOL	0: service not operat...
SNTIP_CLIENT	1	BOOL	0: service not operat...
WEB_SERVER	1	BOOL	0: service not operat...
FIRMWARE_UPGR...	1	BOOL	0: service not operat...
FTP	1	BOOL	0: service not operat...
FDR_SERVER	1	BOOL	0: service not operat...
EIP_ADAPTER	1	BOOL	EIP Adapter (Server...
SERVICE_STATUS2	3	WORD	One bit for each use...
A_B_IP_ADDRESS...	1	BOOL	0 in case of duplicat...
LLDP_SERVICE	1	BOOL	LLDP service status
ETH_PORT_1_2_S...	177	BYTE	Ethernet port 1 and ...
ETH_PORT3_BKP...	51	BYTE	Ethernet port 3 and ...
IN_PACKETS	57093	UINT	Number of packets r...
IN_ERRORS	0	UINT	Number of Inbound ...
OUT_PACKETS	38526	UINT	Number of packets ...
OUT_ERRORS	0	UINT	Number of Outbound ...
CONF_SIG	0	UDINT	Signature of all files ...
CRA_CNX_HEALTH		ARRAY[1..16]...	CRA Objects Conne...
DEVICE_CNX_HEA...		ARRAY[0..7]...	DIO Connection he...
DIO_CTRL		T_DIO_CTRL	CTRL Bits for DIO O...

This means that the communication between the Altivar drive and the PLC is good.

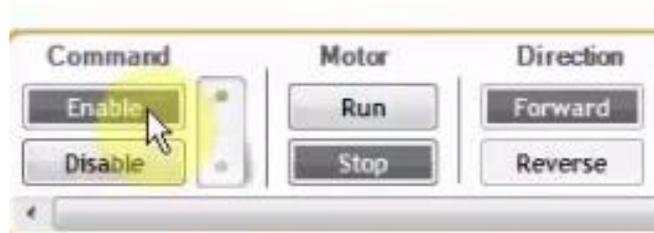
## Exercise - Configure an Altivar Drive (cont.)

**Control and diagnose the drive from the DTM window (Hardware is required for this section)**

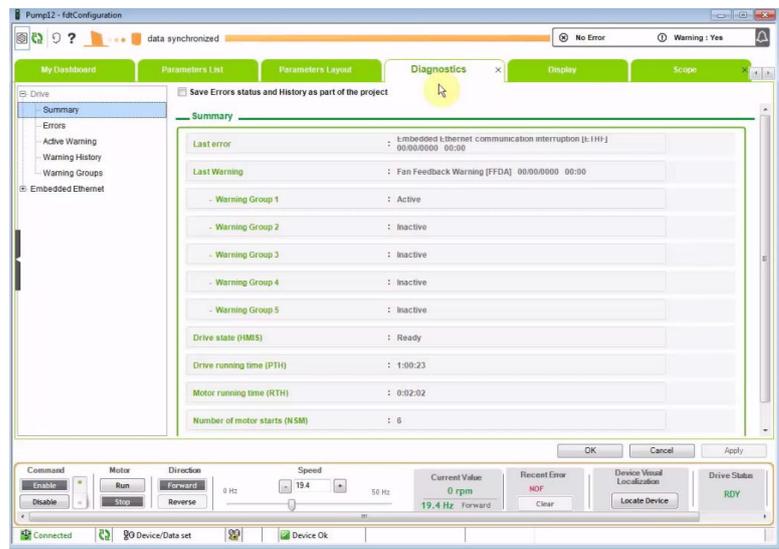
- i. Double click the drive in the DTM window.
- ii. Enable the command from the DTM window by clicking **enable**:



- iii. Set a speed by moving the scale button, and run the drive by clicking run.



- iv. The drive should now start and the value of the speed displayed in the DTM window should change.
- v. Go to the diagnostic tab to ensure all parameters are **OK**.



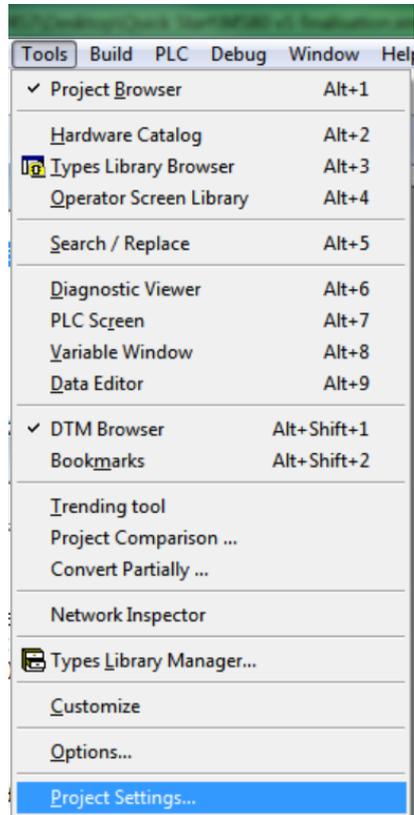
- vi. Go back to the my device tab to disable the command from the DTM window

## Exercise - Configure an Altivar Drive (cont.)

---

### Connect the Device DDT to the DFB

- i. Import the Pump12FDB.xbd section And the Pump12OS.xcr Operator screen located here into the project.
- ii. Build the project.



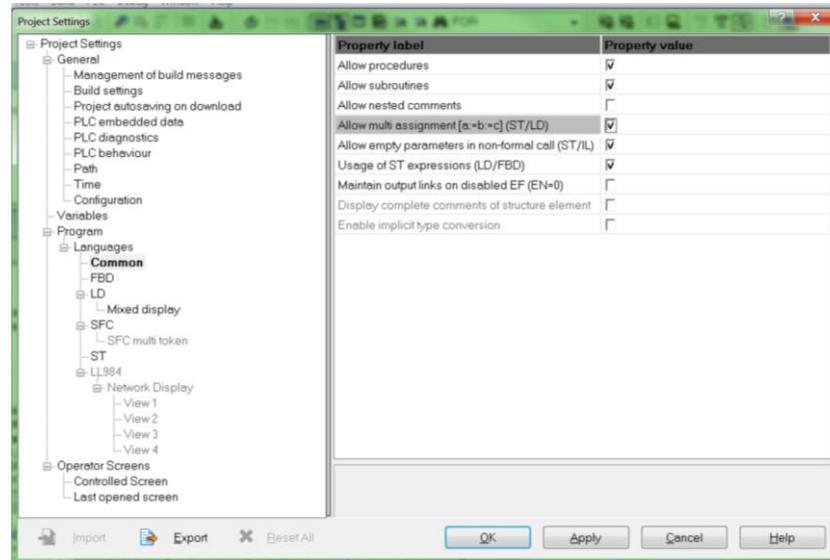
#### Note:

If the following error is seen: "E1203 usage of multi assignment statements is disabled" refer to Tools Project Settings

---

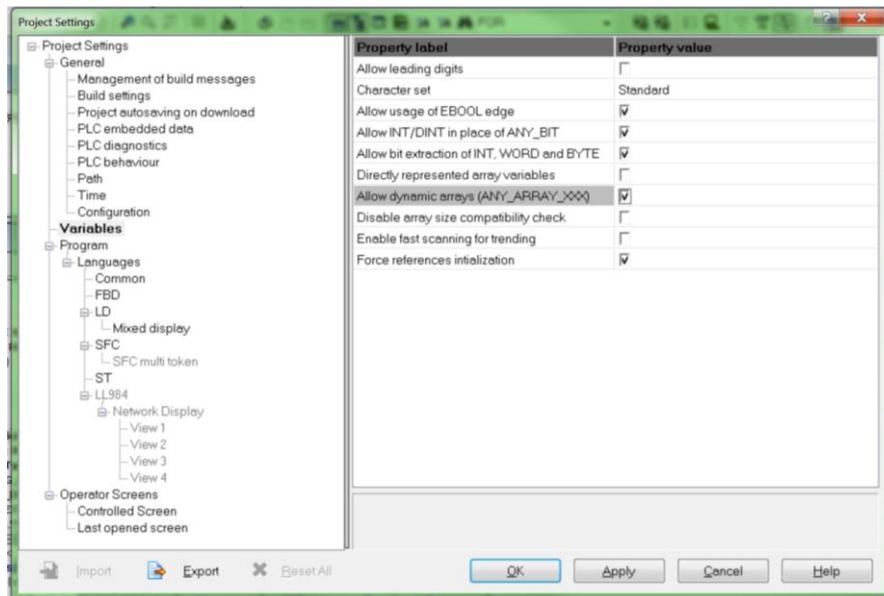
## Exercise - Configure an Altivar Drive (cont.)

- iii. In /Program/Languages/Common and tick the Allow multi assignment box.



### Note:

If you have “E1208 usage of dynamic arrays is disabled”, in the project settings click variables and tick “allow dynamic arrays”.

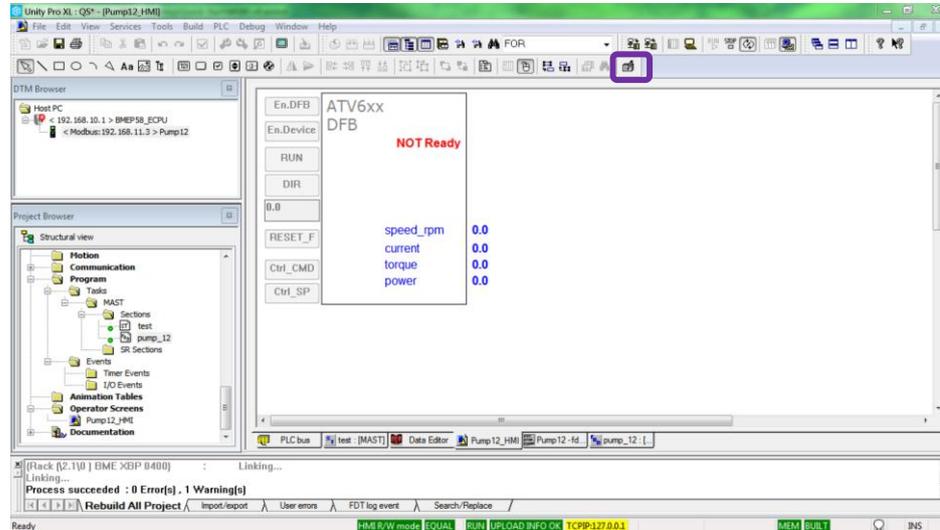


- iv. Build the project again.

## Exercise - Configure an Altivar Drive (cont.)

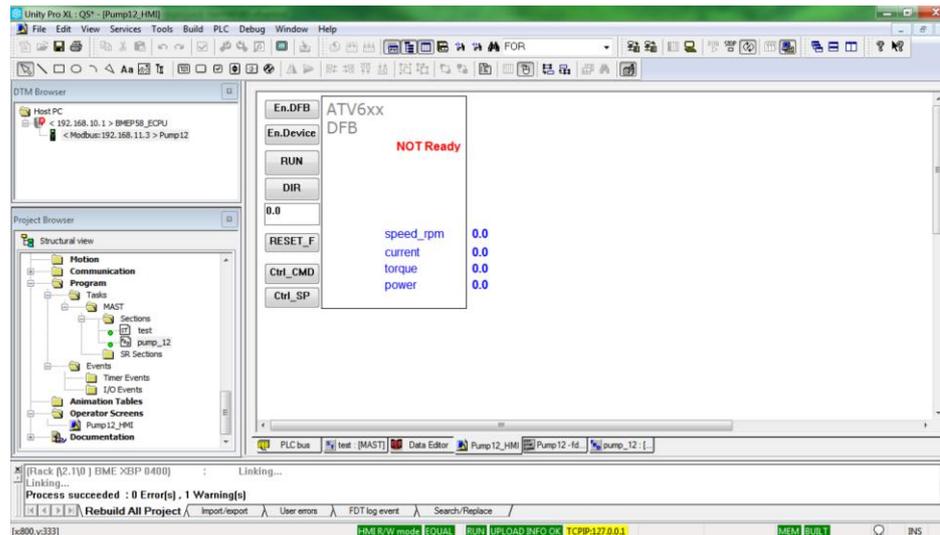
Test the drive from an operator screen [Optional] (Hardware is required for this section)

- i. **Build and transfer** the project to the PLC and the drive then **Run** it.
- ii. Open the operator screen and enable write variable modification.



- iii. Note: If the text Ext. controlled is displayed it probably means that did not disabled the control from the DTM window (redo the steps at the end of 5 "Control and diagnostic" the drive from the DTM window).

iv.



- v. The device should start running and the speed should be actuated in the operator screen.
- vi. NOTE: The values aren't actuated in the DTM window.
- vii. **Stop** the drive when finished.
- viii. The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).



# NOC

---

## **Introduction**

The first chapter explained the use of the different ports of the M580: Connecting to RIO or DIO drops or to a third party client such as a SCADA or Unity Pro.

A NOC's role is quite similar: Connected to DIO drops or a SCADA. Doing so, will extend the number of drops connected to the M580 rack, as well as freeing bandwidth and CPU usage for the M580.

This chapter will explain how to configure a NOC; Once the NOC is configured a DIO drop will be connected to it, as per the DIO chapter, or connect it to the SCADA system.

## **Topic Objectives**

By the end of this section the student will be able to:

- Configure an NOC both for SCADA applications or to connect to DIO drops

## Exercise - Distributed Devices via a NOC

### Learning Outcomes

By the completion of this exercise the student will be able to:

- Implement an isolated distributed device network using the **BME NOC 0311** module
- Integrate a distributed device using **Modbus/TCP**
- Monitor and control the health of a device via the available DDTs.

### Equipment & Software Required

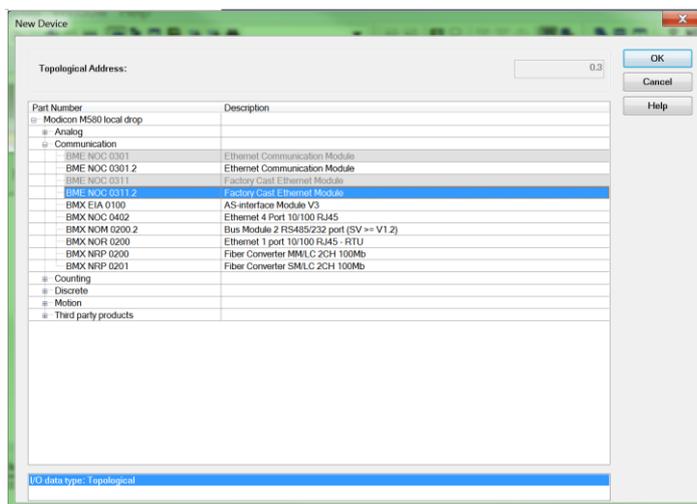
This exercise **requires** the Advantys software.

To complete this exercise on a PLC the following equipment is required:

- **One NOC 0311**
- **One M580**
- **One compatible rack**
- **One compatible power supply**
- **STB Modules**

### Add the BME NOC 0311 to the Local Rack.

- Open the **PLC Bus** and insert the **BME NOC 0311.2** module into the correct slot as per the hardware configuration.

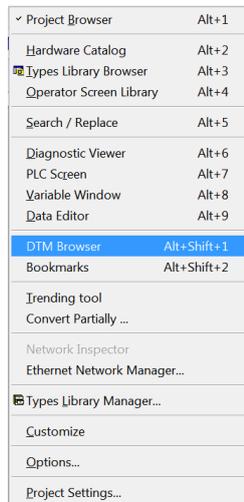


- Use the default name and click the **OK** button.

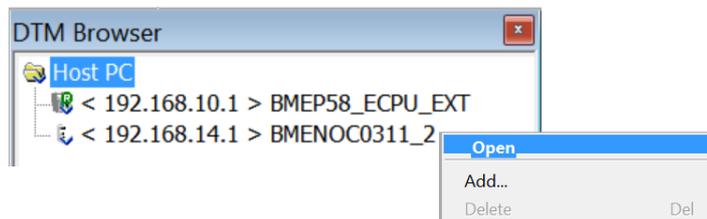
## Exercise - Configure an Altivar Drive (cont.)

### Configure the IP address of the BME NOC 0311.

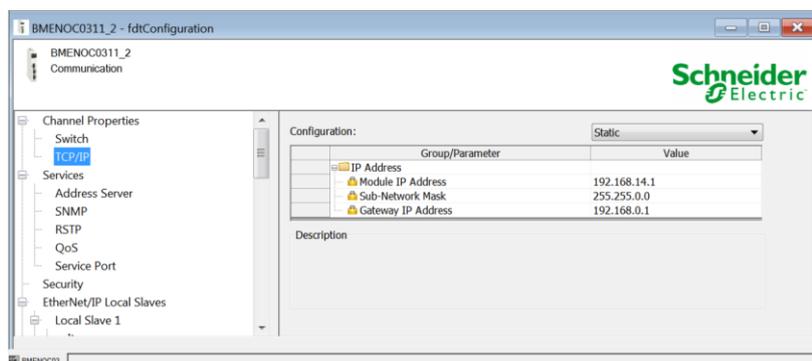
- i. View the **DTM Browser** by selecting **Tools » DTM Browser**.



- ii. In the DTM manager, right-click the **BMENOC0311** and select **Open** from the menu.



- iii. In the browser tree, select **TCP/IP**.



- iv. From there, you can see the IP address assigned to the device. In the picture: 192.168.14.1. This IP is assigned by the PLC, and can't be changed.
- v. Close the window.
- vi. The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).

# Summary

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## Summary

In this chapter the following topics have been covered:

- *How to add a NOC in Unity Pro*
  - *Configuring a NOC*
- 

## Questions

The following questions will help to check understanding of the topics covered in this chapter:

- What are the possible roles of a NOC?

# M580 Isolated Device Networks

---

## Introduction

Distributed I/O can be combined with RIO on a single network to reduce wiring and installation costs. However, with a large amount of DIO, this can impact performance of both the RIO and DIO networks.

A solution is to isolate the Distributed I/O onto a separate network. This chapter details the techniques for this and how to use the BME NOC to achieve network isolation.

---

## Topic Objectives

By the completion of this topic you will be able to:

Understand the difference between combined and isolated Device Networks

Investigate possible network architectures

Configure an Isolated Device Network using the BME NOC 0311

Use the BME NOC 0311 Web Services

Configure a FactoryCast Web page

---

### **This Part Covers the Following Topics:**

Device Networks .....	2-22
BME NOC 03*1 .....	2-24
BME NOC Web Services .....	2-38
FactoryCast.....	2-42

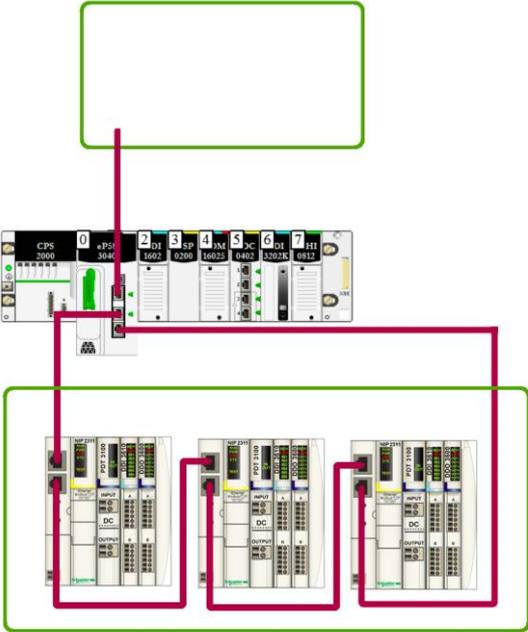
# Device Networks

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## Distributed Devices

A **distributed device cloud** is one or more **distributed devices** that are daisy chained or linked to a standard switch or service port in the M580 architecture.

A cloud can be connected to the main ring via a dual-ring switch (DRS), or it can be isolated via a direct connection to an M580 CPU with the DIO Scanner Service or an Ethernet module (**BME NOC 03x1**) in the Local Rack.



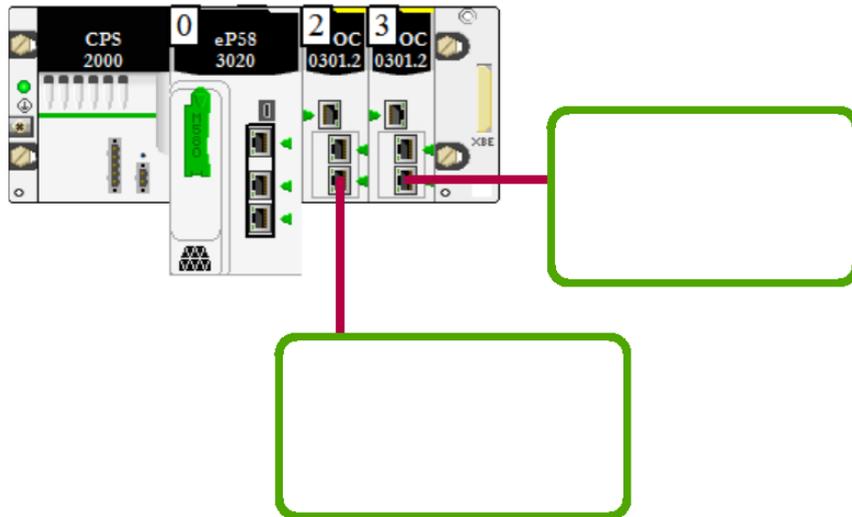
A single connection allows a single device or multiple devices to be "daisy chained" shown above the CPU in the picture above. The configuration shown below the CPU is a Daisy Chain Loop

---

## Isolated Device Networks

### Isolated Distributed Device Network

The **second** way to integrate **distributed devices** is to separate them from the M580 Ethernet Remote I/O network. This allows for optimum utilisation of resources. Daisy chain loops are supported. We will not learn how to do this in this training.



## BME NOC 03\*1

---

### BME NOC

The **BME NOC 03\*1** is a replacement for the BMX NOC 0402. Physically it is almost the same but only has three Ethernet ports on the front of the module. The fourth port has been moved to the back of the module to connect with the Ethernet bus on the rack.



It is functionally similar to the BMX NOC 0402 although it has Cyber Security built in. It also does not require the Interlink cable that is used by the BMX NOC 0401 to communicate with the processor.



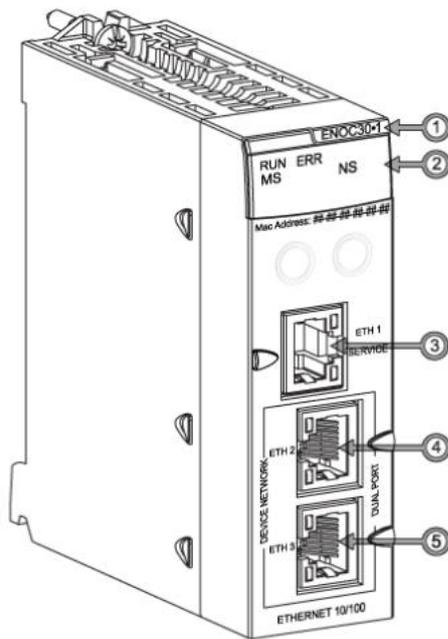
#### Note:

Although the BME NOC 03\*1 has multiple RJ45 ports it only has a single IP address.

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## BME NOC 03\*1 (cont.)

### Module Description



Item	Description	Function
1	Module Name	BME NOC 0301 or BME NOC 0311
2	LED Array	Module status and diagnosis
3	Service Port	Used for programming, diagnostics, SCADA, HMI etc.
4	Device Network Port (ETH2)	Ethernet comms to distributed devices
5	Device Network Port (ETH3)	Ethernet comms to distributed devices



#### Note:

The two device Network ports can provide redundant connections to distributed devices.

## BME NOC 03\*1 (cont.)

---

### Features

The BME NOC module provides the following features:

- I/O Scanner
- Modbus TCP Server
- HTTP Server
- Address server for connected Ethernet Devices
- Sntp client
- FactoryCast Server (0311 only)

The I/O scanner provides EtherNet/IP and TCP/IP scanner services for communication to distributed equipment on a DIO network.

The HTTP server provides access to the modules web pages using a standard web browser.

The FactoryCast server also includes a FTP server and allows the creation of basic HMI pages for web animation

### Feature Comparison

Both modules support all features except FactoryCast Enhanced Web Server which is only available on the BME NOC 0311.




	BME NOC Ethernet	BME NOC FactoryCast
Router	No	
I/O Scanner max connect	128	
Support EtherNet/IP	Yes	
Support Modbus/TCP	Yes	
Web server type	Basic	Advanced

# Exercise - Distributed Devices via a NOC

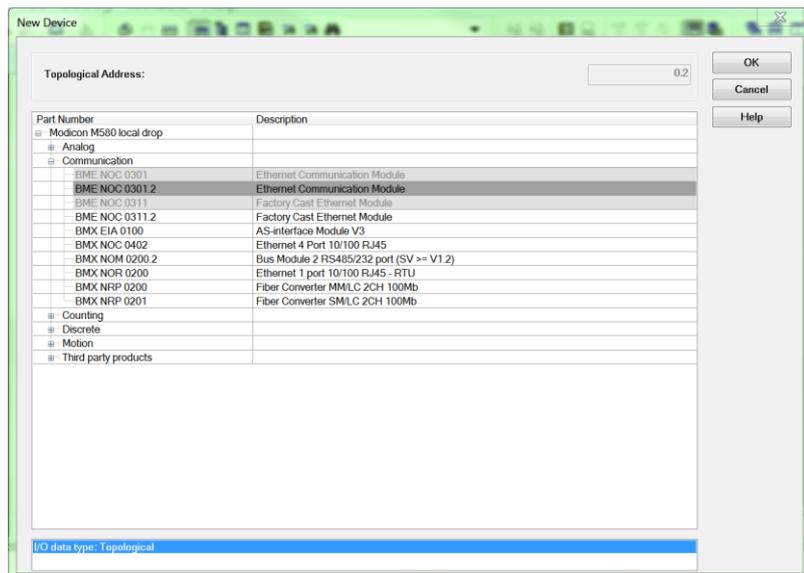
## Learning Outcomes

By the completion of this exercise the student will be able to:

- Implement an isolated distributed device network using the **BME NOC 0311** module
- Integrate a distributed device using **Modbus/TCP**
- Monitor and control the health of a device via the available DDTs.
- Isolate the Distributed I/O from the rest of the Ethernet architecture.

### Add the BME NOC 0311 to the Local Rack.

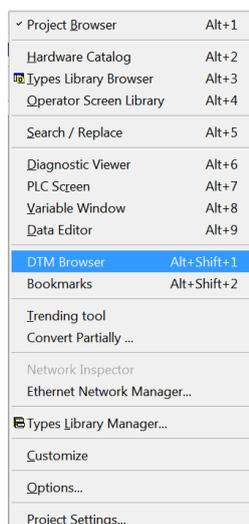
- 1 Open the **PLC Bus** and insert the **BME NOC 0311.2** module into the correct slot as per the simulator being used.



- 2 Use the default name and click the **OK** button.

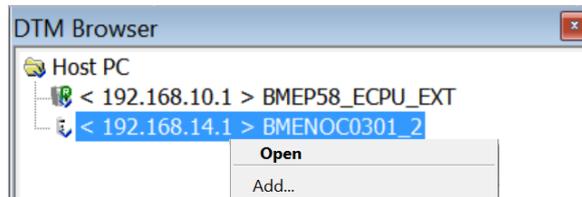
### Configure the IP address of the BME NOC 0311.

- 1 View the **DTM Browser** by selecting **Tools » DTM Browser**.

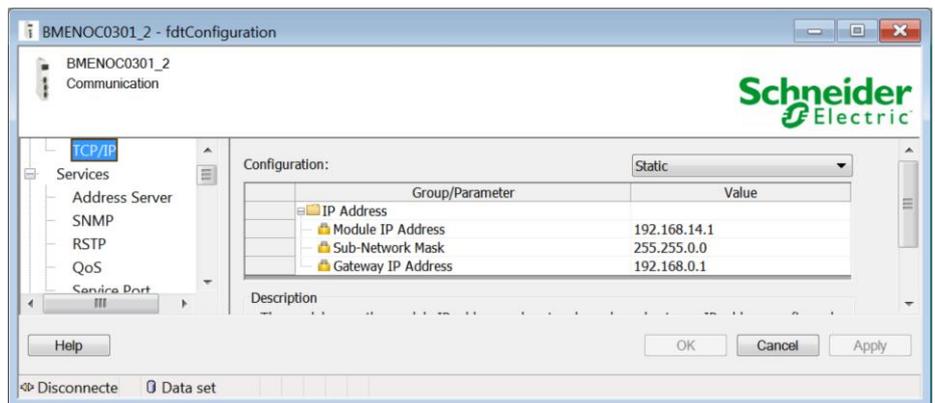


## Exercise - Distributed Devices via a NOC (cont.)

- 2 In the DTM manager, right-click the **BMENOC0311** and select **Open** from the menu.



- 3 In the browser tree, select **TCP/IP**.

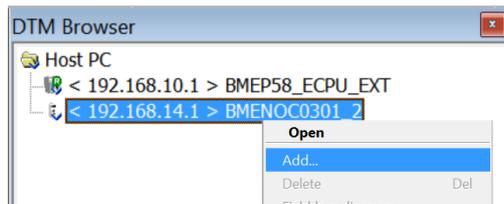


- 4 Note that the IP address is automatically set. In the above picture it is set to 192.168.14.1.
- 5 Click the **Cancel** button.

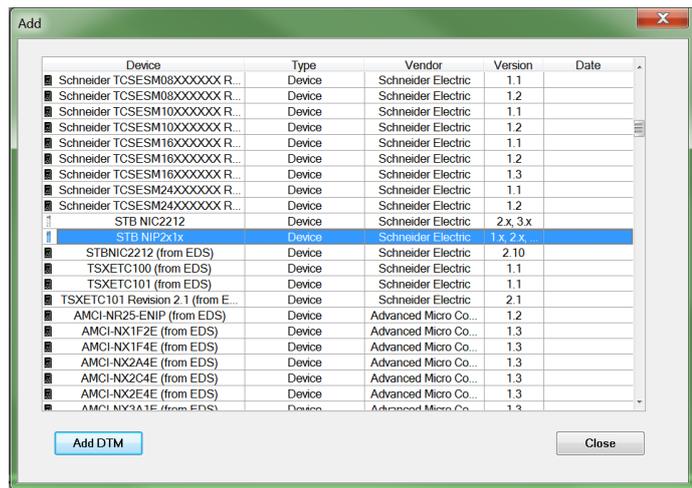
## Exercise - Distributed Devices via a NOC (cont.)

### Add the Advantys STB DTM.

- 1 Right-click the **BMENOC0311** and select **Add...** from the menu.



- 2 Locate and Select the **STB NIP2x1x** item from the list of available DTMs. Click the **Add DTM** button.



This DTM is installed by the Advantys Configuration Software.

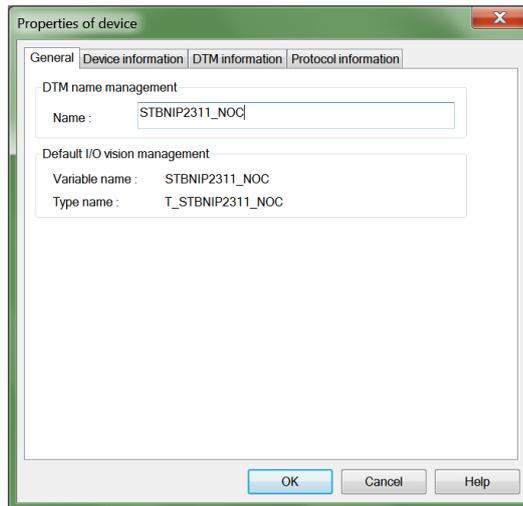


#### Note:

If there the **STB NIP2x1x** does not appear in the list; check your installation of Advantys.

## Exercise - Distributed Devices via a NOC (cont.)

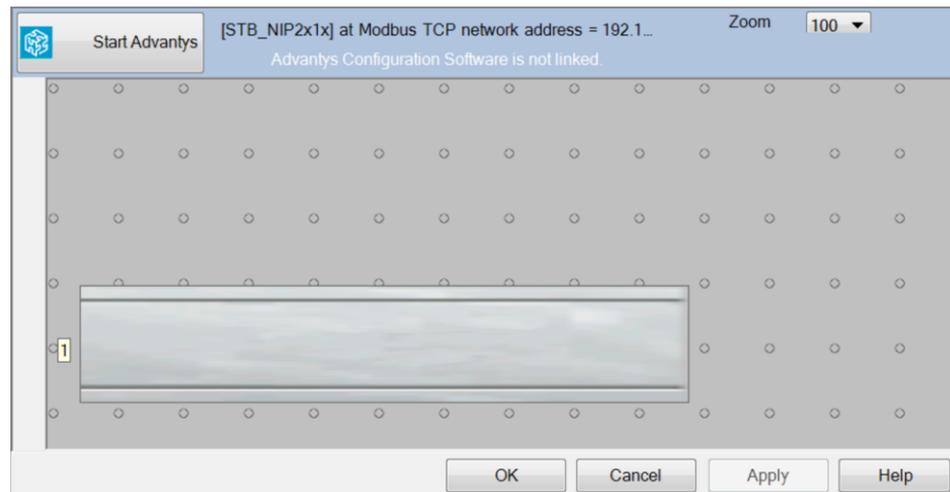
### 3 Use **STBNIP2311\_NO** for the DTM Alias name.



Be aware of the **Variable Names** that are being created based upon the **Alias Name**.

### Use the DTM to configure the new module.

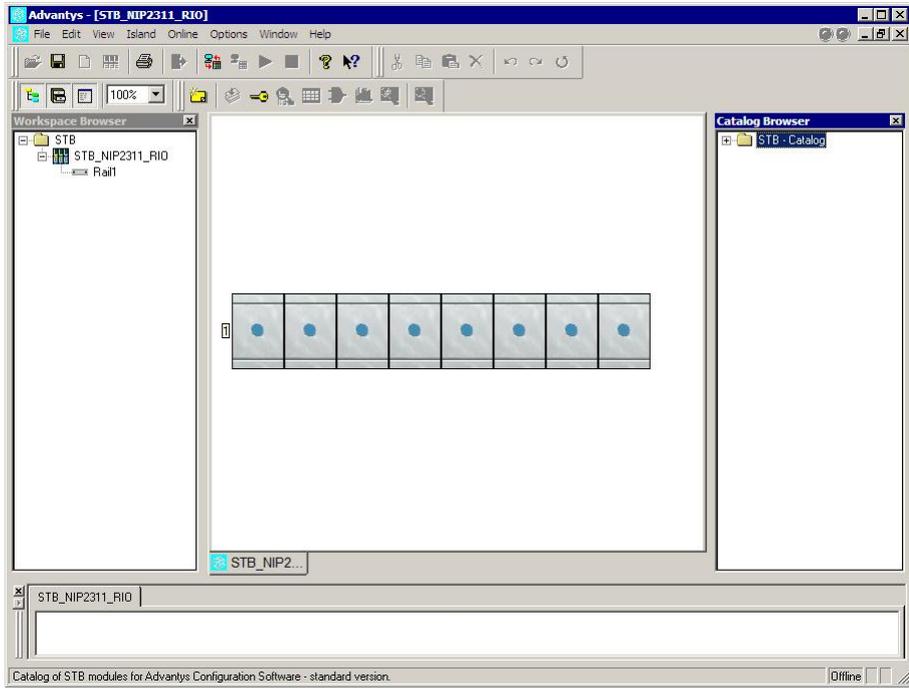
- 1 Double-click the new **STB** item within the **DTM Browser**. The DTM will open and will show a view of an empty island configuration.



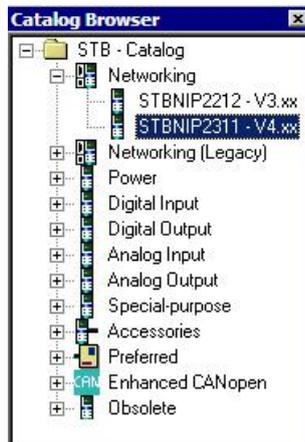
## Exercise - Distributed Devices via a NOC (cont.)

- 2 Click the **Start Advantys** button.

The **Advantys Configuration Software** will open, and a **Blank** configuration is shown.

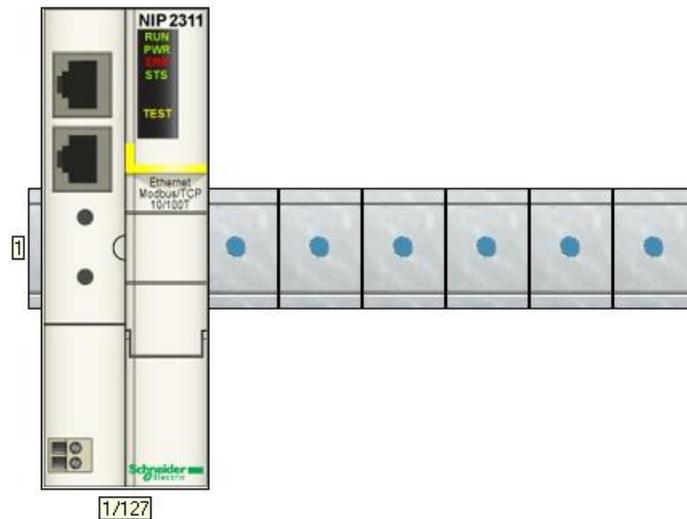


- 3 From the **Catalog Browser**, expand the **Networking** family and select the **STBNIP2311 - V4.xx** NIM (Network Interface module).

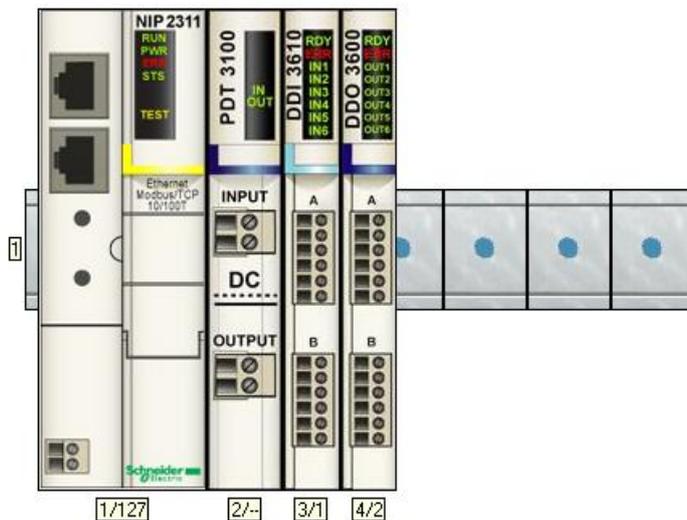


## Exercise - Distributed Devices via a NOC (cont.)

- To add the **NIM** to the configuration either double-click the **STBNIP2311 - V4.xx** or drag & drop it to the empty island.



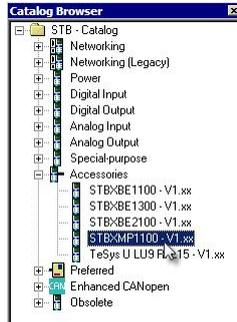
- Configure the remaining components of the island using the same method as above.



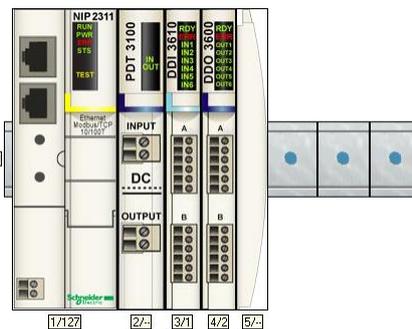
The remaining components can be located in the **Catalog Browser** in the **Power**, **Digital Input** & **Digital Output** families respectively.

## Exercise - Distributed Devices via a NOC (cont.)

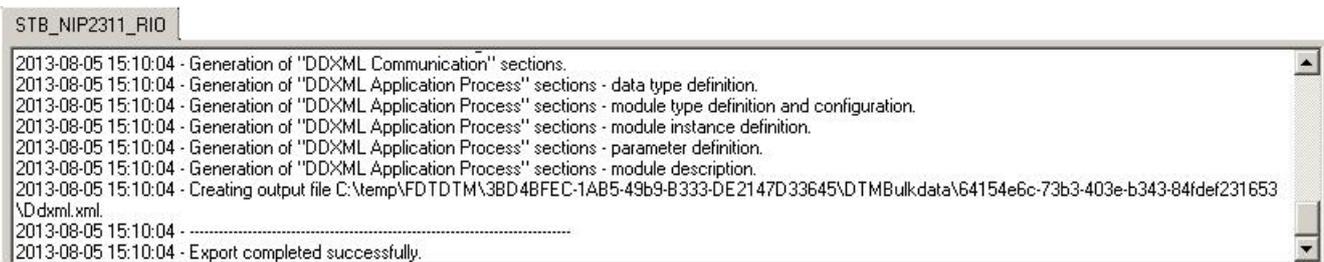
- The last item to add is the terminator that resides at the end of the Island. Locate the **STBXMP1100 - V1.xx** from the **Accessories** family and add it to the Island.



The Island configuration should now look similar to this.



- The final step is to save the configuration. Using the **Advantys Configuration Software** toolbar, click **File » Save**, this will build the Island and then **Export** the data back to **Unity Pro**.

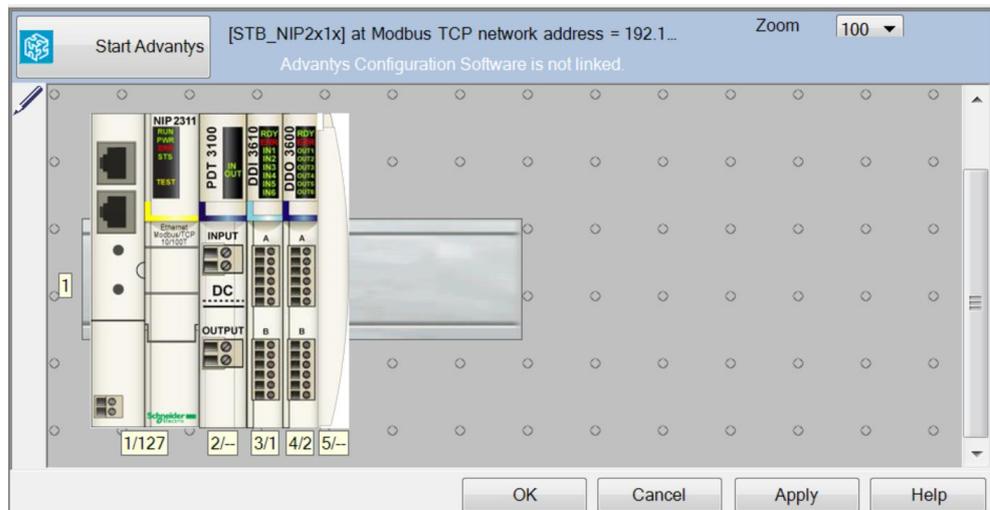


## Exercise - Distributed Devices via a NOC (cont.)

**8** Close Advantys Configuration Software.

The DTM in **Unity Pro** is updated accordingly.

**9** Click the **OK** button.

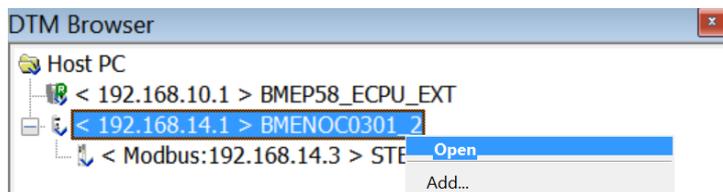


**10** Close the DTM.

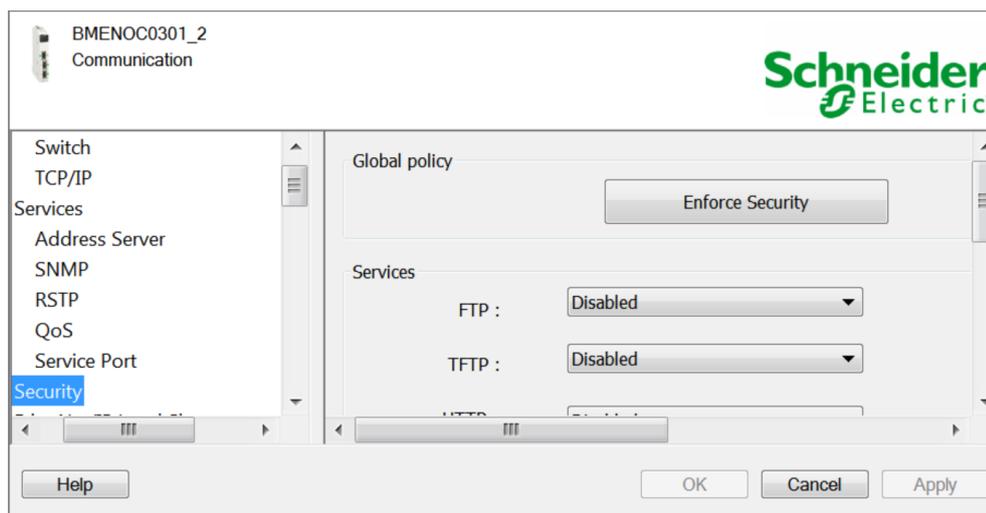
## Exercise - Distributed Devices via a NOC (cont.)

### Configure the IP settings of the STB via the BME NOC DTM.

- 1 From the **DTM Browser**, right click the BME NOC DTM **BMENOC0311** and select **Open...** from the popup menu.

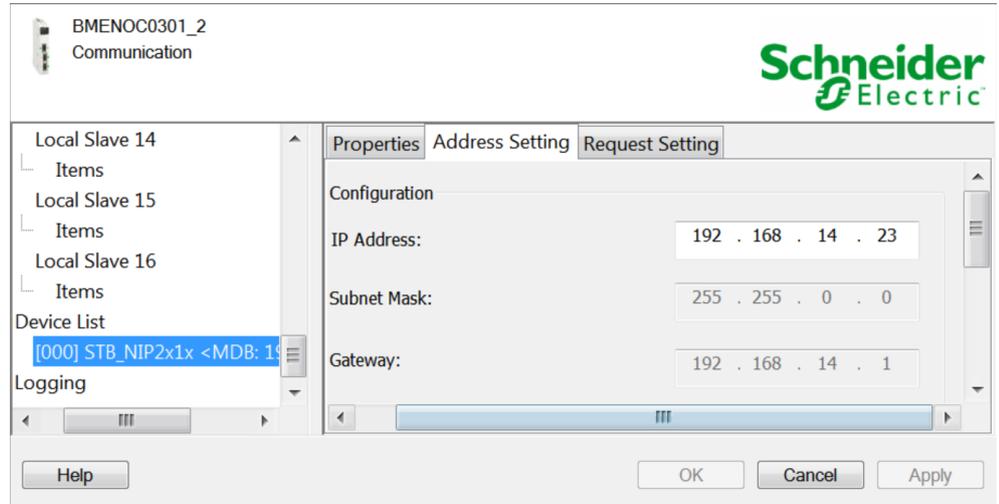


The BME NOC DTM will open.

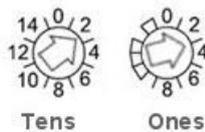


## Exercise - Distributed Devices via a NOC (cont.)

- 2 Locate the **Device List**, select the **STBNIP2311\_NOC** item, and then select the **Address Setting** tab. Configure the **Address Server** settings as follows, ensure the **Identifier** uses the correct format as shown below.



By doing this, the PLC will assign the IP Address 192.168.11.23 to the STB with role name of `STBNIP2311_0XX`. To match this name, on the simulator, set the rotary switches on the front of the STB to 3 for ones, and 2 for Tens.



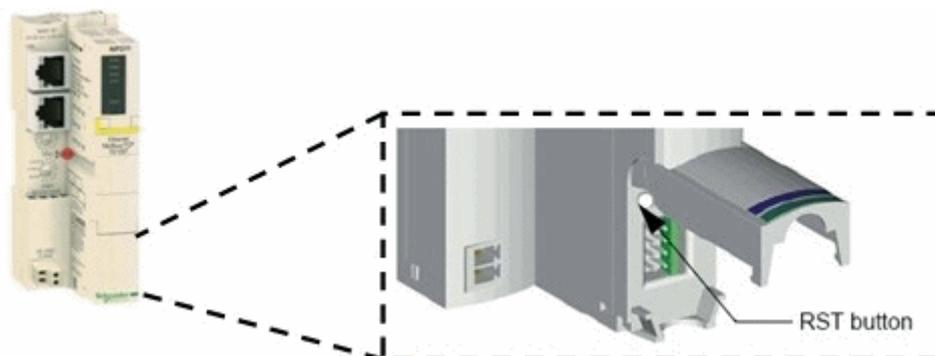
- 3 Click the **OK** button to accept the changes.
- 4 **Build** the application.
- 5 **Save** the application.

## Exercise - Distributed Devices via a NOC (cont.)

---

### Auto-configure the Advantys STB Island

- 1 Power cycle the Advantys STB island, so it will take into account the new rotary switches configuration.
- 2 Open the front door of the Network Interface Module (NIM).
- 3 Using a screw driver, **press and hold** the **RST** button for 3 seconds to reset the Island to its factory settings. (This action has nothing to do with the IP Address: It is just to reset the modules configuration).



- 4 When the reset is done, both **PWR** and **RUN** LEDs should be steady on.

---

### Test the Distributed Device.

**Connect, Transfer** and **RUN** the application.

- 5 Use a Red patch cable to connect the **Device** port of the NOC to one of the available Ethernet ports on the **STBNIP2311**.
- 6 Open the **Data Editor**, select the **STBNIP2311\_NOC** variable and add it to an **Animation Table**.

## Exercise - Distributed Devices via a NOC (cont.)

- Expand the structure and click the **Modification** button to be able to modify the values of this variable.

Name	Value	Type	Comment
STB_NIP2311_RIO		T_STB_NIP2311_RIO	
Freshness	1	BOOL	Global Freshness
Freshness_1	1	BOOL	Freshness of Object
Inputs		T_STB_NIP2311_RIO_IN	Input Variables
ID3_Input_Data	3	BYTE	
Free0	0	BYTE	Unused Variable
ID3_Input_Status	0	BYTE	
Free1	0	BYTE	Unused Variable
ID4_Echo_of_Output_...	1	BYTE	
Free2	0	BYTE	Unused Variable
ID4_Output_Status	0	BYTE	
Free3	0	BYTE	Unused Variable
Outputs		T_STB_NIP2311_RIO_OUT	Output Variables
ID4_Output_Data	1	BYTE	
Free4		ARRAY[0..2] OF BYTE	Unused Variable
Free4[0]	0	BYTE	
Free4[1]	0	BYTE	
Free4[2]	0	BYTE	

- Set a value to **ID4\_Output\_Data** and observe the outputs of the STB on the simulator.
- Add the **BMENOC0311.MODBUS\_SCANNER** variable to the **Animation Table**, confirm the Distributed Device Service (Modbus Scanner) is now in operation.

MODBUS_SCANNER	1	BOOL
----------------	---	------

- Save the application.
- View the **Device List**, and observe the **Request/Connection Summary** information, making note of the addresses being used. In order to view the Request/Connection Summary section the DTM may have to be maximised, or locate the scroll bar and scroll down.

Device Name	Type	Address	Rate (msec)	Input Packets per second	Output
STBNIP2311_NOC	Modbus	192.168.20.23	60	16	

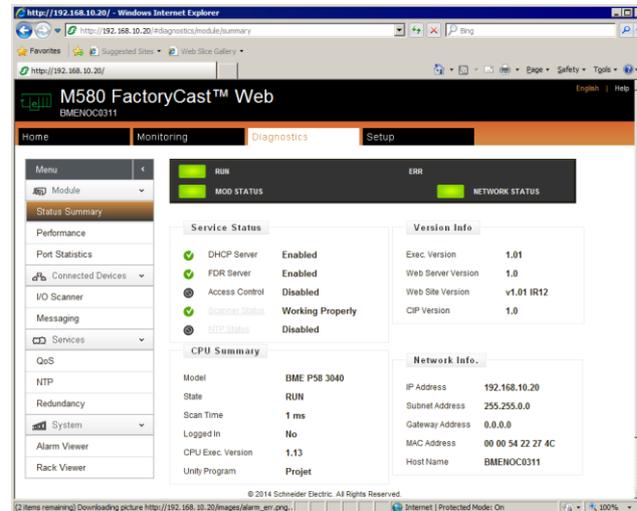
- The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).



# BME NOC Web Services

## What are Web Services

Web Services are provided by a Web Server embedded in the BME NOC modules. They provide diagnostic and other information to show the operation of the module. They also give diagnostic information to help with troubleshooting.



## See Also:

Web services were examined briefly in the *Exercise - View the CPU Web Pages* (page **Error! Bookmark not defined.**) as the CPU offers similar functionality.

## How to access BME NOC Web Services

Web services can be accessed using any Web Browser from a computer on the BME NOC network. Simply enter the address of the BME NOC into the browser's address bar to open the Web Services main web page.

If security is enabled, a username and password will be required to access the Web Server. The default username is 'admin' and the default password is 'factorycast'.

## BME NOC Web Services (cont.)

---

### **Diagnostics Viewer**

The Diagnostic Viewer offers several pages of diagnostic information for the BME NOC. These includes the following:

Module Status

Performance

Port Status

I/O Scanner

Redundancy Status

Alarm Viewer

Rack Viewer

These pages can assist with fault-finding the module or device network. The other pages that are available can assist with more detailed network troubleshooting.

# Exercise - BME NOC Web Services

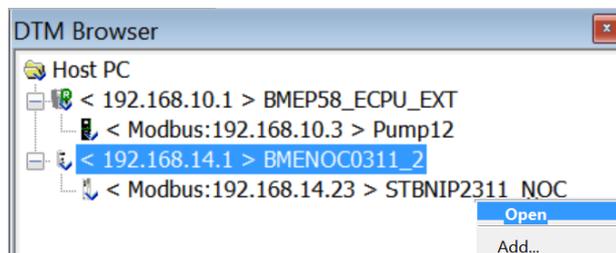
## Learning Outcomes

By the completion of this exercise you will:

Access Web Services in the BME NOC

### Enable the HTTP connection.

- 1 In the DTM manager in Unity Pro, right-click the **BMENOC0311** and select **Open** from the menu.



- 2 In the browser tree, select Security.
- 3 Drop down the **HTTP** Selection box and choose **Enabled** from the list.
- 4 Build the application and download it to the M580.

### Connect to the BME NOC Web Server.

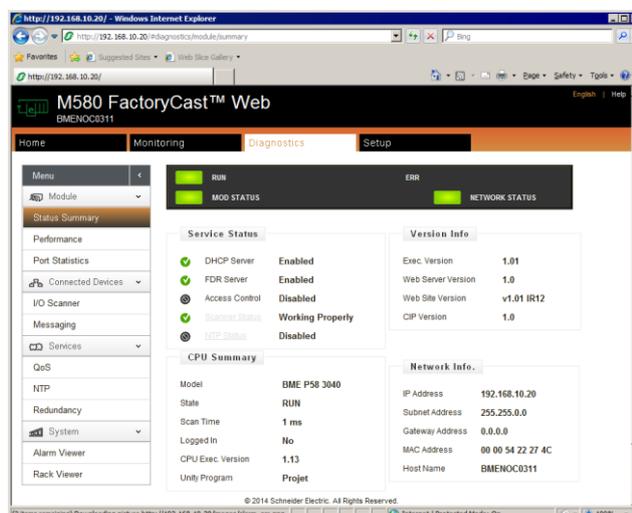
- 1 Connect an Ethernet cable from the **PC** to the **service port** of the BME NOC 0311.
- 2 Open the Web Browser and enter the address `http://192.168.20.1` (where X is the Group number being used).
- 3 If the login screen is displayed, enter the following:

Username: admin

Password: schneider

### View the Status Summary

- 1 Click the Diagnostics tab.



- 2 View the information displayed on the Status Summary page.

# FactoryCast

---

## What is FactoryCast?

FactoryCast is a Web server included with the BME NOC 0311. It provides the following features:

Custom Web Pages to create a user defined interface to the module

Rack Viewer providing a graphical representation of the configured ePAC system including all modules and I/O status

ePAC Program Viewer giving a view of the ePAC program code with animated variable states

Trend Viewer for graphical visualisation of variables

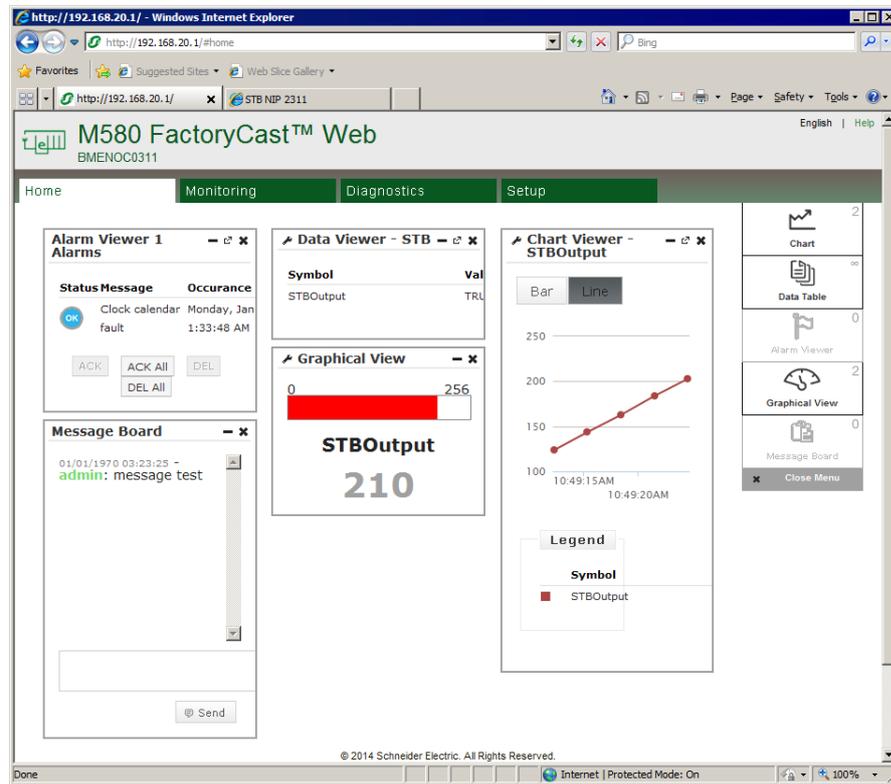
Customisable Dashboard with widgets to provide an efficient view of process data

Configuration is via a built-in designer which is part of the Web Interface. Logos and colours can be configured to provide easy brand labelling.

# FactoryCast (cont.)

## Graphic Viewer

The Graphic viewer allows data to be displayed on a page in a Web browser.



Several widgets are available to simplify configuration of the graphic display. These can be added to the page and the data point selected.

Tables and graphs must be configured in the monitoring section before they can be displayed in a widget.

# Exercise - FactoryCast Graphic Display

## Learning Outcomes

By the completion of this exercise you will:

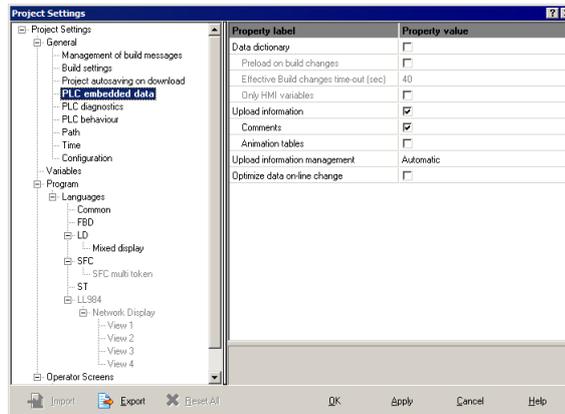
Access FactoryCast in the BME NOC

Explore the FactoryCast Data Display features

### Prepare the application to use FactoryCast.

In Unity Pro, select **Tools » Project Settings** to open the project settings.

- 1 Select PLC embedded data from the left menu.



- 2 Select the **Data Dictionary** tickbox and click the **OK** button to save the changes.
- 3 Build the application and download it to the M580.

### Connect to the FactoryCast Server.

- 1 Open the Web Browser and enter the address <http://192.168.14.1>.
- 2 If the login screen is displayed, enter the following:

Username: admin

Password: schneider

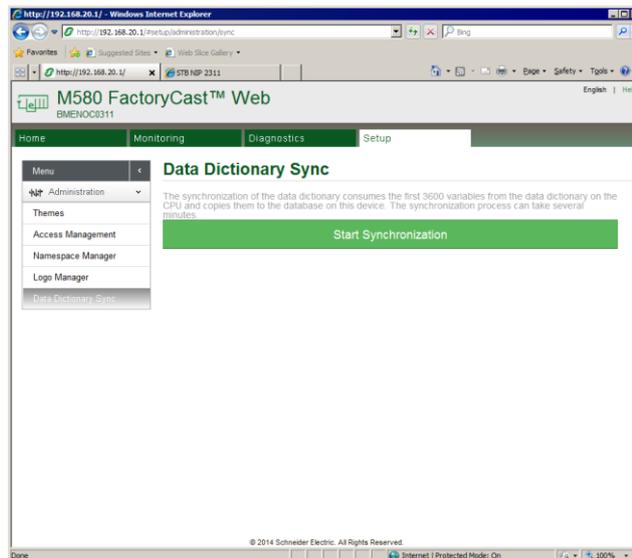
## Exercise - FactoryCast Graphic Display (cont.)

- 3 If anything is displayed on the Main screen, delete all the objects as these may be referencing variables that are not used in the application.



### Configure data for the widget

- 1 Select the **Setup** tab and in the left menu select **Data Dictionary Sync**.



- 2 Click the **Start Synchronization** button.

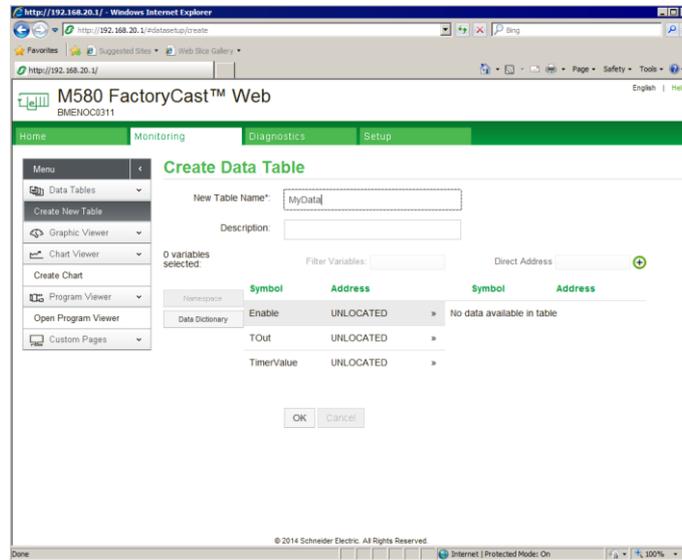
When the process has completed, a message will show Synchronisation Completed.

## Exercise - FactoryCast Graphic Display (cont.)

### Create a new data table.

Select the **Monitoring** tab.

- 1 Create a new data Table with the name `MyData`.
- 2 Click the **Data Dictionary** button to show a list of all variables in the application.



- 3 Click the small arrow to the right of each variable to add the variable to the table.

Symbol	Address
Enable	UNLOCATED »

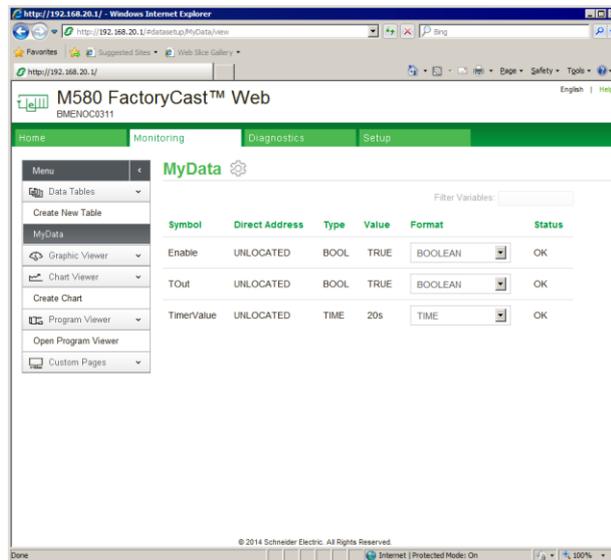


### Note:

If there are no variables in the list, go back to Unity Pro and add some internal variables to the application and download it to the M580.

## Exercise - FactoryCast Graphic Display (cont.)

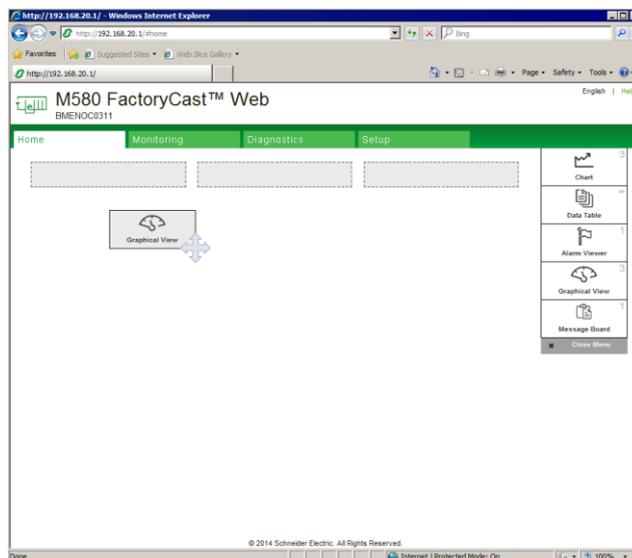
- 4 When the variables have been added, click the **OK** button to create the table.



### Add a widget to the main screen

Select the **Home** tab.

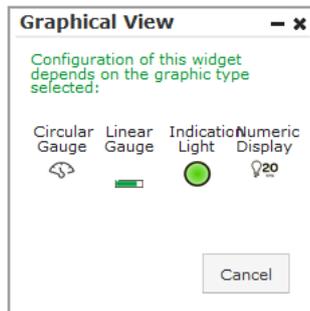
- 1 Click the **Add Widget** button to open the Widget menu. Select the **Graphical View** widget and drag it onto the main page. Three grey rectangular blocks will appear.



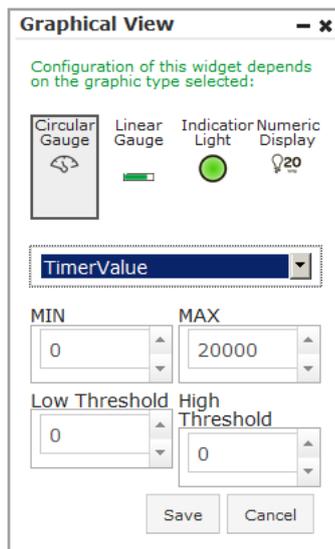
- 2 Drop the widget onto one of the blocks.

## Exercise - FactoryCast Graphic Display (cont.)

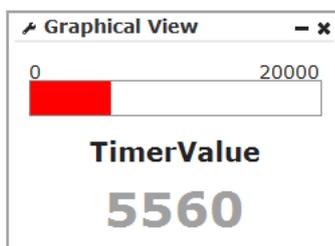
### Configure the widget



- 1 Click **Circular Gauge** to select it.



- 2 Drop down the list box to choose an analog variable.
- 3 Set the **Maximum Value** to match the maximum value of the variable.
- 4 Click the **Save** button to save the widget and display the data.



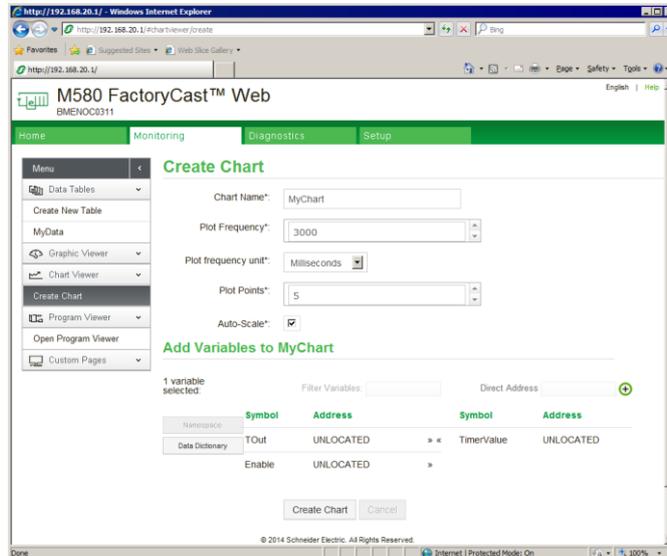
- 5 The configuration of the widget can be changed by clicking the spanner icon in the top left hand corner.

# Exercise - FactoryCast Graphic Display (cont.)

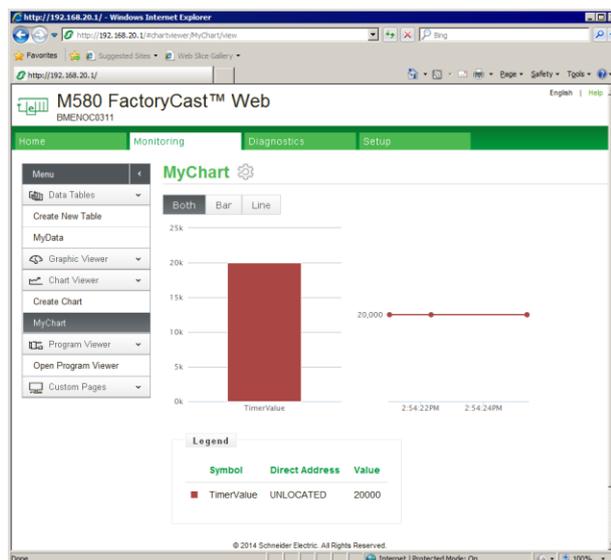
## Create a chart.

Go to the monitoring tab and select Create Chart from the left menu.

- 1 Give the chart the name `MyChart` and add an **analog value** to the configuration (click the arrow as with the data table).



- 2 Click the **Create Chart** button to save the chart and display the data.



## Exercise - FactoryCast Graphic Display (cont.)

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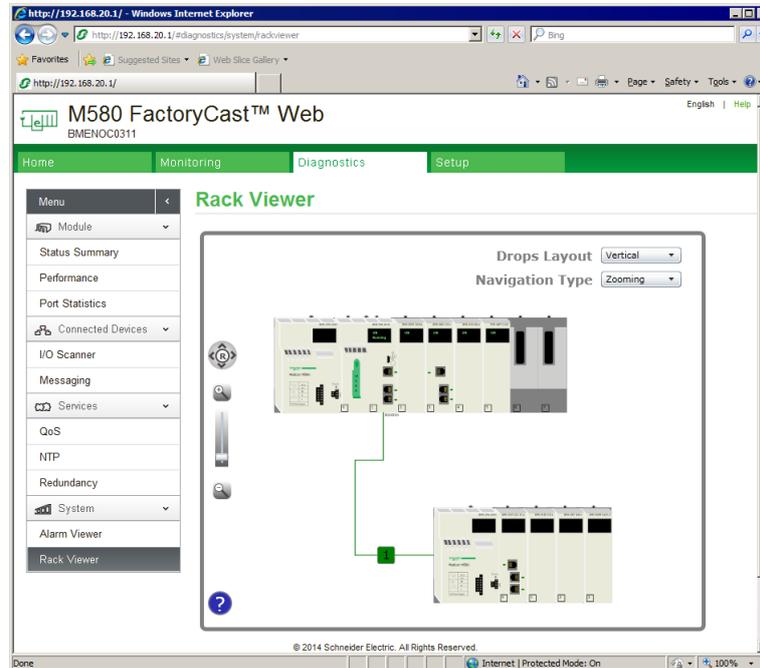
### Add the chart to the home page.

- 1** Go to the **Home** tab and drag a **Chart** widget onto the page. Select **MyChart** and click the **Save** button to display the data.
- 2** Modify the analog value in Unity Pro and observe the changes on the Web page.

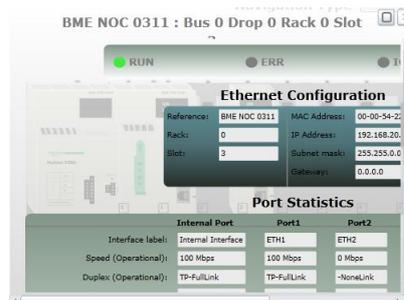
## FactoryCast (cont.)

### Rack Viewer

The rack viewer gives a graphical representation of the M580 architecture, showing racks, modules and some diagnostic information for the modules. The view can be zoomed and scrolled to explore the architecture.



Clicking a module will give detailed information for that module. For example, clicking a NOC module will show Ethernet configuration and port statistics.



#### Note:

The Rack Viewer requires Microsoft Silverlight installed on the computer.

## Exercise - The Rack Viewer

---

### Learning Outcomes

By the completion of this exercise you will:

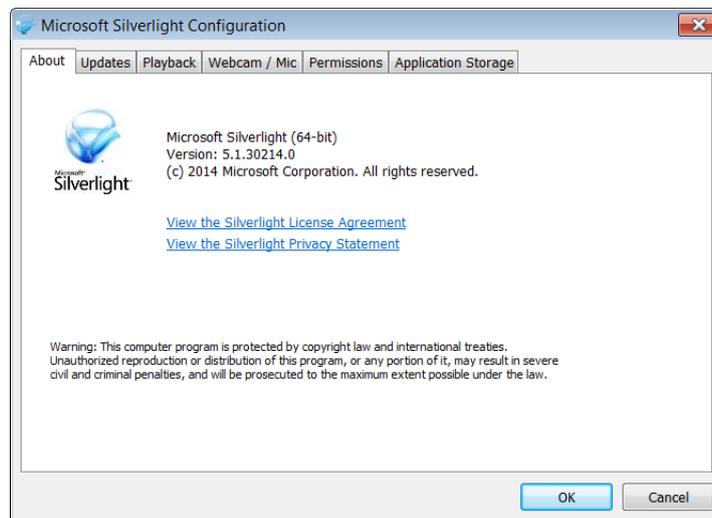
Use the rack viewer to examine the PAC architecture

---

### 2 Ensure that Microsoft Silverlight is installed on the machine.

Click the Windows Start button and enter `Silverlight` into the **Search all Programs and Files** dialog box.

Select **Microsoft Silverlight** from the list.



If Microsoft Silverlight does not appear, or the version is older than V5 then go to <http://www.microsoft.com/silverlight/> and follow the instructions to download and install the latest version.

---

### Open the FactoryCast Web Page in a browser.

Open the Web Browser and enter the address `http://192.168.14.1`.

If the login screen is displayed, enter the following:

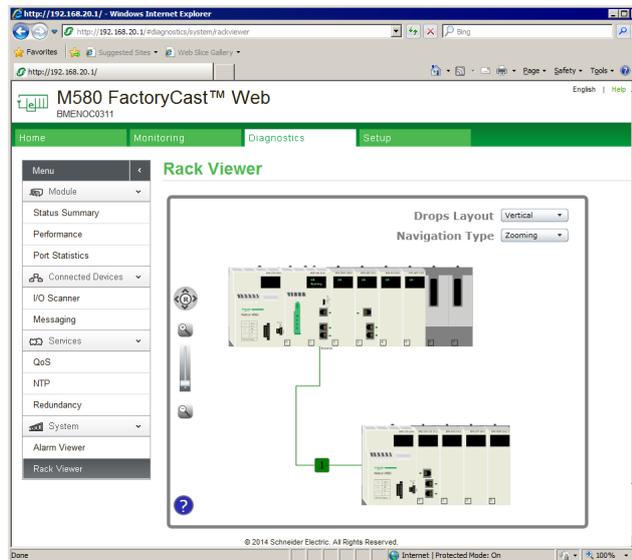
Username: `admin`

Password: `schneider`

## Exercise - The Rack Viewer (cont.)

### Examine the Rack Viewer

1. Click the **Diagnostics** Tab. Select **Rack Viewer** from the left Menu.



2. Use the zoom buttons, or slider to zoom out to see the complete architecture.



#### Note:

The mouse wheel can also be used to zoom in and out but only when the Java window has focus.

Hover the mouse button over the various modules to identify them.

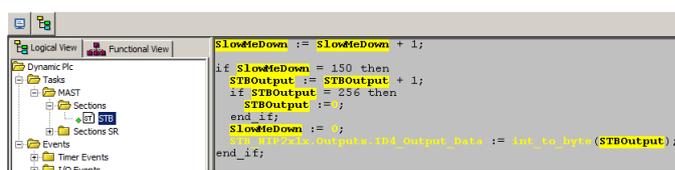
## FactoryCast (cont.)

---

### Program Viewer

The Program Viewer allows sections of the program to be displayed complete with run-time animation similar to Unity Pro.

#### Program Viewer



The explorer on the left hand side allows the program section to be selected. The animated section of code is then shown in the right hand section. As with Unity Pro, hovering over a variable will show the value of that variable.

The main difference is that the Program Viewer is not able to show the state/value of I/O variables.



#### Note:

The Program Viewer requires Java Runtime installed on the computer.

---

# Summary

---

## Summary

In this chapter the following topics have been covered:

*Device Networks*

*Isolated Device Networks*

*BME NOC 03\*1*

*BME NOC Web Services*

*FactoryCast*

---

## Questions

The following questions will help to check understanding of the topics covered in this chapter:

What are the possible roles of a NOC?

How many BME NOC modules make up the offer?

Which BME NOC modules support Factorycast?

# Remote I/O (RIO)

---

## Introduction

The first chapter explained how to configure local I/O.

This chapter will show that configuring an RIO drop is quite similar to a local.

This makes the configuration of RIO much easier than DIO drops.

Other advantages of RIO over DIO are:

- The rapidity of communication between the devices and the M580
- The possibility to use FDR (Fast Device Replacement)
- The use of RSTP

See the M580 Configuration Course for more details in these features.

The main limitation of RIO is that only some X80 modules support it.

If you have a Quantum PLC with X80 modules, you can configure these modules as an M580 RIO drop.

## Topic Objectives

By the end of this section the student will be able to:

- Configure a RIO drop

## Exercise - Implement a Remote I/O Drop

### Learning Outcomes

By the completion of this exercise you will:

- Deploy a Simple Daisy Chain Loop architecture with Unity Pro
- Implement an eX80 series remote I/O drop
- Use both FDT/DTM and DDTs to retrieve diagnostic information

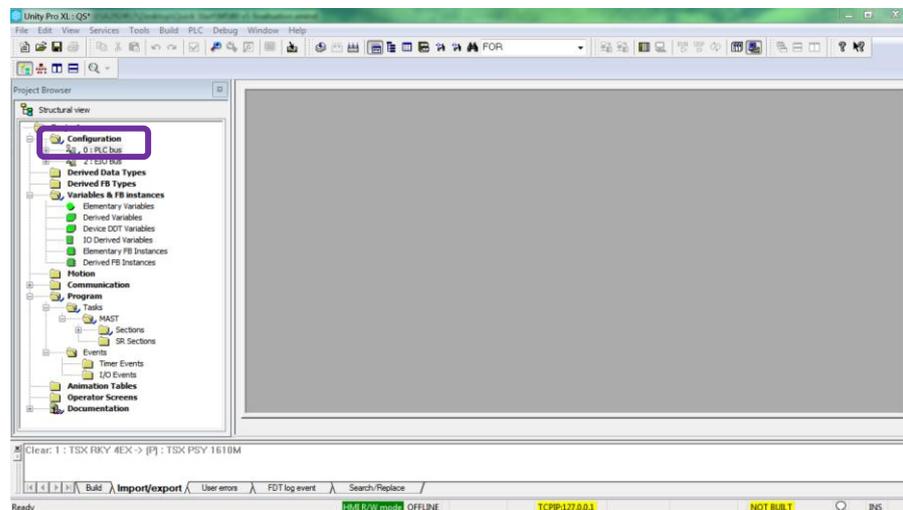
### Equipment Required

To complete this exercise on a PLC the following equipment is required:

- **One DDO1602**
- **One M580 \*\*40**
- **One compatible rack**
- **On compatible power supply**
- **One Ethernet cable**

**Make sure you have a \*\*40 part number M580.**

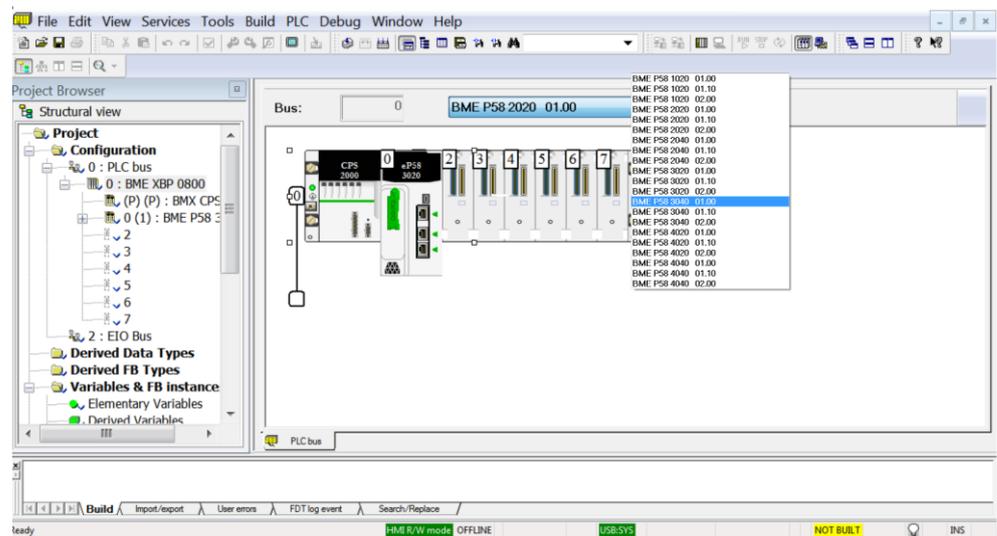
- In the **Project Browser**, double-click the **PLC bus**.



- The main rack window will pop-up
- Make sure the part number ends in 40.

## Exercise - Implement a Remote I/O Drop (cont.)

- iv. If it is not the case click the drop down list and select a \*\*40 CPU.

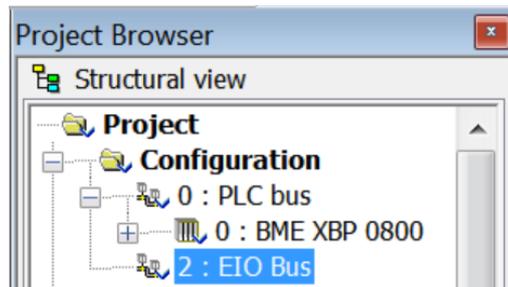


- v. If a \*\*40 CPU is not available then this exercise can be run in Simulation Mode.

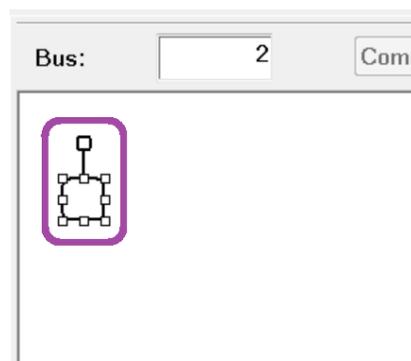
## Exercise - Implement a Remote I/O Drop (cont.)

### Create the Remote drop.

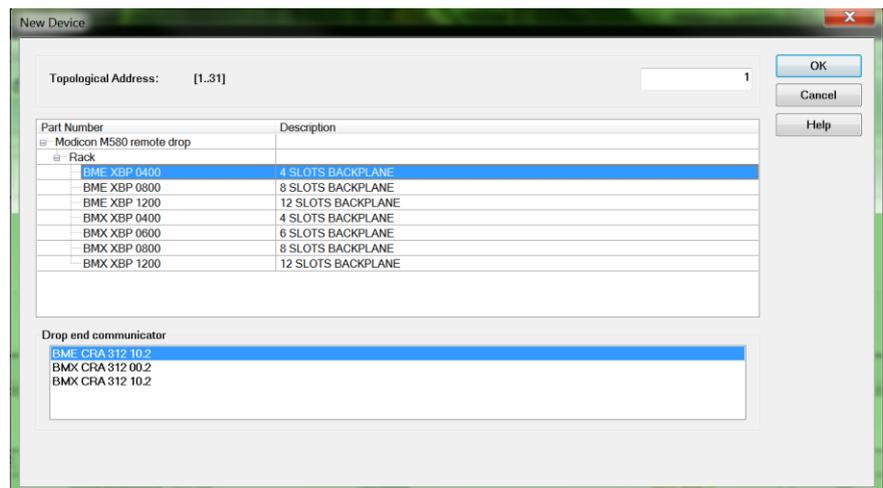
- i. From the **Project Browser**, double-click the **EIO Bus** item.



- ii. Double-click the **Bus** place holder



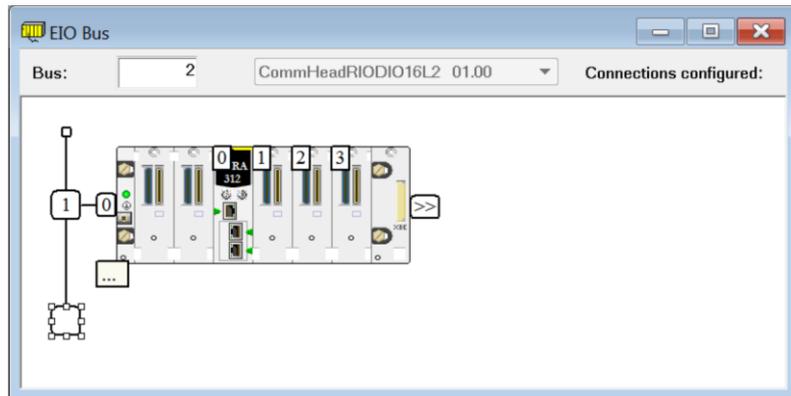
- iii. Select the correct **Ethernet Rack** and **Drop End Communicator** to match the simulator. Click the **OK** button.



## Exercise - Implement a Remote I/O Drop (cont.)

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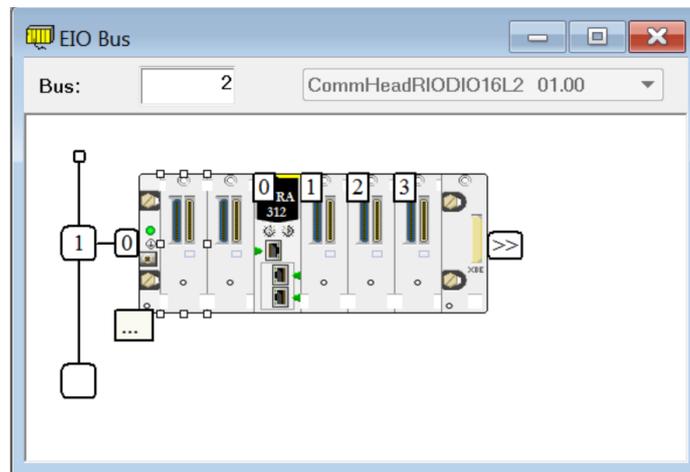
The **Drop** is created and the **CRA** is added by default.



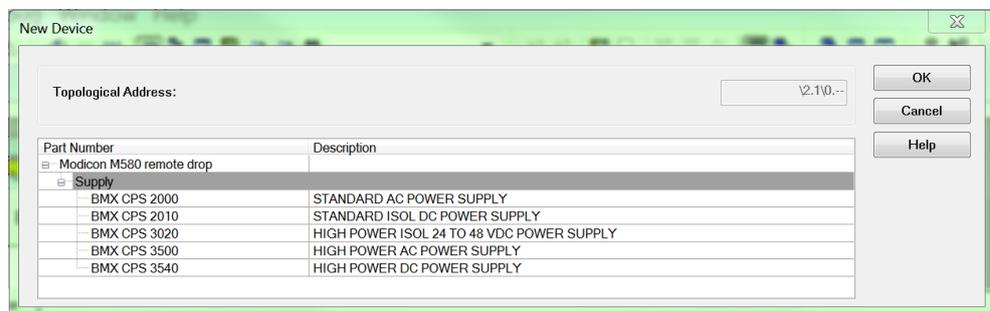
## Exercise - Implement a Remote I/O Drop (cont.)

### Add the Power Supply to the Rack.

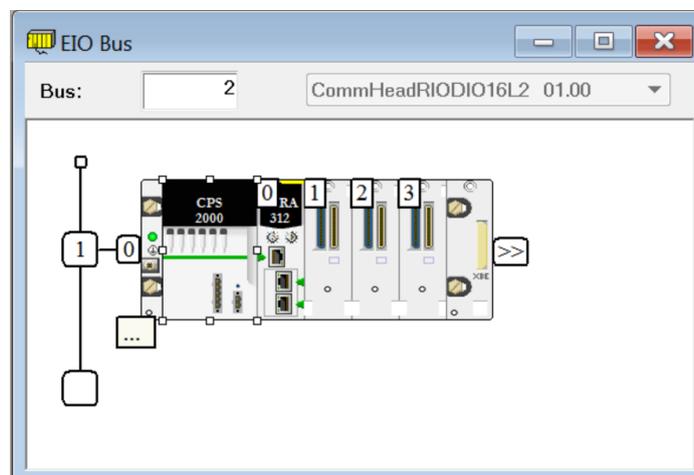
- i. Double click **Slot 0** or **Slot 1**.



- ii. Select the appropriate **Power Supply**. Click the **OK** button.



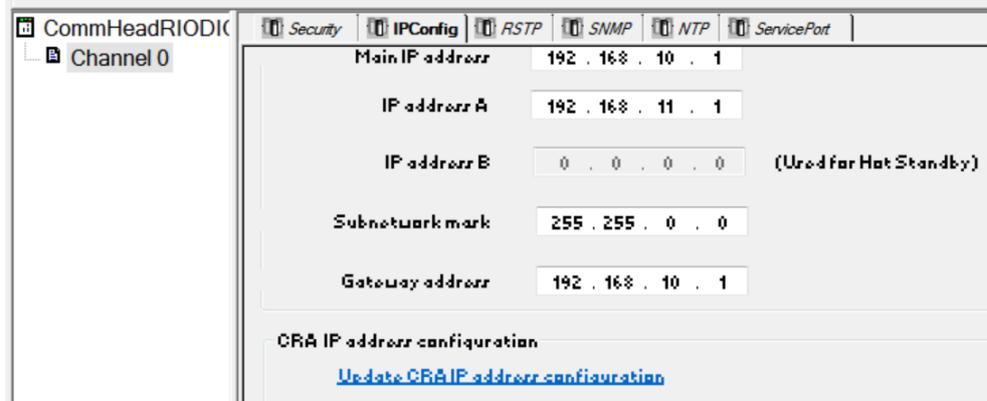
- iii. The Power Supply is added to the Rack:



## Exercise - Implement a Remote I/O Drop (cont.)

### Configure the IP Address for the drop.

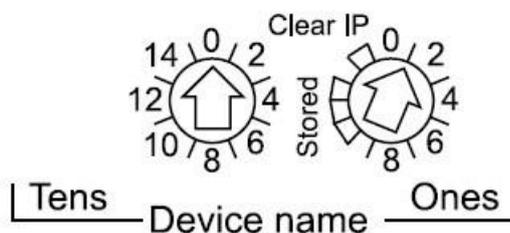
- i. Open the **Ethernet Port** properties of the M580 CPU from the **PLC Bus** by clicking the port of the M580 on the main rack.
- ii. Click the **IP Config** tab, and click Update CRAIP address configuration link.



- iii. By default the new drop has been added and should be set to **IP Address A + 1**, if this is not the case change it accordingly. It should be: **192.168.11. 2**. NOTE if you have a new project make sure that as in the basic exercise you set an address for the M580 I/O scanner.

Name	Type	Subtype	CRA	Profiles	Topo address	DHCP Enable	IP Address	Subnet Mask
BMECRA_001	Module	CRA	<input checked="" type="checkbox"/>	Remote	2.1/0.0	Yes	192.168.11.2	255.255.0.0

- iv. **Validate** the configuration .
- v. If you have the hardware, use a screwdriver, set the role name of the CRA. As there is only 1 CRA configured, the role name is **BMECRA\_001** which means that 001 has to be set on the rotary switches.



- vi. Power cycle the **CRA** every time the rotary switch positions are changed.

## Exercise - Implement a Remote I/O Drop (cont.)

---

### Add the DDO1602.

- i. Add a **DDO1602** in the Remote rack.
- 



#### Note:

This time Device DDT is automatically chosen as the type of I/O cannot be selected NOTE: This time Device DDT is automatically chosen as the type of I/O cannot be selected.

---

- ii. Change the device name to `Obi2` and un-tick the **Supply Monitoring** box.
- iii. Open the test ST section created in the basic exercise, or create a new one if you started a new project.
- iv. Type in this code:

```
FOR i:=0 TO 15 BY 2 DO
    Obi2.DIS_CH_OUT[i].VALUE := TRUE;
END_FOR;
```

---



#### Note:

Note the difference in the name of the device between this code and the code used in the basic exercise.

---

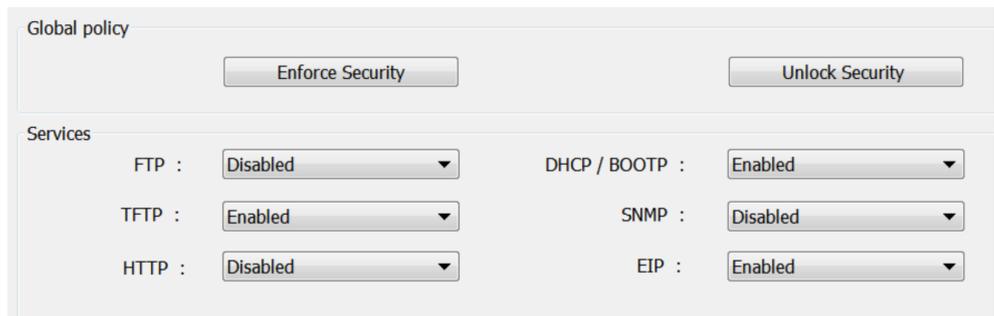
## Exercise - Implement a Remote I/O Drop (cont.)

### Test the functioning of the RIO drop.

- i. If the equipment is available, wire one of the M580 device ports to one of the CRA device ports.
- ii. **Build all, Transfer, and Run** the project.
- iii. If you did not enable the TFTP, Unity Pro will prevent you from building and display this message:



- iv. This is a typical message Unity Pro shows when a project is built that uses a protocol not allowed by the Cyber Security settings.
- v. If this message is seen go to the security tab of the **M580**, and enable the **TFTP, EIP** and **DHCP/BOOTP**:



- vi. **Build all, Transfer, and Run** the project again. This time there should not be any error message.

## Exercise - Implement a Remote I/O Drop (cont.)

- i. Once the project is running an animation table can be created to monitor the CRA Device DDT:

Name	Value	Type	Comment
BMEP58_ECPU_EXT		T_BMEP58_E...	
ETH_STATUS	0	WORD	Ethernet status
PORT1_LINK	0	BOOL	Link up/down for Ethernet port 1
PORT2_LINK	0	BOOL	Link up/down for Ethernet port 2
PORT3_LINK	0	BOOL	Link up/down for Ethernet port 3
ETH_BKP_PORT_LI...	0	BOOL	Link up/down for Ethernet bac...
REDUNDANCY_ST...	0	BOOL	Redundancy status / backup p...
SCANNER_OK	0	BOOL	Scanner OK and scanning at L...
GLOBAL_STATUS	0	BOOL	0: one or more services not op...
SERVICE_STATUS	0	WORD	One bit for each user-observa...
RSTP_SERVICE	0	BOOL	0: service not operating normal...
PORT502_SERVICE	0	BOOL	0: service not operating normal...
SNMP_SERVICE	0	BOOL	0: service not operating normal...
MAIN_IP_ADDRES...	0	BOOL	Main IP address status (0 in c...
ETH_BKP_FAILURE	0	BOOL	Ethernet backplane hardware ...
ETH_BKP_ERROR	0	BOOL	Ethernet backplane error (0: er...
EIP_SCANNER	0	BOOL	0: service not operating normal...
MODBUS_SCANNER	0	BOOL	0: service not operating normal...
NTP_SERVER	0	BOOL	0: service not operating normal...
SNTP_CLIENT	0	BOOL	0: service not operating normal...
WEB_SERVER	0	BOOL	0: service not operating normal...
FIRMWARE_UPGR...	0	BOOL	0: service not operating normal...
FTP	0	BOOL	0: service not operating normal...
FDR_SERVER	0	BOOL	0: service not operating normal...
EIP_ADAPTER	0	BOOL	EIP adapter (server) service 0...
SERVICE_STATUS2	0	WORD	One bit for each user-observa...
A_B_IP_ADDRESS...	0	BOOL	IP address A/B status (0 in ca...
LLDP_SERVICE	0	BOOL	LLDP service status
EVENT_LOG_STAT...	0	BOOL	0: event log service not operati...
LOG_SERVER_NO...	0	BOOL	1: No acknowledgement receiv...
ETH_PORT_1_2_S...	0	BYTE	Ethernet port 1 and 2 status
ETH_PORT3_BKP...	0	BYTE	Ethernet port 3 and backplane...
FDR_USAGE	0	BYTE	% of FDR server usage
IN_PACKETS	0	UINT	Number of packets received o...
IN_ERRORS	0	UINT	Number of inbound packets th...
OUT_PACKETS	0	UINT	Number of packets sent on int...
OUT_ERRORS	0	UINT	Number of outbound packets t...
CONF_SIG	0	UDINT	Signature of all files on local m...
DROP_HEALTH		ARRAY[1..31]...	DROP health bits (Drop 1 to 31)
RIO_HEALTH		ARRAY[257]....	RIO health bits (1 bit per RIO ...)
LS_HEALTH		ARRAY[1..3] ...	Local Slave health bits (Local ...)
DIO_HEALTH		ARRAY[513]....	DIO health bits (1 bit per DIO ...)
DROP_CTRL		ARRAY[1..31]...	DROP control bits (Drop 1 to 3...
RIO_CTRL		ARRAY[257]....	RIO control bits (1 bit per RIO ...)
DIO_CTRL		ARRAY[513]....	DIO control bits (1 bit per DIO ...)

- ii. As well as the DDO1602.

Name	Value	Type	Comment
Obv2		T_U_DIS_STD...	
MOD_HEALTH	0	BOOL	Module health
MOD_FLT	0	BYTE	Module faults
DIS_CH_OUT		ARRAY[19]O...	
DIS_CH_OUT[0]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	1	EBOOL	Discrete output value
DIS_CH_OUT[1]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	0	EBOOL	Discrete output value
DIS_CH_OUT[2]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	1	EBOOL	Discrete output value
DIS_CH_OUT[3]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	0	EBOOL	Discrete output value
DIS_CH_OUT[4]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	1	EBOOL	Discrete output value
DIS_CH_OUT[5]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	0	EBOOL	Discrete output value
DIS_CH_OUT[6]		T_U_DIS_STD...	
CH_HEALTH	0	BOOL	Channel health
VALUE	1	EBOOL	Discrete output value

## Exercise - Implement a Remote I/O Drop (cont.)

---

- iii. If you have the equipment, check the DDO1602 outputs:



- iv. The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).

## Summary

---

### Summary

In this chapter the following topics have been covered:

- *Configuring a CRA for a RIO drop*
  - *Configuring a device in a RIO drop using a Device DDT*
- 

### Questions

The following questions will help to check understanding of the topics covered in this chapter:

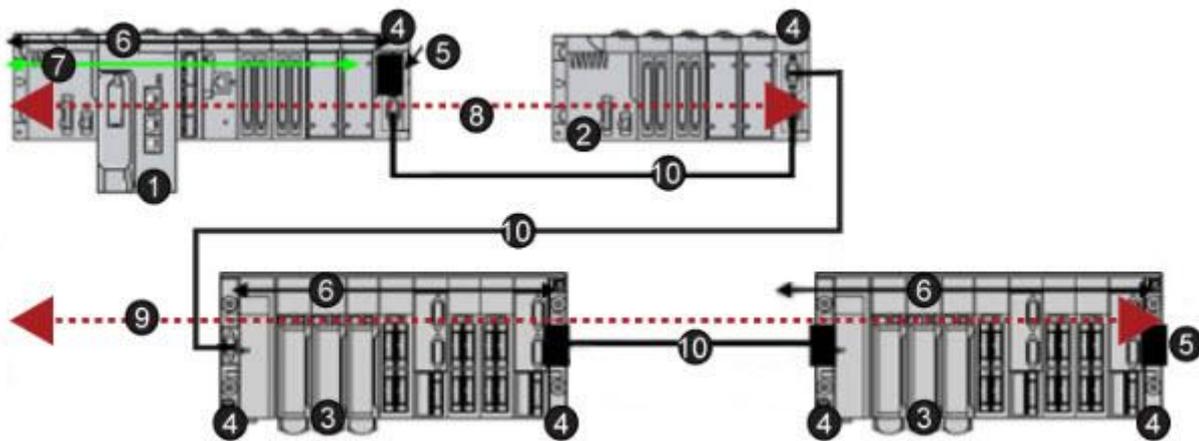
- What is the main advantage of an RIO drop over a DIO drop?
- Which service needs to be enabled in the M580 security features to allow the use of a RIO drop?

## Premium I/O

### Legacy Migration (Premium I/O)

In addition to the new modules and features, a key feature of the M580 is the ability to manage install base via the possibility to connect to Premium PLC racks and use the Premium I/O.

An existing Premium installation can be easily migrated by replacing the Premium local rack with a **BME XBP \*\*00** and M580 CPU, whilst the Premium Remote racks can be upgraded to Premium Extended racks (**TSX RKY \*\*EX**) and connected to the M580 rack via a **BMX XBE 1000** expansion module and supported cables.



1	Modicon M580 main local rack
2	Modicon X80 extended local rack
3	Premium extended local rack
4	extension rack module
5	bus terminator module
6	X Bus connection on the rack
7	Ethernet connection on the rack
8	maximum X Bus cable length between the M580 main local rack (1) and the Modicon X80 extended local rack (2) is 30 m (98 ft)
9	maximum X Bus cable length between the M580 main local rack (1) and the Premium extended local rack (4) is 100 m (328 ft)
10	X Bus extension cable



#### Note:

Premium motion, communication, and safety and modules are not supported in an M580 system.

### Topic Objectives

By the end of this section the student will be able to:

Connect a Premium I/O drop to a M580 main rack

## Exercise - Premium I/O

### Learning Outcomes

By the completion of this exercise the student will:

- Integrate Premium I/O as an Extension Rack with an M580 architecture
- Prove Legacy Migration of Install Base systems

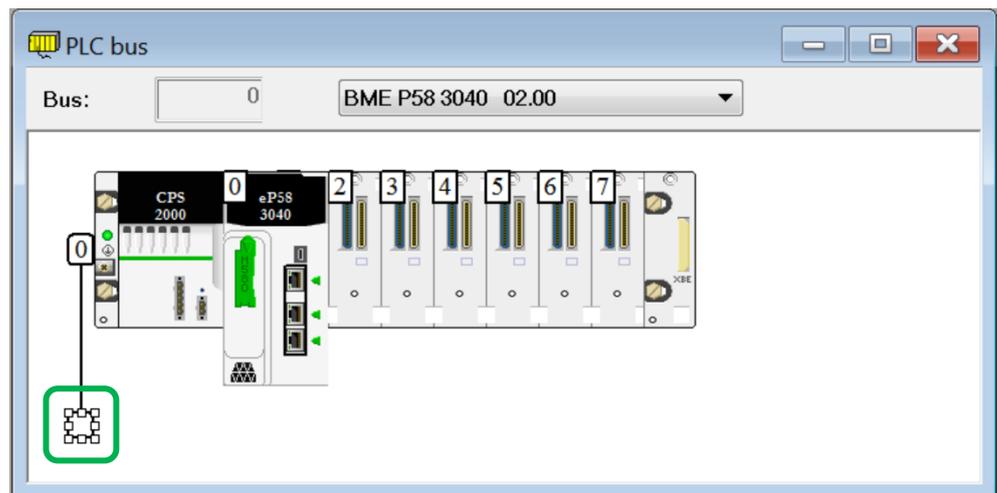
### Equipment Required

To complete this exercise on a PLC the following equipment is required:

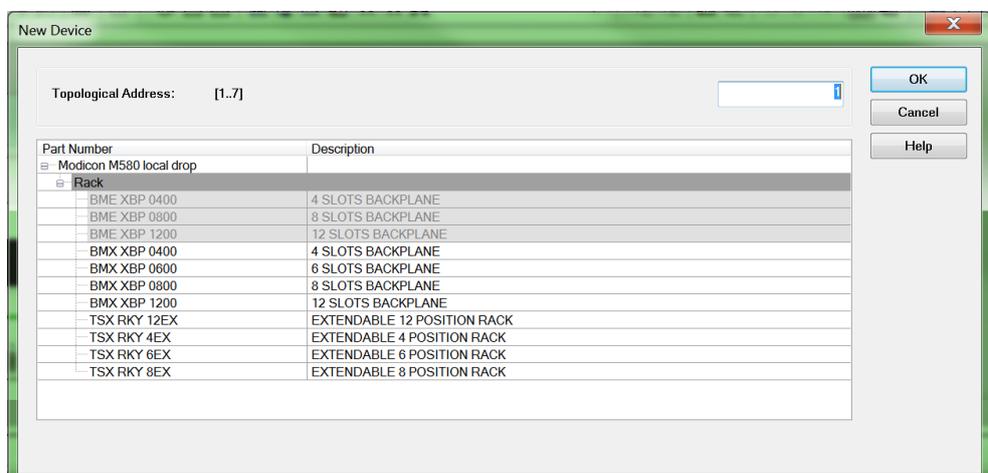
- TSX RKY 4EX
- DEY 08D2
- DSY 08T2

### Configure the Premium Extension Rack within the Application.

- From the **Project Browser** open the **Main rack**.
- Double-click the place holder for the Extension Rack.



The New Device window appears.

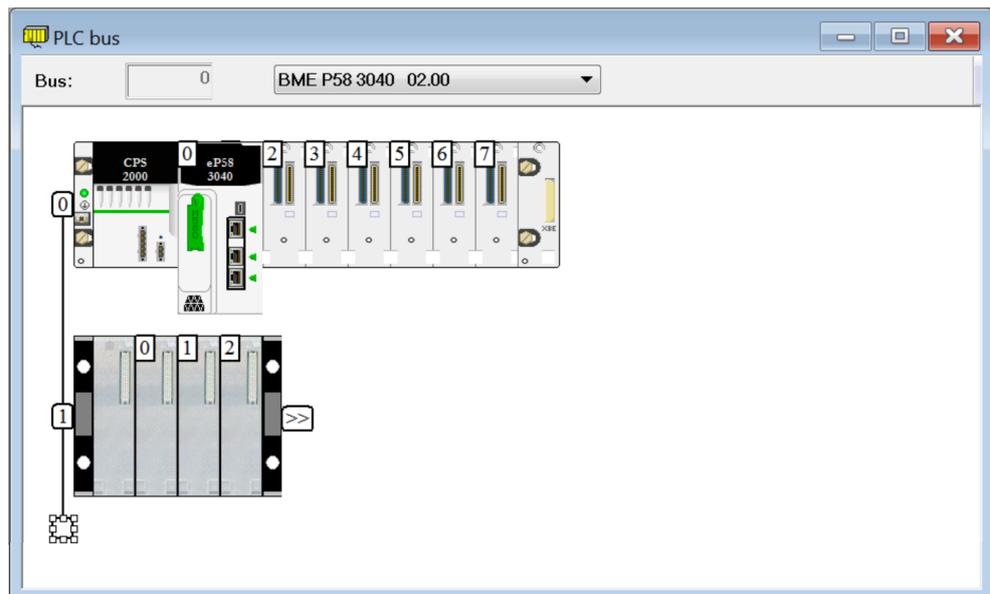


## Exercise - Premium I/O (cont.)

- iii. Select the **TSX RKY 4EX** rack and click the **OK** button.

Part Number	Description
Modicon M580 local drop	
Rack	
BME XBP 0400	4 SLOTS BACKPLANE
BME XBP 0800	8 SLOTS BACKPLANE
BME XBP 1200	12 SLOTS BACKPLANE
BMX XBP 0400	4 SLOTS BACKPLANE
BMX XBP 0800	6 SLOTS BACKPLANE
BMX XBP 0800	8 SLOTS BACKPLANE
BMX XBP 1200	12 SLOTS BACKPLANE
TSX RKY 12EX	EXTENDABLE 12 POSITION RACK
<b>TSX RKY 4EX</b>	<b>EXTENDABLE 4 POSITION RACK</b>
TSX RKY 6EX	EXTENDABLE 6 POSITION RACK
TSX RKY 8EX	EXTENDABLE 8 POSITION RACK

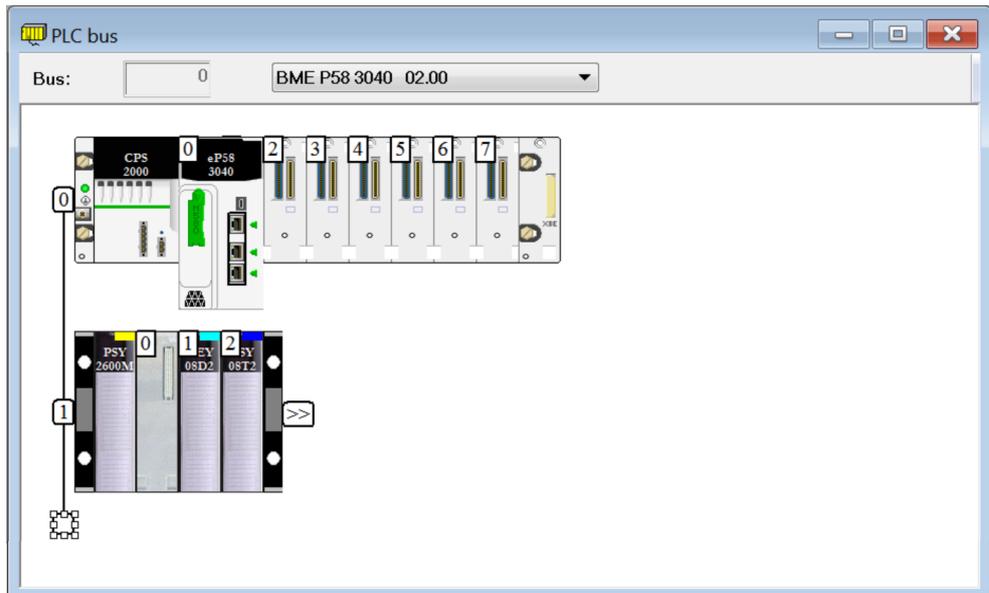
- iv. The new rack will appear.



## Exercise - Premium I/O (cont.)

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- v. Populate the rack with the appropriate Power Supply and I/O modules.



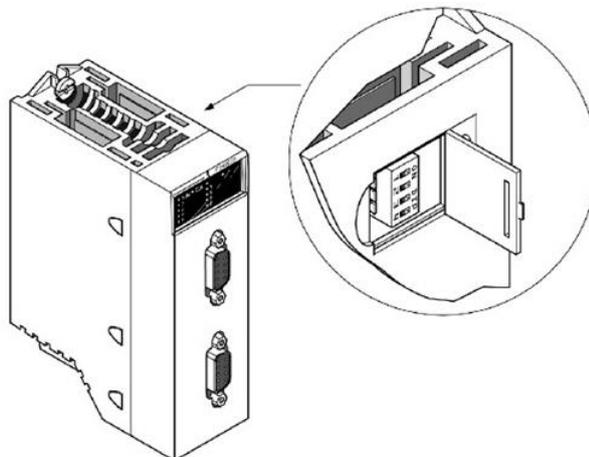
- vi. **Build** and **Save** the application.

**Do NOT Transfer the application yet.**

---

### Manually configure the hardware components required.

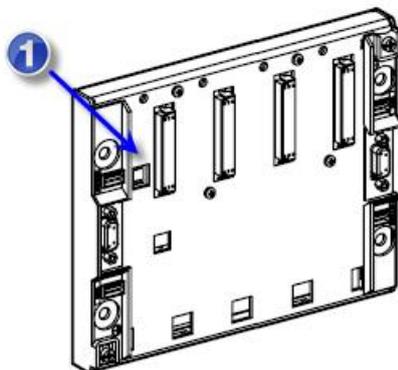
- i. Take the **BMX XBE 1000** adaptor, open the door on the side and confirm the **Address** is set **0** via the Dip Switches.



## Exercise - Premium I/O (cont.)

---

- ii. Remove the Power Supply of the Premium Rack to reveal the dip switches **(1)** used to set the Address. Ensure the **Address** is set to **1**, to match with the Rack number within Unity Pro.



- iii. Take the Bus-X terminators (TSX TLY EX). Place the Terminator marked **A** into the **Top Port** of the **BMX XBE 1000** adaptor. Place the Terminator marked **B** into the **Port** on the **Right Side** of the **Premium Rack**.
- iv. Using the Bus-X cable, connect the **bottom port** of the **BMX XBE 1000** adaptor and the **Port** on the **Left Side** of the **Premium Rack**.
- v. Turn **OFF** the power to the Simulator.
- vi. **Connect** the **BMX XBE 1000** adaptor to the **XBE slot** of the **Local Rack**.
- vii. Power **ON** the Simulator and the Premium Rack.
- viii. The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).

# Summary

---

**Summary**

In this chapter the following topics have been covered:

- *Integrating Premium I/O modules in a M580*
- 

**Questions**

The following questions will help to check understanding of the topics covered in this chapter:

- Which type of I/O is a PIO drop: local I/O RIO or DIO?
- What type of cables do you need to connect the main rack to the PIO drop?

# M580 Hot Standby (HSBY)

---

## Introduction

Just as Premium PLCs, M580s come with a Hot Standby offer to ensure high reliability of systems.

This chapter covers the basic configuration of M580 architectures. For more information, follow the M580 HSBY configuration course.

## Topic Objectives

By the end of this section the student will be able to:

- Configure a basic Hot Standby M580 architecture
- Test this architecture

# Exercise - Create a New HSBY Project

## Learning Outcomes

By the completion of this exercise the student will:

- be able to create a new M580 HSBY ePAC project using Unity Pro
- configure the embedded Ethernet ports of the CPU
- setup parameters for Hot Standby operation
- test a M580 HSBY architecture

## Equipment Required

To complete this exercise in simulation mode the following software is required:

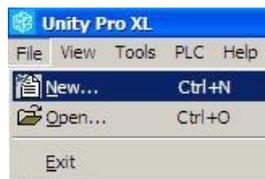
- Unity v11 or later

To complete this exercise on a PLC the following equipment is required:

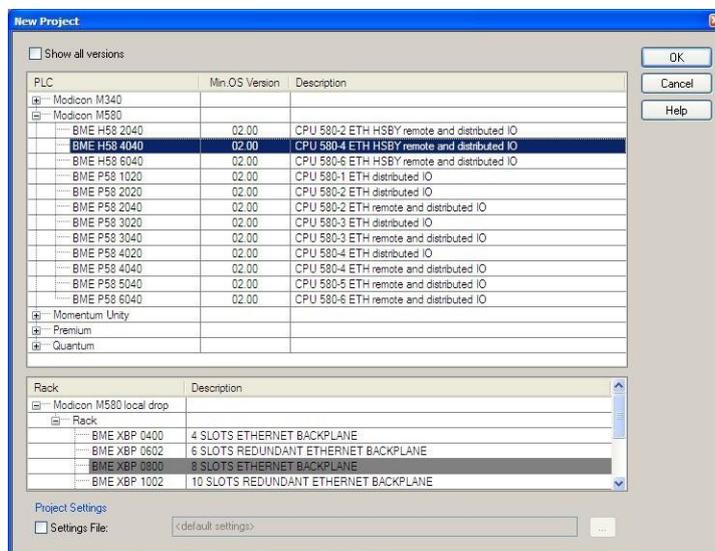
- 2 M580 HSBY
- 2 compatible power supply
- 2 Racks
- 1 Ethernet cable

## Create a new project

- Create a **New Project** by clicking **File » New** from the Unity Pro menu, or clicking the **New Project**  button on the toolbar:

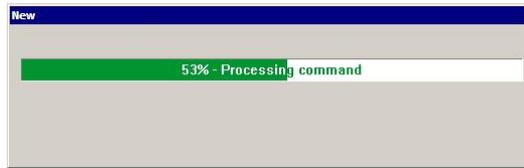


- Select the appropriate **M580 HSBY Processor** and **Rack** according to the simulator being used:

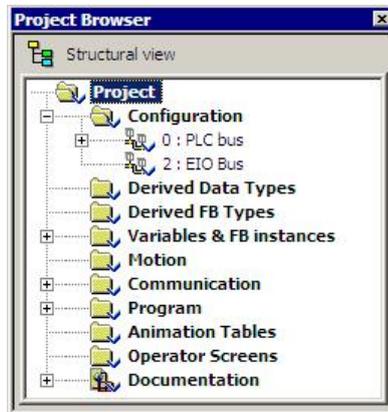


## Exercise - Create a New HSBY Project (cont.)

- iii. Unity Pro will create the new project and populate it with default items:



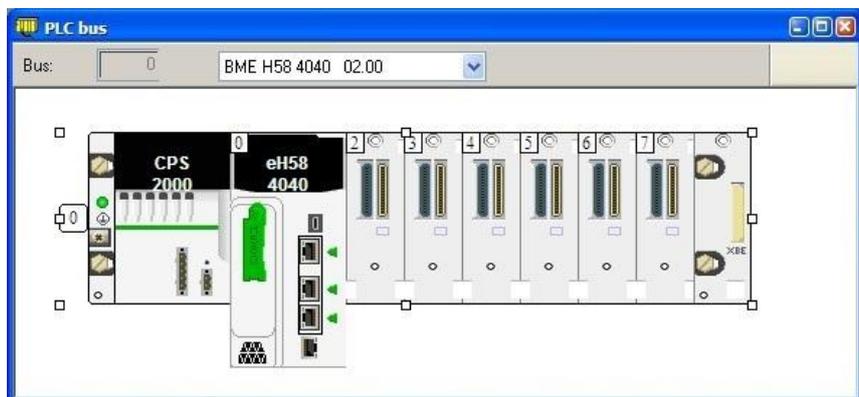
- iv. The **Project Browser** will display to show the project contents:



- v. Double click the **0: PLC Bus** item from the **Project Browser**:



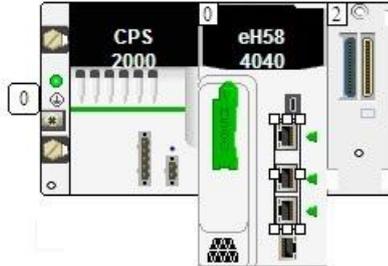
- vi. The **Local Rack** will be displayed, pre-populated with the **CPU** and the **Power Supply**:



## Exercise - Create a New HSBY Project (cont.)

### Configure the IP address.

- i. Double click the embedded Ethernet modules of the CPU:



- ii. Go to the **IP Config** Tab, enter the following **Main IP Address**: 192.168.10.21.

Field	Value	Notes
Main IP address	192.168.10.21	
Main IP address -1	192.168.10.2	(Used for Hot Standby)
IP address A	192.168.11.21	
IP address B	192.168.11.22	(Used for Hot Standby)
Subnetwork mask	255.255.0.0	
Gateway address	192.168.11.21	

- iii. Set **IP Address A** to: **192.168.11.21**, this is the **Primary** IP address of the Remote I/O (RIO) Scanner for I/O exchanges with modules or devices in the device network drops.
- iv. Set **IP Address B** to: **192.168.11.22**, this is the **Standby** IP address of the Remote I/O (RIO) Scanner in a Hot Standby architecture.
- v. Set the Subnet Mask to: **255.255.0.0** and change the **Default Gateway** to **192.168.11.21**.
- vi. Go to the **Security** Tab, click **Unlock Security** button. This will disable all Cyber Security features during the development state.

Remember to click **Enforce Security** button when the actual project is ready to deploy for operation.

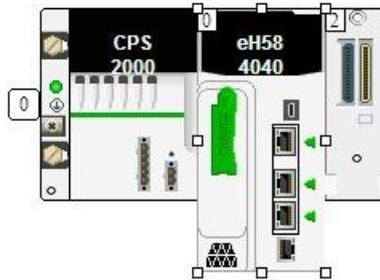
Service	Status
FTP	Enabled
TFTP	Enabled
HTTP	Enabled
DHCP / BOOTP	Enabled
SNMP	Enabled
EIP	Enabled

- vii. **Validate**  the changes.

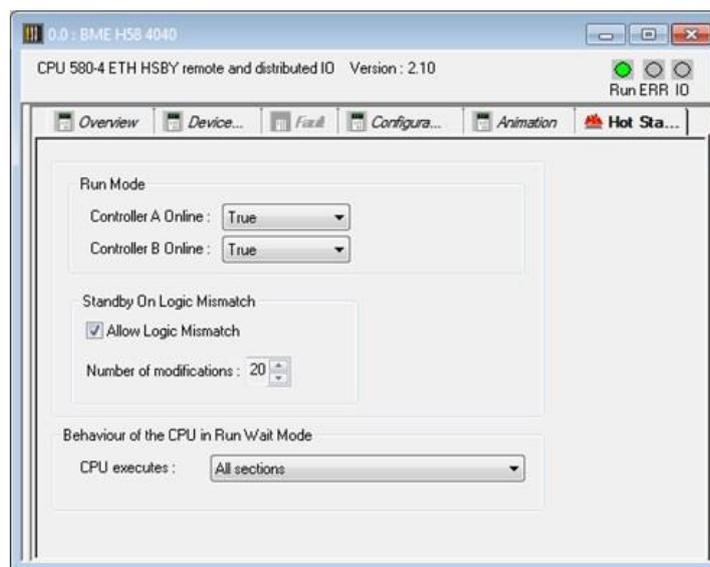
## Exercise - Create a New HSBY Project (cont.)

### Setup parameters for the Hot Standby operation

- i. Double click on the CPU module:



- ii. Configure the parameters for **Hot Standby** Tab as shown:



Checked option for "**Allow Logic Mismatch**"

- iii. Select CPU executes to "**All sections**" for the behaviour of the CPU in **WAIT** (Run Offline) mode.
- iv. **Validate**  the changes.
- v. **Build** the application.
- vi. Rectify any error(s).
- vii. **Save** the application as **M580\_HSBY.stu**.



## Exercise – Hardware Setting

---

### Learning Outcomes

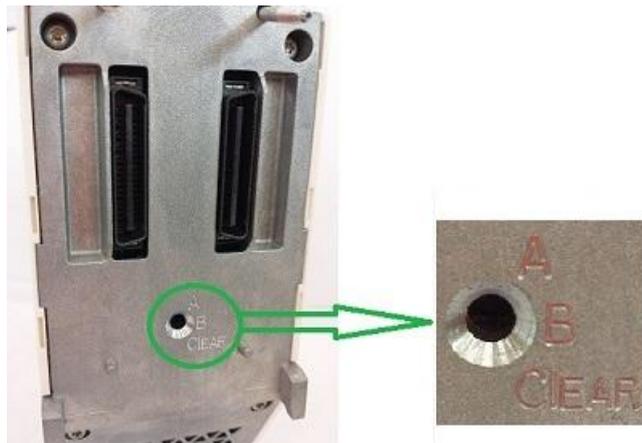
By the completion of this exercise you will:

- Configure the identity of the physical HSBY processor.
  - Create a simple daisy chain loop of a M580 HSBY ePAC system.
- 

### Determine which CPU to be setup as A or B (You will need the Equipment for this part of the exercise)

- i. Before starting any HSBY project, we need to decide which CPU to be setup as CPU A or CPU B.

On the back of the processor module, you will find a small rotary switch.



- ii. Decide one of the HSBY CPU to be designated as **A**. Use a small screwdriver provided and change the rotary switch pointing to position **A**.
- iii. Mount this **CPU A** onto the CPU local rack.
- iv. The other HSBY CPU will be designated as **B**. Similarly, use a small screwdriver and change the rotary switch position to **B**.
- v. Mount this **CPU B** onto the other CPU local rack.

---

### Hints & Tips

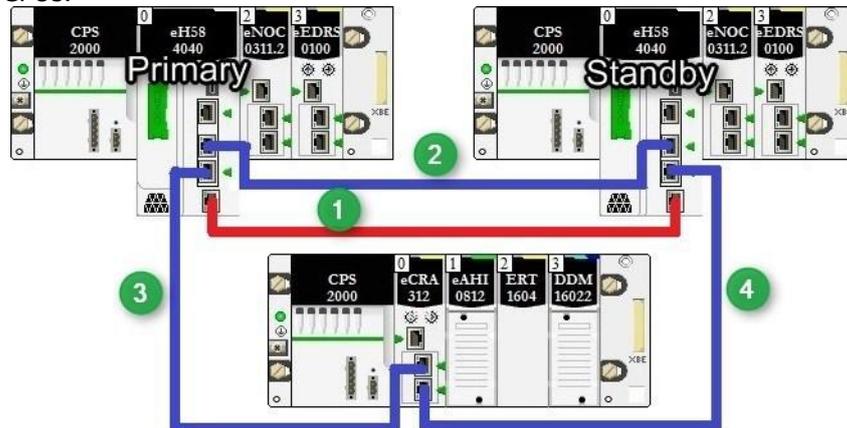
This procedure is important to identify the physical processor module in Hot Standby system architecture.

---

## Exercise – Hardware Setting (cont.)

### Connect the hardware for a daisy chain loop

- i. Use a patch cable to link the two dedicated ports of the two M580 HSBY CPUs.



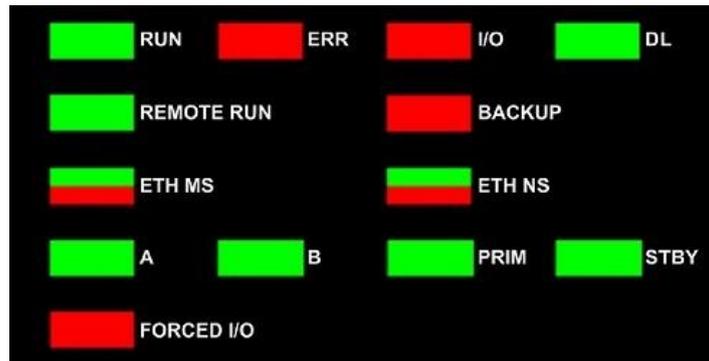
- ii. Take a long Blue patch cable and connect the ETH2 port from the Primary M580 HSBY CPU to the ETH2 port on the Standby M580 HSBY CPU.
- iii. In the same manner, use another short Blue patch cable and connect the ETH3 port from the Primary M580 HSBY CPU to the ETH2 port on the BME CRA 312 10.
- iv. To make a simple daisy chain loop, loop back by connecting the ETH3 port of the BME CRA 312 10 to the ETH3 port of the Standby M580 HSBY CPU.
- v. Switch both PLCs to ON.
- vi. Observe the LEDs behaviour of both M580 HSBY CPUs and the CRA module.

## Exercise – Hardware Setting (cont.)

---

### Test the functioning of the M580 HSBY

- i. Locate the Primary CPU Using the LED panel on the CPU:



- ii. Unplug all cables from this CPU.
- iii. Check that the other CPU is now Primary.
- iv. The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).



# Summary

---

## Summary

In this chapter the following topics have been covered:

- *Configuring a Basic Hot Standby architecture in Unity Pro*
  - *How to set a PLC as A or B*
  - *Wiring a Hot Standby architecture*
- 

## Questions

The following questions will help to check understanding of the topics covered in this chapter:

- Which version of Unity Pro do you need to configure a Hot Standby architecture?
- How can you check if the PLC is A or B and primary or secondary?

# Advanced Cyber Security

---

## Introduction

The first chapter explained the very important Cyber Security feature of the M580; the activation/deactivation of its services.

In this topic we will discover more Cyber Security features such as:

- Password management
- Integrity Checks
- Memory and Run/Stop Protect
- IP address restrictions

---

## Chapter Objectives

By the end of this chapter the student will be able to:

- Deploy advanced Cyber Security measures in M580 architecture.
-

# Application Security

---

## Password Management

Password management is one of the fundamental tools of device hardening, which is the process of configuring a device against communication-based threats. Schneider Electric recommends the following password management guidelines:

Enable password authentication on all email and Web servers, CPUs, and Ethernet interface modules.

Change all default passwords immediately after installation, including those for:

- user and application accounts on Windows, SCADA, HMI, and other systems
  - scripts and source code
  - network control equipment
  - devices with user accounts
  - FTP servers
- 

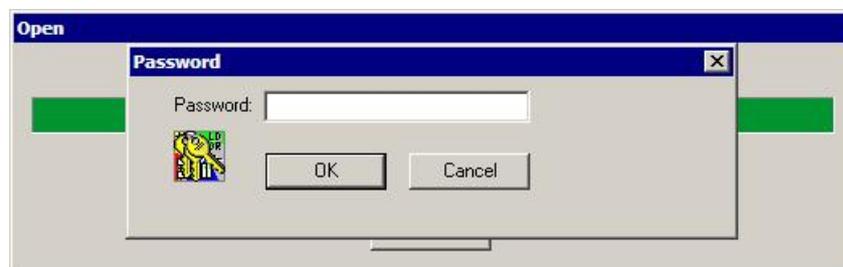
## Passwords in Unity Pro

When creating an application in Unity Pro, Schneider Electric recommends creating an application password.

Guidelines for creating a strong password are to choose a password that contains alphanumeric characters, and is case-sensitive. Unity Pro encrypts the password, and stores it in the application:

- Choose a password that contains a minimum of 8 characters.
- Choose a password that is difficult to guess.
- The password should combine upper and lower case letters, digits, and special characters.

When you open an existing application, the **Application Password** dialog box opens. Type the password, and click OK.



## Application Security (cont.)

### Auto-Lock

Within Unity Pro it is possible to **Auto-Lock** the application based upon a time period.

This means that after the allocated Auto-Lock timeout is exceeded the application will time out and prompts the user to login again.



# Exercise - Password Management

## Learning Outcomes

By the completion of this exercise you will:

- implement an application password within Unity Pro.
- prove the application password feature.
- implement the Auto-Lock functionality.



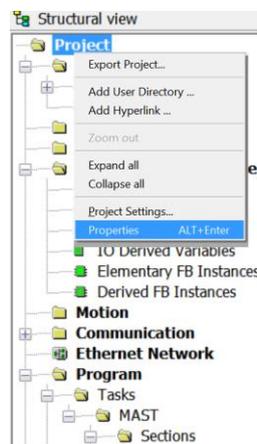
### Note:

For this exercise the **Simulator Mode within Unity Pro** will be used. Please disconnect from and turn off the physical simulator / PAC now.

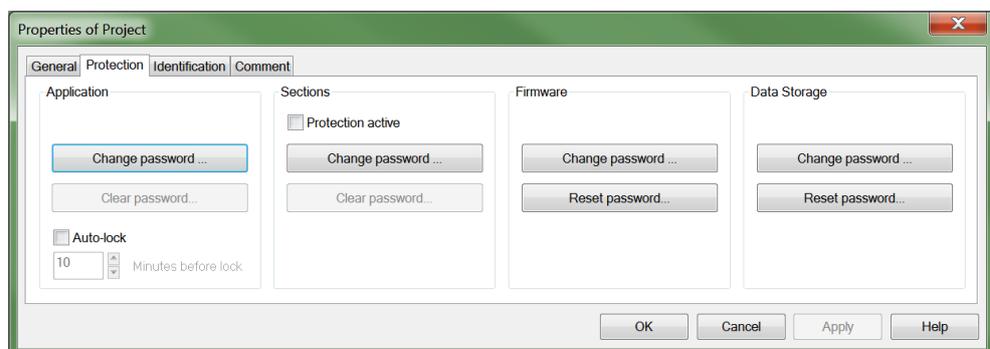
If you are unsure how to achieve this please ask the instructor.

### Open the Project Properties and create an Application Password.

- Open the **Project Properties** by right clicking on the **Root** of the **Application** in the **Project Browser**. Select **Properties** from the popup menu:

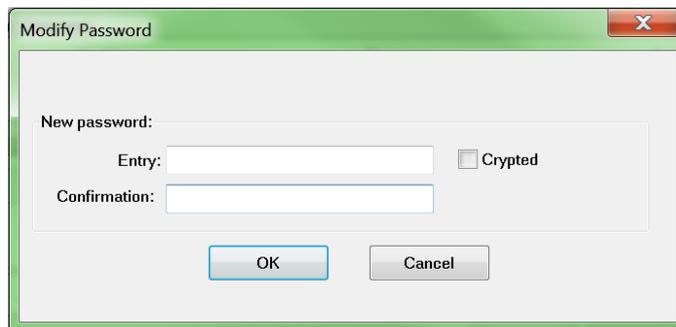


- Select the **Protection** tab:

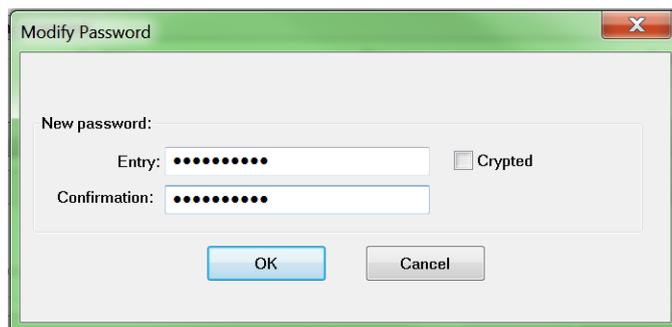


## Exercise - Password Management (cont.)

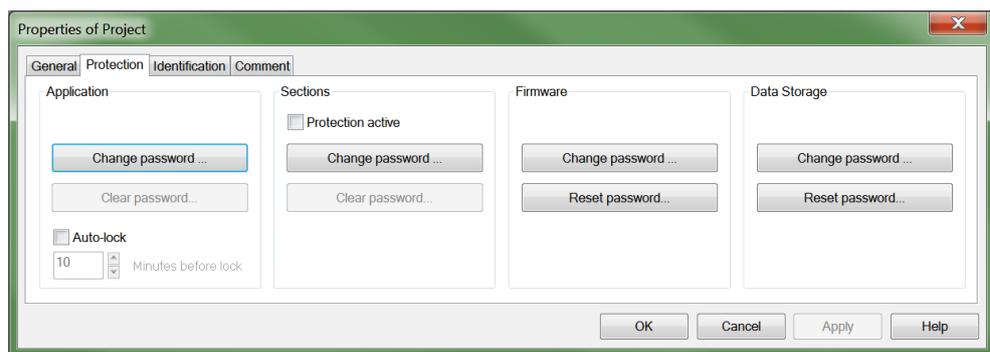
- iii. From the **Application** section. Click the **Change Password...** button. The **Modify Password** dialog appears.



- iv. Enter the password automation into both fields. Click **OK**:



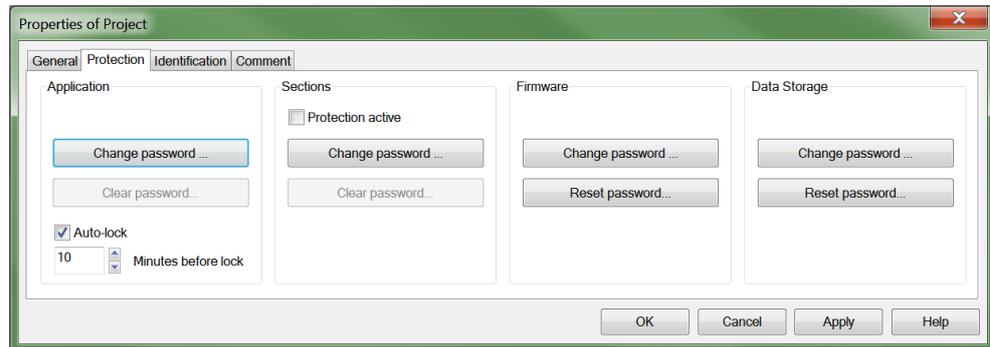
- v. The user is returned to the **Protection** tab:



## Exercise - Password Management (cont.)

---

- vi. Enable the **Auto-lock** function, by selecting the tick box, leave the default of 10 minutes. Click **Apply**:



- vii. **Build, Connect & Transfer** the application to the Simulator.  
viii. **Save and Close** the application.



### Note:

In a real project, make sure you do not forget the password!

---

## Exercise - Password Management (cont.)

---

### Test the Password Management settings:

- i. Re-open the previous application within Unity Pro. This time the user will be prompted to enter the application password created in step (iv) of the previous exercise:



- ii. Unity Pro will open the application if the correct password is entered. **Close** the application again.
- iii. **Connect** directly to the PLC without opening the application. This time the user will be prompted for the **PLC Application Password**. Enter the correct password. Click **OK**:



- iv. Without the password the user is unable to connect to the PLC.
- v. **Transfer** the application from the **PLC** to the **PC**.
- vi. **Save** the application.



# Memory & Run/Stop protect

---

## What are Memory & Run/Stop Protect?

Run/Stop protect is a feature that makes the PLC reject any start/stop command unless a specific input is ON.

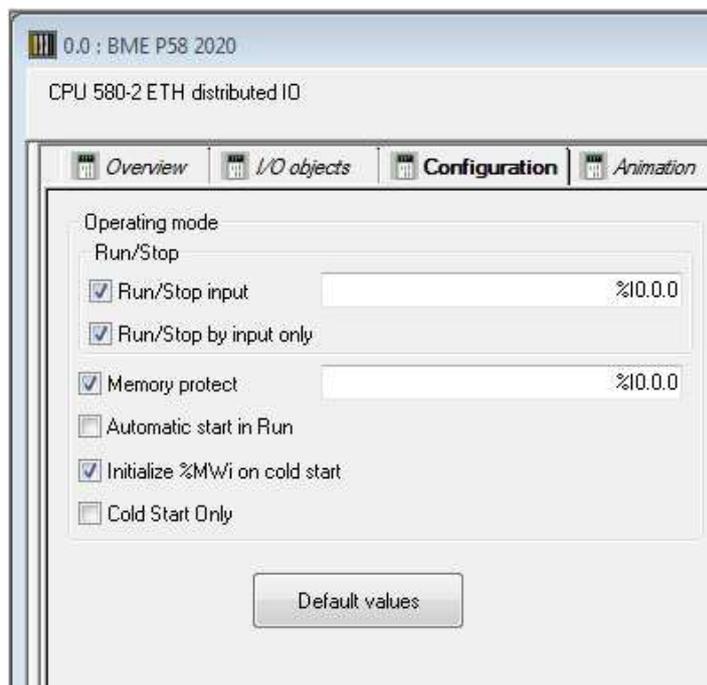
Memory protect is an extension of the Run/Stop protect that will reject any project transfer to the PLC unless a specific input is ON.

This way a remote hacker cannot Start/Stop the PLC or download a corrupted project into the PLC.

---

## How to Activate Run/Stop and Memory Protect? (Unity v11)

In the configuration tab of the M580, tick the feature you want to enable and type in the variable allowing/rejecting commands.



# Integrity Checking

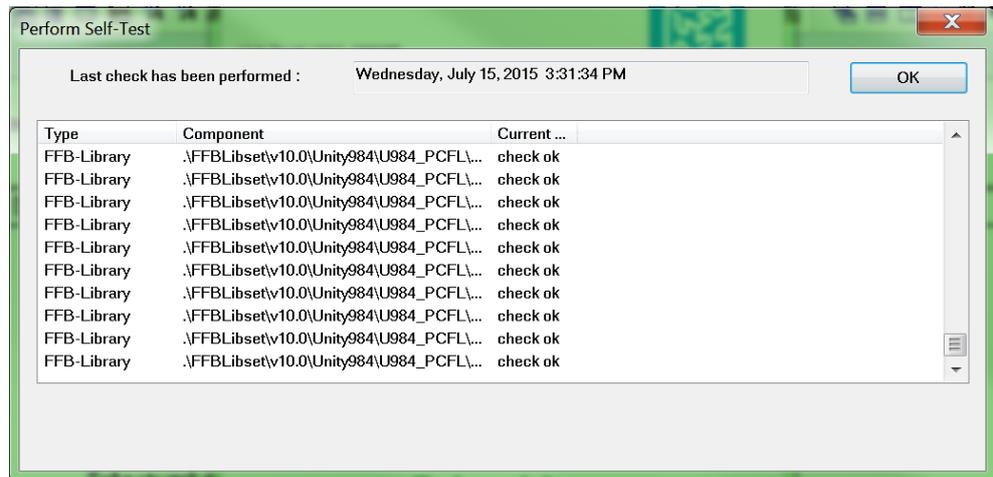
## Integrity Checks

The integrity check feature in Unity Pro running on an authorized PC helps prevent Unity Pro files from being changed via a virus / malware through the Internet.

The integrity check feature concerns the following components:

- DLLs
- Unity Pro hardware catalogue
- libset and object files of EFBs
- DTMs

Unity Pro automatically performs an integrity check when you first open an application. Beyond the first check, Unity Pro will automatically run the integrity check periodically.



It is also possible to run the Integrity Check manually.

## Exercise - Integrity Checks

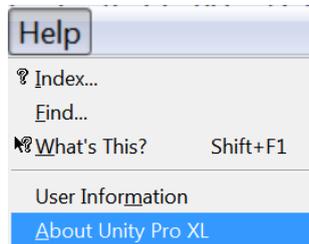
### Learning Outcomes

By the completion of this exercise you will be able to:

- Complete a manual integrity check.

### Open the Unity Pro Properties.

- From the **Help** menu select **About Unity Pro XL**:



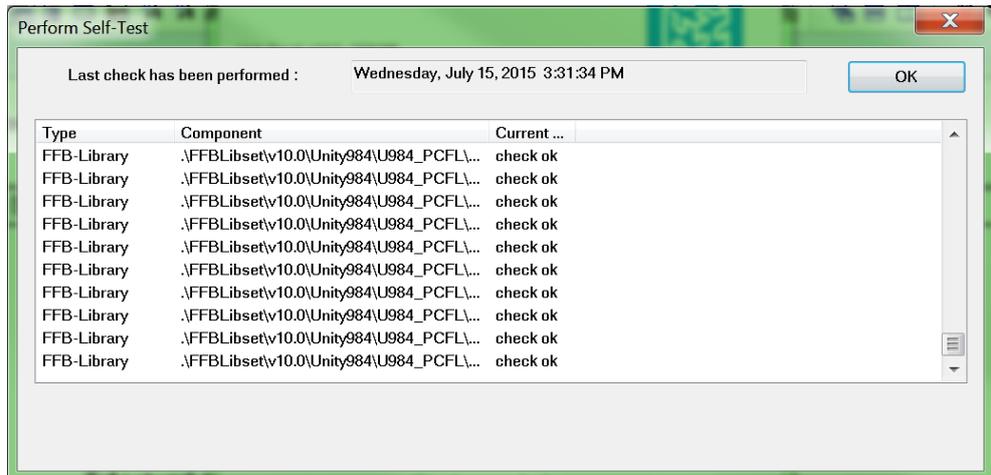
- Click the **Perform self-test** button from the Integrity check area of the dialog:



## Exercise - Integrity Checks (cont.)

---

- iii. The **Perform Self-Test** window will display. The **Integrity Check** will commence and complete automatically:



- iv. Scroll up the finished list and ensure that all entries have **check ok** for the **Current Status**.
- v. Click **OK** when finished with the **Self-Test** window.
- vi. Then click **OK** to close the **About** window.

---

### Remove all Cyber Security & Passwords settings.

- i. Return to the Embedded Ethernet Port properties and open the **Security** tab and click the **Unlock Security** button.
- ii. Visit the **Application Settings** and **remove** the **Application Password** set in the earlier exercise.
- iii. **Build, Transfer, Run & Test** that the settings have **Cyber Security** and that the **Application Password** has been removed.
- iv. The exercise is now over click the link to go back to the [Chapter 2 Organisation Chart](#) or to the [Table of Contents](#).



# Access Control

---

## Introduction

Access control is a feature that allows the user to set which IP addresses are allowed to communicate with the device (PLC or cyber secured NOC), communication from any other IP will be rejected by the device.

In Unity Pro v11 this feature will be combined with the restriction of the features allowing IP addresses to communicate with device via specific protocols only.

---

## How to enable it?

As with most of the M580 cyber security features, this feature is located in the Security tab of the M580. From there type in the list of authorised IP addresses, then enable access control and download the program to the PLC.



### Note:

Be careful if you usually download the projects to the PLC via Ethernet cable to add the IP address of the computer in allowed IP addresses, and remember the PC IP address.

If you usually transfer the project via other media, make sure that the service is enabled before downloading the project to the PLC!

---

# Summary

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## Summary

In this chapter the following topics have been covered:

- *Setting a password to restrict the download of a project to the PLC*
  - *Performing integrity checks*
  - *Setting the memory protect and run/stop protect features*
  - *Restricting the access to the PLC to some IP addresses*
- 

## Questions

The following questions will help to check understanding of the topics covered in this chapter:

- How does the memory protect and run/stop protect features work?

When are the integrity check performed?



# Chapter 3: Make the Most of the M580!

## Overview

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### Introduction

The previous chapters have explained only the most common features of the M580. This chapter highlights expanded features which increase the possibilities of the M580.

These features include:

- The use of a SD card
- Local extension racks
- Embedded web pages
- The SCAIME weighing module
- The HART module
- Time-stamping



### Further Training:

In case you want to implement these features we suggest you to go through the M580 in-class training.

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## SD Card

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### SD Memory Card (BMX RMS 004GPF)

The SD memory card **BMX RMS 004GPF** is optional and is used for application backup and data storage.



The memory card is of "Industrial Grade" and formatted for use with Schneider Electric Modicon M580 CPU only. Do not use the memory card with any other CPU or tool, or the card may not be recognised by the Modicon M580 CPU.



#### Note:

Only the **BMX RMS 004GPF** SD memory card is supported by the Modicon M580. SD cards from the Modicon M340 are **NOT** supported by the Modicon M580.

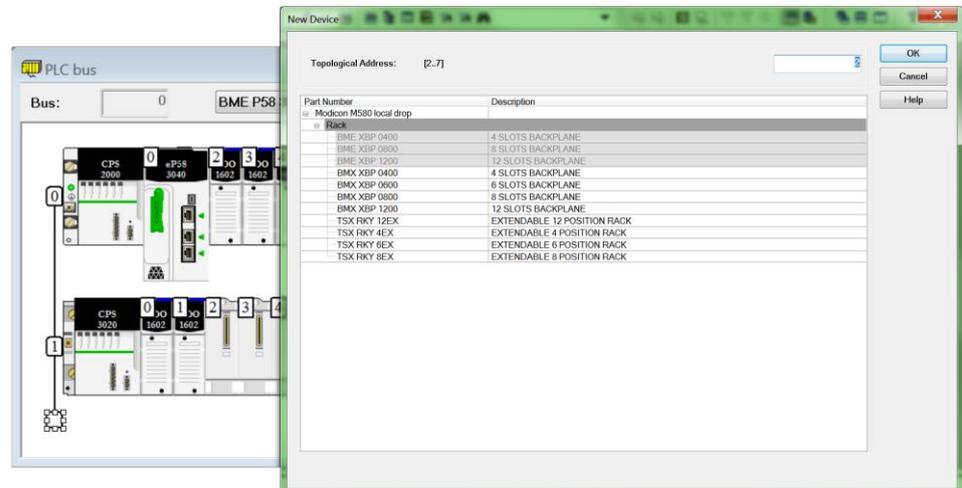
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# X80 Extension Racks

## Extension Racks

Just like PIO

Extension racks are based on **X-Bus-only** backplanes and can contain **X-Bus I/O modules only**:



## Extension Rack Rules

- If an Ethernet backplane is used as an **Extension Rack**, Ethernet Modules will **NOT** start as they are not on a **Rack 0**
- Depending on processor performance level, up to **7 Extension Racks** are supported the specifics for each CPU can be checked here: *CPU Selection Overview* (page **Error! Bookmark not defined.**)
- The M580 ePAC will support up to **8 BMX XBP backplanes** (racks) of 4, 6, 8 or 12 slots
- To extend the configuration using additional racks, users must use a bus extender module (**BMX XBE 1000**) and X-bus cables
- The backplane extender will be plugged on the right side dedicated connector of the backplane. It won't occupy any module slot
- The XBE extender module is **NOT** hot-swappable in accordance with M340 existing functionality
- Each backplane has to include a power supply module and can support up to **12** modules depending on the rack type

# Weighing Module Overview

## General Characteristics

The **PME SWT 0100** is a versatile and flexible weighing module controller, which can be used wherever weighing scales are to be used in the Schneider Electric Mx80 automation system. The modules main features are:

- Install on either M580 local CPU rack or X80 RIO rack of Ethernet backplane
- Uniform design technology and consistent communication via Ethernet backbone
- Uniform configuration with UNITY V8.0 or latter.
- Configuration, calibration and diagnosis via FDT/DTM.
- Measurement of weight or force with high resolution of 24 bits A/D converter
- High weighing accuracy 0.01 %
- External Measurement response time of 10ms
- Internal measurement rate up to 400 Hz
- 2 x Digital Inputs for monitoring of limit values
- 4 x Digital Outputs for dosing control
- Parameter definable inputs and outputs
- Continuous flow rate calculation
- Theoretical adjustment possible without adjustment weights
- RS485 communication port for dedicated local HMI
- Factory Pre-calibration
- Replacement of the module possible without a new adjustment of the scale
- Use in Hazardous area zone 2 and 22 (ATEX approval), class I division 2 (cULus approval)
- Intrinsically safe load cell powering for the hazardous area Zone 1 (With optional SCAIME Zener barrier kits)



# HART with the M580

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## **HART Multiplexer Function**

The X80 HART module takes the role of HART multiplexer, facilitating the transmission of HART field instrument data as follows:

The multiplexer provides one-to-many communications between:

A HART master device, for example, asset management software resident on a PC, and Multiple HART slave devices (for example, HART field instruments)

The multiplexer provides HART instrument data to a PLC master.

The HART I/O data of AHI & AHO modules is accessed and managed by the AMS software. The following AMS software packages are supported:

- Emerson AMS suit
- FieldCare
- PACTware

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## **I/O Mapping**

In addition to the **AMS software**, the HART I/O data of the **BME AHI 0812 & BME AHO 0412** modules can also be accessed by the **I/O mapping** function found in the device DTMs.

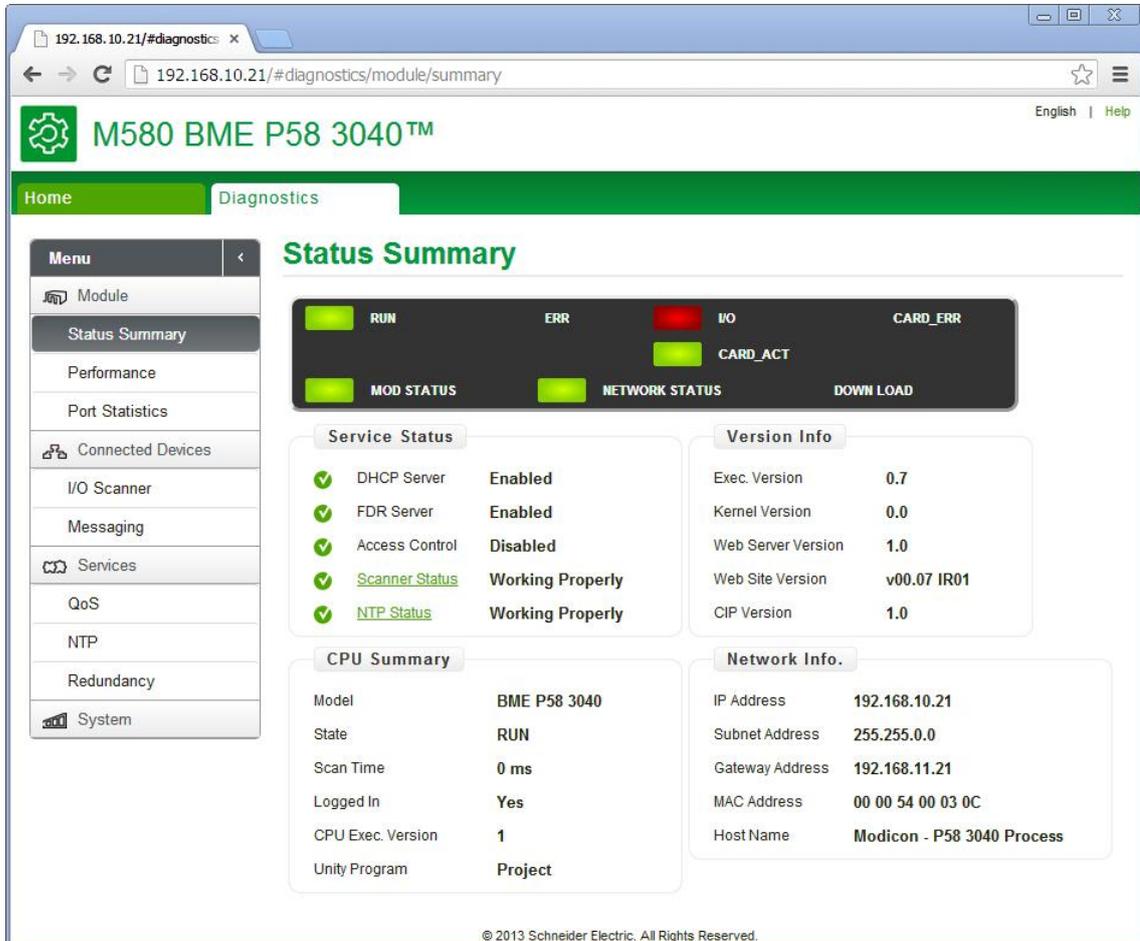
The X80 HART interface modules support the mapping of HART instrument input and output data items to the HART multiplexer process image. The data items enabled in I/O mapping function can be dynamically controlled by the program logic.

# Web Pages

## M580 Embedded Web Pages

The M580 CPU comes equipped with a selection of embedded web pages that can be used for diagnostics and monitoring information.

The web pages can be accessed using a web browser and navigating to the IP address of the CPU.



The list of **Diagnostic** web pages available is:

- Status Summary
- Performance
- Port Statistics
- I/O Scanner
- Messaging
- QoS
- Network Time Service
- Redundancy
- Alarm Viewer

### Hints & Tips

The web pages can only be accessed via the **Main IP Address** of the CPU.

# Introduction to Time Stamping

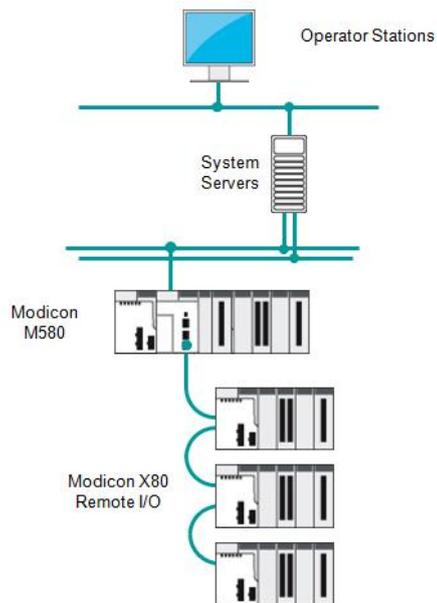
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## System

**System** time stamping provides a consistent SOE (sequence of events), time stamped at the source, in order to allow the user to analyse the source of abnormal behaviour in a distributed automation system.

The SOE is displayed in an alarm summary or SOE page of a client (such as a SCADA).

Each source of time stamped event of the SOE is a discrete I/O value change (transition) detected by a time stamping module, this event is then passed through to OFS and straight to the SCADA.



## Introduction to Time Stamping (cont.)

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### Benefits

There are many benefits of **system time stamping**:

- removes the need for PLC programming.
- **Direct communication** between the **time stamping modules** and the **client**.  
If the time stamping modules are in a Modicon X80 Remote I/O drop, the **PLC communication bandwidth is not used**.
- Consistency of data (I/O values) between the process (**time stamping modules**) and the client (**SCADA**).
- **Time quality information** associated with each **time stamped event**.
- No loss of events in normal operating conditions:
- A buffer is available to store the events in each time stamping module. The event storage is stopped when the buffer is full.
- **Rising and falling** edges transitions are stored for each **discrete I/O**.
- Where available, Hot Standby configurations on the PLC and/or redundant SCADA are managed.





# Appendix A: Appendix

## Answers to Questions

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**Introduction**

The following pages give suggested answers to the questions asked at various points in the document. These are mainly the end of chapter questions.

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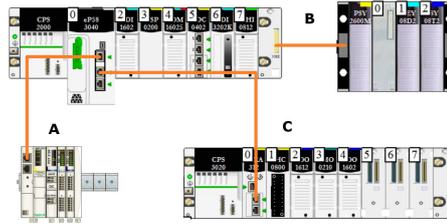
**This Chapter Covers These Topics:**

- M580 Basics ..... A-2
- Device I/O ..... A-3
- NOC..... A-4
- Remote I/O ..... A-5
- Premium I/O ..... A-6
- M580 Hot standby ..... A-7
- Advanced Cyber security ..... A-8
- Make Most of your M580! ..... A-9

# M580 Basics

## Answers

- For each part of the following picture, select which kind of I/O is used:



A: Device I/O

B: Local I/O

C: Remote I/O

- What are the three types of I/O? Which ones are faster to configure?

Local I/O

Remote I/O

Device I/O

Local I/O and Remote I/O are usually faster to configure than Device I/O.

- What are the purposes of the **SERVICE** port?

Most of the time the service port is connected to a SCADA, but it can also be connected to a Device I/O Drop, to Unity Pro, or to a computer for port mirroring and traffic analysing.

- What is the advantage of **Device DDT** over topological addressing?

The main advantage of Device DDT over topological addressing is that there is no need to map the I/O.

- What is the purpose of observing the M580 Device DDT?

The M580 Device DDT gives relevant information about the state of the M580 and its communication. It helps to monitor and troubleshoot the PLC.

- How to access the security parameters of the M580?

To access the security parameters of the M580, open the main rack, double click the ports of the CPU, click channel 0 and the security tab.

- To ensure higher cyber security; which services should be disabled?

To ensure higher Cyber Security it is best to disable all unused protocols

## Device I/O

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### Answers

- What kind of device can be included in a DIO drop?

It is possible to connect any DTM device to a DIO drop, including non Schneider-Electric devices.

- What is the main advantage of device integration? (You can take the Altviar drive as an example)

Device integration makes integration of devices easier by configuring and testing them from single software.

## NOC

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### Answers

- What are the possible roles of a NOC?

A NOC has the same use as the service port of M580; it can be used to connect a drop to a SCADA or to connect DIO drops.

In both cases, using a NOC instead of connecting directly to the M580 reduces the resources used by the M580.

- Which BME NOC modules support FactoryCast?

The 0311 support FactoryCast.

## Remote I/O

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### Answers

- What is the main advantage of an RIO drop over a DIO drop?

Remote I/O drops are usually much faster to configure than Device I/O drops.

- Which service needs to be enabled in the M580 security features to allow the use of a RIO drop?

TFTP needs to be enabled in order to being able to build a project with a RIO drop.

## Premium I/O

### Answers

- Which type of I/O is a Premium I/O drop: local I/O RIO or DIO?

A Premium I/O drop is considered as a local drop.

- What type of cables do you need to connect the main rack to the PIO drop?

To connect a PIO drop to the M580 main rack, you will need X-bus cables.

## M580 Hot Standby

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### Answers

- Which version of Unity Pro do you need to configure Hot Standby architecture?

HSBY architectures are configured via Unity Pro v11 or later versions.

- How can you check if the PLC is A or B and primary or secondary?

To check if the PLC is A or B and Primary or Secondary you can either look the M580's LED panel, or check the M580 Device DDT.

## Advanced Cyber Security

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### Answers

- How does the memory protect and run/stop protect features work?

Run/Stop protect is a feature that makes the PLC reject any start/stop command unless a specific input is ON.

- When are the integrity check performed?

Unity Pro automatically performs an integrity check when you first open an application. Beyond the first check, Unity Pro will automatically run the integrity check periodically.

## Make the Most of the M580!

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### Answers

- What are the two purposes of using an SD card with the M580?

The SD memory card is optional and is used for application backup and data storage.

- What is the role of the M580 web pages?

Embedded web pages are used for diagnostics and monitoring information.