# CXpro<sup>HD</sup> USER GUIDE



SMART ENERGY CONTROL

© Cylon Controls Ltd. 2020. All Rights Reserved.

CXpro<sup>HD</sup> (MAN0133 rev 15)

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

#### TRADEMARKS

All trademarks and trade names used in this document are acknowledged to be the copyright of their respective holders.

UniPut<sup>™</sup> technology is covered by UK Patent GB 2 400 991 and Irish Patent 84413



www.cylon.com



# CONTENTS

SECTION 1 :	Cylon Building Management System	
Hardware Comp	onents	10
Software Compo	Software Components	
CXpro <sup>HD</sup> – Overv	view	12
SECTION 2 :	Basic tasks	
Starting CXpro <sup>HC</sup>		14
The CXpro <sup>HD</sup> Inte	erface	15
Connecting to a	Field Controller	17
<b>Opening Strateg</b>	y files	18
Navigating a mu	lti-page strategy	19
Finding an elem	ent in a strategy	23
Zooming and Na	vigating the drawing area	24
Changing the dis	splay	24
Modifying the D	rawing Area (Grid settings)	25
Modifying displa	ay colour settings	25
Saving Files		26
Printing		28
Closing files		32
SECTION 3 :	System Configuration	
System Configur	ration definitions	34
Configuring Sites	s	35
Configuring Seria	al Port Connection	48
Configuring Stra	tegy Defaults	49
Configuring BAC	net Communications	50
<b>Configuring Site</b>	Communicatons (Commands)	54

## SECTION 4: Using Modules

Modules - Overview	58
Accessing Modules	58
Placing a module on the drawing area	60
Joining modules in a strategy	66
How to add text to a strategy	75
Virtual modules	77

## SECTION 5: Points and Point Values

What are points?	80
What are blocks?	80
Block Numbers	80
Point Numbers	81
Defining hardware points	83
What are UniPuts™?	88
Configuring the Field Controller's Inputs and Outputs	89
Keeping CXpro <sup>HD</sup> and Controller strategies in Sync	97
Reading Live point values (LiveLog)	101
Manually Overriding Point Values - the Override Point dialog	105
How to Enable a hardware point value (remove manual override status)	108
How to change the value of a Setpoint	109

## SECTION 6: Creating Strategies

What is a strategy?	111
An example of a strategy	111
How to Create a Strategy	112
How to reorder blocks in a Strategy	120
How to Upload Setpoint Values	121
Naming strategy Files	121
How to open an existing strategy:	122
Strategy Associations	123
Opening multiple strategies	126

## Contents

Downloading a strategy	126
Starting a strategy (sending the Setup)	131
Testing a strategy with Scan Mode	134
Securing CBM data	137
How to expose Points on a BACnet system	139
How to View BACnet points from A Controller	140

## SECTION 7: Naming Objects

Why objects are named	142
Rules for naming objects	142
Procedures for naming objects	142
Naming Points	142
Naming Field Controller time schedules	143
Naming datalogs	144

## SECTION 8: Using Macros

Macros - Overview	146
Macro structure	147
Macro Description (Help) Files	147
How to Create a Macro Template	148
How to create a new macro group and sub-group	158
How to rename points in a Macro Template	160
How to Set Macro Setpoint Unit LaBels	161
How to transfer macros from one computer to another	163
Working with Macros	166

## SECTION 9: Communicating with Controllers

Communicating with Cylon Controllers	172
Sending information to a Field Controller	172
Getting Controller Information	173
How to set the Controller Time and Date	180
Changing the address of a controller (CBM only)	181

SECTION 10: Datalogs and Alarms

Datalogs	184
Alarms	189

## SECTION 11: Simulation Mode

Introduction	192
Configuring the Simulation	193
Running a Simulation	194
Point properties	195
Point logging	201

## SECTION 12: Sites

Overview	204
Installing a new site on the PC	204
What happens when a new site is installed	204
How a new site is installed on the PC	205
Site backup	205
Site Discovery	207
ASPECT <sup>®</sup> / INTEGRA™ Export	210

## SECTION 13: Appendix :: Adding units of measurement to the system

Adding units of measurement	214
Example of adding units to analog units list	215
SECTION 14: Appendix :: File Management	
File Management in CXpro <sup>HD</sup>	218
SECTION 15 : Appendix :: BACnet Explorers	
NB-Pro	220
Discovery Tool	220

SECTION 16: Commissioning Controllers with CXpro<sup>HD</sup>

How to Configure a Controller's BACnet settings	228
Commissioning a range of controllers quickly (Mass Commissioning)	230

# SECTION 1: CYLON BUILDING MANAGEMENT SYSTEM



The **Cylon BACnet Building Management System** is made up of several components, which fall into two main categories:

- Hardware the products that monitor and control a building's environment.
- **Software** the interface which allows users to configure and monitor Cylon Hardware.

## HARDWARE COMPONENTS

Cylon BACnet uses the following main hardware components:

- Routers.
- I/O Field Controllers.
- Keypad
- PC

There may also be other supplementary hardware components such as printers, modems, pagers, etc., but these are not essential to the basic system.

#### Routers

**CBR** devices route communications between BACnet IP and BACnet MS/TP networks.

**Aspect® MATRIX Series** and **NEXUS Series** devices are programmable communications controllers, which provide supervision of Cylon BACnet networks and route communications between BACnet IP and BACnet MS/TP networks.

3rd-party BACnet Routers can also be used with the Cylon BACnet system.

### I/O Field Controllers

**CBM** and **CBT** Field Controllers take inputs from sensors and Building Control plant and send output to Building Control plant in response. They are available as programmable or unitary controllers, with various input/output configurations.

These I/O controllers can be programmed with **Strategies**, which configure them to send specific outputs to connected devices in response to events occurring on their inputs. For example, you can create a **Strategy** in **CXpro<sup>HD</sup>** and download it to a **Field Controller** specifying that a valve is opened if the temperature being input to the controller rises above a predetermined level.

Cylon Field controllers are networked together using RS485 by BACnet Routers, which in turn are networked by Ethernet. A Field Controller can also be linked directly to a PC, as well as to a modem or a printer.

#### РС

The PC is connected to a Cylon network by Ethernet, RS232, or modem connection. The PC can also be connected directly to a Field Controller for small installations with stand-alone controllers.

**CXpro<sup>HD</sup>** software - which is used to configure the controllers, schedule events, and extract reports - is run on the **PC**, which must have **Windows 10** Professional 64-bit and **Windows 7** Professional / Enterprise / Ultimate 64-bit installed and running.

The minimum configuration to run this application is: **Core 2 Duo E6300**, 1Gb **RAM**, 80Gb hard drive.

The recommended configuration is: Core 2 Duo E6600, 2Gb RAM, 160Gb hard drive.

### **Connections between hardware components**

The following types of connections exist between the hardware components:

- Fast Ethernet bus connecting CBR routers and Aspect® devices with the CXpro<sup>HD</sup> PC.
- An RS485 fieldbus, using shielded twisted pair cables, connecting the BACnet Router to the I/O controllers.

## SOFTWARE COMPONENTS

The Cylon suite of software applications is used to set up, maintain, and control the Cylon system in operation.

## CXpro<sup>HD</sup> modules

The following applications are available from **CXpro<sup>HD</sup>** group in the **Windows** Start menu :

#### • Database Interface

The **Database Interface** program allows you access to the database that contains details of all the point values on each Field Controller in the network. You can set point values graphically in **CXpro<sup>HD</sup>**, or you can enter or delete them in the **Database Interface** program.

• Datalog Manager

A datalog in **CXpro<sup>HD</sup>** logs the value of a specified point in a **Field Controller** at a specified interval so that it contains a record of the changes in that point value over a period of time. The **Datalog Manager** program allows you to display the contents of a datalog in either graphic or tabular form. (see also *MAN-0043 Datalog Manager User's Guide*)

• Engineering Tool

**CXpro<sup>HD</sup>** is a graphical interface created for programming the Cylon the product range. In **CXpro<sup>HD</sup>**, strategies (which tell a controller how its outputs should respond to conditions on its inputs) can be designed, edited and downloaded to, or uploaded from, **Field Controllers**. **CXpro<sup>HD</sup>** could be described as the most important of all the Cylon applications, as it is the application that programs the Cylon controllers. This manual describes how to carry out a variety of tasks in **CXpro<sup>HD</sup>**.

- Manage Software Licence
- Site Organiser

The **Site Organiser** is an easy way to configure and examine a complete site or part of a site. Instead of downloading strategies individually to all the controllers on a site, this can be done in one simple task. Any combination of strategies can be downloaded to any combination of controllers or to one type of controller in a *.ins* batch file. (See also *MAN-0020 Site Organiser manual.*)

• Start CXpro<sup>HD</sup>

## $CXPRO^{HD} - OVERVIEW$

**CXpro<sup>HD</sup>** provides all of the tools required to design, configure, test, commission, and maintain **Cylon BACnet** systems automatically.

You can use **CXpro<sup>HD</sup>** to:

- Graphically create strategies that implement solutions to conditions on site.
- Save those strategies for future editing, testing, or reference.
- Test the operation of strategies.
- Debug and edit strategies.
- Download strategies to the appropriate controllers.
- Define and assign **3rd party blocks** to carry data across a **Fieldbus**.
- Define and assign wide 3rd party blocks to carry data between Fieldbusses and across the network of a site.
- Upload existing strategies from controllers.
- Upload analog and digital point values from controllers.
- Upload statistical and reference information from controllers.
- Record changes that occur on a site as they happen and save the record to a file.

# SECTION 2: BASIC TASKS



## STARTING CXPROHD

Open the **CXpro<sup>HD</sup>** section on the **Windows Start menu** or **start screen**, or search for "**CXpro<sup>HD</sup>**" in the **Application** search box .

Click on the **Start CXpro<sup>HD</sup>** icon. The **CXpro<sup>HD</sup>** interface will open:



**Note**: If other Cylon Engineering Software, e.g. **CEC7** is installed on the same PC, then instead of the **CXpro<sup>HD</sup>** interface opening directly, a "Chooser" dialog opens first allowing the user to select the software to be opened.

## THE CXPRO<sup>HD</sup> INTERFACE

The **CXpro<sup>HD</sup>** User Interface consists of the following sections:

#### The Site List

This gives an overview of the BMS Sites that are accessible from this PC



#### The Strategy Drawing Area

This part of the UI shows the **modules** and **points** in the current **Strategy**, and the connections between them,



### The Right-Hand Pane (Inspector)

On the right-hand side of the UI there is an area that displays the Modules library, a Module Property editor, a BACnet properties inspector and Page navigation panels.

By default, these panels are displayed one-byone in a tabbed interface,

ounces			
Modu	lles	ů.	×
		2	¢
Favo	rites	•	^
Cons	tants	+	
Cont	rols	+	
Func	tions	-	
A B C	Analog Gate		
A>B	Comparator	ф.	
GGG ↓ ◇	Digital Encode		
0-20	Digital Extract		
Max	Limit at Min and M	Max	
100 20	Limit to 0 or 100		
	Make Linear		
A C	Rescale Custom		
100 B	Rescale from 0 to	100	,
Page	Nam Properties	Modules	Т
-			

but the layout can be configured by dragging the tabs so that the panels can be displayed all together as shown here:

FIL	operties		Ψ 🎽	Mod	ules	4	х
<	> ?	Tuneable	Forward PID 🔹				×
	General	, Informatio	n	Favo	orites		¥.
	Туре		Tuneable Forward PID	Cons	stants		
	Service O	rder	1	с			
	Synchron	nised Stat	Disconnected	гù	Digital Constant		
-	Inputs			Int	Integer Constant		
	🗄 Setpo	int	Analog 1 Room Setpo	~	integer constant		
	Proce	ss Variable	Analog (1) Room Te	~	Real Constant		
	🕀 Gain		Analog	Cont	rols		
	Enabl	e	Digital	Euro	tions	-	
	🗄 Integr	ration time	Analog	Fund	uons		•
	Deriva	ative time	Analog	Math	1		۲
-	Constant	s		Sche	edules, Timers, and L		Þ
	Integratio	on time	900	Setp	oints, Inputs, and O		
	Derivative	e time	0	Stati	ietice	_	
_	Service ti	me	1	Juan	Sucs		*
	Outputs		A 1 (0) 11 (1) 14	VAV			۲
	Outpi	ut	Analog (9) Heating V	Virtu	als		
In	tegration	time					
Pe	riod of int	egration of	difference between the				
- Se	tpoint and		s variable. Set to zero to				
		General     Type     Service O     Synchror     Inputs     Setpc     Proce     Gain     Enable     Integration     Derivativ     Service ti     Outputs     Outputs     Outputs	Constants     Outputs     Outputs	Image: Second	Image: Service Order       Tuneable Forward PID       Image: Service Order       Favor         Service Order       1       Consistent       Consistent         Service Order       1       Consistent       Consistent         Setpoint       Analog 1 Room Setpo       R         Process Variable       Analog (1) Room Te       R         Gain       Analog       Consistent         Integration time       Analog       Funct         Derivative time       Analog       Matti         Constants       Integration time       900         Derivative time       0       Setpoint         Outputs       Vav       Vav         Integration time       Process Variable, Set to zero to	Image: Service	Image: Service Order       Tuneable Forward PID       Favorites         Service Order       1       Constants         Service Order       1       Digital Constant         Synchronised Stat       Disconnected       Integer Constant         Setpoint       Analog 1 Room Setpo       Real Constant         Process Variable       Analog       Functions         Enable       Digital       Constants         Derivative time       Analog       Functions         Derivative time       Analog       Math         Constants       Schedules, Timers, and L       Setpoints, Inputs, and O         Service time       1       Statistics         Output       Analog (9) Heating V       VAV         Output       Analog (9) Heating V       Virtuals

## The Ribbon

At the top of the **CXpro<sup>HD</sup>** User Interface, there is a palette similar to many Windows applications called the Ribbon. The Ribbon allows access to the majority of **CXpro<sup>HD</sup>** features.



The feature options are grouped into tabs each of which contains a different set of options.

### The Quick Access toolbar

If there are specific Ribbon feature options that you use often, you can add them to the **Quick Access Toolbar** where they will be accessible at all times:



To do this, right-click on the feature in the Ribbon and select Add to Quick Access Toobar :



## CONNECTING TO A FIELD CONTROLLER

Work in **CXpro<sup>HD</sup>** can be done on-line or off-line. When on-line, the **PC** can communicate directly to the controller. When off-line, there is no direct link between the **PC** and the **controller**. For tasks that involve direct communication between the **PC** and the **controller**, e.g. uploading or downloading information, it is necessary to work on-line.

• To work online, you must connect to the controller by clicking on the **Connect** button in the **Home** tab of the **Ribbon** :



• To work off-line, click the **Disconnect** button.

## **OPENING STRATEGY FILES**

To open a strategy file in **CXpro<sup>HD</sup>**, you can

Create a new strategy •

#### or

CXpro<sup>HD</sup>

Open an existing strategy file. •

It is possible to open multiple files: multiple new strategies in different controllers, multiple existing files, or a mixture of both (see page 19)

To create a new Strategy, either double-click on a Field Controller in the Site List that does not already have a Strategy associated with it or select New from the File menu



You will be asked if you want to create a new strategy - click Yes.

To open an existing Strategy file, double-click on a Field Controller that has an associated Strategy, or select Open from the File menu:

🛄 후	E	ingineering Centre
File T Home	Controller Strategy	
<u>N</u> ew	Recent Documents	BACnet P
🗁 Open	1 001 01 222	BACnet U
Save	1001_01.552	dules to Strategy [
Save <u>A</u> s		ategy
Save A <u>I</u> I		
Footers		

## NAVIGATING A MULTI-PAGE STRATEGY

For clarity, many strategies are drawn over several print-pages. To facilitate navigation through these pages, **CXpro<sup>HD</sup>** provides a **Page Navigation** panel.

To open it, select Navigation on the Home Ribbon.

<b>—</b> =								E	ngir	nee	ring	g C	ent	re - l	8.00.00-286
File • Home	Controller	Strat	egy												
💉 Connect 💉 Disconnect Site	Copy Paste Select All Clipboard	Site List	Pro	pertie igatio e Nan	n [ nes Q	Ma Ma Sei Vie	odule acros arch w	es [	Str Re	ateg opei	y H n St	elp rate	gies	Ca	onfiguration Database D Interface N
Site List		4 ×	4	001	01.s3	2							Þ	×	Properties
B-단 Sites - 단 BACI - 단 BACI - 단 - 단 - 단 - 단 - 단 - 단 - 단 - 1 - 단 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	net IP 01 - Network 9, 001 - 001 - UC 001 - 002 - CB ret Serial 01 - Network ole Apps BACnet	:U3213V :M24		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		* * * * * * * * * * *	• • • • • • • • • • •		~	

The button turns green to indicate the panel is currently displayed:

					Engineering Cer	tre - a	8.00.00-28	36
File • Home	Controller	Strate	gy					
💉 Connect 💉 Disconnect Site	Copy Paste Select All Clipboard	Site List	Properties Navigation Page Names	Modules Macros Search View	Strategy Help	es Co	onfiguration	Database Di Interface Ma
Site List		Ф 🗙	Navigation			. Д. 🗙	Properties	
Sites - He BACr - HE BAC	net IP 01 - Network 9, 001 - 001 - UC 9 001 - 002 - CBI et Serial 01 - Network ole Apps BACnet	U3213V V124		Ξ				

The **Navigation** panel appears by default as a docked panel within the **CXpro<sup>HD</sup>** window, but by dragging its title bar it can be repositioned within the window or even 'popped out' as an independent window that you can position anywhere on your monitor:

Navigation		x
	-	

The Navigationpanel shows blank rectangles to indicate strategy blocks and a red rectangle to who the currentStrategy Drawing Pane. Dragging the red rectangle moves the display within theStrategy Drawing Pane :



## Labeling the pages within a strategy drawing

An alternative method for navigating a large Strategy is to use page names. A pane is available for this, to open it click on the Page Names button in the Home ribbon:





The **Page Names** panel appears by default as a docked panel within the **CXpro<sup>HD</sup>** window, but by dragging its title bar it can be repositioned within the window or even 'popped out' as an independent window that you can position anywhere on your monitor.

<b>—</b> :																
File × Home	Controller	Strat	egy													
🗯 Connect	Copy	h.	Properties	Module	Strategy Help					1						
S Disconnect	Paste	4	S Navigation	Macros	Reopen Strateg	ы – <b>Ф</b>		⊻ ∟_#։	L3 L(	•						
	Select All	Site	Page Names	Search		Configuration	Interface Mana	ilog Site ager Organiser	Backup NB-Pi	0						
Site	Clipboard			View			Util	lities								
Site List		- <b>4</b> - <b>X</b>	4 001_01.s3	2										ÞΧ	Page Names	# 🖬 (
E- Sites														^	+ 🔀 🗆 Show Page Numbers On Drawing	
B-To BACn	et IP													1.1	Page Number Page Name	
B-92 0	01 - Network	1122120														
	001 - 002 - CB	M24												1.1		
B-물 BACn	et Serial				Analog Input	1								1.1		
<u>⊕</u> . <u></u> 00	01 - Network				AI Room Temper	ture					TIT TUNE	able Hysteresis	1			
⊞ <u>≣</u> _ Samp	le Apps BACnet					Roint Q (1)					D_	Artice Mich I				
											(1) O Depti	Active Low				
											) Off Level	01 1 1 1 1 1				
											Chineven 2.00	Off level: 4.00				
				(	Analog Setpoint Room Temp	1		David	and Mainhia							
				· · ·	Setpoint			N	and variable							
				E				1 O Input 1	High value 1 4							
								2 O Deadband 1	Low value 14	2 <b>1</b>						
								O Deadband 2	Low value 24	5						
					Analog Setpol Room Temp Se	tting		Type 1: 2: Type 2.00: Deadband	2: 2: Deadband 1 2: 4.00							
					o 100 deadband	Boint Color										
						1.1.0										
															There are no items to show in this view.	

The Page Names pane allows you to hide the page number on the Strategy Drawing:

And allows you to add names for pages instead numbers:

Þ	>	×	Page Nan	nes				Ļ	x	r - 1
		^	<b>★</b> ×	🔲 She	ow Page Nu	mbers On	Drawing			
			Page Nu	mber	Page Nan	ne				
			1		New Page	e Name				
										-
•										
<b>•</b> •										
file - Home	Cont	troller Str	stegy							
Ste	Class	ect All List	Austgation     Macros     Macros     Marros     Marros     Marros     View	Reopen Strategies Configu	ntion Database Datalog Site Back Interface Manager Organiser Utilities	up NE-Pro				
Site List										
G- 🚯 Stes B- 🔓 BACo	et IP		New Page	Name			< d	Page Names     Page Num     Page Number Page Num	bers On Drawing	- 0
G-Q Stes G- <u>To</u> BACo G- <u>C</u> 00	et IP 01 - Netw 5 001 - 0 9 001 - 0	work 101 - UCU3213* 102 - CBM24	New Page	Name				Page Names     Page Names     Page Number     Page Name     New Page Name	bers On Drawing Same	- 0
0-10 Stes 0-10 Bin	et IP 01 - Netw 001 - 0 001 - 0 et Serial 01 - Netw Ie Anns I	vork 101 - UCU32139 102 - CBM24 vork BACort	New Page	Name			< 4	Page Name     Page Name     Page Num     Page Number     Page Name     None Page 1	bers On Drawing Some	• 0
日日 5 Stes 日日 20 BACA 日日 20 CA 日日 20 CA 日 20 CA 日 日 20 CA 日 日 20 CA 日 日 20 CA 日 20 CA 日 日 20 CA 日 20 CA 日 日 20 CA 日	et IP 21 - Nietw 5, 001 - 0 6 001 - 0 et Serial 21 - Nietw Ie Apps 8	verk 201 - UCU3213 202 - CBM24 verk BACnet	New Page	Name			< 4 	< Page Names Page Names Page Number Page Numb	bers On Drawing	- 0
0 월 546 8 월 14 AGA 8 월 14 AGA 14 AG	et IP 01 - Netw 5, 001 - 0 6 001 - 0 et Serial 01 - Netw ie Apps 8	eork 201 - UCU3213/ 202 - CBM24 eork BACnet	New Page	Name			< 4	K Page Name ★ ★ X Shor Page Num Page Number Page Name Number Page Name Number Page Name Number Page Name	bers On Drawing	
0-10 Stee 0-10 Bit Co 0-20 Bi	et IP 01 - Nietw 5,001 - 0 001 - 0 et Serial 01 - Nietw ie Apps II	eork 2001 - UCU32137 2002 - CBRQ4 eork BACnet	New Page	Name		Al Receipton 1 Receipton Proceeding	< 4	< Page Name	bers On Drawing	-
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ot IP 11 - Netw 5, 001 - 0 6 001 - 0 et Serial 11 - Netw Ie Apps 8	- 2 101 - UCU3213 02 - C8040 102 - C80400 102 - C8040 102 - C80400 102 - C8040 100 - C8040 100 - C8040	New Page	Name		AI Rean Temporare beneficial beneficial	< (	C Page Linear: ↑ ★ X = Store Page Name Page Namber Page Name 1 tone Page X 1 tone Page X	bers On Drawing	- 2
C € 500 0	et IP 31 - Netw 5 001 - 0 6 001 - 0 et Serial in - Netw ie Apps II	eork 301 - UCU3219 302 - CBM24 eork BACnet	New Page	Name			د د المالي ( المالي ) المالي ( المالي )	Toge theme by the Y ⊂ Deer Page Nume Tage Number → Page Nume 1 Number → Page Number 1 Number > Page Number 1 Number > Page Number 1 Number > Page Number	bert On Drawing	- 8
C € 10 EE 0 ± 00 EE	et IP 21 - Nethe 5, 001 - 0 et Serial 21 - Nethe Ie Apps 8	eork 201 - UCUI2139 202 - CBR24 eork BACnet	New Page	Name			[2] Make 	Septement ↓ X □ Deer logs here frage freeders Frage here transformer in the second second second second second second second second second second second second second second second second second second second	hers On Drawing	* 8
	et IP 11 - Nettswi 6 001 - 0 6 001 - 0 6 ce Serial 1 - Netts ie Apps II	work 2011 - UCUI2139 2022 - CBR24 work BACnet	New Page	Name				Ingelment ↓ X □ Deer loge hare trap threader 1 months in the set of the set 1 months in the set 1 months	bers On Drawing	. 2

Double-click on the name in the Page Names pane to edit it:

	д 🗙 I					
+ 🗙 🗖 Show Page Numbers On Drawing						
Page Name						
Inputs						
	w Page Numbers On Drawing Page Name Inputs					

and the new name is displayed on the Strategy Drawing:



Click on a name in the Page Names pane to align the top left corner of that page in the top left corner of the Strategy Drawing Pane :

🛄 🗧	Engineering Centre - 8.00.00-286
File - Home Controller Stra	tegy
Connect Disconnect Site Clipboard	Improperties       Improvements       Improvements <td< th=""></td<>
Site List 🕮 🕮	4 001_01.s32 ▷ × Page Names
E-Sites	A + X Show Page Numbers On Drav
	Process Page Number Page Name
i	I Inputs
001 - 001 - UCU3213V	2 Process
BACnet Serial	
DACHELSEN	
H	
	P Tuneable Hysteresis 2
	(1) O Input Active High D
	On Level Active Low 2
	3 Off Level On peel 2:00: Off Level 4:00

**CXpro<sup>HD'</sup>s** Find pane is a facility for locating specific objects in a strategy,

It is opened by either pressing [Ctrl]+[F], or by selecting the search window from the Home tab of the Ribbon.

Search Results		
X Delete Select All Module	▼ Type Boolean ▼ Name	Vumber Q Find Q Q
□ □ Search results for "subtype: Boolean,typ	e: Module" in strategy BACnet IP: 001 - Network: 001 - 002 - CBN	Л24 (2 matches)
Boolean		

This pane contains a number of lists in which you can specify a number of filters to reduce the kinds of items that will be located – for example in the screenshot above, only Boolean modules are shown.

You can then step through all of the matching items in the strategy drawing using the mouse or arrow keys and selecting the module discovered in the search results. The current match will be highlighted in the drawing:

				_				
		D D	Boolean <sup>1</sup>			DD B	olean 2	
		Input A	Output 🗖		1	Input A	Output	
		🗗 Input B	Complement 🗗			Input B	Complement	
		Input C				Input C		
		Input D				Input D		
				(	I			
1								
Search Results								
🗙 Delete 🛛 Select All	Module	Type Boo	lean	▼ Name		Ŧ	Number	Q Find Q Q
⊡ · □ Search results for "sub	type: Boolean,type: Module	" in strategy B/	ACnet IP: 001 - Netw	vork: 001 - 002	- CBM24 (2 ma	atches)		

Boolean Boolean Basic tasks

## ZOOMING AND NAVIGATING THE DRAWING AREA

The drawing area can be displayed in an enlarged or reduced view. The default view is 100 %, i.e. full size.

With a mouse, zoom in and out by rotating your mouse wheel with the control button pressed on your keyboard.

If you do not have a mouse with a mouse wheel or are using a trackpad, you may use the zoom slider at the bottom of the drawing area to zoom in and out.



For navigating around the drawing area, you can use the scrolls located on the right and bottom of the drawing area.

The mouse wheel may also be used to move around the drawing. Scrolling up and down with the mousewheel will move the drawing up and down. Scrolling up and down with the Shift button pressed on your keyboard, you may move right and left.

You may also use the right mouse button to drag the strategy around in the drawing area.

If you are using a trackpad, the Navigation Pane makes it easy to get around your strategy.

## CHANGING THE DISPLAY

The following features of **CXpro<sup>HD</sup>** can be customized:

- **Drawing Area (Grid Settings).** To simplify positioning modules on the drawing area, you can choose a grid of either lines or dots. You can also customize the size of the grid from 8-pixel to 56-pixel squares (see page 25).
- **Colours.** The colour of either the background or the grid can be customized using the **Colour** menu option from the **Display** menu. In addition to the standard colours available, custom colours can also be defined *(see page 25).*
- Macros. If the work you do in CXpro<sup>HD</sup> involves repetitive strategies or parts of the strategies, you can create macros (*see page 146*) to automate much of that work. You can arrange those macros in groups and, using an art tool, such as Microsoft Paint, you can draw icons to represent the macro groups and individual macros you have created.

## MODIFYING THE DRAWING AREA (GRID SETTINGS)

From the Strategy tab on the Ribbon , choose Grid .



This opens the **Grid** dialog box, where you can specify whether or not to show the grid, and if it is shown, whether you prefer lines or dots. You can also set the spacing of the grid.



## MODIFYING DISPLAY COLOUR SETTINGS

From the Strategy tab on the Ribbon , choose Grid Colour or Background Colour .



In both cases, the **Colour** dialog box is called. This allows you to select from a range of colours. You can also make custom colours, by clicking on the **Define Custom Colours** button. When you have selected the colour you require, click **OK**. The colour is applied immediately.



**CXpro<sup>HD</sup>** allows you store files on disc by:

- Saving a new file
- Saving changes to an existing file
- Saving multiple files at once

Files will be saved in the "strat5" folder of the relevant site directory, under a numbered directory. The number of the directory matches the number of the BACnet Router to which the targeted controller is attached - for example:

```
C:\CXproHD\Lan\strat5\001\001_01FanCoil.stg
```

would be a strategy in a controller on the first BACnet Router of the site called "LAN".

### Saving a new file

If a file is being saved for the first time, press [Ctrl]+[s] on your keyboard or choose Save from the File drop-down.



This produces the Save As dialog box allowing you to specify how the file is to be saved:

-	Save As	×
) ( ) → ( ) ( ) →	✓ 🖒 Search 001	,p
Organise 🔻 New folder		0
CAMPBLOR ACCHIVE dbase DRAWINGS KEYPAD MACROS strat5 001	▲ Name ↓ Upload □ 001_01.s32	
Upload	v <	>
File name: 001_01.s32 Save as type: V6 Strategy (*.s32)		* *
See Hide Folders	Save Cance	el

#### Saving changes to an existing file

If you have made changes to an existing file and wish to save those changes, but do not wish to rename the file, nor save it to a different location on the PC, you can save the file in two ways:

- Press [Ctrl]+[s] from the keyboard or
- choose Save from the File drop-down.

🖳 🗧	
File 🔹 Home	Controller Strategy
<u>N</u> ew	Recent Documents
<u>○</u> pen <u>■</u> Save	<u>1</u> 001_01.s32
Save <u>A</u> s	2 001_02.s32
Sa Save As Fo Save the I Page Size	strategy with a new name.
Print Set <u>up</u> Print Close	
	() <u>H</u> elp ()
	Apps BACnet

#### Saving more than one file

If you have a number of files open and wish to save them all, choose Save All from the File drop-down. This saves each of the files.



If one of the open files is being saved for the first time, **CXpro<sup>HD</sup>** will prompt you to specify a drive, directory, name, and file extension for that file by calling the **Save As** dialog box.

## PRINTING

CXpro<sup>HD</sup>

**CXpro<sup>HD</sup>** can generate a hard-copy **printout** of the current strategy.

## Including a footer in a printed strategy

When you print files created in **CXpro<sup>HD</sup>**, they include additional information at the end of the printed page in the form of a footer. The footer includes the name of the site, as well as the **BACnet Router** and **Field Controller** for which the strategy is designed. You can edit the footer to include your name, your company's name, the name of the project to which the file belongs, the number of the drawing if any, and the date and details of any revisions made to the drawing.

#### How to edit the footer that will appear with the strategy when it is printed:

Choose Footers from the File tab of the Ribbon .

This opens the **Footers Details** dialog box:

Footer Details			×	
Company Name Company <u>A</u> ddress	Cylon Controls Clonshaugh Bu Clonshaugh Dublin 17 D17 A662	Ltd. usiness and Techno	logy Park.	
Project Project Title Open-Plan Office Eile 001_01.s32 Project No. 14 Drawing No. 5				
Revision Rev Date A 23/07 B C D	Drawing 7/15 3	Checked Rema	ırks	
			<u>Save</u> <u>C</u> ancel	

Enter the required details and click Save.

## Altering the print set-up

To define how the strategy is to be printed, choosePrint Setupfrom theFile Tab of the Ribbonto open the standardMSWindowsPrint Setupdialog box, where you can specify the required printer, paper, etc.

Print Setup		×
Printer		
<u>N</u> ame:	Brother HL-2170W series Printer	<u> </u>
Status:	Ready	
Type:	Brother HL-2170W	
Where:	WSD-63b62ecc-9045-4af1-b52e-8efa8	3b006811.006f
Comment	:	
Paper		Orientation
Size:	Letter	C Portrait
<u>S</u> ource:	Automatically Select	A r Landscape
Net <u>w</u> ork		OK Cancel

## Printing a file

To print a file, choose the **Print** option from the **File** tab of the **Ribbon**. This opens the standard **MSWindows Print** dialog box to specify the required printer, pages to be printed, and the number of copies.

🖳 👳			~
File - Home	Controller Strategy	Print	~
New New	Recent Documents	Printer	
Den Save	<u>1</u> 001_01.s32	<u>N</u> ame: <u>Brother HL-2170W series Printer</u> Status: Ready	<u> </u>
📱 Save <u>A</u> s 🖺 Save A <u>I</u> I	<u>2</u> 001_02.s32	Type: Brother HL-2170W Where: WSD-63b62ecc-9045-4af1-b52e- Comment:	Sefa8b006811.006f
i⊒ Foo <u>t</u> ers ⊡I Page Si <u>z</u> e 壹I P <u>r</u> inter Scaling		Print range	Copies
Print Setup		C Pages from: 1 to: 12 C Selection	11 22 33 Collate
Print Print	the strategy.	,	OK Cancel

## Changing the size of a Printout

If a strategy is large, it may not be possible to view enough modules on each page with a standard printout. **CXpro<sup>HD</sup>** has a Printer Scaling option, which allows you to decrease the printed size of the strategy so that more of it is visible per page.

Also, if you have set a strategy up for printing on a particular printer, you may find that if you try printing on a different printer it may not fit properly on the page. The Printer Scaling option allows you to adjust the printout size to compensate for this.

To resize a printout, select Printer Scaling... from the File menu

This opens the **Printer Scale** dialog box:

Printer Scale	$\times$
Printer Scale 100 🕂 %	
Apply to all open documents	
<u>OK</u> Cancel	

Enter a scaling factor between 20% and 300%.

- Factors from 20% to 99% will decrease the size of the modules in the printout.
- Factors from 101% to 300% will increase the size of the modules in the printout.

Ticking the Apply to all open documents box will set all currently-open Strategies to print with the same scale.

# Basic tasks

## Fitting a Strategy to a page size when printing.

The **Strategy** drawing indicates where Modules will appear on the printed page, by drawing gray borders on the **Strategy** drawing. In this example, the printer scaling is 100%



The **Printer scale** setting will change the size of the pages relative to the modules. Below shows an example of the printer scale of 200%



The physical page size represented by the gray borders is set by selectingPage Sizefrom theFiletab of theRibbonThis opens thePage Sizedialog:dialog:dialog:dialog:dialog:

Page Size X
Use Standard Page Size
A4 💌
C Use Custom Page Size
1130 x 799 x
<u>OK</u> Cancel

## CLOSING FILES

You can close an open Strategy file in two ways:

Click the Close button at the top right-hand corner of the file window,



or

Select Close from the File tab of the Ribbon.



If changes have been made to the file since the last save, **CXpro<sup>HD</sup>** will prompt you to save it before closing. If more than one file is open, selecting **Close** from the **FileTab of the Ribbon** closes the active window.

# SECTION 3: SYSTEM CONFIGURATION



## SYSTEM CONFIGURATION DEFINITIONS

In order to properly communicate with and engineer **Cylon BACnet** Sites, the **Cylon** software installed on a PC must be given specific configuration information describing the **sites** to which the Software will connect, and the methods of connection to each of those **sites**.

## What is meant by "System" during configuration?

The "System" is the current installation of **CXpro<sup>HD</sup>** software.

#### What is a "Site"?

A physical **BMS Site** in the Cylon system is either a single **Field Controller** acting on its own, or a collection of Field Controllers grouped into **fieldbusses**, co-ordinated by one or more **Network**s.

In the Cylon Software, a "Site" is the virtual representation of such a physical BMS installation, and that virtual representation is specified using the Cylon Configuration utility.

#### What is meant by "Network"?

There are 2 distinct types of channels through which the Cylon Software can connect to a physical BMS installation:

- Serial Connection (RS232)
- BACnet IP

Each of these channels can be enabled or disabled, whether or not **Sites** have been configured to use them. Disabling channels can prevent delays when connecting to or disconnecting sites, by avoiding 'auto detection' being carried out through unused channels.

## **CONFIGURING SITES**

When you set up a Site, you need to provide the following information:

- The method that the supervisor PC will use to communicate with the Site
- The name of the Site
- The directory on the PC where the site information is stored
- The number and type of controllers on the site
- The controller names

#### Defining the contents of a site

The Cylon software system must be able to communicate directly with individual controllers within a **Site**. In order to do this, the software system must know how many controllers a **Site** contains and must be able to identify individual controllers.

The following information must be specified for each Site:

- The number of Networks on the Site
- The number of Field Controllers that are attached to each Network
- The names of the Field Controllers on the Site

This information is specified when adding a Site to the system by right-click on the root node of the Site Tree (i.e. the Sites node) and selecting Add Site



to open the Add Site dialog:

Add Site	×
Name: Directory:	
Type of Connectio	n for this Site:
	C Serial Connection
	BACnet IP     BACnet IP     BACnet IP     BACnet IP     Second Content     Second     Second Content
Enable BBMD - S	ite Level
IP Address	0 . 0 . 0 . 0 47808
Time to Live	60 seconds
	Enable BACnet NAT
	OK Cancel

or when editing an existing Site by right-clicking on its node in the Site Tree and selecting Site Properties

□				Site Properties Name:	X Eampus block R
B→ H₂ Compus block R D→ H₂ PL Office D→ H₂ OU1 - Neth D→ H₂ OU1 - D→ H₂ OU1 -	Discover Site Backup Site Export ASPECT/INTEGRA Data Create BACnet EDE Data Commission BACnet Devices Edit Controllers Delete Site Site Properties	to open the dia	Site Properties alog:	Directory: Type of Connection 	CAMPECK           for this Site:           Serial Connection           @ BACnet IP           te Level           0 . 0 . 0 . 0           60           seconds           Enable BACnet NAT

#### Site Properties / Add Site Dialogs : Site Information section

Each site on the system is given a unique name to identify it to the user and Cylon programs.

#### Name

The Site Name is used to identify the site at all places throughout the Cylon system. The Site name is entered in the Name field of the Add Site dialog box and can be edited in the Site Properties dialog when editing an existing Site.

Site Information	
Name	PL Office
Directory	PLOFFICE
Name	PLOTTICE
Manie	

PLOFFICE

Directory

#### Directory

You use the **Directory** field to specify the directory that will contain the site information.

When adding a new Site, enter the name of	the directory to a	contain the files for this <b>Sit</b>	<b>te</b> . The name that you input
here will be assigned to a subfolder of the c	Xpro <sup>HD</sup> directory	, that will be created to co	ontain the site information.

- The software will suggest a directory name as you type the Site name in the Add Site dialog.
- The Directory name is limited to eighty characters.
- Giving two sites the same **Directory** name will cause the system to malfunction.
- The Directory cannot be edited in the Site Properties dialog when editing an existing Site.

## Site Properties / Add Site Dialogs: Selecting the Network for connection to a site (Type of Connection)

Type of Connection for this Site

Serial Connection

BACnet IP

#### Serial Connection (RS232)

If the Supervisor PC will connect to the Site by Serial communication (RS232), select Serial Connection

#### BACnet IP

#### Editing the number and names of controllers on a site

There are several reasons why you may wish to edit the information about the controllers on a particular site. For example:

- A new Cylon site has been set up
- A Cylon site connected to the PC has changed, (so the system information has to be changed to match)
- You want to change the description of a controller

Cylon programs must contain accurate information about the number and types of controllers that each site contains. This allows the supervisor PC to communicate accurately with the system sites.

You must specify the number and names of Networks on a site, and the number and names of Field Controllers attached to each Network.
To edit the controllers on a Site, right-click on the Site in the Site Tree and select Edit Controllers :

	🗞 BACnet		Compare
Site	Configura	ation	
Site List		џ 🗙	
⊡         Sites           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿           ⊡         廿	0801 net IP net Serial pus block R		
	01 - Netw , 001 - 0 001 - 0	Discove Backup	r Site Site
⊡ <u>₽</u> PLO1	ffice 01 - Netw	Export A Create E	ASPECT/INTEGRA Data BACnet EDE Data
	001 - 0	Commis	sion BACnet Devices
	02 - Netw	Edit Cor	ntrollers
⊕ <u>₽</u> Samp	ole Apps B	Delete S	5ite Vo
⊡ <u><del>2</del></u> Store	s	Site Pro	perties

Which opens the **Edit Controllers** dialog, showing all of the **Networks** on the site. When a **Network** is selected, the dialog displays the **Controllers** connected to the selected **Network**.

Edit Controll	ers - Campus block R									×
Networks 1 Netwo	rk(s) for Site: Campu	is block R				Controllers 2 Contr	oller(s) for Network:	001 - Network		
Address	Name	Туре	Network	Device In	Duplicate	Address	Name	Туре	Device In	
	001 - Network	CBR	1			1 2	001 - 001 - CBM08 001 - 002 - CBV-2U	CBM08 CBV-2U4-3T-N	41 65644	
Add	Edit	Delete			Add Multiple	Add	Edit	Delete	Add Mu	ıltiple
								01	Car	ncel

Note: You can also select a Network by opening the Edit Controllers dialog directly from that Network in the Site Tree :

Site List	무 🔀		Edit Cont	rollers - sample Apps o	ACHE								
E-S Sites			Networks						Controllers				
	)1		6 Net	work(s) for Site: Sam	ple Apps BACnet				1 Cont	roller(s) for Network:	003 - FCU		
표-문o BACnet	IP		Address	Name	Type	Network	Device In Du	plicate	Address	Name	Type	Device In	1
BACnet	Serial		1	001 - Wet Systems	CBR	1	1710100		2	10090100 Modulati	CBX-8R8	1710302	
H-P- Campu	s block R		2	002 - AHU	CBR	2	1710200	_					
n E PL Offic	·e		4	004 - VAV	CBR	4	1710400						
	Appr RACost		5	005 - RTU	CBR	5	1710500						
	Wet Contents			000-11	COR	0	1710000						
	- wet systems												
	- AHU												
무옥딸	Even and ACOD CT (INTE	COA Data											
	Export ASPECT/INTE	EGRA Data											
<u>∎ ≅ °</u>	Update BACnet EDE	E Data											
<u> <u> <u> </u> <u> </u></u></u>													
₫	Commission BACnet	t Devices	<					>					
亩-물 <sub>므</sub> Stores	Edit Controllers		Add	Edit	Delete		Add	Multiple	Add	Edit	Delete	Add	fultiple
	Devites Description	AT .											_
	Router Properties	- 0										OK C	ancel

The Edit Controllers dialog box is used to specify the Network and Field Controller numbers and names.

By default, **Networks** are assigned sequentially numbered names in the format 001-Network, and Field Controllers are assigned names in the format 001 - 001 - CBM24, with the Network or Field Controller number increasing in line with the number of controllers on the site.

The Field Controller name must be unique in the Site, so the Router address is included - e.g. on Router address 1, and Field Controller address 2 it can be either 001 - 002 - CBM24, or CBM24 - 002 - 001.

The default names are automatically assigned but can be edited as necessary.

The dialog box allows you to specify the types of **Networks** and **Field Controllers** contained in the site, and the number of **Field Controllers** that are attached to each **Network**.

The left-hand pane of the dialog lists the **Networks** on the site. At the top of this pane, the **Site** Name and total number of **Networks** are displayed:

*	1	orks Netwo	ork(s) for Site: F	PL Offi	ce		
			Name		Туре	Device In.	Duplicate
			001 - Network		CBR		

The right-hand pane of the dialog lists the **Field Controllers** connected to the **Network** that is currently selected in the left-hand pane. At the top of this pane the name of the selected controller and the total number of **Field Controllers** attached to the selected **Network** are displayed:

Control	lers			
0 0	onti	oller(s) for Network:	001 - Network	
Ad		Name	Туре	Device In

#### Adding Networks to a Site

Before adding Field Controllers, one or more Networks (fieldbusses or Subnets) must be defined. The fieldbusses can be MS/TP or Modbus.

To add a new Network to the site, click the Add button underneath the Network list.

The New Router dialog will appear:

New Router		×
Network Number		
Name	002 - Network	
('001 - Net	work' or 'Network - 001')	
Controller Type	CBR	
Device Instance	(0 to 4194302)	
IP Address	· · · ·	
Enable BBMD - Ro	uter Level	_
IP Address	· · ·	
Time to Live	seconds	
	Enable BACnet NAT	
	OK Canad	1
	OK Cancel	

The next available **Network Number** is automatically assigned, but you can manually enter a different value in the **Network Number** field.

- Enter a name for the Network in the Name field.
- Select the Router type from the Controller Type drop down list.
- Enter a BACnet Device Instance Number .
- Optionally enter an IP address and Port Number for the Router.
- If the Router is to be used as a **BBMD**, to transfer communications to a different **BACnet** network, check the **Use as BBMD** checkbox.

Click the **OK** button to confirm your choice.

#### **Note**: Additional tabs are displayed if a Modbus-enabled router is selected, to allow different Address and Name to be set for each fieldbus.

Address: 1	MSTP1   Modbus   Address: 1
Name: 001 - Network	Name: 001 - Network
Name format: '001 - UCxxxx' or 'UCxxxx - 001'	Name format: '001 - UCxxxx' or 'UCxxxx - 001'
Default Type:	Default Type: CBR/MOD 💌
Device Instance Number: (0 to 4194302) 5321	Device Instance Number: (0 to 4194302) 56161
OK Cancel	OK Cancel

**Note**: If the router type is set to CBXi, then additional fields are displayed in the Edit Router dialog that matches the Field Controller dialog described in Editing Controller information on page 40 and FLX I/O modules on page 41

ħ	letwork Number	2	
	Name	102 - Network	
	('001 - Netw	ork' or 'Network - 001')	
	Controller Type	BXi ~	
Device I	nstance Number	54231 (0 to 4194302)	
	IR Address - Port	102 168 05 146 . 57	
Modules	IP Address : Port	192 . 168 . 85 . 146 : 67	
Addr	Туре	Dipswitch	Add
1	FLX-8R8	1 2 3 4 5 APEMA ONI	Dele
2	FLX-4R4-H	1.2.3.4.5 APEM: 0N1	
		ОК	Canc

**Note**: If the router is set to a type that does not support routing BACnet traffic to MS/TP networks, the right-hand section of the Edit Controllers dialog will be disabled.

#### Adding Field Controllers to a Site

To add a new Field Controller to the currently selected Network, click the Add button underneath the Field Controller list. The New Controller dialog will appear.

New Controller ×
Address 1
Name 001 - 001 - CBM24
Name format: '001 - 001 - CBxxx' or 'CBxxx - 001 - 001'
Controller Type CBM24
Device Instance Number 5539 (0 to 4194302)
OK Cancel

The next available controller address is automatically assigned, but you can manually enter a different value in the Address field.

Enter a name for the Field Controller in the Name field.

Note: A controller name cannot be more than forty characters long.

Select the Field Controller type from the Type drop down list. By default, only controller types from the current product range are listed. However, if the View All Controllers box is ticked, all supported controllers will be listed. Click the OK button to confirm the choices that you made in the dialog.

Set the Device Instance Number . This must be an ID for this controller that is unique within the Cylon BACnet Site.

Note: The number set here in the CXpro<sup>HD</sup> must match the Device Instance Number set in the Field Controller.

#### Editing Controller information

Clicking the relevant **Edit** button while a **Network** or **Field Controller** is selected causes an **Edit** dialog to open, which has identical parameters to the corresponding '**New**' dialogs above. If you change the values of any of the parameters in an **Edit** dialog and click the **OK** button then the parameters of the selected Controller will be updated to match the dialog.

#### FLX I/O modules

If the site includes **CBX-8R8** devices, their I/O capabilities can be expanded by adding **FLX** devices. The expanded I/O must be configured on each **CBX-8R8** device as follows:

In the New Field Controller Details dialog change the Controller Type to CBX-8R8 :



An I/O Modules table will become visible in the New Controller dialog:

		New Controller	×
	Address	2	
Name	Name	001 - 002 - CBX-8R8	
Co	ntroller Type	CBX-SR8 V View All Controllers	
Device Insta Modules	ance Number	(0 to 4194302)	
Addr Tj	pe	Dipswitch	Add
The	ere are no iten	ns to show in this view.	Delete
Device Instan	ice Number m	ust not be empty! OK	Cancel

If the **CBX** device has one or more **FLX** modules connected to it, add the same number of entries in the **I/O Modules** table:

I/O Modules		1/0 Mod	ules			I/O Modu	les		
Address Type Dipswit	ch Add	Addres	з Туре	Dipswitch	Add	Address	Type	Dipswitch	Add
These are no items to show in this	Delete	1	FLX8R8	1 2 3 4 5 APEM4 ONI	Delete	1	FLX8R8	1 2 3 4 5 APENL ONI	Delete
There are no items to show in the	s view.					2	FLX8R8	1 2 3 4 5 APEMs ONI	
Device Instance Number must not be		Device Inc	tance Number mus	nothe		Device Inst	ance Number m	ust not be	
empty!	OK Cancel	empty!	tance ritumber mus	OK	Cancel	emptyl	ance wantier m	OK	Cancel

If you attempt to add more modules than the CBX can support, an error message will be displayed:



When the correct number of FLX modules have been configured, enter a Device Instance number and click OK .

Comms Co	ntrollers on Site:				Field Co	ntroll	er on Subnet		
East Hall					001 · N	etwor	k		
				Totat 1					Total 3
Ad 🗵	Name	Туре	Device In	Duplicate ID	Ad	$\mathbf{Z}$	Name	Туре	Device In
<	UUI - Network	LBH		>	1 2 4		001 - 000 - CBM24 001 - 002 - 028 + 16 001 - 002 - 024 - CBT12W	CBM24 CBX8RB CBT12WAV	5001 456 774
Add	Edit Dele	te Genera	te Names		Add.		Edit Delete	Generate Nar	nes

In the Strategy drawing, IO blocks can be added up to the total on the configured FLX modules plus the CBX onboard IO.

**Note:** If a **FLX** module is deleted from a **CBX** configuration (in the Configuration Utility) after the Strategy drawing has been set up, the blocks associated with that **FLX**'s IO will be 'greyed out' to indicate that they are inactive.

#### Modbus devices

A CBX controller can communicate with up to 4 Modbus devices connected to its Modbus RTU port.

A **CBXi** Controller can communicate with 24 **Modbus TCP/IP** devices or 12 **RTU** devices.

These devices are configured in **CXpro<sup>HD</sup>** in a similar way to **FLX** modules.

To configure Modbus devices,

- 1. open the strategy of the CBX or CBXi to which the Modbus devices are connected
- 2. in the Site Tree right-click on the CBX or CBXi, and
- 3. select Configure Modbus Devices from the context menu



This will open a dialog that allows you to configure the **CBX**'s **Modbus RTU** port to match the attached devices and to add an **Address** and **Name** for each of those **Modbus** devices.

Configuring the CBX or CBXi's Modbus RTU port

Configure Modbus Devices		×
RTU      [15] Electricity Meter      [1] Lighting Offices      [1] Lighting Production	Configuration Baud Parity Stop bit Inter-packet delay Communication Timeout Deleting a device will disable a	9600       Image: Constraint of the strategy of the strategy.         1       Image: Constraint of the strategy of the strategy.
Devices used: 3 / 4 Add Delete		OK Cancel

When the **RTU** node of the **Device Tree** is selected, you can specify the **Baud**, **Parity**, and **Stop bit** settings that all devices on the **RTU** network will use to communicate.

**Note**: With Modbus, **all** devices on an RTU network must be configured with the same communication parameters for the network to function properly.

Set an Inter-packet delay value that is reasonable for the devices on your network. Modbus devices commonly need time for the RS-485 transceivers to switch from a writing mode to a reading mode. Some Modbus devices will write to their flash or perform similar operation before being ready for the next Modbus command to be sent. Set the Inter-packet delay to a value that allows for the worst-case operation.

The **Communication Timeout** is the time the **CBX** will wait before giving up on one request and moving on to sending the next request.

**Note**: The status output of a Modbus Analog or Modbus Digital module will display a value that is non-zero for any failing Modbus transmission.

#### Adding and Removing Modbus Devices

Before a **CBX** or **CBXi** can access **Modbus** points, it must be configured with a list of **Modbus** devices that is available to the **Modbus Analog** or **Modbus Digital** modules.

To add a device, click the " Add " button

Configure Modbus Devices		×
KTU     [15] Electricity Meter     [1] Lighting Offices     [1] Lighting Production	Configuration Baud Parity Stop bit Inter-packet delay Communication Timeout Deleting a device will disable a	9600         •           None         •           1         •           200         ms (40-500)           200         ms (200-10000)           any associated point in the strategy.
Add Delete	1	OK Cancel

A new device will be added to the tree. Select it:

Configure Modbus Devices		×
RTU     [13] Electricity Meter     [1] Uphting Offices     [1] Uphting Production     [1] Device of	Configuration       Name     Device 4       Address     1       Deleting a device will disable any associated point in the strategy.	
Devices used: 4 / 4 Add Delete	OK Cancel	

and then edit the Name and Modbus Address of the Modbus device.

The Address must be one of the following:

- Modbus RTU A number between 1 and 255.
- Modbus TCP An IP address with optional port, in the format nnn . nnn . nnn . nnn : pppp. The port (pppp) is separated by a semicolon. The port is optional, and if omitted the default Modbus port of 502 will be used.
- Modbus RTU device behind a Modbus Router An IP address with an optional port and RTU address in the format nnn . nnn . nnn . nnn : pppp / zzz The port (pppp) is separated by a semicolon. The RTU address for routing (zzz) is separated by a '/' character. The port is optional and if omitted, the default Modbus port of 502 will be used. For routing, the RTU address is required.

**Note**: The Modbus Addresses do not need to be sequential.

To delete a Modbus device from the list, choose the device, and click the " Delete " button.

At any time later, the Address of the Modbus device can be updated without any change to the Modbus Analog or Modbus Digital modules in your strategy.

#### Accessing Modbus points in the Strategy

To access a point within any of the **Modbus** devices configured for a specific **CBX**, add a **Modbus Analog** module or **Modbus Digital** module (whichever is appropriate for the point) to that **CBX**'s Strategy.



Modbus modules are displayed as follows:

Modbus Analog 1	Modbu	us Digital 2
⊘ Value in Value out ⊘	Value in	Value out 🗗
🗗 Write control Status 🛇	Write control	Status 🛇
Device: Device 1; Register: 0	Device: Device 1)	Coil/input: 0

In the module **Properties**, specify which of the **CBX**'s configured **Modbus** devices contains the required point:



The modules are capable of interacting with the following Modbus entities:

Module	Action	Modbus Entity
Modbus Analog	Reading	Input Register
Modbus Analog	Reading and Writing	Holding Register
Modbus Digital	Reading	Discrete Input
Modbus Digital	Reading and Writing	Coil

For writing to occur, the "Value in " input of the module must be connected. For reading to occur, the "Value out " output of the module must be connected.

If Write Control is connected, then the input value must be a 1 before COV or other timers are evaluated.

Reading data from a Modbus device is done periodically and controlled by the "Read Frequency" constant.

Writing can be performed either periodically or be triggered by a change of value. For a Change Of Value, if the input value to the module changes (or, in the case of a **Modbus Analog** module, changes by a predetermined amount), then a write is performed.

The Modbus Analog module can handle endian differences, word swapping, and interpretation of the value read from the Modbus device.

#### Removing a Controller from a Site

Clicking the relevant **Delete** button while a Network or Field Controller is selected, will remove the selected Controller from the list.

#### \* Adding Multiple Controllers

At certain times you may find it convenient to add several controllers to the site at once.

The **Edit Controllers** dialog contains an **Add Multiple** button underneath each of the Network and Field Controller lists.

- If you click the button under the Network list, you can automatically add several Networks to the Site.
- If you click the button under the Field Controller list, you can add several Field Controllers to the currently selected Network.

When you click either Add Multiple button, the relevant Generate Default Names dialog will appear.

Add Multiple Controllers	Add Multiple Controllers ×
Number of Controllers	Number of Controllers 1
Controller Type CBR v View All Controllers	Controller Type CBM08 V View All Controllers
Name Format 002 - CBR ('001 - <text>' or '<text> - 001' where 001 will be the incremented.)</text></text>	Name Format 002 - CBM08 ('001 - <text> ' or '<text> - 001' where 001 will be the incremented.)</text></text>
Starting Device Instance Number (0 to 4194302)	Starting Device Instance Number (0 to 4194302)
OK Cancel	A valid Device Instance Number is required! OK Cancel

These dialogs are similar to the Add dialogs for single Comms and Field Controllers, with the exception that the **Address** parameter is replaced with a **Number of controllers** parameter.

This parameter specifies the maximum address that will be used to generate controller entries. What that means is that controller entries are generated starting at the next available controller address and continuing as far as the address specified in the Number of controllers box.

For example, if controllers exist for the current Network up to address 5, and the Generate Default Names facility is used with 10 in the Number of controllers box, then Controllers will be generated for addresses 6, 7, 8, 9 and 10.

**Note**: The Number of controllers parameter does **not** represent the total number of items that will be added automatically. Instead, it represents the maximum address that will be generated.

#### Sorting the Controller List

The Network and Field Controller lists can be sorted based on:

- Address
- Name
- Type

By default, the controllers in the list are sorted by address. To sort by any of these columns, click the column header at the top of the controller list.

#### Saving the changes made in the Edit Controllers dialog

When you click **OK** from the **Edit Controllers** dialog, the changes are immediately validated.

#### CONFIGURING SERIAL PORT CONNECTION

In order to modify Serial Port settings, or to choose between serial ports if your PC has multiple ports, open the **Application Settings** dialog by clicking on the **Settings** icon in the **Settings** group of the **Home** ribbon:

ile 🔻	Home	Controller	Strategy					
💉 Co	nnect	С Сору	Properties	Page Names 🔍 Search				📥 🔥 BACnet
💉 Di	sconnect	Paste	BACnet Properties	Modules ? Strategy Hel		L <u>M</u> LÅ	; L•	Strategies
		Select All	List Navigation	Macros	Interface	Manager Organ	NB-Pro	Reopen Strategies
1	Site	Clipboard		View		Utilities		Settings

In the Application Settings dialog, select Serial Port Connection :

Application Settings				×
Download Options Scan Options Strategy Settings BACnet Configuration Serial Port Connection Commands Livelog	F Enable Seria Detected COM Port Port Speed	I Connection	2	
		OK	Cancel	Apply

#### CONFIGURING STRATEGY DEFAULTS

By selecting the **Strategy Settings** option in the **Application Settings** dialog, you can set several default values for new **Strategies**:

A 15 15 15 10	~
Application Settings	×
Application Settings Download Options Scan Options Strategy Settings BACnet Configuration Serial Port Connection Commands Livelog	Strategy files         □         □       Enable auto-backup         □       ▲         □       ▲         Analog inputs default         Temperature to:       □         □       ▼         Note: this value apply only to new analog inputs. Existing inputs will keep their values.         Analog value precision         Show this number of decimal places       2
	OK Cancel Apply

This can be opened directly by clicking on the Strategies icon in the Settings group of the Home ribbon:

le 🔹 Home	Controller	Strategy		
🚿 Connect 💉 Disconnect	습 Copy 라 Paste	Image Properties         Page Names           Site         BACnet Properties         Modules	Strategy Help	BACnet
	Select All	List Navigation Macros	Interface Manager Organiser	Reopen Strategies
Site	Clipboard	View	Utilities	Settings

Also in the **Settings** group of the **Home** ribbon, there is a checkbox that defines whether or not Strategies that were open when **CXpro<sup>HD</sup>** was closed will be automatically opened when **CXpro<sup>HD</sup>** next starts.



#### CONFIGURING BACNET COMMUNICATIONS

In order to connect **CXpro<sup>HD</sup>** to a specific **BACnet** Site, you must set its system-wide **BACnet** Properties in the **Application Settings** dialog.

These properties are the identity of the Network Adapter that will be used to connect the PC to the BACnet System, and the Device Instance Number of that Network Adapter in the BACnet system.

Open the BACnet Configuration option in the Application Settings dialog by clicking on the BACnet icon in the Settings group of the Home ribbon:

le 🔹 🛛 Home	Controller	Strategy		
🖋 Connect 🖋 Disconnect	습 Copy 급 Paste	Improperties         Page Names         Search           BACnet Properties         Modules         Strategy He	Ip Database Datalog Site NB-Pro	Settings
	Select All	List Navigation Macros	Interface Manager Organiser	Reopen Strategies
Site	Clipboard	View	Utilities	Settings

Application Settings	×
Download Options	Device Instance Number for this Computer
Scan Options	Device Instance Number 214 (0 to 4194302)
Strategy Settings	- IP Addrase
BACnet Configuration	192.168.000.073 : Intel(R) Ethemet Connection (2) [219-LM
Serial Port Connection	Port 47808
Commands	Subort Mark 255 255 0
Livelog	
	Retry Settings
	Number of Retries U
	□ Enable BBMD - System Level
	IP Address 192 . 168 . 6 . 35 47808
	Time to Live 60 seconds
	Enable BACnet NAT
	OK Cancel Apply

This opens the Application Settings dialog with BACnet Configuration selected

The Device Instance Number will be set to "-1". This must be changed to a unique Device Instance Number.

In the **IP Address** drop-down list, select one of the PC's **network adapters** to be used as the channel for all BACnet communication. Set the **Subnet mask** in accordance with the local network policy – if in doubt ask your local Network Administrator. The default is 255.255.26.

It is recommended that the Number of Retries is left at 0 unless there is a clear reason for changing it.

Note: In order to avoid conflicts with **Command** settings for set and get, the BACnet Timeout should be set to Number of retries = 0 and Time out = 20 seconds.

If you wish to connect to a remote BACnet site, enter that site's IP address in the BBMD settings – System Level section.

Click **OK** to save these settings.

#### **Configuring BBMD**

If you wish to connect to a remote **BACnet** Site, you must set a **Network**, a **Site** or the **CXpro<sup>HD</sup>** system to act as a **BBMD**.

#### What is BBMD?

Some BACnet services (e.g. "Who-Is") use 'broadcasts'. These broadcasts are blocked by standard Ethernet routers so that BACnet broadcasts are limited to the IP subnet of the BACnet device. A BACnet/IP Broadcast Management Device (BBMD) is one way to get around this limitation on a BACnet/IP network of 2 or more IP subnets.

#### How a BBMD operates

A **BBMD** located on an **IP subnet** monitors broadcast messages on that subnet and constructs a "peer to peer" message for each broadcast to pass it through any **IP** router. This "peer to peer" message is received by other **BBMD**s on other IP subnets and transmitted as a broadcast on their attached subnets.

Since the **BBMD** messages are 'directed', individual messages must be sent to each **BBMD**. Each **BBMD** device maintains a **Broadcast Distribution Table (BDT)**, the content of which is usually the same for all **BBMD**s within the network. Each **BBMD** must know the IP address of every other **BBMD** in the network.

#### Setting a BBMD in CXpro<sup>HD</sup>

BBMD properties can be set at the System Level, on a Site or a Network, and if more than one is set then it 'cascades' upwards. This means that if a controller attempts to communicate with a remote BACnet Site, it will use the Network-level BBMD settings if any have been defined. If the Network to which the Controller is attached does not have BBMD settings configured for it, then the Controller will use Site-level BBMD settings if any have been defined. If the Site containing the Controller also does not have BBMD settings configured for it, then the System-level settings.

#### **BBMD** Parameters

In the **CXpro<sup>HD</sup>** system, the following BBMD parameters can be set:

- IP Address
- Port Number
- Time to Live (not available in Site-level parameters)
- Enable NAT ( Override "I am" ) (not available in Site-level parameters)

Note: If a user wants to access a BACnet device across a firewall, they must setup a NAT rule on their LAN's Firewall Router that maps a port number on the LAN's public IP Address to an IP Address + Port Number on the private side. The IP Address and Port Number must correspond to that of the BBMD router.



In the diagram above, the LAN's firewall router is set up to map a port number on its Public address to the internal BBMD router address. The **CXpro<sup>HD</sup>** BBMD settings are then set to the firewall routers external IP address & port.

In this scenario Discovery and the I-am messages reach **CXpro<sup>HD</sup>**, but when **CXpro<sup>HD</sup>** reads a property for one of the discovered devices, it would by default use the source IP Address found by Discovery (an internal IP address) instead of the actual BBMD address.

The Enable NAT (Override "I am") checkbox on the BBMD settings in **CXpro<sup>HD</sup>** forces it to always use the BBMD address for all communications.

#### System-level BBMD parameters

To set the **BBMD** parameters for the whole **CXpro<sup>HD</sup>** system, click on the **BACnet** icon in the **Settings** group within the **Home** ribbon:

le 🔹 Home	Controller	Strategy		
S Connect	Сору	Properties Page Names Search		BACnet
🖋 Disconnect	Paste	BACnet Properties 🔢 Modules 💽 Strategy Help		Lo Strategies
	Select All	List Navigation Macros	Interface Manager Organiser	Reopen Strategies
Site	Clipboard	View	Utilities	Settings

This opens the Application Settings dialog with BACnet Configuration selected. The BBMD - System Lev settings are at the bottom of the dialog:

	Time Out 20 seconds
	- I Enable BBMD - System Level
	IP Address 192 . 168 . 6 . 35 47808
	Time to Live 60 seconds
	Enable BACnet NAT
l	
	OK Cancel Apply

#### Site-level BBMD parameters

To set the BBMD parameters for a specific Site, right-click on that Site and select Site Properties

Sites           □         10020801           □         □         BACnet IP           □         □         BACnet Serial           □         □         □         □           □         □         □         □         □           □ <th□< th="">         □         □         &lt;</th□<>	R Discover Site Backup Site Export ASPECT/INTEGRA Data Create BACnet EDE Data Commission BACnet Devices Edit Controllers	to open the dia	Site Properties	Site Properties Name: Directory: Type of Connection Type of Connection IP Address Time to Live	Campus block R           CAMPBLOR           for this Site:           • Serial Connection           • Serial Connection           • BACnet IP           te Level           • 0 . 0 . 0           • 60           seconds
B-모 Sample Apps B-모 Stores	Commission BACnet Devices Edit Controllers Delete Site Site Properties			Time to Live	60     seconds       Finable BACnet NAT         OK         Cancel

The Site BBMD settings parameters are at the bottom of the dialog.

#### Network-level BBMD parameters

To set the BBMD parameters for a specific Network, right-click on that Network and select Router Properties



The IP settings in this dialog include a checkbox to allow the router to be used as a BBMD.

#### CONFIGURING SITE COMMUNICATIONS (COMMANDS)

The commands that **CXpro<sup>HD</sup>** uses to communicate with **Cylon** controllers can be adjusted from the **Application Settings** dialog.

This can be useful in troubleshooting connection failures. It can be useful to tell the system to give the connection more time to become established.

On the other hand, if you have a reliable fast connection it can be of more benefit to reduce the time taken to establish connections, and so increase the speed and responsiveness of the system.

#### **Command Settings**

To adjust the Commands settings, open the Application Settings dialog by clicking on the Settings icon in the Settings group of the Home ribbon:

ile 🔹 Home	Controller	Strategy				
🚿 Connect 💉 Disconnect	다 Copy 다 Paste	Site	Page Names Search	Database Datalog Site	NB-Pro	Settings
Site	Clipboard		View	Utilities	ci i	Settings

In the Application Settings dialog, select Commands :

Scan Options Stategy Settings BACnet Configuration Serial Port Connection Commands Livelog Number of Fletnes for Command NACKS (Failures)	Download Options	Commands	Time out (1-20s)	Retries (0-25)
Get Block 20 4 Strategy Settings BACnet Configuration Serial Port Connection Commands Livelog Number of Retries for Command NACKS (Failures) 3 Xerial Port Connection Commands Livelog	Core Options	Controller Detect	5	0
Strategy Settings         BACnet Configuration         Serial Port Connection         Commands         Livelog         Number of Retries for Command NACKS (Failures)	scan Options	Get Block	20	4
BACter Vector     5     0       BACnet Configuration     Set Block     20     2       Serial Port Connection     Set Block     20     2       Livelog     Image: Set Block     20     2         Number of Retries for Command NACKS (Failures)     Reload	Strategy Settings	Get Point	5	2
BACnet Configuration     Set Block     20     2       Set all Port Connection     5     2       Commands     Image: Set Point     5     2       Livelog     Image: Set Point     1     1       Number of Retries for Command NACKS (Failures)     Image: Set Point     1	Strategy Settings	Router Detect	5	0
Serial Port Connection Commands Livelog Number of Retries for Command NACKS (Failures) Reload 3	BACnet Configuration	Set Block	20	2
Serial Port Connection Commands Livelog Number of Retries for Command NACKS (Failures)	-	Set Point	5	2
Commands Livelog Number of Retries for Command NACKS (Failures)	Serial Port Connection			
Livelog Reload Number of Retries for Command NACKS (Failures)	Commands			
Number of Retries for Command NACKS (Failures)	Livelog			
Number of Retries for Command NACKS (Failures)	-			
				Reload
		Number of Retries for	Command NACKS (Failur	es) 3

To edit a value, double-click on it in the Port Handler Command Settings dialog.

Clicking the 'Reload' button will cause all of the values to revert to their previous settings, and any changes made will be lost.

Each command has a Retries setting:

Number of Retries for Command NACKs (failures)

The retries in the main list apply to Timeouts, where no response is received. This parameter sets the number of retries when a response is received, and the response is NACK, indicating a failure.

When the **OK** button is pressed, each edited value is checked to see if it is valid.

If a command Time Out is greater than 20 seconds then it will be reduced to 20 seconds, and if a Time Out value is less than zero seconds, then zero seconds will be used.

If a command **Retries** value is greater than 25 then it will be set to 25, and if a **Retries** value is less than zero then it will be set to zero.

#### **Profiles:**

The following profiles provide advisory settings that may be helpful when requests from a site and its controllers, or manipulation of data, results in failures.

#### **\*** TCP/IP Profile:

Command	Time Out	Retry
Get Point	2000	1
Set Point	2000	1
Get Block	2000	1
Set Block	5000	1
Router Detect	2000	0
Controller detect	2000	0

#### Default Profile:

Command	Time Out	Retry
Get Point	2000	0
Set Point	2000	0
Get Block	2000	0
Set Block	5000	0
Router Detect	10000	0
Controller detect	10000	0

### SECTION 4: USING MODULES



**Modules** are the building blocks from which strategies are constructed. They are the basic units of operation in **CXpro<sup>HD</sup>**.

Modules perform tasks within a strategy such as

- bringing controller inputs into the strategy
- changing the values of points in the strategy according to mathematical rules
- comparing the values of points in the strategy
- recording the values of points in the strategy
- sending point values to the controller's outputs.

Modules can be grouped and saved as in order to avoid repetitive tasks, i.e. if you use a particular strategy or part of a strategy frequently, you can save it as a **macro** and reuse it without having to repeatedly re-create it.

#### ACCESSING MODULES

By default, **Modules** are available from the right-hand pane, by clicking the **Modules** tab at the bottom of the Pane:

		1	>	×	Modules 4	E
				~		×
					Favorites	
					Constants	-
					constants	
•					Controls	•
					Functions	•
					Math	•
					Schedules, Timers, and	
					Cotrainte Innuts and	
					Setpoints, Inputs, and	•
					Statistics	•
					VAV	•
					Virtuals	
					L	
•	•					
		÷				

The Modules Pane groups the available modules into Constants, Controls, Functions, Math, Schedules/Timers, Setpoints/I/O, Statistics, VAV, and Virtuals. To access individual modules, click on one of the groups:

nf	igu	irat	ion	Da In	tab terf	ac	e D e M	Datalog Site Backup NB-Pri Ianager Organiser Utilities
					1	>	×	Modules
							^	
								Favorites
								Constants
								Digital Constant
								Int
								Integer Constant
								Real Constant
								Controls
								Controis
								Functions
								Math
								Take dates Therein and
								Schedules, Timers, and
								Setpoints, Inputs, and
								Statistics
	·		·					
								VAV
								Virtuals
							~	
						>		Page Nam Properties Mod

Using Modules

There is also a "Favourites" group, where you can set up a custom list of modules that you use frequently or want to be able to access quickly.

To add a module to the Favourites group, right-click on the module in the Modules Pane and select Pin to favorites :



To remove a module from the Favourites Group, right-click on it and select Unpin from Favourites:



In order to use a module in a **strategy**, you must place it in the **strategy**'s 'drawing area'.

To do this, click on the module name in the Modules pane:

					C	XproH	ID - '	1.00.0	)0-32	20								-		×
File - Home	Controller	Strate	egy																	í
Connect	Сору	i.	Pro	pertie	s 🔲	Modul	es ?	Strate	egy He	lp										
J Disconnect	Paste	LE .		vigatio	n 🕅	Macros		Reon	en Str	ategie	s	l	-\$		L	9		└┢╯└╬╵└ぢ	L.	
*	Select All	Site		ne Nam		Search						Conf	igura	tion	Data	bas	e D	atalog Site Backup	NB-Pro	
Site	Cliphoard	List	[]] a	je Nali		View									Inter	тас	e M	anager Organiser Litilities		
Site List	coperate	п 🔽	a /	Ctra	tom/1	1					-					Þ	×	Modules	п	
Site List		*		Sua	legyi											r .	_	Modules	~	
	net ID	^																		×
	001 - Network																	Favorites	+	
	001 - 001 - UC	U32 <sup>-</sup>	1 · ·															Constants	+	
	001 - 002 - CB	M24																Controls	•	
H	net Serial																	Functions		
⊟ 🗄 Sam	ple Apps BACnet		- ·															Turicuons		
	001 - Wet Systems		- ·															Math	•	
	🗐, 1111 - CT Sing	le P																Schedules, Timers, a		
0	🗐, 1112 - CT Sing	le P																Setpoints, Inputs, an		
	🗐, 1113 - CT Sing	le P																		
0	🗐, 1114 - CT Dua	l Pui																Al Analog Input		
0	ଅ, 1115 - CT Dua	l Pui	- ·																	
0	🔜, 1116 - CT Dua	l Pui	- ·															AO Analog Output		
	🔍 1121 - VT Sing	le Pi	1 · ·															Analog Setpoint		
	🔜, 1122 - VT Sing	le Pi														1		0 100 Panalog Sectorine		
	🖳 1123 - VT Sing	le Pi																BACnet Analog		
	🖳 1124 - VT Dua	Pur																		
	🖳 1125 - VT Dua	Pur	- · ·															BACnet Analog Priority.		
	🗢 1126 - VT Dua	l Pur	- ·															DACost Dipart		
	- 1131 - Four Bo	ollers	1 · ·															BACHEL BINARY		
	🖃 , 1132 - Four Bo	ollers																PACnot Pinany Driarity /		~
	🖃 1133 - Two Bo	ilers v															۷.	<	>	•
<		>	<													>		Page Nam Properties	Modu	les
										c	onn	ected	to: s	Samp	le Ap	ps I	BAC	net (3),		

Then click on the **Strategy** Drawing Area at the position where the module is to be placed (note the cursor changes to the "Module Cursor" [1] during this process):

<b></b>		CXproHD - 1.00.00-320 - 0	⊐ ×
File - Home	Controller St	rategy	í
🖋 Connect 💉 Disconnect	Copy Paste Select All	Improperties       Modules       Improperties       Impr	NB-Pro
Site	Clipboard	View Utilities	
Site List	д	Strategy1 D X Modules	부 🗙
	iet IP 01 - Network	A Favorites	× ^
	<ul> <li>001 - 001 - UCU32</li> <li>001 - 002 - CBM24</li> </ul>	Controls	
⊞ <u>₽</u> _BACn	et Serial	Functions	•
	01 - Wet Systems	Math	
	, 1111 - CT Single P	Schedules, Timers, a	•
	1112 - CT Single P	Setpoints, Inputs, an	-
	<ul> <li>1113 - CT Single P</li> <li>1114 - CT Dual Pur</li> <li>1115 - CT Dual Pur</li> </ul>	Al Analog Input	
	1116 - CT Dual Pui	AO Analog Output	
	1121 - VT Single Pi 1122 - VT Single Pi	Analog Setpoint	
	, 1123 - VT Single Pi , 1124 - VT Dual Pur	BACnet Analog	
	, 1125 - VT Dual Pur 1126 - VT Dual Pur	BACnet Analog Priority	
	1131 - Four Boilers	BACnet Binary	
	1133 - Two Boilers	v DAChat Diago Driarity A	>
<	>	Page Nam Properties	Modules
		Connected to: Sample Apps BACnet (3),	, d

Some modules (e.g. Analog Input) prompt for basic configuration information when they are first placed. When this happens, fill in the dialog and click **OK** 

<b>□</b> =		CXproHD - 1	.00.00-320		- 🗆 ×
File - Home Controlle	r Strategy				í
Connect     Copy     Disconnect     Copy     Site     Clipboard	Site List	pperties III Modules ? vigation III Macros III ge Names III Search View	Strategy Help Reopen Strategies	Configuration Database Interface	Datalog Site Backup NB-Pro Manager Organiser Utilities
Site List	Ф 🗙 🗸	Strategy1		Þ ×	Modules 📮 🔀
□-••••••••••••••••••••••••••••••••••••	UCU32 CRM24		· · · · · · · · · · · · · · · · · · ·	^ 	Favorites
		PC	oint Name		Functions
Sample Apps BACr	net i i	Doint Name	a am Tamparatura		Math
⊡	ems Single P	Point Name   K	Schedules, Timers, a		
	Single P				Setnoints Inputs an
	Single P		01		sectorines, inpues, and
	Dual Pui		<u>O</u> K	Cancel	Al Analog Input
	Dual Pui				AO Analog Output
	ingle Pi				Analog Setpoint
	Single Pr				BACnet Analog
	Dual Pur				BACnet Analog Priority
	Dual Pur r Boilers · ·				BACnet Binary
	Boilers			· · · · · · · · · · · · · · · · · · ·	Const Dinane Driarity A
<	°, <			>	Page Nam Properties Modules
Setup block updated.			Con	nected to: Sample Apps BA	Cnet (3),

The module is displayed on the Strategy Drawing, and as it has just been placed it is automatically selected. This is indicated by a green outline:

	CXproHD - 1.00.00-320 – C	×
File - Home Controller Strat	egy	í
Connect Copy Connect Copy Connect Copy Select All Copy Site List Copy Copy Copy Copy Copy Copy Copy Copy	Improperties       Improvements       Improvements <td< td=""><td>IB-Pro</td></td<>	IB-Pro
Site Clipboard	View Utilities	-
Site List 🛛 🗸 🗙	Strategy1 D X Modules	<b>Д</b> 🗙
BACnet IP G → 001 - Network → 001 - 001 - UCU32 → 001 - 002 - CBM24 BACnet Serial → 10 - 002 - CBM24 → 11 - CT Single P → 1111 - CT Single P → 1113 - CT Single P → 1113 - CT Dual Pui → 1115 - CT Dual Pui → 1112 - VT Single P → 1122 - VT Single P → 1122 - VT Single P → 1123 - VT Single P → 1125 - VT Dual Pui → 1125 - VT Dual Pui → 1125 - VT Dual Pui → 1125 - VT Dual Pui	Analog Input       1         Point O       Constants         Controls       Functions         Math       Schedules, Timers, a         Setpoints, Inputs, an       AI         Analog Output       Image: Analog Setpoint         Analog Setpoint       Image: Analog Setpoint         BACnet Analog Priority       BACnet Analog Priority	
	BACnet Binary Priority A	
<	A Page Nam Properties	Modules
Setup block updated.	Connected to: Sample Apps BACnet (3),	

It is possible to examine and edit the properties of the selected module by clicking on the **Properties** tab at the bottom of the Right-Hand pane:



You can edit the properties of the selected module by clicking in the property's value in the right-hand pane. Help text relevant to the property being edited is displayed in the lower portion of the Right-Hand pane



**Note**: If you have multiple strategies open at once, ensure that you select the strategy into which you would like to place the module before you select the module from the modules bar.

The module can now be **selected**, and **edited**, **moved**, **copied**, **cut**, or **joined** to other modules.

#### Selecting modules on the drawing area

Before you can move, copy, cut, or delete a module, you must first select it. This can be done by:

Clicking on the module symbol,



Or by clicking and dragging from the top left to the bottom right of the module symbol(s) as shown. When you release the mouse button, the module will be selected



#### To select more than one module on the drawing area:

You can select multiple modules at once by the following methods:

- 4. Press and hold down the [Ctrl] button while clicking the modules required.
- 5. if you want to select every item in the drawing simultaneously, click on Select All in the Strategy tab.



6. Click and drag a box around all the modules you want to select. When you release the mouse button, all the modules within the box will have been selected.



Selected modules (and points, which are represented by lines) are surrounded by coloured borders. Most modules will have a red border, but one will be green. This is the module (or point/line) whose properties are currently displayed in the Properties Pane – i.e. the module that is "in focus".

You can change which of the selected modules is "in focus" by using the navigation controls at the top of the **Properties** pane, with the arrows:



Or the drop-down, which lists the currently selected modules and points:

Strategy1		⊳	×	Proper	ties	Д X
			^	<	> ? Tur	neable Forward 💌
Analog Setpoint 1				E G	eneral I Ana Ana	alog Input [1]
0 100 Room Setpoint				Se	rvice Or 1 (A	neable Forward PID
	Tuneable Forward PID	2		Sy ⊡ In	nchroni 1 (A	(nalog): Room Ten
	1 Setpoint Output	0	3	÷	Setpoint	Analog 1 R
Analog Input	.(1) O PV			÷	Process	Analog (1)
Point Q	Enable			÷	Gain	Analog
Override 🗖	O Integration			÷	Enable	Digital
	O Derivative			÷	Integrat	Analog
	Integration time: 900; Derivativ	e			Destant	Anglen

#### Move, Delete, Cut or Copy a module or modules on the Strategy drawing area

In order to Move, Delete, Cut, or Copy a module or modules, you must first select the module(s) as described above. Then:

#### **Moving modules**

To **move** the selected module(s) on the drawing area, drag any one of the selected modules. The modules and their connected points (lines) will move together. Alternatively, you can also use the arrow keys on the PC's keyboard to move all of the selected modules at the same time.

#### **Deleting modules**

To **delete** the selected module(s) from the drawing area press the **[Delete]** button on the PC's keyboard.

#### Copying modules on the drawing area

To **copy** the selected module(s) to the PC's clipboard, so that they can be pasted to another part of the drawing area or to a different Strategy, either

- Press [Ctrl]+[c] on the PC's keyboard, or
- Click on Copy in the Home tab:

Home	Controller
nnect	Сору
sconnect	Paste
	Select All
Site	Clipboard

A copy of the module(s) will be saved on the Clipboard until placed (pasted) elsewhere.

Then, **paste** the module(s) to a specific point within the same strategy, or to another strategy, by first either

- pressing [Ctrl]+[v] on the PC's keyboard, or
- clicking on Paste in the Home tab:

Home	Controller
nnect	Сору
sconnect	Paste
	Select All
Site	Clipboard

then click on the drawing area in the target Strategy with the mouse. The top left-hand corner of the module(s) will be positioned on the point where the mouse was clicked.

**Note:** Pasted hardware point modules may adapt some parameters to the destination point but retain others. For example, an analog input configured as PT1000 when pasted to a UniPut will change to a voltage input but retain the max and min limits (in the Advanced button) which for PT1000 could be min 0 and max 0, leading to incorrect operation of the UniPut.

#### **Tool Tip Data on Modules**

To view details of a specific Module, hover the mouse pointer over the Block in the Strategy drawing.

		Е	• •		P	Analog Output 13	
2		1		AO			eating Valve
	(स्ट	Ē	) Po	int		XO Type: Output	
0	<u> </u>	) =	-	-	_	Ănalog/Digital Type: Analog	
<u> </u>	(1,3)				·	8 bit range: 0-255	
					·	Type of Input Sensor: Volts	
						Lower actuator: 0	
						Higher actuator: 10000	
						Strategy lower: 0	
						Strategy upper: 100	
	· .					Output error: 0.00	
						Sensor Type: 0-10Kohms	
						Sequence on period: 0	
						Unit: °C	

#### JOINING MODULES IN A STRATEGY

Modules in a strategy must be **joined** together to allow information to flow from input to output. The flow is from left to right, so that controller input **connection points** are on the left of the drawing area, controller outputs are on the right, and the modules are positioned between the inputs and outputs in the center of the drawing area.

#### Notes on joining modules

- A connection is possible only if both the input and the output are of the same type (analog or digital).
- An output of a module can be linked as often as required with inputs of other modules.
- An input of a module can be linked with only one output of a module.

#### Module connection points

Connection points are marked on module symbols as blue circles or squares on the left and right edges of the module. When the mouse pointer is placed over a connection point, it changes to a cross-hair.

- Circular connection points are analog.
- Square connection points are digital

If you want to connect two points, make sure they are both either digital **or** analog. You cannot connect analog to digital or vice versa.

#### How to join modules

Place the mouse pointer over the required output of the first module so that it changes to a crosshair.

Click and drag the mouse from the output to the required input of the other module. You will see that the crosshair changes back to a mouse pointer once you have left the blue connection point and return to cross-hair format when you reach the next blue connection point.

Release the mouse when you have reached the required input. The two modules are now joined. The connection between the two modules is marked by a coloured line. The default colour is black, but this can be customized by clicking on the connection line with the right mouse button.



#### How connections are represented

By default, the connection between 2 modules is represented by a black line with the numbers of the points at each end of the connection also displayed (as in the above example).

You can customize the way in which all connections are represented by right-clicking on the Drawing Area to open

# the Display Options menu:

Point 🚫 erride 🖃

This gives access to the following options:



#### Show Name



You can customize the line and label visibility of a single point (line) in the properties panel:

Pro	perties	Д 🗙
<	> ?	-
	Point Details	Analog 1 Room S
	Number	1
	Туре	Analog
	Value	0.00
	Name	Room Setpoint
	Unit	°C
-	<b>Display Propert</b>	ies
	Show Line	True
	Labels	Show value only 🗸
		Hide
		Show number
		Show name 15
		Show value only (sin

You can also change the default visibility using the New Connections option on the Strategy tab of the Ribbon :

Strategy												
Сору		T	Π.	BACnet Points	2	Create	Ö	Ö.	Ö.	Current Logging	👪 Grid	Leve Connections
Paste			t int	BACnet Units		Manager			5	Configuration	🕎 Grid Colour	13
Select All	Modules T	laa 1/0 lext Termir	nals Modules	C Strategy Details	Help	Macros Save New	Start/Pause	Stop	Reset	-	Background (	Colour
Clipboard			Strateg	у		Macros		Sim	nulatio	n		Display
<b>д X</b> (	Strategy	4									Þ × I	lodules

This opens the **New Connections** dialog, where you can set the appearance of new **module** connections:

New Connections		×
☑ Display lines on newly created connection	ns.	
Configure how point information is display or created connections.	on newly	
Show value only (simulation Hide Show number Show name Show value only (simulation)	Cancel	

## Using Modules

#### Connectors

Lines are a convenient and intuitive way to connect modules that are close together in the Strategy drawing. However, clicking and dragging to connect modules that are far apart in the drawing can be impractical. To overcome this, **CXpro<sup>HD</sup>** provides an alternative way to connect modules using named **Connectors**.



A Connector creates an invisible channel of information between a single Source and multiple Destinations.

#### Add a Source Connector

To set up a Source Connector, right-click on any output on any module and select Add Source Connector.

Max Ma	ximum	4													
) Input A	Maximum 6	- 1										-			Ľ.
) Input B		1	Sho	w li	nes										1
) Input C	1														1
) Input D	1		Add	150	urc	e C	on	neo	to	r					1
) Input E	1		Cor	iver	t Li	hos	to	Со	nn	ect	ors				1
) Input F	1														-1
) Input G	1		Sim	ulat	ion	Pr	ор	erti	es						1
) Input H	1	-		-	-	-	-	-	-	-	-	-	-	-	-

In the dialog that opens, enter a name for the point that will be exposed by the Source Connector you are creating.

Point Name	
Point Name MaxHWater	
ОК	Cancel

The Source Connector is now created.

lax	Мар	ámum	4	].								
Input A		Max	imum 🛇	28			K	0	Max	dHWa	ater	٦
Input B				1								
Input C				1.								

Note: Points exposed by Source Connectors must be named.

#### Adding a Destination Connector

To connect a module to a point exposed by a **Source Connector** you must create a **Destination Connector** as follows: Right-click on any input of any module and select **Add Destination Connector**.



A list of Source Connectors will be displayed.

	Select	Source (	Conne	ctor	-
Name					
MaxHW	ater				
Adder/S	caler Block	19 Outpu	ıt		
Weathe	rCom Block	(8001 Inp	u		
		0	K N	Cance	4

Choose the appropriate **Source Connector** and click **OK** to complete the connection. The new destination connector is added to the input of the module.



#### **Deleting Connectors**

The rules for deleting connectors are as follows:

Source: If a Source Connector is deleted, <u>all</u> Destination Connectors connected to the Source Connector will also be deleted.

Destination: If a Destination Connector is deleted, it is the same as disconnecting an input from any output.

If the **Destination Connector** is the last one connected to the source, a dialog will be displayed asking the user if they want to delete the source. If they decide to do so, then the **Source Connector** will also be deleted. If the user does not delete the **Source Connector**, that point will be available for new **Destination Connectors**.

#### **Quick Searching for Connectors**

#### • Jumping from a Destination Connector

Right-click on the Destination Connector and choose either Jump to Source or Jump To Other Destination .

	North A State Stat
L	MaxHWater O 78 O Input B Comp
	Jump to Source
	Jump to Other Destination
	· · · /2· · · · · · · · · · · · · ·

If you choose Jump to Source you will immediately be taken to that Connector .

If you choose Jump To Other Destination and there is only one available, you will immediately be taken to that Connector .

If you choose Jump To Other Destination and there is more than one available Destination, then the Search Results window (below the Strategy Drawing window) will display them as a list so that you can select which one to view.

	O Input A
	MaxHWater O 28 28 O Input B Comp
8 Imp DPS Imp Trip Imp Speed np DPS	Masinum  A Maxinum O 128 28 O MaxiNitate C S S S S S S S S S S S S S S S S S S S
np Trip np Speed imp DPS imp Trip imp Speed np DPS np Trip np Speed OnOff Modulating	Verice     Verice

#### • Jumping from a Source Connector

Right-click on the source connector and choose Jump to Destination .



If there is only one **Destination** Connector, then that Connector will immediately be displayed. If there is more than one, then the Search Results window (below the Strategy Drawing window) will display them as a list so that you can select which one to view.



#### **Convert Lines to Connectors**

It is possible to quickly convert an existing Line to a set of Connectors (one Source and one Destination).

Right-click on a Line and choose Convert Line to Connector .



If the point is not named, you will be given the option to name it.

#### **Viewing Point properties**

The **Properties** panel in the **CXpro<sup>HD</sup>** Right-hand pane can be used to examine points and routing. To do this, select a line (representing a connection between two modules, usually meaning a point). The properties of the point are displayed in the **Properties** panel:

Properties 📮 🗙								
<	> ?	-						
	Point Details	Analog (9) Heati						
	Number	9						
	Туре	Analog						
	Value	0.00						
	Name	Heating Valve						
	Unit	°C						
	<b>Display Properti</b>	ies						
	Show Line	True						
	Labels	Show value only						
Number								
Th pa	hat represents a ategy. There are a							
Properties Page Names Modules								

Some attributes of a point (such as Name or Unit ) are editable and can be changed directly in the Properties panel.

#### **Viewing BACnet properties**

If the BACnet Properties option is enabled in the Home tab of the Ribbon,

	Home	Controller	Strat	egy		
ſ	nect	Сору	1	Properties	Page Names	Q Search
	connect	Paste	1921	BAGnet Properties	Modules	? Strategy Help
		Select All	List	Navigation	Macros	🗌 Reopen Strat
j	te	Clipboard			View	

then in the right-hand pane, alongside the **Properties** panel, there is a **BACnet Properties** panel:

O Input E			
>	Properties	BACnetProperties	

When a BACnet-exposed point (the line representing the point has hexagon indicators near each end) is selected

AI	I	1	Ana Fem	log i per	inpu atu	t re		3								Л	-		Hys	tere	esis
					(	P Over	oint ride	0	(3)	-	-	2	•	-	<b>(</b> 3)	⊙ In	put			1	Acti Act
													:		-	On: 2	.00;	Off:	4.0	0	_

and the controller is connected in CXpro<sup>HD</sup>

File 🔹	Home	C
🚿 Co 💉 Di	sconnect	
	Site	Cli
then **CXpro<sup>HD</sup>** will interrogate the **BACnet** network in real-time, and live **BACnet** property values for the selected point will be displayed in the **BACnet Properties** panel.

BACnet Properties	<b>Д</b> 🔀										
Device properties											
■ ANALOG_INPUT	▲										
object-name (77)	Temperature										
object-type (79)	0										
object-identifier (	Analog Input (0),										
present-value (85)	1000.000000										
🗄 status-flags (1											
event-state (36)	normal										
reliability (103)	No Fault Detected										
out-of-service (81)	False										
units (117)	62										
min-pres-value (	78.000000										
max-pres-value (	120.000000										
cov-increment (22)	0.100000										
time-delay (113)	0										
notification-class	0										
high-limit (45)	0.000000										
low-limit (59)	0.000000										
deadband (25)	0.000000										
🗉 limit-enable (											
event-enable											
acked-transiti	to-offnormal, to										
notify-type (72)	Alarm										
•											
Properties BACr	net Properties										

# **Viewing Module BACnet Properties**

The **BACnet Properties** panel can also be used to view and edit BACnet information related to certain modules as well as points.



The following modules are supported:

- Binary input/output
- Analog input/output
- Setpoints
- BACnet Schedules
- Unitron Schedules
- Broadcast transmit and receive
- Modbus Analog and Digital
- Accumulator
- BACnet Trendlogs

# **Viewing Device BACnet Properties**

At the top of the **BACnet Properties** panel there is a **Device Properties** checkbox:



Checking this box changes the contents of the panel from the properties of the selected point or module, to the **BACnet** properties of the device that contains that point or module:

DAG	Cnet Properties	д						
	Device properties							
	ANALOG INPUT							
	object-name (77)	Temperature						
	object-type (79)	0						
	object-identifier (	Analog Input (0),						
	present-value (85)	1000.000000						
	status-flags (1							
	event-state (36)	normal						
	reliability (103)	No Fault Detected						
	out-of-service (81)	False						
	units (117)	62						
	min-pres-value (	78.000000						
	max-pres-value (	120.000000						
	cov-increment (22)	0.100000						
	time-delay (113)	0						
	notification-class	0						
	high-limit (45)	0.000000						
	low-limit (59)	0.000000						
	deadband (25)	0.000000						
	🗄 limit-enable (							
	event-enable							
	🗄 acked-transiti	to-offnormal, to local-date (56)						
	notify-type (72)	Alarm						

# HOW TO ADD TEXT TO A STRATEGY

You can add text comments to a Strategy drawing by selecting Add Text from the Strategy tab on the Ribbon :



Click the drawing area at the point where you want the text to be displayed.

×	4	/	-	Str	ate	gy.	1																
^	Γ.					4	_																
	μH		I.	)	u	l	S																
	· ·		Ň									•									•		
			15			Ċ						÷			1		1	A	nalo	g Se	tpoi	nt	_
															ò	10	0	Ro	om	Se	tpo	int	
																						P	pint
															-		•	•	•	•	•	•	•
	· ·						Anal	log i	Inpu	rt.	 1												
	lk i i		14	۱.	-																		

The Add Text dialog box will be displayed:

		Add Text	×	<b>[</b>
l				
l				alog Setpoint om Setpoint
	Font	ОК	Cancel	

To select the type of font in which the text should be displayed, click Font. The standard Windows Font dialog box will be displayed in which you can choose a font, style, point size, etc. Once you have chosen the required font, click the OK button.



**Note**: It is recommended that you always use "True-type" fonts. When the printing is scaled, non true-type fonts do not scale properly.

Add Text

 B1 DS floor temp sensors

 Font

 QK

 Cancel

In the Add Text dialog box, type the text that you would like to include in the strategy

#### And click OK .

The text will then be displayed on the drawing area on the point at which you clicked the mouse.



# How to change text that has been added to the strategy drawing

To change text, select the text, and edit its content or font directly in the **Properties** pane.



# VIRTUAL MODULES

Virtual modules are so-called because they do not result in point values being downloaded to the Cylon controllers, i.e. they do not represent real points. The basic function of a virtual module is to allow for greater flexibility in connecting modules, e.g. backward connection of modules. Virtual modules are also used when creating macros, as they allow one external point of a macro to be connected, via a virtual, to many internal macro points. There are two virtual modules on a floating toolbar – one analog and one digital.

Analog Virtual Module: 🔯	0
Digital Virtual Module:	G

# Placing Virtual modules on the drawing area

The procedure for placing virtual modules on the drawing area is similar to that for any other module.

Select the required module from the Virtuals group	
in the Moules panel:	

Modules	Ф 🗙
	×
Favorites	•
Constants	+
Controls	+
Functions	+
Math	+
Schedules, Timers, and Logic	+
Setpoints, Inputs, and Outputs	+
Statistics	+
VAV	•
Virtuals	-
V Analog Virtual	
V Digital Virtual	
Properties Page Names Modul	es

And click in the drawing area (note the cursor changes to the "Module Cursor" induring this process)

The top left-hand corner of the module's symbol will be placed on the point where the mouse was clicked.



#### **Rules for connecting to virtual modules**

- 1. If the point being connected to the virtual module has a point number, then this becomes the number of all the inputs and outputs of the virtual module. Any modules that are then connected will have the same point number.
- 2. If the point being connected to the virtual module does not have a point number, **CXpro<sup>HD</sup>** chooses a new number and this becomes the number of all the inputs and outputs of the virtual module.
- Rules 1 and 2 describe how the inputs and outputs of the virtual module are numbered once a connection has been made. This is why **CXpro<sup>HD</sup>** will not allow you, once the first connection has been made, to connect another module that has a number. You can, however, connect a module if its point number box is blank.

#### Numbering virtual modules

Since virtual modules are not downloaded, they do not use any memory in the controller and do not need to be numbered in the Block Manager like other modules.

Virtual modules have their own numbering system. The first virtual module used in a strategy is numbered V1, the second V2, etc.

#### Virtual modules in macros

Virtual modules are useful when creating macros as they allow one input to be used several times.

For example, to create a macro from the strategy shown, it would be necessary to include two inputs in the macro.



Creating the same macro with a virtual module requires just one macro input.

																	Ð	Boolean	3
																	D		
																(3)	Input A	Output	G
																Ľ.	🗗 Input B	Complement	
																	Input C		
																1	Input D		
Γ.			Digi	tal I	nput	:		3											_
	וכ		T	rigg	er														
				Γ		P	oint	Ø		76	3			E	3				
					C	)ver	ride	Ø	(2)	 - / L					-(-)	1			
_		_				_		_								1			
																L	D	Boolean	4
																	D <sup>D</sup>		
																	I Input A	Output	П
																72			_
																. (3)	Input B	Complement	
																. (3)	Input B	Complement	0
																. (3)	Input B Input C	Complement	
																. (3)	Input B Input C Input D	Complement	
																. (3)	Input B Input C Input D	Complement	
																. (3)	Input B Input C Input D	Complement	

# SECTION 5: POINTS AND POINT VALUES



# WHAT ARE POINTS?

A **Point** is an area in a **Controller** where data is collected and stored. The data stored by the point is referred to as the **Point**'s "value". Controllers in the Cylon system include input, output, set, and virtual **Point**s.

# Note: Cylon's Controllers are sometimes referred to as "universal controllers", where "universal" means that they can contain both analog and digital Points.

# WHAT ARE BLOCKS?

An important aspect of **CXpro<sup>HD</sup>** is the concept of **blocks**.

Blocks can be seen as units of measurement for the number of modules and points used in a Strategy – one block corresponds to one module, one hardware input Point, one hardware output Point, or one virtual point.

The Managers dialog, accessible from the View menu, allows you to see at a glance which of the blocks in the controller are occupied and which are not.

When **Points** or **Strategies** are downloaded to a **Controller**, the **Controller** must also be informed of how many **blocks** are needed to store the required information.

- If you are using Automatic Download (see page 85), CXpro<sup>HD</sup> automatically recognizes how many blocks are required and it sends this information to the Controller.
- If you are not using Automatic Download you must, when downloading Points and Strategies, send specific "Setup" information to the Controller, instructing it as to how many blocks it must serve in the Strategy. This procedure is called Sending Setup (see page 172).

# BLOCK NUMBERS

An important aspect of **CXpro<sup>HD</sup>** is the concept of **blocks**.

Blocks can be seen as units of measurement for the number of both modules and points used in a strategy.

• In the **CBM**, **CBV**, and **CBT** controllers, the Hardware **Point** numbers are from 1 to 1024, and **Strategy block**s go from 1 to 1024. Note however that only **Hardware Points** 1-24 are used on the **CBM24**, only **Hardware points** 1-16 are used on the **CBM16**, etc.



In **CXpro<sup>HD</sup>**, the connections between modules are referred to as '**Points**'. These **Strategy Points** can represent physical inputs and outputs on a **Controller**, or Analog/Binary values (referred to in **CXpro<sup>HD</sup>** as '**Virtual Points**').

Each Analog Input, Analog Output, Binary Input, Binary Output, Analog Value, and Binary Value is assigned a number, and how these points are numbered depends on the controller type.

In **CBM**, **CBV**, and **CBT** controllers, controller terminals (i.e. inputs and outputs) - "hardware points" in **CXpro<sup>HD</sup>** - are assigned numbers between 1 and 24. Each terminal can be either an input or an output so that there cannot be two hardware points with the same number. For example, if there is an **Analog Input** 3 there cannot be an **Analog Output** 3 or **Binary Input** 3 at the same time.

**Note**: In theory, hardware Point numbers could be up to 1024, but is limited by the Controller hardware so that the current maximum is 24.

Analog Values ("Analog virtual points") can be numbered 1-1024, and Binary Values ("Digital virtual points") can be numbered 1 - 1024, so that there could be for example both Analog Value 3 and Binary Value 3.

**Note**: The combined number of Analog Values and Binary Values that can be exposed on a BACnet network by a single **CBM** or **CBT** is 225. As a result, it is recommended to keep the total number of defined setpoints in a Strategy below this value.

However, it is possible to have up to 100 additional setpoints **that are not exposed on BACnet**. Such setpoints in effect act as constants, because they cannot be changed by the Strategy nor via BACnet, but can be set using **CXpro**<sup>HD</sup>.

In **Strategy** drawings generated by **CXpro<sup>HD</sup>** for **CBM**, **CBV**, and **CBT** controllers, it is possible to identify a **Strategy** Point's nature as follows:

- If the number has brackets around it is a "hardware point" Analog Input, Analog Output, Binary Input, or Binary Output.
- If the number is not bracketed but is connected to a circular connection point, it is an Analog Value ("analog virtual point").
- If the number is not bracketed but is connected to a square connection point, it is a **Binary Value** ("digital virtual point").
- If the line representing the point has a hexagon near each end, then that point is exposed on the **BACnet** network.





# DEFINING HARDWARE POINTS

#### Hardware points are the inputs and outputs of Field Controllers.

To define a hardware point it is necessary to define the following features:

- Point number
- Point name
- Point type (input, output, digital, analog)
- Unit of measurement
- Damping (for analog inputs only)

Once the required hardware points have been defined in **CXpro<sup>HD</sup>**, they are then downloaded to the **Field Controller** for which they are intended.

#### How to define hardware points

The procedure for defining hardware points is as follows:

- Specify (Target) the controller for which the hardware point is being defined
- Choose the module from the modules bar
- Place the module on the drawing area
- Complete the module dialog box
- Save the hardware point definition
- Log in to the Field Controller
- Download the hardware point definition to the Field Controller

#### **Defining Hardware points – Target the controller**

in the Site List select the BACnet Router and Field Controller that you want to target. This specifies the Field Controller on which the hardware point is being defined and the location in the database on the PC's hard disk in which the point definition will be stored.

#### Defining Hardware points - Place the module on the drawing area

Once you have selected a module from the **modules bar**, place it on the drawing area by simply clicking the drawing area. A dialog box will appear prompting you to enter a name for the hardware point.

Enter a name and click **OK** to close the dialog box.

The top left-hand corner of the module's symbol, i.e. the graphical symbol for the analog input point, will be placed on the point on the drawing area where the mouse was clicked.

#### Expandable I/O – Hardware Points on CBX + FLX devices

In the **Strategy** drawing, IO blocks can be added up to the total on the configured **FLX** modules plus the **CBX** onboard IO.





Note: Unlike CBM UniPuts, if UniPuts on CBX/CBXi devices are configured as Analog Inputs, they have all of the parameters that are available in Universal inputs. Also, the "Operation Mode" parameters, which a apply only to certain CBM UniPuts, are not used by CBX/CBXi.

#### Defining Hardware points - Save the hardware point definition

Save the edited strategy by choosing Save or Save As... from the File menu. The Save As dialog box appears:

Save	e As
	✓ C Search 001
Organise 👻 New folder	III • @
BACNETIP     BACNETIP     BASE     DBASE     DRAWINGS     Keypad     Macros     strat5     001	Name No items match your search.
June 2017	✓ <
File name: 801_02.632 Save as type: V6 Strategy (*.532)	
Hide Folders	Save Cancel

Enter a name under which the strategy should be saved. **CXpro<sup>HD</sup>** enters a default file name that identifies the **BACnet** Router and Field Controller for which the **Strategy** has been designed, e.g. if Field Controller #3 on BACnet Router #1 was connected to a **VAV**, its strategy might be named: "001\_03VAV.s32".

When the Save As dialog box is complete, click OK. The name of the strategy will appear in the Drawing tab:



#### **Connect to the controller**

Connect to the controller by clicking the Connect button on the Strategy tab of the Ribbon

File 🕆	Home	Controlle	r	Strategy	
💉 Conr 🔊 Disco	<b>ect</b> ज nnect	Download	ľ	] Copy ] Paste ] Select All	
Site		Controller	C	lipboard	

#### Download the hardware point definition.

You can download a strategy to a controller in just one step, by choosing Download from the Controller tab of the



**CXpro<sup>HD</sup>** will automatically wipe the Field Controller's memory, download the hardware point, and send the set-up to the UC, i.e. the number of blocks it is to serve. While it is doing this, it will display the **Downloading** window. As the point is being downloaded, the **Downloading** window displays the progress and in the **System status** section, it shows which of the 3 stages (wiping memory, downloading strategy, or sending set-up) **CXpro<sup>HD</sup>** is currently completing. If only one hardware point is being downloaded, the process will take place so quickly that the downloading window will appear only for a brief moment.

It is more usual to download an entire strategy, with several hardware points and other modules. In that case, the **Downloading** window will remain visible for longer and the progress of the download will be measured in the progress bars.

Downloading		×
Controller		
Hardware Points	48	
Strategy Blocks	2	
Analog Setpoint Values		
Digital Setpoint Values		
BACnet Point Config		
Sending strategy to controller		
	Close Abort	

# Summary of procedure for defining hardware points

In practice, the procedure for defining hardware points is as follows:

- Define all hardware points whose values are already known, in the module dialog boxes and place the corresponding modules somewhere on the drawing area.
- Save the strategy.
- Click Communications Setup from the Communications menu and enable Automatic Download.
- Log in
- Choose Download from the Communications menu.

#### Point numbers for inputs and outputs

When another input module is selected, **CXpro<sup>HD</sup>** automatically assigns it to it the next unused input, i.e. the unused input with the smallest point number.

Defining digital and analog outputs follows the same principle. As outputs are numbered in the range 9 to 16, **CXpro<sup>HD</sup>** assigns point number 9 to the first output.

For **CBX** and **CBXi** devices, point numbers are defined by the I/O module in which they reside – internal I/O on the **CBX/CBXi** device are I/O module "0", any attached **FLX** devices are I/O modules 1,2 or 3

I/O Module	Terminal Number	Туре		
CBX-8R8	1 8	Universal Input		
	9 <mark>16</mark>	UniPut™		
FLX-8R8 adress 1	<mark>101</mark> 108	Universal Input		
	109 <mark>116</mark>	UniPut™		
FLX-8R8 adress 2	<mark>201</mark> 208	Universal Input		
	209 216	UniPut™		
FLX-8R8 adress 3	<mark>301</mark> 308	Universal Input		
	309 316	UniPut™		

## A short cut to defining hardware points

To save time when defining the hardware points you can bring the definitions directly to the database by using the **Database Interface**.

The types ("A" for analog, "D" for digital), point names, and point numbers and units can be written as commaseparated or tab-separated lists in a word processing application, copied and pasted via the clipboard to the Database Interface. This avoids unnecessary writing work and typing errors. Using external applications for text handling also saves time because of their Copy, Search, Replace, and Pasting features.

The point list shown below was created in Microsoft Windows Notepad. Other software applications, such as Excel and Word may also be used.

A	Room Temperature 1 °C	1	
A	Room Temperature 2 °C	2	
A	Outair Temperature South-East	°C	3
A	Outair Temperature North-West	°C	4
A	Supply Water Temperature 1 °C	5	
A	Supply Water Temperature 2 °C	6	
A	Valve 1	olo	9
A	Valve 2	010	10
D	Pump 1 ON/ OFF	11	
D	Pump 2 ON/ OFF	12	

When preparing a hardware point definition list you must separate the values (type, point name, unit, point number, etc.) by using tabs or commas, not spaces.

**Note:** This shortcut for defining hardware point values should only be used for UCs that do not already have hardware point definitions in the database on the PC's hard disk, since existing database entries are not deleted. The Database Interface does not check for uniqueness. This means that there is a danger of defining more than one entry per point, which will cause a lot of confusion in the later use of the point in other programs.

# WHAT ARE **UNIPUTS™**?

A UniPut<sup>™</sup> can act as an input or an output so that you can now have a controller that fits your BMS design exactly - no need to use an extra controller to gain an extra output while leaving an input on the original controller unused. BMS sites can make more efficient use of a smaller number of controllers, saving on cost and complexity.

A UniPut<sup>™</sup> can be configured as any one of the following:

- an Active Input, reading between  $0 \dots 10$  V at  $40 \text{ K}\Omega$ , with 9-bit resolution.
- an Active Output, outputting 0 ... 10 V at a maximum load of 20 mA
- a Digital Volt-Free contact.
- a digital input detecting the presence or absence of 24Vac

or

• a relay switched output.

The Cylon range of controllers has several different combinations of UniPuts<sup>™</sup> and standard Universal Inputs.

UniPuts<sup>™</sup> are used in controller strategies through standard Analog and Digital Input and Output modules. However, before it is possible to add a module for a UniPut<sup>™</sup> to the strategy, the UniPut<sup>™</sup> must be configured using CXpro<sup>HD</sup>'s I/O Terminals dialog box.

# CONFIGURING THE FIELD CONTROLLER'S INPUTS AND OUTPUTS

Cylon controllers have a mixture of Universal Inputs and UniPuts<sup>™</sup>. The Universal Inputs are fixed as inputs, but UniPuts<sup>™</sup> may be configured as analog or digital inputs or outputs using the I/O Terminals panel.

# How to open the " I/O Terminals " Strategy Details tab.

The I/O Terminals tab on the Strategy Details dialog can be opened by clicking the I/O Terminals button in the Strategy tab of the Ribbon :

roller Strategy	iew dules	Reorder Module Strateg	BACnet P BACnet L BACnet L Strategy		
Strategy Details					×
Display New Line Strategy Blocks Controller Limits Resources Points Manager Reorder Modules BACnet units 1/O Terminals	Address 001 002 003 004 005 006 007 008 009 010 011 011 012 013 014 015 016 101 102 103 104 105 106 107 108 109 110 111 112	Type Universal Analog Analog Universal Universal Universal Universal Universal UniPut	Input/Output Input UniPut UniPut UniPut UniPut UniPut UniPut Input	Name       Heating Water Temp       Temperature       Hysteresis Block 15 A	Configure Reset Reset All
				OK Can	cel Apply

# How to configure a UniPut™

To configure a particular UniPut™ (UIO), doubleclick on its terminal number in the I/O Terminals tab.

The Configure IO Types box opens

Display	Address	Туре	Input/Output	Name	^	
New Line	001	Universal	Input			Configur
	002	Analog	Input	Heating Water Temp		
arategy Blocks	003	Analog	input locut	remperature		Reset
	005	Universal	Input			
ntroller Limits	006	Universal	Input			Reset A
ources	007	Universal	Input			
	008	Universal	Input			
ts Manager	009	Digital	Output	Hysteresis Block 15 /	A	
der Moduler	010	UniPut	UniPut			
del modules	012	UniPut	UniPut			
net units	013	UniPut	UniPut		_	
	014	UniPut	UniPut			
minals	015	UniPut	UniPut			
	101	Universal	Innut			
	102	Universal	Input			
	103	Universal	Input			
	104	Universal	Input			
	105	Universal	Input			
	105	Universal	input loout			
	108	Universal	Input			
	109	UniPut	UniPut			
	110	UniPut	UniPut			
	111	UniPut	UniPut			
	112	UniPut	UniPut		~	
				ОК	Cancel	App
				ОК	Cancel	Appl
ategy Details				ОК	Cancel	Appl
stegy Details splay	Address	Туре	Input/Output	OK	Cancel	Appl
egy Details lay	Address 001	Type Universal	Input/Output	OK Name	Cancel	Appl
y Details y ine	Address 001 002 003	Type Universal Analog Analog	Input/Output Input Input	OK Name Heating Water Temp	Cancel	Configu
y Details y ne yy Blocks	Address 001 002 003 004	Type Universal Analog Universal	hput/Output Input Input Input Input	OK Name Heating Water Temp Temperature	Cancel	App Configu Reset
y Details y ne yy Blocks	Address 001 002 003 004 005	Type Universal Analog Analog Universal Universal	hput/Output Input Input Input Input	OK Name Heating Water Temp Temperature	Cancel	Configu Reset
y Details y ne gy Blocks oller Limits	Address 001 002 003 004 005 006	Type Universal Analog Universal Universal Universal	Input/Output Input Input Input Input Input Input	OK Name Heating Water Temp Temperature	Cancel	Configu Reset
Details ne y Blocks ler Limits ces	Address 001 002 003 004 005 006 007	Type Universal Analog Analog Universal Universal Universal Universal	Input/Output Input Input Input Input Input Input	Name Heating Water Temp Temperature	Cancel	App Corfigu Reset
Details e Blocks er Limits es	Address 001 002 003 004 005 006 007 008 009	Type Universal Analog Universal Universal Universal Universal Universal	Input/Output Input Input Input Input Input Input Input Octoord	OK Name Heating Water Temp Temperature	Cancel	Configu Reset
y Details y gy Blocks gy Blocks oller Limits rces Manager	Address 001 002 003 004 005 006 007 008 009 010	Type Universal Analog Universal Universal Universal Universal Universal Universal Universal Universal	Input/Output Input Input Input Input Input Input Input UniPut UniPut	OK Name Heating Water Temp Temperature Hysteresis Block 15 /	Cancel	Configu Reset
yy Details yy Jine gy Blocks oller Limits irces i: Manager fer Modules	Address 001 002 003 004 005 005 007 008 009 010 012 Co	Type Universal Analog Universal Universal Universal Universal Universal Digital Universal Universal Universal Universal Universal	Input/Output Input Input Input Input Input Input Input UniPut UniPut	OK Name Heating Water Temp Temperature Hysteresis Block 15 /	Cancel	App Configu Reset A
y Details y gy Blocks gy Blocks oller Limits rces Manager er Modules t units	Address 001 002 003 005 006 009 001 011 012 Co 03 014 014 014 014 014 005 005 005 005 005 005 007 007	Type Universal Analog Analog Universal Univeri	input/Output input input input input input input input input UniPut UniPut	OK Name Heating Water Temp Temperature Hysteresis Block 15 /	Cancel	Configu Reset A
Details e y Blocks ler Limits ces danager r Modules units innals	Address 001 002 003 005 005 005 007 008 009 010 011 012 013 014 015	Type Universal Analog Universal Universal Universal Universal Universal Digital Universal Univer	Input/Output Input Input Input Input Input Input UmPut UmPut Output UmPut	OK Name Heating Water Temp Temperature Hysteresis Block 15 /	Cancel	App Configu Reset A
betails Blocks r Limits S anager Modules nits nals	Address 001 002 003 004 005 005 006 006 006 007 010 011 012 013 014 015 016 017 017 017 006 007 006 007 006 007 007 00	Type Universal Analog Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Optal Universal Optal Universal Optal Universal Optal Universal Opta	Point Direct	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion ut	Cancel	Configu Reset A
etails Nocks Limits is Nodules nits nals	Address 001 002 003 004 005 006 006 006 006 007 006 007 007 001 012 013 014 013 014 015	Type Universal Analog Universal Universal Universal Universal UniPut Migure IO Types Point Type © Analog © Digital	hput/Output hput hput hput hput hput hput hput	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion ut tput	Cancel	Configu Reset
Details Blocks er Limits es Janager Modules units innals	Address 002 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 011 012 013 014 015 016 017 004 005 005 005 005 005 005 005	Type Universal Analog Analog Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Ogtal Universal Offal Universal Offal Universal Offal Universal Offal Universal Offal Universal Offal Universal Offal Universal	Point Direct Point Direct Point Direct Point Direct Point Direct C upp	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion ut tput	Cancel	Configu Reset A
Details e Blocks ee Alanager Modules units ninals	Address 001 002 003 004 005 007 007 007 007 007 009 010 013 014 013 014 015 013 014 015 019 019 019 019 019 019 019 019	Type Universal Analog Universal Universal Universal Universal Universal Universal Uniptal Uniptal Uniptal C Digital C Digital	hput/Output hput hput hput hput hput hput hput	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion tiput	Cancel	Configu Reset A
y Details y ine gy Blocks oller Limits rces Manager er Modules t units minals	Address 001 002 003 004 005 009 009 010 011 012 013 014 015 103 104 105 05 009 009 009 009 009 009 009 009 00	Type Universal Analog Analog Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Ogtal Universal Universal Offal Universal Universal Offal Universa Universa Un	Input/Output           hppd.	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion ut tpput ancel	Cancel	Configu Reset
- Details - - y Blocks Iler Limits ces Manager r Modules - units ninals	Address 001 002 003 004 005 007 007 007 007 007 007 001 012 013 014 015 013 014 015 016 017 017 017 017 018 018 018 018 018 018 018 018	Type Universal Analog Universal Universal Universal Universal Universal Uniptal Uniptal Uniptal Configure IO Types Point Type C Digital	hput/Output hput hput hput hput hput hput hput	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion tiput ance	Cancel	Configu Reset A
Details ne y Blocks ller Limits ces Manager r Modules units <b>minals</b>	Address 001 002 003 004 005 009 009 009 011 01 014 015 106 107 007 007 009 009 009 009 009 009 009 0	Type Universal Analog Analog Universal Universal Universal Universal Universal Universal Universal Universal Ogtal Universal Officer 10 Type © Analog © Digital Universal	Input/Output           Input           Input           Input           Input           Input           Input           Output           UmPut           Output           Output           Other           C           OK           Cok	OK Name Heating Water Temp Temperature Hysteresia Block 15 / X tion ut tiput ancel	Cancel	Configu Reset
y Details y Blocks lier Limits ces Manager r Modules r units minals	Address 001 002 003 004 005 009 010 012 013 014 015 016 015 016 107 102 016 017 012 016 016 017 012 016 016 017 012 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 017 016 016 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Type Universal Analog Analog Universal Universal Universal Universal UniPut Point Type © Analog © Digital UniPut	Input/Output Input Input Input Input Input Input Input Input Input Output UniPut Output Input	OK Name Heating Water Temp Temperatures Hysteresis Block 15 / X tion tu tiput ance	Cancel	Configu Reset A
Details re y Blocks ler Limits ces Aanager • Modules units iinnals	Address 001 002 003 004 005 007 009 009 009 010 012 013 014 015 016 015 016 107 103 104 105 106 107 109 109 109 109 109 109 109 109 109 109	Type Universal Analog Analog Universal Universal Universal Universal Unifigure IO Types Point Type C Digital Unifigure IO Types Of Digital Universal Universal Universal Universal Universal Universal Universal	Input/Output Input Input Input Input Input Input Output (* Input C Output (* Output (* Input Point Direct (* Input Point Direct (* Input Direct Input (* Output (* Output)) (* Output (* Output)) (* Output) (* O	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tilen ut tiput ancel	Cancel	Configu Reset
- Details Ne y Blocks IIer Limits ces Wanager r Modules units ninals	Address 001 002 003 003 004 006 006 009 010 012 012 013 015 016 100 103 106 106 106 106 106 106 106 106 106 106	Type Universal Analog Analog Universal Universal Universal Universal Universal Universal Universal Universal C Digital C Digital Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal Universal	Input/Output           Input           Output           UmPht           OK           C           Input           OK           C           Input           UnPht           UnPht	OK Name Heating Water Temp Temperature Hysteresis Block 15 / X tion tion tiput ancel	Cancel	Configur Reset Reset A

ОК

Cancel

Note: Terminals marked Universal are not UniPuts<sup>™</sup>, so the Configure IO Types dialog for these terminals does not allow the terminal to be changed from Input to Output

Set whether the **UniPut<sup>™</sup>** is to deal with Analog or Digital signals (the following illustrations show the **UniPut<sup>™</sup>** being set as an analog output),



Configure IO Types

ОК

Point Direction

Input

C Output

Cancel

Point Type

C Analog

C Digital



Note: When the I/O Terminals dialog is closed, point modules will be added to the strategy drawing for

any newly-configured terminals which were not already in the strategy.

# Changing the configuration of a UniPut™

If you want to change the configuration of an existing UniPut<sup>™</sup>, you must 'delete' its configuration from the I/O Terminals panel.

Note: The Deletebutton on theI/O Terminalspanel will not work if there is a module in the strategy forthat point. If you click onDeletewhen a point is selected for which there is a module in thestrategy, a message will appear to alert you of this fact.



In order to proceed in this case, you must delete the module representing that point from the Strategy drawing area by selecting it and pressing the **[Delete]** button on the PC's keyboard.

Open the I/O Terminals panel, by clicking on the I/O Terminals button in the Strategy tab of the Ribbon :



I/O Terminals Terminal Number Type Input/Output Defaults 001 002 003 004 005 006 007 008 009 010 011 Analog Analog Input Input Configure Digital Input Input Input Input Input Analog Digital Digital Universal Universal Input Analog Output Analog Output Digital Output 013 014 015 016 UniPut UniPut UniPut UniPut UniPut UniPut UniPut Delete UniPut ОК Hide I/O Terminals when finished Cancel I/O Terminals Terminal Number Туре Input/Output Defaults 1 001 002 003 004 005 006 007 008 009 010 011 Analog Input Input Analog Configure Input Input Input Input Digital Digital Analog Digital Digital Universal Universal Input Input Analog Output Analog Output Digital Output 013 014 015 016 UniPut UniPut UniPut UniPut UniPut UniPut Delete UniPut UniPut Hide I/O Terminals when finished OK Cancel

Select the terminal number

and click on Delete

The selected terminal has now been returned to the blank 'UniPut' configuration.

detailed in *How to configure a* on page 89.

 
 Terminal Number

 001
 002

 003
 004

 005
 006

 007
 008

 009
 010

 011
 012

 013
 013

 015
 016
 Type Input/Output Defaults . Analog Analog Digital Analog Digital Universal Analog Analog Digital UniPut Input Input Input Input Input Input Input Output Output Output UniPut Configure The terminal can now be re-configured as UniPut Delete ✓ Hide I/O Terminals when finished ОК Cancel

I/O Terminals

# **Example: Configuring Analog Input module properties**

01_01.s32		$\triangleright$ ×	Prop	perties	<b>Д</b> 🗙
		^	<	> ? Analog Input [1]	•
				General Information	Angles land
				Туре	Analog input
				Service Order	1
				Name	Outside Air Temperature
				Synchronised Status	Checking
				Constants	
	Analog Input 1			<ul> <li>Point type</li> </ul>	Input Analog
	A Outside Air Temperature			Low threshold	78
	Point Q 11	-i		High threshold	120
	Override 🗖	Ľ		Lower sensor range	-50
				Upper sensor range	150
				Input error	0.0000
				Exponential filter	20
				Sensor type	PT1000
	Analog Input 2			Unit	°C
	A Heating Water Temp			Averaging	0
	Point Q (2)	-		Outputs	·
	Override 🗖			Doint	Apalog (1): 0.00 Outside Air T
				Point     Manual everyide	Divital
				In Internation overhoe	Digital
		· 🗸			
		>	Pro	perties Page Names Mod	ules

#### • General Information

#### Type

(not editable) shows that this is an Analog input.

#### Service Order

(not editable) indicates the order in which this block will be processed by the controller.

#### Name

Shows the text identifier for the point, which must be no more than 24 alphanumeric characters. Spaces, commas, full stops may also be used. Each point in a Field Controller must have a point name that is unique within that controller.

#### Synchronised Status

Shows whether the Strategy Drawing matches the Strategy in the connected Controller.

#### • Constants

Low Input Threshold / High Input Threshold / Low Strategy Value / Hight Strategy Value

The threshold settings specify the on/off turnover point on a digital input or output.

#### Input Error

A constant with the same unit as the input value, which is added to the input value to compensate for errors in input arising from factors such as resistance of long cables or positioning of sensors. Temperature values (sensor type PT1000) are corrected in mV. To compensate for 1 °C, the input error is 2.5 mV. For example, a decrease in temperature of 2 °C requires an input error of -5.0 mV to be entered. This feature is only available for analog passive inputs.

#### Exp. Filter Constant

An individual time constant for the analog input., behaving as a damping filter. The measured input value will be averaged over the time specified in seconds by the **Exponential Filter** constant, so that short-term variations of the measured value can be filtered out if the **Exponential Filter** value is longer than the sensor response time.

#### Sensor Type

Select the required filter from the Sensor Type list. Some of the available options are:

- Pt1000: This configures the analog input for reading temperatures from a standard Pt1000 sensor. The Controller will convert the measured resistance (voltage) to a temperature signal.
- 0-10 V: This converts the hardware voltage signal 0...10 V DC to a software value in the range 0...100 %. For example, the voltage signal 6.7 V DC will be converted to 67.0 %.
- 0-20 mA: This converts the hardware current signal 0...20 mA to a software value in the range 0...100 %. For example, a current of 15.0 mA gives the software a value of 75.0 %.
- Pulse(V/F): This is designed for reading voltage-free contacts, which can be operated at a frequency of up to 12 Hz. The value of the input will be incremented by 1 after each detected pulse. Evaluation and resetting of the counter will be done by using the Meter Module (module 63).

Additional sensor types can be allowed for by defining extra units of measurement - see Appendix :: Adding units of measurement to the system on page 213.

#### Unit

The Unit list box contains a collection of text strings, one of which will be displayed together with the point value. Choose from the list the type of unit that corresponds to the type of input, e.g. if an analog input point represents a temperature reading in degrees Celsius, you may choose DegC from the Units list box. If necessary, additional units may be defined in the C:\CXproHD\(*SITENAME*)\SYSTEM\site.ini file. *Appendix :: Adding units of measurement to the system* on page 213 contains details of how this is done.

#### • Outputs

#### Point

The output of the Analog Point module assumes the type, name, and units of the point module. A point number is automatically assigned (though this can be edited by selecting the connecting line, which represents the point itself)

**Note:** Point numbers 1...8 represent controller inputs 1...8.

Point numbers 9...16 represent controller outputs 1...8.

#### **Viewing used blocks**

To check which blocks have been used in a Strategy, select Strategy Details from the Strategy tab of the Ribbon :

					cripioni	
Strategy						
은 Copy 한 Paste Select All Clipboard	View Modules	Add Text	I/O Terminals	Reorder Modules Strategy	BACnet Points BACnet Units Contemportants Bachet Units	Strategy Help
			п 🔽	4 / 6	04 04 -22	

This opens the Strategy Details dialog:

Strategy Details	×
etegy Blocks Controller   Resources   Points Manager	
101         Comparator           102         BAcIne Schedule           103         Absolute Value           104         BAcIne Schedule           105         Absolute Value           106         Absolute Value           107         Rounding           108         Intel 0 or 100           109         Real Constant           109         Real Constant           101         VAU Differential Pressure           111         Not Used           121         Not Used           123         Not Used           124         Not Used           125         Not Used           126         Not Used           127         Not Used           128         Not Used           129         Not Used           120         Not Used           121         Not Used	^
121 Net Used 122 Net Used 23 Net Used	~
	)к

#### Viewing the list of blocks

Click on the Strategy Blocks tab to see which of the available blocks have been used in the active strategy and which have not.

	Strategy Details	
trateg	y Blocks Controller   Resources   Points Manager	
001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022	Comparator         BACnet Schedule         Aboulte Value         Aboulte Value         Aboulte Value         Aboulte Value         Analog Gate         Analog Gate	^
024	Max Hand	*
		ОК

In the above example, the **Strategy Blocks** tab indicates that the first block (block no. 001) is being used as a **Comparator** module.

Block 002 is an BACnet Schedule module, block 003 is an Absolute Value module etc.

Blocks 011 to 023 have not been used in the strategy.

To view the remaining blocks (in the above example, blocks 024 ... 1024), use the horizontal scroll bar to move down the Strategy Blocks tab.

# Viewing the blocks associated with each point

The **Points Manager** tab allows you to examine points in a **strategy**, listing the **strategy blocks** to which each **point** is connected.

Strategy Details	×
Strategy Blocks   Controller   Resources   Points Manager	
Contained Points     Contained Points	
	ОК

In this example, Analog Point number 2 is connected to strategy blocks numbered 3 and 4.

## **Strategy Compare**

When connected to a site, it is possible to compare the strategy in **CXpro<sup>HD</sup>** with that in the **Controller**.

To compare **CXpro<sup>HD</sup>** and **Controller** strategies,

Connect to the **Controller** by clicking on the **Connect** button in the **Home** tab of the **Ribbon** :



Right-click on the Field Controller in the Site List and select Strategy operations > Compare Strategy To Controller ,

🗄 📲 PL Office											
🖃 🖳 001 - Network											
🗢 , 001 - 001		k .									
🗄 📲 Sample Apps I								Δ1		Analo	ig Inpi
🗄 💻 001 - Wet	Configure FLX Hardware Modules					÷		AI		Temp	veratu
	Diedk										
	Copy Strategy To										
	Strategy operations		Per	rder	M	odul	e R	locks			
	Stategy operations	-+		- aci		Juui		IUCKS			
	Export Aspect Data										
	Update BACnet EDE Data		Cor	npar	e St	trate	av.	To Cor	ntrol	ler	5
🗐 , 1122 - 🗤 🖘	ingle Fump mp				_		2	1			emp

Alternatively, you can select Compare from the Controller tab of the Ribbon .

·									
ie	Controller	Stra	Strategy						
	👆 Communica	tions	📥 Download	Compare	1.23 Version	ςв			
:t	Gontroller		Wipe Controller	Show Compare	🗟 Time and Date	St			
	BACnet		🛃 Auto Online		Maximums	a Lo			
	Configuratio	on		Ope	rations				

Only strategy modules are compared.

Note: Parts of the strategy that can be modified using tools other than the Engineering Tool (e.g. CCView) are not compared. For example, the sample interval on a Datalog module is excluded from the comparison, but the Type of datalog is included.

#### **Compare Process**

When the **Compare** process is requested, the **Select Items to Compare** dialog is displayed:

Select Item	is to Compare
Hardware Blocks	
Range Strategy Block:	001-024
Range	001-1024 ues
Range	001-1024
Digital Setpoint Valu	001-1024
BACnet Points	001-224
Select / deselect all	001-224
	Compare Cancel
_	

This allows specific subsets of the strategy to be compared if required.

Clicking the Compare button starts the process, and shows the Uploading progress dialog:

Uploading	X
Controller	
controller	
Hardware Points	16
Strategy Blocks	1025
Analog Setpoint Values	3
Digital Setpoint Values	
BACnet Point Config	
Receiving analog setpoints	
	Close Abort

and when the upload is complete, a comparison report dialog is displayed

site : BACnet Real Comms Controller No. : 2 Field Controller No. : 1								
Select blocks to upd	ate							
Туре	Service Or	Block Type	Difference					
FLX Module Strategy Blocks Strategy Blocks Strategy Blocks Strategy Blocks	1 1 3 6 1025	Configuration Boolean Adder/Scaler Modbus analog FLX port configurat	FLX Module a The Output " The Input "In The block of The "Module	it address <1> is configured on contri Complement' has address - «Uncom put B' has address - «Uncomnected» type Modbus analog at address 6 on t at T' value is: - «FUX-4R4» on the Con	oller but is not configure lected> on the Controlle on the Controller <2> he strategy is not presen troller - <none> on the</none>			
<					>			
		Show only blocks with the second s	th differences	C Show all blocks				
PC				Controller				
		<b>^</b> <u>I</u>	imp to		^			
<		×		5	~			
Compare is compl	ete. (Select to st	art a new upload.)			Close			

This dialog lists all of the differences between the PC version of the Strategy and the Controller version, with a facility to jump to each of the modules that contains a difference, so that the difference can be manually resolved.

When the differences have been resolved, clicking on the Close button terminates the Compare process.

#### **Strategy Synchronization**

**CXpro<sup>HD</sup>** will evaluate whether its copy of the **strategy** and the **Controller's** are fully synchronized at the following times:

- When a module is selected in the Strategy drawing
- When a strategy is closed following a partial download
- When Scan Mode is enabled

If any potential discrepancy is found, the user will be prompted to run the Strategy Compare feature.

Modules in the drawing that do not match the controller strategy are marked with an icon showing a red circle containing an "x" to indicate that it is no in sync:



The user is not blocked or forced to take any action, and no changes take place in the background.

**Note**: The checks apply to all strategy modules with the following exceptions:

- Macros
- DI Modules
- Set Point Modules
- IO Modules (On UC16 controllers)
- Comment Modules

#### When a module properties are edited:

When a module is selected, its Synchronised Status is displayed in the properties inspector:

s32											Þ	×	Prop	pert	ties					џ	x
												^	<	3	>	?	Analog Ir	nput [3]			-
														Ту	pe				Analog Input		
														Ser	vice	e Or	der		3		
														Na	me				Outside Air Temperature		
													Г	Syr	nchi	roni	sed Status	;	Checking		
														Co							
	Г	_	 _	Ana	log i	Inpu	t	_	3	1				+	Po	int t	уре		Input Analog		
	I	A		Out	sid	e Ai	r			Ŀ.				Lov	w th	resł	hold		78		
	ŀ		 	- Cili		acui	F	oin	: 0	-	Ľ.			Hig	gh t	hres	hold		120		
	L					0	Dve	rride	2		<u> </u>	-		Lov	wer	sen	sor range		-50		
														Up	per	sen	sor range		150		
														Inp	out e	erro	r		0.0000		
														-			1.000		20		

#### When a strategy is closed following a partial download:

A partial download takes place when the Automatic Download feature is <u>disabled</u>. In this case, selecting Compare from the Controller tab of the Ribbon will open a Select items to Download dialog allowing different subsets of the strategy to be downloaded individually.

This dialog is similar to the Select Items to Compare dialog used in the compare process (see *Strategy Compare* on page 97).

However, if you carry out a partial download the **setup block** is not downloaded. The next time you close the strategy, the **Synchronisation** process will register a discrepancy between **PC** and **Controller** strategies. When this happens, a warning will be displayed stating that the "setup block was updated but not downloaded" and suggesting that the setup is downloaded:

	Cylon Engineering Centre	×
0	The setup block was updated but not downloaded to the controller. This may cause synchronization issues between the controller strategy and PC strategy. It is strongly recommended that you download the setup to the controller before continuing. Do you want to continue anyway?	
	Yes No	

Clicking on the **No** button will allow you to save the setup block. If you do not wish to do so, click the **Yes** button and the **strategy** will be closed without updating the **setup block** on the **Controller**.

#### When Scan Mode is enabled

When **Scan Mode** is activated (see *Activate scan mode* on page 136) the **PC** version of the **strategy** is compared to the **Controller** version and if any discrepancies are found, the mismatched modules will be identified by a flashing 'highlight box' and a message in the status bar will inform the user

The **LiveLog** feature in **CXpro<sup>HD</sup>** allows you to read the values of points in the controllers on your site (i.e. it reports "live" or in real-time from the site).

As well as reading point values, the LiveLog also scans time schedules, the **BMS** network, and its Fieldbusses, and, if configured to do so, it will log those values to a text file. It can also show **HOA** values.

# **Configuring Live Log**

Livelog can scan just one strategy or all open strategies, can either append to the log or wipe the log each time it starts and can write the log to a file for later analysis.

To set up these options, select LiveLog Setup from the Controller tab of the Ribbon

Controller Stra	ategy									
Communications	古 Download 「 で Wipe Controller 日 ず Auto Online	Compare	123 Version Time and Date Maximums	Board Diagnostics	<b>₽</b> Scan	Over Poi	ride LiveLog	LiveLog Setup	Interface Co	onfig
Configuration		Oper	ations				Te	sting	Keyp	ad
		# 🗙 🛛	001_01.s32		⊳	×	Properties	LiveLog Setup		
		^				^		Configure LiveLog ope	ration.	

This opens the Livelog Setup dialog.

Livelog Set	tup 🌄
can C All Opened Strategies Active Strategy Scan Interval (<60s) 5	Update C Append © Overwrite
Log To File SYSTEM\iowin.log	
	OK Cancel

In the Update section, select Append to cause the LiveLog to add new scan data to the end of the existing list, or Overwrite to cause the LiveLog list to be replaced each time a scan is completed.



In the Scan section you can either click the All Opened Strategies radio button to allow the LiveLog to show point values from all of the strategies that are currently opened or else restrict the log to the point values of the active strategy only, by clicking the Active Strategy radio button.

Scan						
O All Opened Strategies						
Active Strategy						
Scan Interval (<60s) 5						

If you chose to scan the **Active Strategy** only, enter a number between **1** and **60** in the **Scan Interval** edit box. This represents the number of seconds **CXpro<sup>HD</sup>** will remain idle after scanning the **strategy** before it will scan the **strategy** again. (The LiveLog continuously scans the **strategy** until you press the **Stop Scan** button on the **LiveLog** dialog)

If you would like the results of the LiveLog to be written to a text file and saved, click the Log to File checkbox. By default, logs are saved to \SYSTEM\iowin.log

To view the contents of the LiveLog text file, click LiveLog Report in the Controller tab of the Ribbon :

Controller Stra	ategy							
Communications	Download     Download     Download     Turpe Controller     Auto Online	Compare	묘 Version 당 Time and Date 데 Maximums	Statistics	<b>₽</b> Scan	Override Point	LiveLog Cetup	Interface Cor Builder
Configuration		Ope	rations				Testing	Keypac
		<b>₽ 🛛</b> 🗸	001_01.s32		Þ	× Prop	perties	
t IP		^				^		

This will open the **log** file in your default text editor:

	iowi	n.log - Notepad	-		×
File Edit Forma	at View Help				
Currently Sca	nning Scanning	Real Points (1-16)	)		^
001_01.s32	PL Office	001 - Network	001 - 001	- CBM24	
001_01.s32	PL Office	001 - Network	001 - 001	- CBM24	
					$\sim$
<				>	- 14

#### **Running LiveLog**

Select from the Site List the site the BACnet Router and Field Controller containing the point that is to be read.

Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :

	Ŧ		
File	* Home	Controller	Strategy
ø	Connect	ር <mark></mark> Copy	Properties Modules ? Strategy
	Disconnect	Paste	Site Navigation Macros Reopen
		Select All	List Page Names 🗨 Search
	Site	Clipboard	View

Activate LiveLog by clicking the LiveLog option in the Controller tab of the Ribbon

	File T Home	Controller St	arategy								
	🚿 Connect		📩 Download 🛛 🖓 Compar	e	23 Version		5	L L		E LiveLog Setup	C
	Disconnect	Controller	Wipe Controller 🕃 Show C	ompare	B Time and Date	Statistics	Scan	Overrie	te Livel o	LiveLog Report	Inter
		BACnet	📩 Auto Online		Maximums	Lock and Unlock	Jun	Poin	i incro	🗣 Upload BACnet Points	Built
	Site	Configuration		Ope	rations				Te	sting	
l	Site List		Ф 🔀	4	001_01.s32		₽	× P	ot 📑	Livelog (Shift+F3)	
1	E-Sites		^					^	L†.	View Livelog output.	

This opens the Livelog dialog:

rategy Target	PL Office	001 - Network	001 - 00	01 - CBM24		
Mode	Point No	Point Name	Point Type	Value	Override	Time
Points     Time Schedu     Network     icanning     iO Points     Analogs     Digitals	002 003	Heating Water Temp Outside Air Temperature	Analog Analog	0.01		14:31:58 14:31:58
	Override	1	Stop	Scan	Clear	

#### **LiveLog - Scanning Definition**

In the LiveLog dialog, you can view the following parameters for the LiveLog, and change them where it is appropriate to do so:

- The **name** of the current strategy
- The Mode of the LiveLog, i.e. whether the LiveLog will log points, schedules or the network status
- The Target Controller for the current strategy
- The type of points to be scanned
- Whether or not points will be **overwritten**

#### Strategy name tab

	Livelog
Livelog of Site	

The name of the strategy which is actively being scanned is displayed on the strategy name tab . If you chose the scan Active Strategy option in the Livelog Setup dialog box (see *Configuring Live Log* on page 101), the file name tab will display the name of the active strategy. If you chose the scan All Opened Strategies option in the Livelog Setup dialog box, there will be a file name tab for every open strategy.

#### **Strategy Target**

Strategy Target	PL Office	001 - Network	001 - 001 - CBM24

This window shows the target of the currently selected strategy. The values cannot be changed in the LiveLog dialog.

#### LiveLog mode

Mode				
Points				
C Time Schedules				
C Network				

The LiveLog interface changes, depending on the mode that is being logged:

#### • Points mode

In this view, you can see points in the selected strategy, their types and values, and you can overwrite them if required.

#### • LiveLog: Time Schedule mode

You can examine the time schedules in the selected strategy with this dialog box.

#### LiveLog: Network mode

You can view the status of the RS485 Fieldbus with this screen, i.e. which controllers are online or offline, and which controllers are servicing or not servicing.

#### Scanning definition

Scanning					
IO Points					
C Analogs					
O Digitals					

The Scanning section of the LiveLog window allows you to decide which values to scan.

To scan the values of the controller's hardware points, click IOPoints.

To scan analog points only, click Analogs in the scanning section. To scan a specific number of analog points, enter a range of point numbers in the edit box under Digitals.

To scan digital points only, click **Digitals** in the scanning section. To scan a specific number of digital points, enter a range of point numbers in the edit box under **Digitals**.

#### **Override Status**

When a scan has been stopped, you can change the **override** status of any point listed in the **LiveLog** window by selecting the point from the list and clicking on the **Override** button at the bottom left of the window.

	1	1			
Point No	Point Name	Point Type	Value	Override	Time
002	Heating Water Temp	Analog	0.01		15:44:08
003	Outside Air Temperature	Analog	0.01		15:44:09
Our state	1	61	c	61	
Overvide		Stop	Scan	Clear	

This opens the **Override Hardware Point** dialog, where the current override status of the point is displayed and can be changed if necessary.

# **Overriding points**

Point values can be overridden using the **Override Hardware Point** dialog, which allows you to set a point in a **strategy** to a particular value, regardless of conditions at a **controller's** inputs or outputs, or conditions within the **strategy** itself.

- When a hardware **output** is manually overridden (disabled), the modules in the **strategy** do not affect the point value.
- When a hardware **input** is manually overridden (disabled), the hardware signal which is connected to the input (**PT1000**, transmitter, dry contact, etc.) is ignored by the input.

In both cases, the overridden hardware point keeps the value that is assigned to it in the **Override Point** dialog.

The only way to change the value of a hardware point which has been manually overridden to another specified value is to use the **Override** option again, assigning a new value in place of the first.

Note: Some specific controllers, such as CBX-8R8-H and FLX-4R4-H, have "HOA" controls built-in to them. When these HOA controls are active, CXpro<sup>HD</sup> cannot affect them but can display the overridden values, but not affect them.

Removing manual override status from a hardware point (enabling) means that the point can now be influenced by the connected hardware or **strategy** once again. The length of time that a hardware point will remain in the overridden state can be set in **CXpro<sup>HD</sup>**.

It is only possible to disable and enable hardware point values from **CXpro<sup>HD</sup>** if the **PC** is connected to a **controller** (either directly or via a **BACnet** Router) and **CXpro<sup>HD</sup> Connect** button is active.

Whether hardware points are overridden by the **CXpro<sup>HD</sup> Override Point** dialog, or by **HOA** switches on the **Controller** itself, **CXpro<sup>HD</sup>** is aware of the override state and value and displays it in the **LiveLog** window.

Point No	Point Name	Point Type	Value	Override	Time	Point No	Point Name	Point Type	Value	Override	Time
209	Anl Output 209	Analog	46.00	HOA	11:31:09	209	Anl Output 209	Analog	15.00	One Hour	11:32:50
Point No	Point Name	Point Type	Value	Override	Time	Point No	Point Name	Point Type	Value	Override	Time

The point's **Strategy module** has a digital output labeled **Override**, which is set to a value of **1** if an override is in effect (i.e. the hardware point is 'disabled'), or **0** if the point is not overridden (i.e. the point is 'enabled').



# Using the Override Point dialog:

To open the **Override Point** dialog, either:

1. Right-click on a line or module and select **Override Hardware Point Value** from the context menu:

	Subtraction 1 A - B - C - D Show Point Route
	Convert Line to Connector
2	Simulation properties
	Override Hardware Point Value

AI	Analog Input Named point	1	Subtraction A - B - C - D
	c	Display Options	> tpu
		Override Hardware Po	int Value

2. or click on the **Override** button in the **Livelog** dialog

terrar Serace Launceau		001 - Network	k name	001 - 002 -	CBX-SR8		
Mode Points C Time Schedule)	Point No	Point Name Named point	Point	Type og Hardware	Value 1000,00	Override	Time 09:51:01
C Betwork Scanning G JO Points C Analogs							
C gigitals							

The relevant Override Hardware Point dialog (analog or digital) will open:

Override Hardware Point	Override Hardware Point
Point Type Analog	Point Type Digital
Point Number 1	Point Number 2
Override Off C 1 Hour Duration C Midnight C Continuous	Override C 1 Hour Duration C Midnight C Continuous
Value 1000,000 Change	Value Off  Change
Status Received point value from controller	Status Received point value from controller
Close	Close

The **Override Duration** can be set to one of the following states:

- inactive at all times Off
- active until the controller time passes 00:00 Midnight
- active for one hour from the time at which it becomes active 1 Hour
- active at all times Continuous
- If the override is caused by a Controller's HOA switch, the override state is reported as "HOA"

The 'Midnight ' and ' 1 hour ' options are provided to conveniently avoid problems that could arise if the override is not removed when it is no longer required.

Note: Even if 'Off' is selected in the Override Duration for Hardware Point section, setting a value (analog) or state (digital) for the point will still have an effect. When the Override button on the dialog is pressed, the value is sent to the point in the controller strategy, which stays at that value until the next time that the controller scans its strategy.

Enter a value for the point.

In this instance, a value of 100 is being is being entered for an analog point.	Value 100 Change
A value of Off or On can be entered for digital points.	Value Off  Change
Select the length of time that the value of the point will be changed in the <b>Override Duration for Hardware Point</b> section of the dialog.	Override C Off C 1 Hour Duration C Midnight C Continuous
The point will be set to the entered value when the <b>Change</b> button is pressed:	Value 100 Charte
Click the <b>Close</b> button to close the dialog.	

#### Notes about overriding BACnet points

#### Inputs

When an input is overridden via **CXpro<sup>HD</sup>**, both the "out of service" and the "override" flags are automatically set.

When an overridden input comes out of its **CXpro<sup>HD</sup>** override both the "out of service" and the "override" flags are reset. It will be put into service regardless of the state it was in prior to going into override.

To override an input via BACnet, the "out of service" flag is manually set by writing to the "out of service" property. Then the desired value is written to the present-value. The OWS can clear any **CXpro<sup>HD</sup>** override by putting the point back into service and then back out again. From **CXpro<sup>HD</sup>** side, the "override" flag will disappear and be replaced with an "overridden" flag.

Putting an input in service will clear all overrides both **CXpro<sup>HD</sup>** and BACnet and will flag the change appropriately on both protocols.

#### Outputs

When an output is overridden via **CXpro<sup>HD</sup>**, both the "out of service" and the "override" flags are set. The information in the present-value property will still be delivered to the hardware layer despite being out of service.

When an overridden output comes out of its **CXpro**<sup>HD</sup> override, the point is put back in service, and both the "out of service" and the "override" flags are reset.

To override an output via BACnet, it is presumed that the priority array will be used, and clear all overrides and flag the change appropriately on both sides.

All I/O blocks have an output labeled Override. This output is true any time the point is "out of service" or "overridden" via **CXpro<sup>HD</sup>**. This way the point reflects the status of the data regardless of whether it is being overridden via BACnet or **CXpro<sup>HD</sup>**.

Removing manual override status from a hardware point (enabling) means that the point will once again respond to hardware connections or **strategy** conditions.

If the override duration on a hardware point has been set to 1 hour or until Midnight the point will be enabled when the specified period has elapsed. However,

- If the override is identified as "HOA" you must use the switch on the **Controller** to disable it.
- if the override duration has been set to Continuous the following procedure must be carried to enable the point:

Open the **Override Point** dialog by selecting **Change Point** from the **Controller** tab of the **Ribbon** or by clicking on the **Override** button in the **Livelog** dialog, and select the point to be overridden.

Select the **Off** option in the **Override Duration** section of the dialog,

Override Coff O 1 Hour Duration Midnight O Continuous

Click the **Change** button to apply the change.

Click the **Close** button to close the dialog.

If you opened the **Override** dialog from the **Livelog** dialog, then to see the new value of the point, click the **Restart** button.

The next time the **LiveLog** scans that point, its new value will be displayed. The **LiveLog** window displays the symbol ¶ beside the value of points that have been changed.

**Note**: Double-clicking a point number in the LiveLog window places an asterisk beside it allowing it to be monitored more effectively.
# HOW TO CHANGE THE VALUE OF A SETPOINT

The value of a set point can be changed using the **Change Set Point Value** dialog box, in a similar way to changing the value of a hardware point.

The procedure for changing the value of a setpoint is as follows:

To open the Change Set Point Value dialog either:

1. Right-click on a setpoint module or the line and click Change Setpoint Value option from the context menu:

<sup>0</sup> 1	Digita Digita	il Se I <b>S</b> e	tpoint tpoint	:	1			:						
			-	C	ha	ng	e Se	et P	oir	nt V	alu	e		

1	)	So	ftS	y se tart	Dela	ay2		~	•			
						P	oint	0	23	÷	Shaw Daint Dawt	
								-			Show Point Route	
											Convert Line to Connector	
											Simulation properties	
											Change Set Point Value	

2. or click on the **Override** button in the **Livelog** dialog:

Point No	Point Name	Point Type	Value	Override	Time
002	Heating Water Temp	Analog	0.01		15:44:08
	Outside Air Temperature				

The relevant Change Set Point Value dialog (analog or digital) will open:

Change Set Point Value	Change Set Point Value
Point Type Analog	Point Type Digital
Point Number 2	Point Number 1
Value 0.00 Change	Value Off  Change
Status Received point value from controller	Status Received point value from controller
Close	Close

Enter a value for the point.

In this instance, a value of 100 is being is being entered for an analog point.

A value of Off or On can be entered for digital points.

The point will be set to the entered value when the **Change** button is pressed:

Click the Close button to close the dialog.

If you opened the **Override** dialog from the **Livelog** dialog, then to see the new value of the point, click the **Restart** button.

The next time the LiveLog scans that point, its new value will be displayed. The LiveLog displays the symbol ¶ beside the value of points that have been changed.

**Note**: Double-clicking a point number in the LiveLog window places an asterisk beside it allowing it to be monitored more effectively.

Value	100		Change
Value	Off	•	Change
Value	100		Charte

# SECTION 6: CREATING STRATEGIES



# WHAT IS A STRATEGY?

A Cylon Field Controller interacts with HVAC and other equipment by varying its outputs in response to inputs such as temperature, switch settings, air flow speed, etc.

The way that the controller's outputs react in response to the controller's inputs can be defined by the user. The definition is called a '**strategy'**.

A strategy is the 'user program', stored in a Cylon Field Controller, which configures the controller for a specific role in a BMS site. It can be described as the "implementation of a solution to a requirement on a site".

In **CXpro<sup>HD</sup>**, a strategy is designed graphically using the algorithmic modules available on the **modules** panel. It is saved as a strategy file on the Engineering PC and then downloaded to the **controller** for which it was designed, where it tells the **controller** how to behave within the BMS site.

The simplest of **strategies** is made up of algorithmic modules, hardware, and virtual points. **Strategies** are often more complex, however, and can also include **time schedules**, **trendlogs**, and **alarms**.

## AN EXAMPLE OF A STRATEGY

#### **The Problem**

The heating system of a building is too costly to run constantly.

#### **The Solution**

The heating system should be switched off when the outside air temperature rises above a certain point (for example 23°C). It should not be switched on again until the outside air temperature drops below another predefined point (in this case, 18°C).

#### The Strategy

A strategy to implement this solution to the problem can be designed in **CXpro<sup>HD</sup>** and downloaded to the controller connected to the heating system, where it will be applied.

The strategy shown below uses the Hysteresis module to compare the outside air temperature to the two set points defined in the module (in this case, these are set at 18 °C and 23 °C). If the outside air temperature is greater than 23 °C, the H output is unset (off). If it is less than 18 °C, the H output is set (on).

The strategy is saved and then downloaded to the Field Controller connected to the heating system.



To create a **strategy**, follow these steps:

• Select Site, BACnet Router, and Field Controller in the Site List and double-click to open its strategy:



If the selected Feld Controller does not already have a strategy, you will be prompted to create a new one:



Click **Ok** to open a blank strategy

• Select a module from the modules panel



and place it on the drawing area



If the module represents a point you will be prompted to enter a name. Enter one and click Ok .



The module is now on the drawing area. It can now be moved, deleted, copied, or linked to other modules.



To operate on a module, it must be selected by left-clicking on it,



or by dragging a selection box around the module symbol (or symbols)



Once a module has been selected, it can then be:

moved	by using the mouse to drag the module to its new location;
deleted	by pressing the <b>[DELETE]</b> key on the keyboard;
cut	by pressing <b>[Ctrl]</b> + <b>[x]</b> on the keyboard
copied	by pressing <b>[Ctrl]</b> + <b>[c]</b> on the keyboard
pasted	by pressing <b>[Ctrl]</b> + <b>[v]</b> on the keyboard

Note: Pasted hardware point modules may adapt some parameters to the destination point but retain others. For example, an analog input configured as PT1000 when pasted to a UniPut<sup>™</sup> will change to a voltage input but retain the max and min limits (in the Advanced button) which for PT1000 could be min 0 and max 0, leading to incorrect operation of the UniPut<sup>™</sup>.

# Place all the required modules on the drawing area and join them

Place other modules required to implement the strategy on the drawing area.

Modules must be positioned from left to right on the drawing area. Hardware inputs must go on the left side of the drawing area, hardware outputs on the right. Between the inputs and the outputs, organize the modules so that a signal flows from left to right across the strategy.

٩	/	0	01_	01.s	<b>32</b>	1																														Þ	>	×
Γ																																						^
ŀ																																						
ŀ																																						
			[	A	I	1	Anal Fem	log I pera	input atur	: e		3				Ø			Hys	tere	sis		15	1			D	0	)	C He	Digit eatir	al O ng E	utpu Enal	t ble	1	ן י		
ŀ			İ							Po	pint	0			6	) In	put			A	ctive	: Hig	ի [	3			E	] Po	oint				0	verri	ide [	3		
ŀ			l						0	ven	ride	٦			0	n le	vel:	2.00	); Of	/ f lev	Activ el: 4	e Lo	w	3														
ŀ																	1		1	1	1	1																
ŀ																																						
l																																						v
<																																					>	

Join the modules together as required, by placing the mouse pointer over module inputs or outputs

4		/	001	_0	1.s3	2																																	⊳	×
F																																								^
ŀ																																								
ŀ								1	1								1	1					1								1	1					1			
ŀ					AI		, Т	inak em p	og li pera	nput Itun	e		3				D			Ηŋ	/ste	resis			15				1	0	)	H	Digit eatii	al C ng I	utpu E na	ıt ble		9		
											Po	oint	1			e	) Ir	nput				Act	ive I	High	G				E	d P	oint				0	)ver	ride	٥		
ŀ				L						0	ven	ide	5			C	)n le	vel	2.0	i0; C	)ff le	Act evel	ive : 4.0	Low 10	Ы															
ŀ																																								
ŀ	c			i.																																			. >	~
	<u> </u>																																							

and dragging to another modules output or input.



**CXpro<sup>HD</sup>** displays lines between linked modules:



If you cannot see a line connecting the two modules, right-click on the drawing area and select Display Options >

Display Lines > Show All Lines from the menu that appears

1												
		D	isp	lay	Ор	tio	ns		۲	Display Lines   Show All Lines		
t ()	1.									Display Labels + Hide All Lines		
									. '		-	

Continue joining modules until all the required connections have been made.

4	_	_	00	1_0	1.s	32	1																																					Þ	×
F																																													^
ŀ																																													
ł														•										1		1		1	Ċ													•			
ŀ					A	I		Ana Ten	alog n pe	y Inp erati	ut ure			3					ſ	Т			Hys	ten	esis			15						D	)	н	Dig leat	ital ing	Out	tput nabl	le		9		
ŀ				h					Ť			Poi	int (	9	-			21	0	Inpl	,t				Acti	/e H	ligh	Ø				- (	5	ЛP	oint			T		Ov	erri	de (	З		
ľ											Ov	erri	de (	3											Acti	ve l	.ow	Ø																	
																		l	On	eve	1:2	.00	; Of	f le	vel:	4.0	0																		
ŀ																																													
ŀ	Ċ			ĺ,																																								>	*

#### Automatic point selection

When two unconnected modules are linked together, **CXpro<sup>HD</sup>** automatically selects the next available virtual point. This is the lowest numbered unused point. This number is entered in the two modules that are linked, as an input and an output, and it is also displayed at either end of the connecting line. In the example below, the number of the virtual point connecting the two modules is 1 and it is displayed at both ends of the connection:



If you cannot see the point number at either end of a connection line, click Module Setup from the Display menu. right-click on the drawing area and select Display Options > Display Labels > Show Number from the menu that appears

1	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	-				•			•			•					
-		Dis	pla	iy C	pti	ion	s		×			Di	spl	ay	Lin	es			۲.														
-												Di	spl	ay	Lab	els	;		۲			Hi	ide										
																						Sh	IOW	N	um	bei	r						1
	•																		F			Sł	ION	Ñ	am	e							
1	1	1.1								1									6			CI-		.ν.			-	(~i.		l-ti.	)		
-																			꿙			51	IOW		anue	- 0	my	(511	nu	au	onj		
•																	÷		0	PV Col	_								÷				

When the output of a module which is already connected is connected to the input of another module, the point number of this output will be written in the input.

#### Selecting a connection line

To select a line connecting two modules, click the line with the left mouse button. Selected lines are displayed with a green highlights. Selected lines can then be:

moved	by using the mouse to drag the line to its new location
deleted	by pressing the <b>[Delete]</b> key on the keyboard

When a connection line is deleted, the point number in the input of the target module will be removed.

If this connection was the only one for the output of the source module, the point number will be removed from there too. The point will now be available for other connections.

#### Naming a point

To give a point a name, select it and then edit the text in the Name property on the Properties pane.



When finished, press enter and the name will be displayed on the module in the Drawing Area.

	⊳ ×	Properties	<b>Д</b> 🔀
	^	< > ? Digital Output [9]	•
		General Information	<u> </u>
		Туре	Digital Output
15 Digital Output	9	Service Order	9
DO Heating Enable		Name	Heating Enable
E High (9)		Synchronised Status	Checking
		Inputs	
		Point	Digital (9): false Heating En
		Constants	
		Point type	Output Digital
		Low threshold	101
		High threshold	<u>ρ</u> ς
		Name	
		This is the name of the module.	
Absolu	te Value 🗸		

The name can have no more than 24 alphanumeric characters. Spaces, commas, and full stops may also be used. Each point in a controller must have a point name that is unique in that controller.

#### Assigning a unit to a point

In the case of Analog points, the Units list box (which is displayed in Properties pane) contains a collection of text strings, one of which will be displayed together with the point value.

To specify a type of unit for a point, select the line that represents it, and select a value from the Unit list.



If the point is a digital point, select the required unit in the Low Unit and High Unit list boxes. The units of a digital point are text strings, which are displayed instead of the digital values 0 or 1.



If the list does not contain the unit you require, additional application-specific units can be entered manually in the C:\CXproHD\(SITENAME)\SYSTEM \site.ini file. For details on how this is done, see Appendix :: Adding units of measurement to the system on page 213.

Additional units of measurement can also be added if points are defined using the shortcut method (see *A short cut to defining hardware points* on page 87). When the tab (or comma) separated list of point definitions is prepared, units of measurement which are not already defined in C:\CXproHD\(SITENAME)\SYSTEM \site.ini can be used. When the definitions are pasted to the **Database Interface**, the new units of measurements will be added automatically to site.ini.

## Creating Strategies - Set the values of the module's Constants

Many modules can be configured by setting internal constant values. These are accessible in the Properties pane when the module is selected. For example, the **Timer with Constant Inputs** module has the following properties:

⊳	×	Properties	Ф <mark>Б</mark>
Timer with Constant 16	•	< > ?	-
		General Information	
Trigger Output		Туре	Timer with Constant Inputs
Reset Complement		Service Order	16
On delay: 10; Off delay: 10; Mini		Synchronised Status	Disconnected
		Inputs	
		Trigger	Digital
		Reset	Digital
		Constants	
		On delay	10
		Off delay	10
		Minimum on time	0
		Outputs	
		Output	Digital
		Complement	Digital
	·		
	. *		

## Creating Strategies - Add explanatory text if necessary

Text can be added to the drawing area to label parts of the strategy to explain the purpose of certain modules, or groups of modules, within the strategy,

You can add text or edit text that is already in the **strategy** drawing. You can also delete, cut, or copy the text in a **strategy**.

For details see *How to add text to a strategy* on page 75

# HOW TO REORDER BLOCKS IN A STRATEGY

It is possible to change the order of blocks within a Strategy, which can help to optimize the servicing process.

From the Site List , right-click on the controller and select Strategy Operations > Re-Order Module Blocks



This opens the Reorder Modules tab in the Strategy Details dialog:

Strategy Details					×
Display	Highlighted modules	are serviced based on time, and not servic	ce order.		
New Line	Service Order	Module	^		1
Strategy Blocks	1	1 - Comparator 2 - BACnet Schedule			1
Controller Limits	3	3 - Absolute Value		<b>•</b>	1
Resources	4	4 - Maximum 5 - Analog Gate		<b>T</b>	1
Points Manager	6	6 - Limit to 0 or 100		<u> </u>	
Reorder Modules	8	8 - Integer Constant			
BACnet units	9	9 - Real Constant 10 - VAV Differential Pressure			
I/O Terminals	11	11 - BACnet Schedule			
	13	13 - Time Schedule			
	14	14 - Comparator 15 - Hysteresis			
	16	16 - Timer with Constant Inputs			
	Find	18 - Real Constant			
	- 1 <u>-</u>		ОК	Cancel	Apply

The list shows modules in their Service Order .

Note: Some modules serviced based on a time schedule, not necessarily according to their Service Order . Any modules in the list that are in this category will be highlighted.

Select a module in the list and use the buttons on the right-hand side of the dialog to change its position in the list:

▲	Move the highlighted block to the top of the list (Service number = 1)
---	--

- Move the highlighted block up one position in the list
  - Move the highlighted block down one position in the list
  - Move the highlighted block to the bottom of the list
  - Highlight the selected block in the Strategy drawing.

Repeat until the list is in the required order.

▼

▼

Find

# HOW TO UPLOAD SETPOINT VALUES

It is possible for all of the controller values for all **setpoints** in a single **Strategy** to be retrieved in a single operation.

From the Site List , right-click on the controller and select Strategy Operations > Upload Setpoints

Site Navigation	×	
🖃 👰 Sites		
East Hall		
	<u>F6110</u>	Strategy ID 22
	Open '001_01.s32'	845
R Ba HQ Block 2	🙀 Break	
	Copy Strategy To	
	Strategy operations	Re-Order Module Blocks
	Show Globals Issues Report	Upload Setpoints
	Show Globals Table	Compare Strategy To Controller
	Update BACnet EDE Data	

This opens the Upload Setpoints dialog:

Point Name	Address	Type 🛛	Local	Controller
<b>√</b> a	1	Analog	0.00	0.00
🗸 aA	2	Analog	9.00	9.00
✔ aB	3	Analog	3.00	3.00
Select/Unselect All		Lindate Se	lected	Close

Select the points to be uploaded and click the Update Selected button

# NAMING STRATEGY FILES

When saving **Strategy** files, it is recommended that you use a name which indicates the site, the **BACnet** Router number, and the **Field Controller** number.

For example, the strategy for the Air Handling Unit controller, which is Field Controller number 1 on the Rooftop subnet (which is BACnet Router number 1) on the Office Block site might be named Office\_001-01 AHU.STG

A Strategy file can only be opened if it is Associated with a controller.

You can open a contoller's Associated Strategy in one of the following ways:

1. Double-click on the **controller** in the Site Tree



3. Right-click on the controller in the Site Tree, and select the filename



4. Select the controller in the Site Tree , and select Open from the File drop-down

File - Home	Controller Strategy
<u>N</u> ew	Recent Documents a
C Qpen	1 001 01 532
The Save	1001_01.352
Save As	2 C:\CXproHD\\001_03VAV.s32
Save All	
Footers	
🖺 Page Si <u>z</u> e	
I Printer Scaling	
Print Setup	
🖶 Print	
Licence Details	
Close	
	() <u>H</u> elp () About 🗙 E <u>x</u> it
	113 - CT Single Pump Speed

- **Note**: If the strategy for the selected controller is already opened, all of these options will be disabled (greyed-out).
- **Note**: If you want to open a different strategy file for a controller you must first remove the existing association, then associate the controller with the required strategy.

## What is an "Associated" Strategy?

Each of the Field Controllers in the Site List can have a Strategy Drawing file 'associated' with it, which means that CXpro<sup>HD</sup> is aware of the filename of the strategy corresponding to that Field Controller. When a Field Controller is selected, its associated strategy can be opened by double-clicking, or by selecting from the right-click menu.

The icon representing the field controller changes when the Strategy file is associated with it.

The relationships between controllers and strategy filenames for a particular site are stored in the file

C:\CXproHD\[siteFolderName]\SYSTEM\associations.xml

Note: CBXi controllers at the 'network' level can also have Strategies associated with them.

#### **Creating Associations**

#### **New strategies**

When a new **Strategy** Drawing is created, a target **controller** must be selected. When that **Strategy** is saved for the first time, it is associated with the selected target **controller**.

#### Existing strategies - manual



A strategy can be associated with a field controller by right-clicking on the Field Controller and selecting "Select". A list of all existing strategy files that are eligible to be associated with the selected controller will be displayed.

#### **Breaking Associations**

Associations can be broken using a toolbar or right-clicked popup menu option; the link between the Site Tree Field Controller and the Strategy Drawing is removed.



If an association is broken for an opened Strategy Drawing, then the Strategy Drawing will be closed and the user will be prompted to save it if changes have been made. Breaking an Association allows the User to associate a different Strategy Drawing to the Field Controller, using a toolbar or right-click popup menu option on the Site Tree Field Controller.

#### **Copying associated strategies**

From the **Site List**, it is possible in a single operation to create a copy of the **strategy** associated with any **Field Controller** node and **associate** that copy with another **Field Controller** node, as long as the target is of a compatible **controller** type and does not already have a **strategy associated** with it.

**Note:** A Strategy can**not** be copied if it is open and has been modified but not saved (the user is prompted to save the Strategy so that the Strategy can be copied).

To copy a **strategy** in the **Site List** interface:

- 1. Right-click on the source Field Controller node i.e. the controller to which the existing strategy is associated.
- 2. In the pop-up menu, select Copy Strategy To



3. In the **Copy Strategy** dialog that appears, click on the **Field Controller** to which you want the copied **strategy** to be associated



The Copy Strategy dialog displays the source Site, BACnet Router, and Field Controller node details as well as the Strategy that will be copied.

The To box contains a "tree" list of potential target Field Controllers, grouped by Site. Potential target Field Controllers are those that:

- are of a Controller Type that is compatible with the source Field Controller Node
- do not already have an Associated Strategy
- do not have a newly created Strategy

The next available **Field Controller** node is always selected on the source **Site**. If no **Field Controllers** are available on the source **Site** then no **Field Controller** is selected and the **Site Tree** is shown collapsed (closed).

The **Copy** button is enabled when a **Field Controller** Node is selected. When it is clicked, a new **Strategy** is created and opened with the contents of the source **Strategy** being copied, including the Database names and Keypad Details. The copied **Strategy** is then **Associated** with the Target **Field Controller** node.

#### Importing a Strategy

The Copy Strategy To function applies to strategy files that reside in the current Site file structure. It is possible that files which were associated with a specific folder have been copied to locations outside the Site folders, and will not be found by the Copy Strategy To process. In that case, the Import Strategy function may be used.

To Import a strategy in the Site List interface:

1. Right-click on the target Field Controller node

The target Field Controller is the controller to which the Imported strategy will be associated.

2. In the pop-up menu, select Import Strategy.

Site List			џ	E
E€ Sites EE. BACnet IP EE. BACnet Serial				
E 또 001 - Net	work			
	Select			
001	New	Ctrl+N		
⊞ <u>₽</u> Sample /	Configure FLX	Hardware Modules		

The system will scan for suitable strategies for import

Import a Strategy	

And display a list of the results.

Import a Strategy ×
OK Cancel
Cancer

Note: It is possible that the list will be blank because a strategy file will only be listed if:

- a. It does **not** reside in the current site.
- b. It has the correct embedded site, BACnet Router address, and field controller address.
- c. It is not already associated with any controller.

You cannot for example import a strategy from controller number 006 on BACnet Router 5 on a remote site onto controller number 005 on BACnet Router 5 on the local site. Neither can you for example import a strategy from controller number 006 on BACnet Router 5 on a remote site onto controller number 006 on BACnet Router 2 on the local site.

i.e. The file to be imported must have originated on the same controller on the same site.

3. Select a **strategy** file and click **OK**. The strategy will be copied to the current **site**, and the copy will be associated with the selected **controller**.

## OPENING MULTIPLE STRATEGIES

**CXpro<sup>HD</sup>** allows you to have several **strategies** open at once. Each **strategy** must be opened individually as described above. Each **strategy** can be minimized, maximized, and arranged in a number of ways in relation to the other open **strategies**.

## DOWNLOADING A STRATEGY

When you have created a **strategy** in **CXpro<sup>HD</sup>**, you must download it from **CXpro<sup>HD</sup>** to the targeted **controller** before it will function.

**Note**: When downloading a strategy to a controller, **CXpro<sup>HD</sup>** automatically wipes the controller's memory and sends set-up.

**Note**: The targeted controller should not be powered down for at least 40 seconds after a strategy write has been initiated by any of the methods above.

To download a **strategy** to the targeted controller:

- 1. Open the **strategy** and connect to the **controller**
- 2. Download the **strategy**

Note: When you download a Strategy to a BACnet controller from CXpro<sup>HD</sup>, any configuration that has been set by a separate B-OWS – e.g. an Alarm Recipients list – will be **wiped**. You must re-download the Alarm Recipients list, and any other B-OWS specific configuration after the Strategy download is complete.

CXpro<sup>HD</sup>

#### Open the strategy and connect to the controller

Select the target controller in the Site List and open its associated **Strategy** by double-clicking or selecting **Open** from the File menu or right-click menu.

Connect to the controller by clicking on the **Connect** button in the **Home** tab of the **Ribbon** :

	Ŧ			
File	+ [	Home	Controller	Strategy
<b>*</b>	Disc	nect Snnect	Copy Paste	Importies         Modules         Important           Site         Important         Macros         Reoperative           Site         Important         Macros         Search
	Sit	te	Clipboard	View

#### Download the strategy

Download the strategy to the targeted controller by clicking on **Download** in the **Controller** tab of the **Ribbon** 

Controller	Strategy		
🎝 Communica	tions	📩 Download 🛛 🖓 Com	
Gontroller		Wipe Controller 🚉 Shov	
🗞 BACnet		💾 Auto Online	
Configuratio	n		

When you use Automatic Download, CXpro<sup>HD</sup> automatically deletes all previous points and strategies from the controller as these could conflict with the strategy being downloaded. It then downloads the strategy and sends the set-up (i.e. it informs the controller of the number of blocks it must service in the strategy).

While this is happening, the **Downloading** window is displayed.

Downloading		×
Controller		
Hardware Points		16
Strategy Blocks		500
Analog Setpoint Values		389
Digital Setpoint Values		314
BACnet Point Config		212
Sending BACnet data via file tra	Close	Abort

The progress bar at the top of the **downloading** window shows the progress of the download, while the status box (at the bottom of the window) tells which of the three stages in the download process (wiping the memory, downloading the **strategy** or sending the set-up) **CXpro**<sup>HD</sup> is currently completing.

The **Downloading** window also includes a **Complete** box, which displays the number of the block of the **strategy**, analog point or digital point that is currently being downloaded. In the above example, the progress bar shows that the download is 79% complete, the complete box tells us that **CXpro**<sup>HD</sup> is downloading block number 251 of the **strategy** and the status box tells us that **CXpro**<sup>HD</sup> is busy downloading the **strategy** to the **controller**.

#### Wipe the controller's memory

Wipe the controller's memory by choosing Wipe Controller from the Controller tab on the Ribbon .

e Controller Strategy

This opens the Wipe Controller dialog box, allowing you to choose individual parts of the controller memory to be wiped

Wipe Controller							
Clear Strategy Clear Points Clear Modem Strings Clear Keypad	Clear Schedules						
Clear BACnet Data Number of datalogs Wipe All	BACnet Options						
Current Status	Wipe Close						

Click Wipe to close the Wipe Controller box.

**CXpro<sup>HD</sup>** will display a message to confirm that the controller's memory has been wiped. Click **OK** to close the message box.

#### • How to check the controller type to which you are downloading

To find the type of the controller to which you are downloading, open the Strategy Details dialog by clicking on

Strategy Details in the Strategy tab of the Ribbon



Click the Controller Limits tab.

In the example shown, the Controller Type box shows that the selected controller is a CBX-8R8 controller.

## Edit the strategy

Edit the strategy by placing and joining the required modules on the drawing area and editing their values and units.

#### Download the strategy

When you have completed the strategy, you must then download it.

Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :

⊒ ∓		
File - Hom	e Controller	Strategy
Connect	t Copy	Improperties         Modules         ? Strategy           Site         Properties         Macros         Reopen
Site	Clipboard	List Lis Page Names Conserver

Download the strategy to the targeted controller by clicking on Download in the Controller tab of the Ribbon

Controller	Stra	itegy	
🔩 Communicati	ons	📥 Download	Compare
Controller		Wipe Controller	Show Compare
BACnet		🛃 Auto Online	
Configuration	n l		Ope

A warning is displayed:

CXproHD	
Warning: Downloading will wipe the controller and cycle the outputs. Continue?	1
Do not ask me again during current session. Yes No	

The **Downloading** window will appear, to display the progress of the download.

Downloading		×
Controller		
Hardware Points		16
Strategy Blocks		500
Analog Setpoint Values		389
Digital Setpoint Values		314
BACnet Point Config		212
Sending BACnet data via file tr	ansfer	
	Close	Abort

When **CXpro<sup>HD</sup>** has downloaded all the blocks that you specified, it will automatically close.

# STARTING A STRATEGY (SENDING THE SETUP)

When the memory of a **Field Controller** has been wiped and the **strategy** has been downloaded to it, the **Controller** must be told how many blocks are to be serviced. This is called the **Setup** of the **Strategy**. Sending **Setup** is also referred to as **starting the strategy**. If you are using **Automatic download**, **CXpro<sup>HD</sup>** sends the **Setup** automatically when you download a **strategy** to the controller. (See *Error! Reference source not found.* on page **Error! Bookmark not defined.**) Otherwise, you must send the Setup as described below.

Select the **Controller** in the **Site Tree**, and connect to it by clicking on the **Connect** button in the **Controller** tab of the **Ribbon** 



Open the Controller Configuration dialog by clicking on Controller in the Controller tab of the Ribbon



Controller Configuration ×							
Number Of Strategy Blocks To Service II Last Composed Time 14:00:16 Date 10/08/2018 Time 14:00:16 Date 10/08/2018 Date 10/08/2018 Time 14:00:16 Date 10/08/2018 Time 14:00:16 Time 14:00:16	Send Receive						
User ID 0 User Name Strategy ID 0 Drawing Reference Min Service Time 0 Time Synchronisation Wait After 0							
– Current Status Attention ! Error receiving setup.	Close						

The number in the Number of Strategy Blocks To Service box, X (which is automatically entered by CXpro<sup>HD</sup> but can be changed by the user), activates the first X blocks of the strategy in the Field Controller. This number, X, must be greater than or equal to the number of the highest numbered block used by the strategy. Otherwise, the parts of the strategy which occupy blocks with a higher number will not be serviced, and their point values will not be updated, which may cause the strategy to fail.

**Note:** If you cannot see how many blocks you have used in the strategy, open the Strategy Details dialog by clicking on Strategy Details in the Strategy tab of the Ribbon

Strategy		
Cipboard	Add IVO Reorder Terminals Modules Strategy Strat	
Strategy Details		×
Display	Number Type	
New Line	2 BACnet Schedule	
Strategy Blocks	3 Absolute Value	
Controller Limits	5 Analog Gate 6 Limit to 0 or 100	
Resources	7 Rounding 8 Integer Constant	
Points Manager	9 Real Constant 10 VAV Differential Pressure	
Reorder Modules	11 BACnet Schedule 12 Holiday Schedule	
BACnet units	13 Time Schedule	
I/O Terminals	14 Comparator 15 Hysteresis	
	16 Timer with Constant Inputs 17 Not Used	
	18 Real Constant	
	19 Adder/Scaler	
	Show used blocks only	

The Strategy Blocks tab lists all blocks in the targeted controller. The highest block number that is marked as used is the number of blocks the controller must service.

The Last Composed section of the Controller Configuration dialog automatically contains the current PC time and date. If the strategy is uploaded later, this time and date will indicate when the strategy was started.

The User ID parameter allows the application engineer to enter a unique identifying character. If the strategy is uploaded later, this number will indicate who started the strategy.

In the User Name field, the engineer can enter the name of the person that started the strategy and this can be retrieved from the controller if the strategy is uploaded. A string of up to sixteen characters can be entered in this field.

In the **Drawing Name** field, the name drawing can be entered. It is recommended that the name of the drawing containing information relevant to the **strategy** is stored here. If the **setup** is uploaded from the **controller** the drawing name will be displayed in this field.

#### The effects of sending the setup

Sending the setup to a controller has the following effects:

• All blocks entered in the Number of blocks to service section will be serviced, even if they are not occupied by modules. For example, if you entered 100 as the number of modules to be serviced, the first 100 blocks will be serviced by the controller.

- A controller that is sent a setup with blocks to be serviced, but without any strategy, will not send any output signals and will not read any input signals.
- **Note:** If a strategy is downloaded after setup is sent, the strategy is serviced immediately. This means the outputs will receive values from the strategy immediately after downloading. It would be preferable to download the strategy before sending setup since untested strategies can cause problems in devices connected to the outputs if the output values are unstable or incorrect.
  - Output points of modules that occupy serviced blocks take their values from the module.
  - If the controller is running without a network (stand-alone), the green LED is constantly illuminated.
  - If the **controller** is running on a fieldbus (connected to a **BACnet** Router), the green LED flashes with regular pulses.
  - An alarm appears on the monitor of the connected **PC** if the alarm feature is active.
  - The keypad program, if one exists and has been downloaded to the controller, will be started.

# TESTING A STRATEGY WITH SCAN MODE

It is important to test a strategy at various stages in its creation, to check for mistakes or faults in its design. This is done by using Scan mode .

## Preparing to test a strategy

To test a **strategy** the following conditions must be satisfied:

- The strategy must be open (see *How to open an existing strategy:* on page 122).
- The strategy must have been sent to the controller (See *Downloading a strategy* on page 126).

Note: Make sure that the downloaded strategy and the open strategy are the same.

• The **strategy** must have been started (see *Starting a strategy* on page 131).

#### How to test a strategy

In Scan mode, CXpro<sup>HD</sup> allows you to view the changes in values in a strategy as the strategy is serviced in the controller. This is useful for testing strategies and parts of strategies for correct operation. In Scan mode, the point values of an uploaded strategy are read by CXpro<sup>HD</sup>, displayed next to their respective inputs/outputs, and updated in real time.

To activate scan mode:

- Open the strategy and Connect to the controller by clicking the Connect button on the Strategy tab of the Ribbon
- Display the **strategy's** point and constant values (page 135)
- Set the Scan mode (page 135)
- Activate scan mode (page 136)

In scan mode, the variable point values of a strategy are updated in real time as they are serviced by the strategy and displayed clearly in the module symbols on the drawing area. In the Rescale to 0 or 100 module of the example above, the values of the 3 input points were changed to 10, 20, and 149.86, and its output was changed to 100 as they were serviced by the strategy.

• Watch the changing values of the modules in scan mode to ensure they are being serviced correctly by the controller.

#### How to Display the strategy's point and constant values

> Display Labels > Show Value Only (simulation)

Display the point and constant values of the strategy by right-clicking on the Drawing Area and select Display Options

•		Di	ispl	ay	Opt	tior	ns	•		D	isp	lay	Lir	nes		•	Ì	
										D	isp	lay	La	be	s	►		Hide
	•	•			•				-									Show Number
																		Show Name
																		Show Value Only (simulation)
																		················

#### Setting the Scan mode

**CXpro<sup>HD</sup>** can scan either the current active **strategy** or all of the currently open **strategies**. To set this, open the **Applications Settings** dialog by clicking **Communications** in the **Controller** tab of the **Ribbon** 

Controller	Strateg
😽 Communica	tions 🛃
Gontroller	×
BACnet	d
Configuratio	on

Select the Scan Options tab in the dialog, and select either the Scan Active Strategy or the Scan all Strategies radio button.

Application Settings	×
Download Options	Strategy Scan
Scan Options	C Scan all Strategies
Strategy Settings BACnet Configuration Serial Port Connection Commands Livelog	C Scan all Strategies BACnet Properties Time Between Scan (s) 30
	OK Cancel Apply

Click OK to close the dialog.

#### Activate scan mode

Begin scanning by clicking  $\mbox{ Scan }$  in the  $\mbox{ Controller }$  tab in the  $\mbox{ Ribbon }.$ 

Controller Stra	ategy				
Communications	📩 Download 🛛 📳 Compare	1.23 Version	Reard Diagnostics		
😼 Controller	Wipe Controller 🔄 Show Compa	re 🛛 🗟 Time and Date	Statistics	٩	0
BACnet	🛃 Auto Online	Maximums	Lock and Unlock	Scan	Point
Configuration	c	perations		- 00	

The **CXpro<sup>HD</sup>** window will change to the **CXpro<sup>HD</sup>** scan mode window, hiding the **Site List**, displaying the **Page Names** pane and disabling all of the Ribbon items except the **Scan** button



• To deactivate scan mode, i.e. to stop scanning the point values of the strategy, click the Scan button again.

#### Suggestions for testing strategies

- If a number of modules are selected in the **strategy** when **Scan mode** is activated, then only those modules will be scanned.
- The module to be tested must have been downloaded to the controller. That is, the **Block number** of the module must be within the range of modules which were downloaded to the controller (see *Downloading a strategy* on page 126)
- A strategy should be tested in small steps during the creation process. Simple faults such as selecting the wrong module or joining to the wrong inputs and outputs can be difficult to correct in a finished strategy. There is also the danger that faults can result in other faults appearing in different parts of the strategy or in other controllers.
- At the end of the creation of a **strategy**, the whole **strategy** should be tested again. This prevents later problems and time losses during the setting-up process in the site.
- The **strategy** should be checked module by module from left to right, starting with the hardware inputs and finishing with the hardware outputs.
- Individual strategy parts can be functioning correctly themselves but cause problems when connected to
  other correctly functioning strategy parts. For example, the direction of analog values may fall in the range
  of 0 % to 100 % or the range of 100 % to 0 %. Digital values and their inversion may also cause confusion.
- Test a strategy before copying it or using it in another controller. Otherwise, all copies of the **strategy** will also have to be tested.
- Manually overriding hardware points allows simulation of each environmental situation to which the strategy would be exposed.

# SECURING CBM DATA

Unlike other BMS controllers, in the **CBM Strategy** information can be secured against accidental loss or unauthorized modification by password-protecting the ability to view or edit **strategy** information and system information.

#### How to password-protect a range of blocks in a CBM strategy

To lock a range of blocks in a strategy, select Lock and Unlock from the Controller tab of the Ribbon .

Controller	Stra	tegy				
tommunica	tions	📩 Download	Compare	123 Version	Board Diagnostics	5
Controller		Wipe Controller	Show Compare	喝 Time and Date	Statistics	
BACnet		🛃 Auto Online		Maximums	Lock and Unlock	SG
Configuratio	on		Oper	ations	<u> </u>	

This opens the Lock and Unlock dialog

Lock and Unlock	×
Enter Password	Lock
1	Unlock
Current Status	
	Close

Enter a numerical password (note: the Enter Password field will only accept numbers) and click Lock

Lock and Unlock	×
Enter Password	Lock
1	Unlock
Current Status Idle	
	Close

The Lock Blocks dialog opens. Specify the start and end of the range of blocks that will be protected:

Lock Blocks
Enter Start Block 12 ÷
OK Cancel

Click OK to close the Lock Blocks dialog

When the lock command has been received by the controller a confirmation message is displayed in the Lock and Unlock dialog.

All of the **strategy** blocks within the specified range are now locked, and cannot be accessed until they are unlocked using the password set above.

## How to access locked strategy blocks

If a range of strategy blocks in a **CBM** controller have been locked, it is only possible to access, view, and edit them by first unlocking them, using the password set during the locking process.

To remove password protection from a locked range of strategy blocks, select Lock and Unlock from the Controller tab of the Ribbon .

Controller	itrategy				
tommunication	s 📩 Download	Compare	1.23 Version	🥄 Board Diagnostics	5
😼 Controller	Wipe Controller	Show Compare	🗟 Time and Date	Statistics	
BACnet	🛃 Auto Online		Maximums	Lock and Unlock	SG
Configuration		Oper	rations	13	

This opens the Lock and Unlock dialog. Enter the required numerical password (set during the locking process) and click on Unlock .

Lock and Unlock	×
Enter Password ****	Lock Unlock
Current Status Idle	
	Close

When the blocks are successfully unlocked in the controller, a message is displayed in the Lock/Unlock dialog.

The strategy blocks are now unprotected and can be accessed from **CXpro<sup>HD</sup>** as normal.

# HOW TO EXPOSE POINTS ON A BACNET SYSTEM

When the **Strategy** has been configured for a controller that is part of a **BACnet Site**, the points within the controller that are to be available to the **BACnet** system must be specified by selecting **BACnet Points** from the **Strategy** tab of

the Ribbon

olle	er Strategy							
ad er	Copy C Paste Select All Clipboard	View Modules	Add Text	I/O Terminals	Reorder Modules Strategy	BACnet Points BACnet Units BACnet Units Strategy Details	Strategy Help	Vi Ma
	n 💌 4							

The BACnet Points dialog opens, listing all of the points used in the Strategy:

ACnet Po	ints			
BACne	et Export	Point Name	Point Addr	Point Type
<b>V</b>		Room Setting	5	Analog Setpoint
		MaxHWater	28	Analog Virtual
✓		Adder/Scaler Block 19 Output	29	Analog Virtual
✓		WeatherCom Block 8001 Inpu	30	Analog Virtual
<b>V</b>		Heating Water Temp	2	Analog Input
Image: A start and a start		Temperature	3	Analog Input
<b>V</b>		Alarm Enable	2	Digital Setpoint
Image: A start and a start		DigVirt_3	3	Digital Virtual
<b>v</b>		Schedule No. 1 (On)	4	Digital Virtual
<b>V</b>		Hysteresis Block 15 Active High	9	Digital Output
Ma Us Ava Exp	aximum BAC ed BACnet ailable BAC port Total	inet 224 10 1214 0	Maximum Bir Used Binary I Available Bin	ary Unit 32 Jnit 3 ary Unit 29
- Setpoint Ma	Limits	d Setpoint and BACnet	Uneynos	ed 0
Ava	ilable Setp	oints / BACnet Points 314	Greepos	10
			Resol	ve Duplicate Point Names
				OK Cancel

Tick the checkbox beside each of the points that are to be exposed, then click on OK .

Note: In BACnet, the point name must be unique. In the Cylon BACnet system, they may not be unique, so some duplicate names may appear in the list. If this is the case, click the Resolve Duplicate Point Names... button.

This opens the Resolve Duplicate Point Names dialog, where names can be changed.

**Note**: The BACnet Points dialog also includes columns of the checkbox to identify points that should be included in any export to **ASPECT<sup>®</sup> / INTEGRA<sup>™</sup>** – see *ASPECT<sup>®</sup> / INTEGRA<sup>™</sup> Export* on page 210.

You can view BACnet points from a Controller by selecting Upload BACnet Points on the Controller tab on the Ribbon



This opens the **Controller BACnet Points** dialog. The points are automatically uploaded so that they can be viewed, and the dialog shows the progress of the upload and the points that have been uploaded:

Point Name	Point Addr	Point Type	Active Unit	Inactive Un
itus				
Uploading BACnet point 41 of 2	25			

# SECTION 7: NAMING OBJECTS



# WHY OBJECTS ARE NAMED

Objects in the Cylon system, such as **controllers**, points, time schedules, datalogs, etc. are given names to make them more identifiable. For example, it is easier to recognize a datalog named "Water Supply Temperature" than one named "datalog\_1", which is the default name of the first datalog used inside a **controller**, automatically given by the database.

# RULES FOR NAMING OBJECTS

When naming an object in the system, the following rules should be remembered:

- Names inside a controller must be unique.
- Names can have a maximum of 24 characters.
- All alphanumeric characters are permitted, except commas.
- If the name of an object in a controller is changed to a name that already exists in that controller, the name of the original object will be deleted.

# PROCEDURES FOR NAMING OBJECTS

The following list contains some of the objects in the system that can be named:

- Sites
- Field Controllers and BACnet Routers
- Points (both hardware points and virtual points)
- Datalog and Time Schedule modules

## NAMING POINTS

#### Types of point

There are three main types of point in the Cylon system:

- A hardware point is an input or output of a Field Controller.
- A virtual point is used to save internal information for a **controller**.
- A setpoint is a type of virtual point, but its value is constant, whereas the value of a virtual point is determined by the **strategy**.

Hardware points, virtual points, and setpoints can be either analog or digital.

#### How to name points

Only hardware and setpoints can be named in **CXpro<sup>HD</sup>**. Virtual points are identified by their block numbers. The procedure for naming or changing the name of a set point is the same as that for a hardware point. A brief summary of the procedure is presented below. (For a more detailed description of how to name a point, see *Defining hardware points* on page 83)

- Open the strategy.
- Select the Point module on the drawing area that is to be named or have its name changed.
- Enter or edit the text in the Name field of the Properties pane.
- Choose Save from the File menu to save the changes made to the strategy.

The **Database Interface** module can be used to enter/edit/delete names of hardware points non-graphically.

Virtual points which are placed in a **strategy** as digital setpoints or analog setpoints are points which are controlled from outside the **Field Controller**. The name of such a virtual point should indicate how its value is passed to it. The following table illustrates this:

Setpoint name	How to set point value is controlled
Outair Temperature_LG	Controlled by 3rd party block
Room Temperature_WG	Controlled by 3rd party block
Set point_KP	Can be changed via the keypad
Gain Factor PC	Can be changed via PC (B-OWS)

# NAMING FIELD CONTROLLER TIME SCHEDULES

Controller Time Schedules are saved and serviced just like modules in a controller. Naming Controller Time Schedules make it easy to locate them for editing, either using the PC, supervisor software, or a keypad.

#### How to name a Field Controller time schedule

The procedure for naming or changing the name of a Controller time schedule is defined below:

- Open the strategy.
- Select the **Point module** on the drawing area that is to be named or have its name changed.
- Enter or edit the text in the Name field of the Properties pane.
- Choose Save from the File menu to save the changes made to the strategy.

When naming the schedule, it is a good idea to indicate the module's function. For example, if the module is a time schedule for the heating system of the site, and is set for Monday to Friday only, the module might be named "Heating Schedule (Mon to Fri)".

# NAMING DATALOGS

**Datalogs** are saved and serviced just like modules in a **controller**. The contents of a **Datalog** can be viewed and analyzed using the **Datalog Manager** module. So that they can easily be identified by the **Datalog Manager**, they are automatically given the same name as the point that they are logging. They are given this name when the point is connected to the **datalog**. In the **Reports** program, **datalogs** can be configured and archived.

#### How to name a datalog

Datalogs are automatically named as soon as they are connected to a point:

#### Open the strategy that contains the datalog.



Join the datalog to a point by clicking on the point to be logged, and dragging to the Datalog's input:



The name of the Datalog is changed to the name of the point and displayed in the Datalog module in the strategy.

A		Ana Tem	log I peri	input atur	e Pi	pint	3		-	-	-	-	-	-	Hysteresis 15	] .	-	-	-	-	D	0	nt	D	igita atin	l Ou g Ei	tput nabl	le errid	9
															Trigger Options: Any Edge; Delta: 1.00; Extended length: 0														
								1	÷						Datalog number: 1; Update interval: 900; Link: 0; Datalog	11													
															Log trigger														
															Digital input														
								÷.						(3)	O Analog input	1													
															M TemperatureA	ŀ													
															Datalan 17														

If you want to modify the name that is automatically given, you can edit it by selecting the **datalog** module and editing the **Name** field in the **Properties** pane.

It is a good idea to give an indication in the name of what part of the **site** the **datalog** belongs to, but it is not necessary to indicate in the name that the module is a **datalog**, as it will only appear in list boxes allowing the selection of a **datalog**. Names that are given to only speed up the copying of strategies (for example, "Temp. Channel 1", "Temp. Channel 2", "Temp. Channel 3", ...), and to save time for creating dynamic graphics, are not helpful for the end-user.

Choose Save from the File menu to save the changes made to the strategy.

CXpro<sup>HD</sup>
# SECTION 8: USING MACROS



# MACROS - OVERVIEW

If your work in **CXpro<sup>HD</sup>** involves creating the same or similar **strategies** repeatedly, you'll find **Macros** useful for reducing the time involved in these tasks. A **Macro** is a set of **strategy** modules grouped together into a single unit.

#### **Macros and Macro Templates**

A Macro Template is used to create a macro within a strategy. It is a definition of module types and connections, and when it is inserted into a strategy a new Macro is created containing new instances of those module types connected together to match the Macro Template.

- Each time a Macro Template is inserted into a strategy, a new Macro is created.
- Each Macro is an instance of a Macro Template, but a strategy can contain multiple Macros that are based on a single Macro Template.
- Macro Templates can be stored, and copied between strategies and controllers.
- Each Macro can be configured and adjusted independently of the Macro Template used to create it.
- When a Macro Template is saved, it acts as a CXpro<sup>HD</sup> module.

#### Example: An "Adder" macro.

An Adder/Scaler module accepts four inputs A, B, C and D, and operates according to the equation

Output = A\*C + B\*D

It can be made into an Adder, which operates according to the equation

Output = C + D

by ensuring that its A and B inputs are always set to 1. This can be done by connecting a Real Constant module to the A and B inputs as shown below.

$\sim^{R}$	Constant 18		•	•	×+	Adde	er/Scaler	19
	Output A 🚫	6		. 6	🛇 Input A		Outp	out 🛇
	Output B 🛇	7		7	🛇 Input B			
Constant A: 1.00;	Constant B: 1.00				🛇 Input C			
					🚫 Input D			

This combination of modules can be saved as a Macro Template and reused whenever an adder is required.

# MACRO STRUCTURE

**Macro Templates** are stored in **CXpro<sup>HD</sup>** in groups and sub-groups. A maximum of 10 **Macro groups** can be created. Each **Macro group** can contain 20 sub-groups and each sub-group can contain up to 100 **Macro Templates**. In total, 20 000 **Macro Templates** can be created and stored in **CXpro<sup>HD</sup>**.

For example, you may want to store all Macro Templates relating to heat control strategies in a group called Heat. This group may contain a sub-group called Boiler, which would contain Macros for boiler control strategies, such as Optimizer, Heating Curve, etc.

# MACRO DESCRIPTION (HELP) FILES

A Macro Description File is a Help file generated by the person who created the Macro Template and is associated with the Macro Template (it is opened by right-clicking on the Macro button). It is normally used to describe the function and usage of the Macro Template.

When a user right-clicks on a Macro in the Macro property window, **CXpro<sup>HD</sup>** opens the editable description file associated with that specific Macro Template. If none exists, **CXpro<sup>HD</sup>** opens a blank text file, which when saved will be associated with that Macro Template. This file can be used to provide documentation about how the Macro should be used or to record history, author, or changelog details for the Macro Template.

The program used by **CXpro<sup>HD</sup>** to open the history file, e.g., MS Wordpad, must be specified in the C:\CXproHD\System\wn3000.ini file under UC16et.

# HOW TO CREATE A MACRO TEMPLATE

There are a number of steps involved in creating a Macro Template:

- 1. Create the strategy.
- 2. Add modules to the Macro Template.
- 3. Select the inputs and outputs for the Macro Template and change their names if required.
- 4. Set names for each of the points within the Macro Template if required.
- 5. Choose a Macro group and sub-group and give the Macro Template a name.
- 6. Choose whether to insert the Macro Template into the active strategy as a Macro.
- 7. Save the Macro Template.

The following guide to creating a Macro uses as an example a typical **strategy** that you might want to save as a Macro – a "weather compensator" strategy. As an exercise in creating Macros, you may want to follow this guide, using the weather compensator as an example.

#### Create the strategy

Create the **strategy** or part of a **strategy** on which you are basing your **Macro Template**. (If you are forming your **Macro Template** from an existing **strategy**, then **open** that existing **strategy**).

#### Example – Weather Compensator macro

For example, if you were to create a Macro Template from a weather compensator strategy, you would place two Real Constant modules and two Rescale to 0 and 100 modules on the drawing area and join them as shown below:

The third input of the first Rescale module (Rescale to 0 and 100) is to be the input of the Macro. It is marked Outside Air Temperature in the diagram below.

The output of the 2<sup>nd</sup> Rescale module (Rescale from 0 to 100) is to be the output of the Macro. It is marked Flow Temperature Setpoint in the diagram below.



#### Select the modules for the macro

The next stage in creating a **Macro** is to select on the drawing area the modules and any text that you want to be included in the **Macro**. Selected modules are marked by red squares around their edges.

To select the modules for the **Macro**, you can drag the mouse from the top left-hand corner to the bottom righthand corner of the strategy to draw a box around the entire strategy so that each module and its inputs and outputs are selected. It is not a problem if, when drawing the box, you included some unwanted modules – they can be easily removed at the next stage.



#### Add the selected modules to the Macro Template

Select Create from the Macro section of the Strategy tab on the Ribbon.



This will open the Add Modules to Macro dialog box, in which all of the modules that you selected for the Macro Template will be listed.

Add Mo	dules to Macro ×
Modules Selected for 020 Rescale to 0 and 100 021 Rescale from 0 to 100 022 Real Constant 023 Real Constant 1025 Outside Air Temperature (OA' 1026 A=20, B=80 1027 A=80, B=20	Modules Added to
NOTE: Hardware modules can not be added to Macros.	Continue Cancel

**Note**: A Macro cannot include hardware points, so if any were included in the selection they will not be listed in the Add Modules to Macro dialog.

	1		
Note: If you click the	macro button o	r macro menu without firs	it selecting the modules for the macro,
you will be pro	mpted to do so w	vith the following error me	ssage:
Cylon Engineering	Centre		
A Please select the modules	: for the macro.		
	ОК		

Select the modules in the left list box that you want to include in the **Macro** by holding down the **[Ctrl]** key and clicking each one with the left mouse button. The selected modules will be highlighted.

Add Mod	dules to Macro
Modules Selected for 020 Rescale to 0 and 100 021 Rescale from 0 to 100 022 Real Constant 023 Real Constant 1025 Outside Air Temperature (OA' 1026 A = 20, B = 80 1027 A = 80, B = 20	Modules Added to
NOTE: Hardware modules can not be added to Macros.	Continue Cancel

150

# **Note:** For illustration, only the functional modules have been selected in this example. It is also possible to include text in a Macro Template for clarity.

Add the selected modules to the Macro Template using the following buttons:

>
>>
<
~<

Add a selected module or several selected modules to the Macro Template

Add all modules to the Macro Template

Remove a selected module or several selected modules from the Macro Template

Remove all modules to the Macro Template

This Add Modules to Macro list box displays all the modules that have been added to the Macro Template. If you add a module or modules that you later decide you do not want, you can remove that module or modules from the Macro Template using the remove buttons (see above).

Modules Selected for	Modules Added to
020 Rescale to 0 and 100 021 Rescale from 0 to 100 022 Real Constant 023 Real Constant 1025 Outside Air Temperature (OA' 1026 A=20, B=80 1027 A=80, B=20	020 Rescale to 0 and 100       021 Rescale from 0 to 100       022 Real Constant       023 Real Constant       <
NOTE: Hardware modules can not be added to Macros.	Continue Cancel

In this example, all 4 modules of the weather compensator strategy are required for the Macro Template and so they are added to the list box on the right. The text has been excluded in this case but could be included for extra information.

Click Continue... when you have added the required modules to the Macro Template.

# Define the Macro Inputs, Outputs, Group and Name (the Create Macro dialog box)

Pressing the Continue... button in the Add Modules to Macro dialog will open the Create Macro dialog box:

	R Real Constant 27 100 B Rescale from 0	0 to 100 25	
	∼		
R Real Constant 26	Output A Q 13 13 Q Lower Limit A	Output 🚫	
$\sim$	Output B O 14 14 O Upper Limit B		
Output A O 16	: 0.00; B: 0.00		
Output B O 17			
A: 0.00; B: 0.00	100 Rescale to 0 and 100 24		
16	Lower Limit A Output O 15		
	O Upper Limit B		
	9 Input		
			/
lacro Inputs/Outputs		Macro Grouping	
Inputs	Outputs		
		Name	
		Group	Lange Marrie -
		Group	Legacy Macros
Click a Module node to add Input	Click a Module node to add Output	Sub Group	Wet Systems 💌
			Macro Manager

The **Create Macro** dialog shows the four modules that were added in the **Add Modules to Macro** box and allows you to edit input and output names, create **Macro** groups and sub-groups and create a history file to record any changes that may be made to the **Macro Template** later.

# Define the inputs and outputs for the macro

This step refers to the Weather Compensator example (see page 148).

When you click on a module output or an unconnected module input in the drawing area of theCreate Macrodialog, it is highlighted on the drawing area and added to the relevantMacro InputsorMacro Outputslist at thebottom of the dialog.



- **Note:** If you click on a connected input, an error message will be displayed: "Cannot select a module input that is already connected to a line."
- **Note**: The number beside each module input is the Node number and does not relate to the module number.
- **Note**: The default name for node 3 in the illustration is "Inpu", but this can be edited see *Change input or output label if* necessary on page 154.

To remove an input or output that has been added to the **Macro Template**, click on it in the drawing area. The input/output will then no longer be highlighted in the drawing area, and it will be removed from the relevant **Macro Inputs** or **Macro Outputs** list.

You can rearrange the order of the inputs or outputs to the Macro, by clicking on an entry in the relevant Macro Inputs or Macro Outputs list and dragging it up or down within the list.

### Change input or output label if necessary

By default, the text that will be displayed on the Macro module as a label for each input will be "Inpu" and for each output will be "Outp":

Т	test		
0	Inpu	Outp 🛇	

but these names can easily be edited.

To edit a Macro input or output name, select the input/output name in the relevant list box

Outputs		
005	Output	

Type a new name in the relevant Name edit box and press [Enter].

An input or output label can have no more than 10 alphanumeric characters.

Outputs		
005	Output	]

### Name and group the Macro

In order to use a Macro Template that you have created, you must give the Macro Template a name, and assign it to a Macro group so that it can be accessed from the Macro bar.

#### Macro Name

In the Macro Name box, enter a name for the Macro Template.

The name provided here will appear on the Macro instance when it is displayed on the drawing area. It can have up to 63 alphanumeric characters.

In this example, the name given to the Macro Template	Macro Grouping	
is "WeatherCom".	Name	WeatherCom
	Group	Cylon Macros 💌
	Sub Group	BACnet
		Macro Manager

**Note:** The following names cannot be used when naming a macro, because they are used to indicate Inputs, Outputs, constants, etc. internally within **CXpro<sup>HD</sup>**:

pi	(n)	where n = a numeric value in the range 0-9
ро	(n)	where n = a numeric value in the range 0-9
sb		
С	(n)	where n = a numeric value in the range 0-9
bc		

When the Macro Template is named, choose a Macro group and sub-group for it

### • Macro Group and Sub-Group

From the **Group** box, select the group to which the Macro you are creating will belong.

The Macro Group chosen for this example is heating.

If no Macro Group exists, you must create a new group (see *How to create a new macro group and sub-group* on page 158 ) by clicking the Macro Manager... button.

From the Sub Groups box, select the sub-group to which the Macro Template you are creating will belong.

The sub-group chosen for this example is **Boiler**.

If no sub-group exists, you must (see *How to create a new macro group and sub-group* on page 158 ) by clicking the Macro Manager... button.

Macro Grouping	
Name	WeatherCom
Group	Cylon Macros 💌
Sub Group	Legacy Macros Cylon Macros Heating
	Macro Manager <sup>K</sup>
Macro Grouping	

Name	WeatherCom
_	
Group	Heating 💌
Sub Group	Boiler 💌
	Boiler
	Macro Manager

#### Set names for all points in the Macro

When creating a Macro Template, there is a facility to edit the names of all the points in the Macro in a single interface. A Macro Point Configuration button is available on the Create Macro dialog:

Clicking the Macro Point Configuration button opens the Macro Point Configuration dialog:

Simply enter text in the Name column against each point and click the OK button.

Note: If the modules selected when creating the Macro included any Setpoints, it is possible to set labels for specific setpoint values

Ma	cro Poir	nt Config	guration	1

	М	acro Point Conf	iguration		
Macro ( N Gr Subgr	Details ame WeatherCom oup Cylon Macros oup BACnet				
Num	Name	Type	Value	High U	Low Un
8		Analog	1	°C	
0		Analog		*	
10		Analog		°C	
11		Analog		°C	
12		Analog		°C	
<				ОК	> Cancel

**Note**: This is different from setting the Input and Output names (labels) as described in *Change input or output label if necessary* on page 154. Those input and output names are labels displayed on the Macro module; the point names set here are the descriptive names stored for each of the points in the Strategy.

#### Choose whether to insert the macro into the active strategy

The **Insert into Strategy** checkbox allows you to immediately insert a new **Macro** based on this **Macro Template** into the active strategy.

If you want to insert the Macro into the active strategy, select this option before saving the Macro Template.

#### Save the Macro Template

To save the Macro Template, click the Save button.

K Insert into strategy	on save Sa

	macro manager.	
ve	Save	Cancel

The Macro Template is saved to the C:\CXproHD\Macros\ directory if it was created in a UCU or UC16 strategy, or in the C:\CXproHD\UC32Macros\ directory if it was created in a CBM or CBT strategy. The group and subgroup information is stored in the macro\_database.db file in the same directory.

If you decide not to save the Macro Template, click the Cancel button to close the Create Macro dialog box without saving.

When you save the Macro Template, an entry is added to the Macro pane:



The Macro symbol is the bitmap that represents the Macro on the drawing area. (See Working with Macros on page 166).

Т		Weat	therCom
0	OAT		Dmnd 🛇

# HOW TO CREATE A NEW MACRO GROUP AND SUB-GROUP

Macro Groups and Sub-Groups are defined in the Macro Manager interface.

Open the Macro Manager by selecting Manager from the Macro group on the Strategy tab of the Ribbon

Copy Paste Select All Clipboard Clipboard	Strategy									
	다 Copy 라 Paste Select All Clipboard	View Modules	T Add Text	I/O Terminals	Reorder Modules Strategy	■ BACnet Points ■ BACnet Units □ Strategy Details	Strategy Help	View Macros	Create Manager Save New Macros	<b>S</b> tart

or by clicking the Macro Manager... button on the Create Macro dialog

Macro Grouping	
macro orouping	
Name	
Group	Cylon Macros 💌
Sub Group	BACnet 💌
	Macro Manager

This opens the Macro Manager window

- Tanana Macros	Groups	Add
E-C Legacy Macros	Legacy Macros	Delet
		Renam

To add a group, click the Add button while the Macros root is selected in the explorer pane (left hand side of the window)

	Macro Manager	×
□    □	Groups   Adq Delete Rename	
		Export Exit

A new group appears in the Right-hand side **Group** pane.

Type in a name for the new group.

Groups	Add
Legacy Macros	Delete
Heating	Rename
	Groups Cyten Macros Cyten Macros Citheathory

To make a sub-group in the new group, first, make groups visible by clicking on the + sign to the left of the Macros root.



To close the Macro Manager , click Exit .

When a new Macro group is created, it will be listed under Macros in the View menu. When a new sub-group is created, an icon is also created for that sub-group and displayed in the Macro sub-group bar.

# HOW TO RENAME POINTS IN A MACRO TEMPLATE

Points can be renamed from the Macro Manager interface.

Open the Macro Manager by selecting Manager from the Macro group on the Strategy tab of the Ribbon

Strategy								
습 Copy Ĉ Paste Select All Clipboard	View Modules	T Add Text	I/O Terminals	Reorder Modules Strategy	BACnet Points BACnet Units Call Strategy Details	Strategy Help	View Macros	Start

or by clicking the Macro Manager... button on the Create Macro dialog

Macro Grouping	
Name	
Group	Cylon Macros 💌
Sub Group	BACnet 💌
	Macro Manager

Clicking on a Macro Template in the left-hand-side 'Tree view' pane of the Macro Manager displays properties of the Macro Template in the right-hand pane.

The Macro Name , Macro ID , User Created flag, and the list of point names are displayed.

If point names have already been defined, then an Edit Point Names button will be displayed on the righthand side of the dialog.

If there is no point names list, then a Create Point Names button will be displayed instead.

Clicking either button will open the Macro Point Name Prefix dialog, allowing point names to be edited for the current instance.

However, if this dialog is opened from the Macro Manager as shown here instead of from the Create Macro dialog, then when OK is clicked the Macro Template is changed and any Macro instances created afterward will use the updated point names list.

∃ 🖫 Macros	Property	Name	Туре	Import
🗒 🛅 Legacy Macros	Macro Name	WeatherCom		
🖻 🗁 Cylon Macros	Macro ID	(D8F90DE3-7A64-4531-B		Delete
BACnet	User Created	True		Demons
Heating	Point 13		Analog	Rename
B- Boller	Point 14		Analog	Edit Points
weather on	Point 15		Analog	
-0	Point 16		Analog	
	Point 17		Analog	
	_			
	_			
	_			

Num N 13 14 15 16 17	Vame	Type Analog Analog Analog Analog Analog	Value	High U °C °C °C	Low Ur
13 14 15 16 17		Analog Analog Analog Analog Analog Analog		°C °C °C	
14 15 16 17		Analog Analog Analog Analog Analog		°C °C	
15 16 17		Analog Analog Analog		°C	
16 17		Analog Analog			
17		Analog		°C	
				°C	
<					

CXpro

# HOW TO SET MACRO SETPOINT UNIT LABELS

In the Macro Point Configuration dialog, it is possible to set labels for specific setpoint values, so that a user can for example select "Night" and "Day" for a digital setpoint, or "off", "on", "trip" and "switch" for an analog point, without the need to know which numerical value matches each function.

To set an enumerated list for a setpoint, right-click on the setpoint in the Macro Point Configuration dialog and select Add/Edit Enumerates .

Note: This option is only available for setpoints.

Note: This option will not be available when a Macro is being added to a strategy, or when a Macro instance is being edited within a strategy – in those cases when the Macro Point Configuration dialog opens the user will be allowed only to select from an existing enumerated list, or to type a value.

Ni Gri Subgr	ame HtgFreeClg oup Cylon Macros oup BACnet					
Num	Name	Туре		Value V	High U	Low
4	CloRange	Analog Setp	oint	40.00	96	
33	HtgRange	Analog Setp	oint	40.00	%	
2	FreeRange	Analog		1 00 00	1.01	
7	HtgFrostStatPos	Analog	Ade	d/Edit Enume	rates	
13	HtgWarmUpPos	Analog Setp	oint		70	
46	HtgFrost1_2Pos	Analog Setp	oint	100.00	%	
5	DamperMinPos	Analog Setp	oint	10.00	96	
8	FreeFrostStatPos	Analog Setp	oint	0.00	%	
9	ClgFrostStatPos	Analog Setp	oint	0.00	%	
14	FreeWarmUpPos	Analog Setp	oint	0.00	96	
47	FreeFrost1_2Pos	Analog Setp	oint	0.00	%	
48	ClgFrost1_2Pos	Analog Setp	oint	0.00	%	
51	ClgWarmUpPos	Analog Setp	oint	0.00	96	
16		Analog			°C	
17		Analog			°C	
19		Analog			°C	
20		Analog			°C	
21		Analog			°C	
22		Analog			°C	
23		Analog			°C	
25		Analog			°C	
26		Analog			*C	
27		Analog			**	
						>

This will open the Setpoint Enumerates dialog.

Enter a Value and Description pair, and click the Add button. The Value/Description pair will be added to the list.

If an entry is made in error it can be removed from the list by selecting it and clicking the **Delete** button.

When the list is complete, click **OK** to close the **Setpoint Enumerates** dialog.

Value	Description	Delete
Value 0	Description Off	 Add



Now, when editing the setpoint, the user can select the required value from a drop-down list.

Macro I N Gr	ame HtgFreeClg				
Subgr	oup BACnet				
	1				
Num	Name	Туре	Value V	High U	Low
4	ClgRange	Analog Setpoint	40.00	%	
33	HtgRange	Analog Setpoint	40.00	%	
2	FreeRange	Analog Setpoint	1:0n 🗸	%	
7	HtgFrostStatPos	Analog Setpoint	0.0#	%	
13	HtgWarmUpPos	Analog Setpoint	1:00	%	
46	HtgFrost1_2Pos	Analog Setpoint	2:Trip	%	
5	DamperMinPos	Analog Setpoint	3:Switchor	%	
8	FreeFrostStatPos	Analog Setpoint	20.00:CurVal	%	
9	CIgFrostStatPos	Analog Setpoint	0.00	%	
14	FreeWarmUpPos	Analog Setpoint	0.00	%	
47	FreeFrost1_2Pos	Analog Setpoint	0.00	%	
48	ClgFrost1_2Pos	Analog Setpoint	0.00	%	
51	ClgWarmUpPos	Analog Setpoint	0.00	%	
16		Analog		*C	
17		Analog		*C	
19		Analog		*C	
20		Analog		*C	
21		Analog		*C	
22		Analog		*C	
23		Analog		*C	
25		Analog		*C	
26		Analog		*C	
27		Analog		• <i>c</i>	
<					>

The setpoint value is displayed in the list with the text description.

Macro I N Gr Subgr	ame HtgFreeClg oup Cylon Macros oup BACnet				
Num	Name	Туре	Value 🗸	High U	LowIA
4	CloRange	Analog Setpoint	40.00	96	
33	HtgRange	Analog Setpoint	40.00	%	
2	FreeRange	Analog Setpoint	2:Trip	%	
7	HtgFrostStatPos	Analog Setpoint	100.00	%	
13	HtgWarmUpPos	Analog Setpoint	100.00	%	
46	HtgFrost1 2Pos	Analog Setpoint	100.00	%	
5	DamperMinPos	Analog Setpoint	10.00	%	
8	FreeFrostStatPos	Analog Setpoint	0.00	%	
9	ClgFrostStatPos	Analog Setpoint	0.00	%	
14	FreeWarmUpPos	Analog Setpoint	0.00	%	
47	FreeFrost1_2Pos	Analog Setpoint	0.00	%	
48	ClgFrost1_2Pos	Analog Setpoint	0.00	%	
51	ClgWarmUpPos	Analog Setpoint	0.00	%	
16		Analog		°C	
17		Analog		°C	
19		Analog		°C	
20		Analog		°C	
21		Analog		°C	
22		Analog		°C	
23		Analog		°C	
25		Analog		°C	
26		Analog		°C	
27		Analog		**	
<					>

The enumerated list is saved with the Macro template and will be available in all instances of the Macro created afterward.

It is possible to use **Macro Templates** created on one PC on a different PC. They must be exported from the PC on which they are created, and added to the 'host' PC system (i.e. the PC on which they will be used) as follows:

#### Export macros from the PC on which they were created

Exporting Macro Templates as follows puts each Macro Template in a separate file with a user-identifiable name so that they can be easily identified and moved to the 'host' PC system.

Open the Macro Manager by selecting Manager from the Macro group on the Strategy tab of the Ribbon

Strategy									
С Сору		Т		::.	BACnet Points	2		Create	
Paste		-	-	<b>-</b> +	BACnet Units	•		Manager	
Select All	Modules	Add Text	I/O Terminals	Modules	C Strategy Details	Strategy Help	Macros	🖻 Save New	Start
Clipboard				Strategy	,			Macros	

or by clicking the Macro Manager... button on the Create Macro dialog

Mana Casuaina	
Macro Grouping	
Name	
Group	Cylon Macros 💌
Sub Group	BACnet 💌
	Macro Manager
	- 0
Sub Group	BACnet

Select the Macro group that contains the Macro Templates you wish to export,

select all of the Macro Templates within that group that you wish to export,

and click the Export button.

A **Select Folder** dialog will open. Select the location into which the selected **Macros** will be saved.

i ⊡ - C macros	^	Macros		^	Import
Legacy Macros		🗹 🛄 Damping			
Cylon Macros		EnthDiff			Delete
BACnet		Frost1_3			Banama
Damping		HtgFClgPID			Kename
Erost1 3		HtgFreeClg			
HtaFCIaPID		HWSCtrl			
HtgFreeClg		Meter Meter			
		OATReset			
···· 🔁 Meter		Optimizer			
OATReset		Keset			
Optimizer					
SenAimi og					
SegCtrl		SPlant			
SeaModule	~			~	
				1.1	
			Ехроп		Exit
		Select Folder			
		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder		^	
Current Selection		Select Folder		^	
Current Selection		Select Folder		^	
Current Selection		Select Folder		^	
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder			
Current Selection		Select Folder	OK Cancel		
Current Selection		Select Folder	OK Cancel		1

Macro Manager

#### Add exported Macros to the host PC system

Once all required Macros have been exported, copy them onto the PC on which they will be used.

Open the Macro Manager by selecting Manager from the Macro group on the Strategy tab of the Ribbon



or by clicking the Macro Manager... button on the Create Macro dialog

Macro Grouping	
macro orouping	
Name	
Group	Cylon Macros
oroup	Cylon Macros
Cub Conve	
Sub Group	BACnet
	Macro Manager
	45

Select the group and subgroup **into** which you wish to import **Macro Template**s,

and click on the Import button.

 Macro Manager

 Impact

 n the standard **Windows** Open dialog. Multiple files can be selected by holding the [CTRL] key while clicking on each file.

Select the Macro Templates you wish to add and click the Open button.

The selected **Macro Templates** will be imported into the selected group.

If the Macro Template already exists on the host PC, an alert box will be displayed identifying the group and subgroup of any duplicates.

If you wish to import any of the listed Macro Templates, tick the box beside its name before clicking the OK button. This will create a new Macro Template on the host PC, in addition to the existing duplicate.

2		Open			×
🔄 🌛 🝷 🕇 🖺 « temp i	Macros	v C	Search Macros		,P
Organise 👻 New folder					0
퉬 sources 🌗 temp	^	Name	*		Date n
퉬 attachments		A05.m32			03/12/
Macros		WeatherCom	.m32		07/01/
i ro					
🍌 VirtualMachines	~	<			
File <u>n</u> ame:	"A06.m32" "A03.	m32" 🗸	*.m32		~
			<u>O</u> pen	Canc	el
Some of these macros h already been imported p import anyway.	nave matching I previously, You	Ds to existing mac can select which n	ros. These may nacros you wou	have Id like to	
Issue				File	_
Macro <a03> has s</a03>	ame ID as <a0< td=""><td>3&gt; in <uc32 macr<="" td=""><td>os-&gt;Air Syst</td><td>A03.m32</td><td></td></uc32></td></a0<>	3> in <uc32 macr<="" td=""><td>os-&gt;Air Syst</td><td>A03.m32</td><td></td></uc32>	os->Air Syst	A03.m32	
Macro <a06> has s</a06>	ame ID as <a0< th=""><th>6&gt; in <uc32 macr<="" th=""><th>os-&gt;Air Syst</th><th>A06.m32</th><th></th></uc32></th></a0<>	6> in <uc32 macr<="" th=""><th>os-&gt;Air Syst</th><th>A06.m32</th><th></th></uc32>	os->Air Syst	A06.m32	
<					>
Select All			OK	Cance	- I

**Note:** Each newly imported Macro Template will be named "*x* New Macro", where *x* is the index of the Macro Template in the list.

To change this name, select it in the Macro Manager dialog, and click the Rename button.

Once all Macro Templates have been added, they are available for use in the 'host' PC.

To access the Macro groups and sub groups that exist in a site, click on View Macros in the Strategy tab of the Ribbon .



The Macros pane will be displayed on the right-hand side of the CXpro<sup>HD</sup> window



#### How to insert a macro into a strategy

To insert a Macro in a strategy, select it in the Macros pane and click in the drawing area (note the cursor changes

CXproHD - 1.00.00-320 BACnet Points Create T R, Ł Copy ? ę. ₽ ₽ Select Al Add Text G Strategy Details Strate 001\_01.s32 001\_01.s32:\ - Ho BACnet IP -**•** : : 문 BAChelo. 승-코 001 - Net - 001 - UCU Office
 Office < Macros Prop. Page .

to the "Module Cursor" 🔃 during this process)

□ 3 5 4 5 0 k =		OV 110 4000		_	_ 🗆 ×
File Home Controller Strateg	1	Macro Point Configurat	ion		()
Connect     Disconnect     Download     Site     Controller     Controller     Controller	Macro Details Name WeatherCom Group Heating	Point Name Pref This text each po Prefix	ix will be prepended to nt name below.	Start/Pause	i III Grid □] IIII IIII IIIIIIIIIIIIIIIIIIIIIIIIII
Site List	Subgroup   Boller			▶ × Mac	ros 🔍 🗷
□     ●     Stest       □     ●     ●       □     OP - 00 - Network       □     ●       □     00 - 00 - 000	Name         23           23         25           25         25           26         27	Type V Analog Analog Analog Analog Analog Analog	alue   High U   Low Un. 'C ' 'C ' 'C ' 'C ' 'C ' 'C ' 'C '		Marcos Legary Marcos Di Gono Marcos Heating Boiler Log Boiler Log WeatherCom
Setup block updated.	<		<u>ок</u>	) > Ma	cros Prop Page Mod 100% OVR (
= 50+ <b>4.0</b> /// •		CXproHD - 1	0.00-320		- 🗆 🗙
File Home Controller Strated	γr	criprorite in			(
Ø Connect Ø Disconnect Download Site Controller Clipboard	View Modules	Reorder s Modules % Strategy	ts s Strategy Help Harros	ate Start/P nager O E New O Simul:	ause 🗣 🛱 Grid 💷 ເຊິ່ 😰 IV ation Display
Site List	Д 🔀	4 001_01.s32 0	11_01.s32:WeatherCom \(\) 001_0	01.s32:Wea 🕨 🗡	Macros 🌐
□         ● Stes           □         ▲ BACnet IP           □         ▲ BACnet Serial           □         ▲ BACnet Serial </td <td>,</td> <td>T Washing</td> <td>n Dened O</td> <td></td> <td>The Macros       B:     Legacy Macros       B:     Cyton Macros       B:     D:       B:     D:</td>	,	T Washing	n Dened O		The Macros       B:     Legacy Macros       B:     Cyton Macros       B:     D:       B:     D:
		<		> 	Macros Prop Page Mod.
Setup block updated.		Connec	ed to: Sample Apps BACnet (3),		100% OVR (

001\_01.s32 001\_01.s32:WeatherCom 001\_01.s3... > × Properties џ× 4 < > ? WeatherCom  $\mathbf{h}$ - General Information
 Name
 WeatherCom OAT Dmnd 🛇 Point Configura... Inputs E OAT Internal Mo... Rescale to 0 and 100 Internal Mo... Upper Limit B Point De... Analog Outputs 🕀 Dmnd Internal Mo... Rescale from 0 to 100 Internal Mo... Input Point De... Analog Name The name of the macro. < > Macros Properties Page Na... Modules

The Macro instance can be renamed, and its details viewed, through the Properties pane.

#### How to view the modules in a macro ("Expanding" a macro)

To expand a Macro, double-click on the Macro symbol on the drawing area.



**CXpro<sup>HD</sup>** will open a new strategy for the Macro's constituent modules.

4	/		001	1_0	1.s	32	r	00	1_0	1.s	32:\	Nea	athe	rC	om	Y	0	01_	01.	s32	2:W	eat	her	Со	m	<i>Y</i>	001	_0	1.s3	2:\	Nea	ath	erC	om	ŋ		Þ	×
	0	2	20 9	°C (	Dut	sid	e A	ir T	emj	per	atu	re is	<b>W</b>	lea ipp	a <b>th</b> bed	er to	Co a F	om lov	ipe / Te	ins mp	ato	o <b>r</b> tur	e S	etp	oin	t of	20		80 °	°C	1		-	•	-			^
														A	= <sup>80</sup>	), в	=2 F	0 Real	Con	star	nt	•	35					10	0_E	R	lesc	ale f	from	10 t	o 10		33	
•	A	=20 R √	), в	=8 F	0 Real	Cor	istai	nt		34				-	$\sim$					0	lutpu lutpu	t A (	00	26	-		. 20	000	) Lo	ver per	: Lim	nit A nit B			Out	put (	0	
	Co	insta	ant	A: 2	0.0	D; C	C C lonst	)utpu )utpu tant	ut A ut B B: 2	0	23 24			B	- 10	o F	A: 8	ale 1	to 0	and	iant	B: 2	32		-	-	2	6	) Inp				1			•		
											ł	-	. 23	A 0 0	/ ( ) Lo	) wer	: Lin	nit A nit B			Outp	put (	0	25														
	0	uts	side	e A	ir 1	en	npe	era	tur	e (	OA.	т)	Re	SC	)In ale	, put s in n'	1pu	t te	mp	era	ture	2	-1															
<			ì																																		>	*

- Note: The view settings for Lines and Point Numbers are saved with the Macro. They are not inherited from the parent strategy. For example, if lines are not visible when a Macro is expanded, simply right-click on the strategy drawing, select Display Options, and specify that lines are to be shown.
- **Note:** To distinguish between the inputs and outputs of individual modules and the inputs and outputs of the overall Macro module red highlighting is used to mark the connection points of the Macro module. It also provides the full path of the strategy file that it just created when expanding the Macro in the **Window** menu.
- **Note:** Any changes made to a macro within a strategy will only affect the current strategy. The macro and all of its module blocks are saved within the active strategy. To edit the macro strategy itself you must open the \*.etm file.

#### How to Edit a Macro

It is possible to edit an existing Macro Template or to re-save a modified Macro as a new Macro Template. To do this, expand the Macro by double-clicking on the Macro symbol in the drawing area.



CXpro<sup>HD</sup> will open a new strategy for the Macro's constituent modules.



Make any required changes to the component modules of the Macro by clicking on the symbol and editing its properties in the **Properties** pane.

To save the changes select Edit Template from the Macros section of the Strategy tab on the Ribbon .



This opens the Create Macro dialog, but in this case, Macro Inputs and Macro Outputs cannot be added or deleted.

The input and output point names can be changed, as can the Macro Name , Group, and Sub Group .



When all required changes have been made, click the **Overwrite** button to save the edits to the original template. Alternatively, if you want to retain the original template along with the edited one, edit the text in **Name** field to the name of the new template and then click **Save New**.

Note: This can also be launched when Macro is selected in the Macro Manager.

# SECTION 9: COMMUNICATING WITH CONTROLLERS

# COMMUNICATING WITH CYLON CONTROLLERS

When you are using **CXpro<sup>HD</sup>**, you will need to communicate with the Cylon **controllers** on the site.

- You may need to **send** information **to** a **controller** such as a control **strategy**, a command to erase its memory, details of its **setup**, etc.
- You may need to **get** information **from** a **controller** such as its version, current **setup**, and details of any **strategies** it may contain.
- You may wish to view events **within** a **controller**, such as changes in values when a **strategy** is being serviced. This can be done in **Scan** mode or by using the **LiveLog** menu option.

# SENDING INFORMATION TO A FIELD CONTROLLER

When the strategy is ready to be downloaded, simply click the download button on the toolbar or choose **Download** from the **Communications** menu and **CXpro<sup>HD</sup>** will download the strategy and send the set-up automatically.

#### Wiping a Field Controller's memory

Although it is no longer necessary to wipe the Field Controller's memory before downloading if automatic download is enabled, it is still necessary to wipe the controller's memory before using it for the first time. If you are not using automatic download, you must manually wipe the controller's memory before downloading.

#### The effect of wiping a Field Controller's memory

Wiping Field Controller memory has the following effect:

- All blocks are deleted (the strategy is deleted).
- The functions of the site (valves, pumps, dampers, etc. controlled by this Field Controller, are no longer available.)
- The number of serviced blocks will be set to zero. Field Controller Set-up has to be sent again.
- All virtual points are assigned the value zero.
- All hardware points are assigned the value zero.
- All outputs go to zero volts.
- Inputs do not read any signals from connected devices. This is true for manually overridden points too.
- The green LED on the Field Controller flashes rapidly. If the Field Controller is running without a network (standalone), the flashes are regular. If the Field Controller is running on a network (connected to a BACnet Router), the flashes are irregular.
- If the alarm feature is active, an alarm appears on the monitor of the connected PC.
- If a keypad program for that Field Controller exists, it will be deleted.

#### Sending the setup to a Field Controller

If you are using **Automatic Download**, it is not necessary to send the **setup** to the **controller** after downloading. Otherwise, the **setup** must be sent manually as described in *Starting a strategy (sending the Setup)* on page 131.

# How to get the Controller version

- Select the **controller** in the **Site List**
- Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :

⊒ ∓										
File - Home	Controller	Strategy								
Sconnect Jisconnect	Copy Paste	Site	Propertie: Navigatio Page Nam	n 💽	] Mo ] Ma ] Sea	dul cros	es s	?	Strat Reo	tegy pen
Site	Clipboard				Vie	w				
Site List		<b>₽ X</b> <	Strat	tegy1	1					
Sites	iet IP									

• Select Version from the Operations section of the Controller tab in the Ribbon .

ne	Controller Stra	ategy			
	tommunications	📥 Download	Compare	L23 Version	Reard Diagnostics
rt	Controller	Wipe Controller	Show Compare	🗟 Time and Date	Statistics
	BACnet	🛃 Auto Online		Maximums	Lock and Unlock
	Configuration		Oper	ations	

**CXpro<sup>HD</sup>** will get the version from the **controller** and display it.

	Version	×
Version	UC32.8B 7.6.9 05/05/16 Boot Ver:06.00	
Serial Number	CU12205068F	
	☐ ECP	
		Close

Click **OK** to close the **Version** window.

# How to get the controller setup

- Select the **controller** in the **Site List**
- Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :



• Select Time and Date from the Operations section of the Controller tab in the Ribbon .

Controller	Stra	ategy				
tommunica	tions	📩 Download	Compare	1.23 Version	Board Diagnostics	1
Gontroller		Wipe Controller	Show Compare	🗟 Time and Date	Statistics	
BACnet	13	者 Auto Online		Maximums	Lock and Unlock	
Configuratio	on		Oper	rations		l

**CXpro<sup>HD</sup>** will get the **Setup** of the **controller** and display it.

Controller Configuration	
Number Of Strategy Blocks To Service	Send
Last Composed     Strategy Last Modified       Time     11:57:35     Date       14/08/2018     Time       11:57:35     Date	Receive
User ID User Name User Name Strategy ID 0 Drawing Reference Min Service Time 0 Time Synchronisation Wait After 0	
Current Status Received setup from controller	Close

Click OK to close the Time and Date window.

#### How to get controller statistics

- Select the **controller** in the **Site List**
- Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :

File 🕆 Home	Controller	Strategy	
Connect	Copy Paste	Site List Page Names Q Search	Strategy Reoper
C 14 -			
Site Site List	Clipboard	Image: Wiew     Image: Wiew	

• Select Statistics from the Operations section of the Controller tab in the Ribbon .

ne	Controller	Stra	ategy			
	😽 Communica	tions	📥 Download	Compare	1.23 Version	Reard Diagnostics
rt	Gontroller		Y Wipe Controller	Show Compare	🗟 Time and Date	Statistics
	BACnet		🛃 Auto Online		Maximums	Lock and Unlock
	Configuratio	on		Oper	ations	

The **Statistics** dialog box, shown below, appears. The **Statistics** dialog box contains information that comes directly from the controller – this information allows you to check the status of the controller.

Statistics	×
Engineering Statistics   System Statistics   Serial Port Statistics	
Number of Resets     0     Clear       Number of Crash Detects     0       Comm. Checksum Errors     0       Number of Bad Blocks     0       Status     □       ✓     WatchDog On       ✓     Real Time Clock present	
	ОК

The Statistics dialog box has three tabs - Engineering Statistics , System Statistics , and Serial Port Statistics .

#### **Engineering statistics tab**

		Statistics		×
Engineering Statistics	System Statistics Serial Po	ort Statistics		1
~s N S	Number of Resets Number of Grash Detects Comm. Checksum Errors Number of Bad Blocks tatus WatchDog On Real Time Clock prese	0 0 0 0	Clear	
				ОК

Number of resets indicates how many times the Field Controller has been powered up and down

Number of crash detects the number of crash events detected since the Strategy started

Comm. Checksum errors the number of data errors that have occurred in communications

Number of bad blocks the number of bad or corrupted blocks that have been detected in the strategy

Watchdog on This shows the current status of the "Watchdog" on the Field Controller – the box is checked if the watchdog is switched on (a watchdog is a hardware component in the controller that checks if the controller is serviceable. When the watchdog is off, the controller is not operating)

Real time clock present indicates if a real time clock is present in the Field Controller

#### System statistics tab

This tab provides information on any problems the controller may have in servicing the strategy.

	Statistics	×
Engineering Statistics	System Statistics   Serial Port Statistics   Last Reset Invalid Invalid Invalid Setup Block Number Of Blocks Servicing 0 Number of Bad Blocks 0 First Bad Block 0 Last Bad Block 0	
		ОК

Last reset Shows the date and time that the Field Controller was last reset

**Set-up block** indicates if the **Setup** block (the block in the controller that stores details of the number of blocks in the **strategy**) is in place.

Number of blocks servicing shows how many blocks are servicing in the Field Controller

Number of bad blocks shows how many bad or corrupted blocks are detected in the Field Controller

**First bad block** The number of the first of the bad blocks (if any)

Last bad block The number of the last of the bad blocks (if any)

#### **Serial Port Statistics tab**

**CXpro<sup>HD</sup>** can display information about messages passing through the **Field Controller**'s serial ports as follows:

		3		
Serial Port Type				- 1
Subnet			_	Receive
C Service				Clear
C Internal H	(eypad		_	
C External	Keypad			
Total Number			Keypad Information	
Bytes Received	0	Overrun Errors 0	Unexpected Responses	0
Bytes Sent	0	Framing Errors 0	Rx Timeouts	0
Packets Received	0	Parity Errors 0	Resends	. 0
Packets Sent	0	Standard Received Error	Packet Size NACKS	0
NACKS Received	0		Undefined NACKS	0
NACKS Sent	0	Break Conditions	Broadcast Information -	
ACKS Received	0	0	Fault	0
ACKS Sent	0	,	CRC Errors	0
Checksum Errors	0		Packets Received Of	0
			Packets Received	0

The first section of this panel, Serial Port Type allows you to select which of the four possible serial ports the displayed information refers to.

Pressing the Receive button causes **CXpro<sup>HD</sup>** to upload information about the selected port from the Field Controller.

Clicking on Clear causes the Field Controller to clear its memory of port statistics for the selected port.

The information displayed is the number of each of the following messages that passed through the selected serial port since the controller's memory was last cleared:

- Number of Bytes received
- Number of Bytes Sent
- Number of Packets received
- Number of Packets Sent
- Number of NACKs received
- Number of NACKs sent
- Number of ACKs received
- Number of ACKs sent
- Number of Checksum errors
- Number of Overrun errors
- Number of Framing errors
- Number of Parity errors
- Number of break conditions

This information can be used to diagnose low-level problems with the **Field Controller**'s serial-port communications, and this is usually done in consultation with Cylon Technical Support.

#### How to get Field Controller Diagnostic information

**CXpro<sup>HD</sup>** has a facility to display information about the operation of the UC32 controller's hardware system. This information referred to as 'board diagnostics' can be of use in troubleshooting unusual and low-level problems on a Cylon site, and is intended for use primarily when communicating with Cylon technical support.

Board Diagnostic information may be viewed by selecting Diagnostics from the Controller tab on the Ribbon .

Controller S	rategy			
tommunications	📥 Download	Compare	1.23 Version	Reard Diagnostics
Controller	Wipe Controller	Show Compare	🗟 Time and Date	Statistics 🗟
BACnet	🛃 Auto Online		Maximums	Lock and Unlock
Configuration		Oper	ations	

This opens a display panel showing categories of information about the Field Controller's hardware.

	Board	Diagnosti	cs		×
Battery Status Battery		Vector VECTOR CO	UNT	VALUE	
DAC Reading for Ov switch to					
Port Setup Address Baud Rate					
Board ID Resistors Main Board Daughter Board					
Ready		<			>
			Receiv	re	Close

Clicking on the **Receive** button causes **CXpro<sup>HD</sup>** to upload the relevant information from the targeted Field Controller.

#### How to get Field Controller Configuration information

Field Controller configuration information can be of use in troubleshooting unusual and low-level problems on a Cylon site and is intended for use primarily when communicating with Cylon Technical Support.

To view this information, select Maximums from the Controller tab of the Ribbon

Controller Stra	ategy			
Communications	📥 Download	Compare	1.23 Version	<b>C</b> Board Diagnostics
Controller	Wipe Controller	Show Compare	🗟 Time and Date	Statistics
BACnet	🛃 Auto Online		Maximums	Lock and Unlock
Configuration		Oper	rations	

This opens a display panel showing the configuration of the Field Controller's hardware.

Maximums	×
Maximum Subnet Address	63
Maximum Strategy Block	1024
Maximum Number of Datalogs	32
Maximum Keypad Program Size	20003
	Close

# HOW TO SET THE CONTROLLER TIME AND DATE

- Select the **controller** in the **Site List**
- Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :

₩ ₹						
File 🕆	Home	Controller	Strate	gy		
👏 Co	anect	Сору	i.	III Properties	Modules	? Strategy
💉 Dis	connect	Paste	<u><u><u></u></u></u>	Navigation	Macros	Reoper
		Select All	List	Page Names	Q Search	
C	ite	Clinboard			View	

• Select Time and Date from the Operations section of the Controller tab in the Ribbon .

ne	Controller Stra	ategy			
	Communications	📥 Download	Compare	1.23 Version	R Board Diagnostics
ct	Controller	Y Wipe Controller	Show Compare	🗟 Time and Date	Statistics
	BACnet	🛃 Auto Online		Maximums 🗟	Lock and Unlock
	Configuration		Oper	rations	

This opens the Time and Date dialog.

Time and Date	×
Time and Date	Send
Time 09:06:57 • System Time/Date	Receive
Date 14/08/2018 -	
Time Based On	
C None	
○ EU	
⊖ us	
C Use Point 0	
Current Status	
Error receiving time and date from controller	Close

In this dialog, you can check the time and date set in the targeted **controller** by clicking on the **Receive** button (time and date are automatically received when you first open the dialog).

The Time and Date can be changed by typing a new date, by scrolling, or by pressing the System Time / Date button, which sets the time and date to match the settings in the PC on which **CXpro<sup>HD</sup>** is running.

The daylight saving time scheme can be selected in the Time based on the box on the Time and Date dialog:

- If the **None** option is selected for Daylight Savings, then the controller will not automatically adjust its time to match conventional **Summertime** and **Wintertime**.
- If the EU option is selected for Daylight Savings, then the controller will automatically adjust its time according to the standard European rules for Summertime and Wintertime.
- If the **US** option is selected for Daylight Savings, then the controller will automatically adjust its time according to the standard rules used in the USA for **Summertime** and **Wintertime**.
- If the Use Point option is selected for Daylight Savings, then you can specify a point whose value will determine Summertime and Wintertime.

If the time and date settings have been changed in the dialog box, they must be sent to the controller before they will take effect. This is done by clicking the Send button:

Clicking the **Close** button closes the dialog box without sending or receiving further information.
# CHANGING THE ADDRESS OF A CONTROLLER (CBM ONLY)

**CBM** controller addresses must be set from software because there are no Address **DIP** switches on this type of **controller**. To set a **controller's** address from **CXpro**<sup>HD</sup>:

- Make sure that the PC, running CXpro<sup>HD</sup>, is directly connected to the Field Controller's service port.
- Make sure that there is a site set up in CXpro<sup>HD</sup> with the PC connected to COM port:

Site Properties	×
Name:	Serial Site
Directory:	SerialSite
Type of Connection	n for this Site:
Enable BBMD - Si	te Level
IP Address	0 . 0 . 0 . 0 47808
Time to Live	60 seconds
	Enable BACnet NAT
	OK Cancel

• Make sure that the directly connected controller is targeted in **CXpro<sup>HD</sup>**'s Site List



• Connect to the controller by clicking on the Connect button in the Home tab of the Ribbon :

	Ŧ						
File	-	Home	Controller	Strat	egy		
<b>1</b>	Cor Dis	enect Connect	Copy Paste	Site	Properties	ा Modules सि Macros दि Search	Strategy Reopen
	S	te	Clipboard			View	

• Select BACnet from the Configuration section of the Controller tab in the Ribbon

Controller	Stra	ategy	
🔩 Communicati	ons	📥 Download	Compare
Controller		Wipe Controller	Show Compare
BACnet		🛃 Auto Online	
Configuration	1		Op

In the BACnet Configuration dialog, you can set the address for the controller

	BACnet Conf	iguration	×
	Controller	Config	New
Controller	1	1	25
Device Instance	41	41	
Device Name	001 - 001 - CBM08	001 - 001 - CBM08	001 - 001 - CBM0

# SECTION 10: DATALOGS AND ALARMS



# DATALOGS

**Datalogs** (Trendlogs) are a feature of Field Controllers that allows point values to be recorded over a period of time. The recorded data can be later retrieved, displayed, and analyzed with the **Datalog Manager** module.

Analysis of logged data is often useful in optimizing the effectiveness of a Cylon site's **controllers** and **strategies**, and Identifying opportunities for energy savings.

# The datalog function module

The collection of point values in a **datalog** is implemented in a **strategy** by either the Datalog module or the BACnet Trendlog module.

Datalog 2 Datalog_1	
<ul> <li>◇ Analog input</li> <li>☑ Digital input</li> </ul>	BACnet Trendlog 4 Outside Air Temperature Trend
Enable	Digital input
Datalog number: 1; Update interval: 900; Link: 0; Datalog Trigger Options: Any Edge; Delta:	Enable     Log trigger
1.00; Extended length: 0	Datalog Trigger Options: Any Edge

The content of a Datalog can be viewed with the Cylon Datalog Manager, and the content of a BACnet Trendlog can be examined by a BACnet supervisor. Their use in the **Strategy** is identical.

# **Restrictions on the use of datalogs**

The number of **Datalogs (Trendlogs)** permitted in a **strategy** depends on the type of **controller** in which the **strategy** will be used.

Some controllers, such as the **CBM24** can have up to 32 datalogs, with a maximum of 1024 entries per datalog. Other controllers, such as the **CBT12**, have up to 6 datalogs, with a maximum of 1024 entries in each. You can determine the number of datalogs that a particular controller can hold using the **Maximums** dialog box, available from the **Operations** section of the **Controller** tab on the **Ribbon** menu.

# **Standard Datalog sampling period**

Each standard **datalog** module can be configured with an individual time constant for sampling data. To make the evaluation of **datalogs** easier it is advisable to use the same time period for sampling data in all **datalog** modules. A sampling period of **15** minutes is suggested.

The period of time over which the datalog samples are equal to the product of number of entries (104 or 192) and the sampling frequency. For example, a datalog module on a UC16PG with a sampling frequency of 15 minutes (900 seconds) will take samples for (192 X 15) minutes = 48 hours.

#### **Time Stamped Datalogs**

A time-stamped **datalog** records the time and date at which a value was recorded, along with the value. A logging interval is not set - instead, the value of the specified point is recorded:

- when the digital trigger point changes state
- when a logged digital point changes state
- or when a logged analog point changes state by more than a predefined amount from the last value that was logged for it.

There are several situations when such a **datalog** would be particularly useful. For instance, if you log the value of a point with a conventional **datalog** and set the logging interval to 10 minutes, the value of the point may change significantly and return to its original value over a period of 3 minutes, and that change might occur during the 10 minutes when the **datalog** is not recording. If so, the event would not be logged at all. On the other hand, if the logging interval was 30 seconds, the event would be recorded - but the datalog could fill up and the event could be 'flushed' before it is viewed. If so, the event would also be lost. In both of these cases, a time-stamped **datalog** could record data over the period of the event only, so that the necessary data is recorded without the **datalog** filling up.

The other primary use of a time-stamped **datalog** is to log conditions that surround an event. For instance, when a window is opened, the temperature of the surrounding area could be logged to see how it reacts.

# Datalog sampling of digital and analog point values

Both digital and analog point values can be sampled. The datalog module has a digital input and an analog input.

AI	Roo	Anak m Te	og Inp empe	ut ratur	e	1		•	•			Datalog 2 Room TemperatureA
				P	oint (	9 (1	1)				.(1)	Analog input
				Oven	ride (	Д						Digital input
												Log trigger
			• •					•				Datalog number: 1; Update
• •	• •		• •			•		•	·	·		interval: 900; Link: 0; Datalog
			• •					•	•			1.00; Extended length: 0
		Digit	al Inp	ıt		2						Valve 209A
DI		Valv	/e 20	9				•	-		•	Analog input
				P	pint (	37	2)				.(2)	Digital input
				Over	ride (	J)						🗗 Enable
												Log trigger
												Datalog number: 2; Update interval: 900: Link: 0: Datalog
												Trigger Options: Any Edge; Delta: 1.00; Extended length: 0

# How to define a datalog

To define a datalog, proceed as follows:

Select the Datalog module in the Modules pane

Modu	lles	Ф 🗙
		×
Cont	rols	•
Func	tions	•
Math		•
Sche	dules, Timers, and Logic	•
Setp	oints, Inputs, and Outputs	•
Stati	stics	-
Â	Alarm	
Â,	BACnet Alarm	
N	BACnet Trendlog	
$\square$	Comment	
Р	Control Flags	
123 IUU	Counter	
$\sim$	Datalog	
<<	Meter	
$\bigcirc$	Real Time Clock	~
Macr	os Properties Page Na Mo	odules



and place it on the drawing area (note the cursor changes to the "Module Cursor" 🛄 during this process)

Select the datalog, and configure its properties



#### Name

A datalog is automatically given the same name as the point to which it is joined but can be edited if the Use Point name property is set to False.

#### Use Point name

If True, then the Name property matches the connected point and cannot be edited.

#### Analog input

This shows details of the point to be logged if an Analog point is connected

#### Enable

The Enabling Point is a digital point, connected to the "Enable" input of the datalog module, which restarts the sampling process if its value changes from 0 to 1. If this point is not connected, then the **datalog** samples continuously. In typical applications, this input is not used.

#### Log Trigger

In Time-stamped **datalogs**, it is possible to record data when this trigger point changes. If the trigger point is not connected, logging occurs according to the '**Minimum Change**' parameter.

#### Digital input

This shows details of the point to be logged if a Digital point is connected

#### Datalog Number

This shows the automatically-assigned number for the Datalog within the strategy.

#### Datalog Type

The type (analog or digital) of the point being sampled is shown in the Type of Point to Log.

#### Update Interval

This is the frequency of sampling (in seconds). By default, this is 900 (15 minutes) but can be edited in the **Properties** pane.

#### Delta

If the datalog type is set to 'Time Stamped', and if the type of point being logged is analog, it is possible to trigger a sample whenever the point value changes by more than a particular amount. This field specifies that amount of change.

# Starting a datalog

A datalog is part of a **strategy** and is saved with the strategy. The example below shows a datalog module linked to a strategy:



Datalogs are started along with the rest of the strategy in which they are contained, when the **strategy** has been saved (see page 121), downloaded (see page 126), started (see page 131) and tested (see page 134).

**Note:** If the block on which a datalog module is placed is downloaded again to the Field Controller, the sampled data is deleted.

# Viewing the contents of a datalog

This is done on a PC running Cylon software.

The **Datalog Manager** program is used to view or print out datalogs, on screen or printer, as text or graphics. To open is, click on the **Datalog Manager** icon in the **Home** tab of the **Ribbon**.

Home	Controller	Strategy								
onnect sconnect	습 Copy 라 Paste	Properties	Modules	? Strategy Help✓ Reopen Strategies	¢			۲. ش	4	
Site	Clipboard	Site List Page Names	Search View		Configuration	Database Interface	Datalog Mana⊿⊋r ( Utilities	Site Organiser	Backup	NB-Pro

The **Datalog Manager** allows data from Field Controller datalogs to be viewed in a variety of ways:

- The data can be listed as text.
- A datalog can be viewed as a graph.
- Information from multiple datalogs can be superimposed on one graph.
- The status of data points can be viewed in real-time.
- 'Snapshots' can be made of data from any set of analog points in a controller strategy.

For further details on the display and printing of datalogs, see the Datalog Manager manual.

Archived datalogs can be statistically evaluated by using programs like Microsoft Excel. This provides valuable information about the operation of the site.

# ALARMS

Alarms are used in a BMS system to alert site supervisors/engineers to any difficulties that may occur on a **Site**. The **Cylon BACnet** range supports **BACnet** Alarm notifications which can be made available to **BACnet** supervisors such as Cylon's **Aspect™ UI**.

The **BACnet** Alarm module is joined to a digital point (**Binary Value**). When the digital point has the value 1, the **BACnet** Alarm module is activated. The **Binary Value** may indicate an error condition, for example, a sensor going out of normal range or a fire alarm being activated.

Alarms can also be set up directly on BACnet points via standard BACnet protocol.

# Starting alarms

Alarms are parts of **strategies** and are saved with the **strategies**. The examples below show how alarm modules can be linked to a strategy.

Alarms are started after the related strategies have been saved, downloaded, started, and tested.

# **Examples of Strategies containing alarms**

#### Alarms - Example 1: Pump Trip Switch

To illustrate the use of an alarm module in a strategy, this guide takes as an example a simple case where a digital hardware input represents a trip-switch contact of a pump. Joining the digital input to an alarm module means that an alarm will be generated if the pump goes off-line.



#### Alarms - Example 2: Pump Trip Switch with delay

This case joins a digital virtual point (a delay of 60 seconds on the digital hardware input) to the alarm record function module.



#### Alarms - Example 3: Room Temperature Input

In this case, an analog input (room temperature) is joined to the alarm record function module and will cause an alarm to be sent to the Alarm Handler program if the input value is not within the range specified in the real constant module.



# SECTION 11: SIMULATION MODE



# INTRODUCTION

A **Simulation Mode** is available within **CXpro<sup>HD</sup>**, which allows the operation of a **strategy** to be simulated without the requiring a **controller** to be connected. This is done, in most cases, by using actual Firmware code to ensure the simulation is as close as possible to real controllers.

Simulation Mode is accessed through the Simulation section of the Strategy tab on the Ribbon





Clicking this button will start and pause the simulation for the current strategy. It is enabled only if **CXpro<sup>HD</sup>** is **not** logged into the site. When the **strategy** is paused, the current simulation state is still visible on the **strategy**.



Clicking this button will stop the simulation and clear the simulation information from the screen. However, the simulation state will still be preserved, and pressing the **Start/Pause** button will restart from where it stopped.



Clicking this button will stop the simulation, clear the simulation information from the screen, and clear any other simulation information for the strategy.

Clicking this button will enable or disable logging of data. When released, no point logging will happen. When pushed, any point that has logging information set will have its values logged accordingly.

Generation Clicking this button opens the Simulation Configuration dialog.

# CONFIGURING THE SIMULATION

Several aspects of the Simulation can be configured by pressing the Simulation button the Simulation Simulation Configuration dialog.

Simulatio	on Configuration
General configuration – Simulation <u>Sp</u> eed	Normal
Display Progress As	Runtime
Current simulation conf	iguration
Start time/date	17:46:18 14/08/2018 🗸
	OK Cancel

# The Simulation Cycle

The basic unit for simulation is a **Simulation Cycle**. This corresponds to approximately 1 second of runtime on a controller. Some modules (Hardware, Globals, time dependent modules) will be processed a fixed number of time during a cycle. Most of the other modules will be processed a number of times that depends on the size of the strategy. The bigger the strategy, the less the modules will be processed.

#### Simulation speed

The Simulation can be run manually ("Step by Step") where each click on the start button runs one Simulation Cycle, or automatically at one of 3 speeds: **Slow** (once cycle every 5 seconds), **Normal** (one cycle per second) or **Fast** (5 cycles per second).

#### Display Progress As:

The progress of the current simulation is displayed in the right-most section of the Simulation Toolbar. This progress can be displayed as **Runtime** (number of seconds since the simulation started) or **Date/Time** (current simulation date and time)

# **Current simulation configuration**

#### Start time/date:

When the Simulation Cycle is run, any time and date dependent modules – such as Time Schedules or Datalogs/Trendlogs - will use a simulated time. The value used will be the time and date set in the **Current simulation configuration Start time/date** field of the **Simulation Configuration** dialog, incremented by one second on each Simulation Cycle.

This allows a Strategy to be tested for unusual behaviors at specific times such as daylight savings time, year-end, leap years, etc.

The value of this time and date will be displayed in the right-most section of the **Simulation Toolbar** if the **Display Progress As** field is set to **Date/Time**.

# RUNNING A SIMULATION

When a Simulation runs, the labels at the end of lines will be updated to show the point values.



A green background means that the value is calculated by the simulation.

A red background indicates that the value has been overridden by the user.

**Note**: It is possible to add, update, and delete modules and lines while the simulation is running. The simulation will take it instantly into account in its calculations.

# Livelog

During a simulation, the livelog will display values from a simulation run so that it is possible to viewpoint values from different parts of the strategy simultaneously.

# POINT PROPERTIES

The Simulation mode has two sets of point properties:

- one for input points that feed into the Strategy (hardware inputs and Globals' destinations),
- one for all the other points whose values result from the **Strategy**'s internal calculation.

# Accessing the points properties

To open the Simulation Properties for a specific point right click and select **Simulation properties**. This can be done on either Lines, Hardware I/O modules or connected nodes:

Lines



#### Hardware I/O modules

AI	Analog Input Outside Air Temperature	ן ו	-		∧ 0′
	Simulation prope	rties			
					<u>ل</u>

# **Connected nodes**



# Point value override

In a point's **Simulation** properties dialog you can specify whether the value for the point will be calculated by the **Simulation**, or set to a fixed value:

# Analog points:

Point calculated automatically:

Point Value Point Logging	il i
All Points	0.00
Input points	

Point is overridden and set to 18.5:

Point Value Point Loggin	g
All Points	18.5D
- Input points	

# **Digital Points:**

Point calculated automatically:

All Deinte	ng	
Override	Г	
- Input points		

Point is overridden, and set to "Off" (boolean 0)

All Delete		
Verride		
- Input points		

Point is overridden, and set to "On" (boolean 1)

Point Value Point Logg	ing	
All Points		
Input points	<b>v</b>	

196

# Input point options

For an input point, a selection of options is available to simulate different types of inputs. For Digital points there are two options, for Analog points there are 7:

# **Digital Input point options**

# • Fixed value

The point will have a fixed value throughout the Simulation run.

Value is "Off" for the whole Simulation run:

Input points		
Fixed	-	
Value:	Γ	

Value is "On" for the whole Simulation run:

Input points		
Fixed	•	
Value:	V	

#### • Periodic change

This option will change the value of the digital point during the Simulation run.

If the Random period box is unchecked, the value will change after the Basic Period specified:

Input points	
Periodic change	•
Random period	
Basic period	2 Secs. 💌

If the **Random period** box is checked, the value will change after a random period which is less than the specified **Basic Period**:

Input points	
Periodic change	•
Random period	V
Basic period	2 Secs. 💌

# Analog Input point options:

Random Value	N
None Fixed	7.00
Random Value	
Up (down) only	1.00
Up (down) only with limit	
Up and down	
Values from File	

# • None

The point is not assigned a value. The value will either be the last value that the point had, or zero if no previous value existed.

_ In	nput points -				
	None		-		
	,				

# • Fixed

The point will have a fixed value throughout the Simulation run.

Input points			7
Fixed	▼	10	-
Value:	10	8 Plot Area	-
		6Se	eries1
		4	-
		2	-
		1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

#### • Random value

During each simulation cycle, the point will be assigned a random value between a given minimum and maximum.

Input points		16
Random Value	-	
Min Value:	5	
Max Value:	15	
		4
		2
		25 25 25 25 25 25 25 25 25 25 23 23 23 23 23 23 23 23 23 23 23 23 23

Series1

# • Up (down) only

The value will change in only one direction (up or down). Use a negative step limit to go down.

- Input pointe	01
input points	180
Up (down) only	150
-	 140
Start value 5	120
	100
	80
	50
	40
	 20
Fixed step 🚽 1	0
	11 D. Cr
- Input points	 2001
input points	90
Up (down) only	80
	70
E	 50
Start value 3	
	50
	40 Series1
	30
	20
	10
[	
Random step up to 🛛 💌	
,,	

# • Up (down) only with limit

The value will go from a Start value to a Stop value.



#### • Up and down

The value will go up and down continuously between two limits either by a specified step (fixed or random) with a specified period (specify the time to go from one limit to the other).



# • Values from file

The point value will be taken from a datalog file – at each simulation cycle, the next value will be read from the file.

This allows using real data such as a datalog of outside air temperature in the simulation. It also makes it possible to repeat a simulation exactly if the input points from the original simulation have been logged.

- Input points		
Values from File	•	
File		

# Simulation Mode

# POINT LOGGING

Point Value Point Logg None None Time stamped logging	ing	
Point Value Point Lo	gging	
File Sample interval	900	
Datalog capacity (50-4096)	1024	

Any point in the strategy can be logged to a file. This can be used to review values after the strategy has run, and analyze issues. It can also be used to feedback the value in another simulation (see "Input points options").

#### Note: Logging will occur only if both

1. the settings in the point Simulation properties dialog are set and



This means that logging can be switched on or off during a simulation by clicking the logging button.

# SECTION 12: SITES



# OVERVIEW

A site is the name given to one or more controllers, optionally connected to a PC. The following are examples of sites.

- A standalone Field Controller.
- One BACnet Router with a Fieldbus of one or more Field Controllers
- A network of **BACnet Routers**, each with a **Fieldbus** of one or more **Field Controllers**, connected to each other via TCP/IP.

Sites are configured in the Configuration program.

Some common procedures carried out on sites include:

- Installing a new site on the PC (see page 204)
- Site backup (see page 205)

# INSTALLING A NEW SITE ON THE PC

To install a new site on a PC, the Cylon Software Suite must be installed already.

A new site is one which has not been installed on this PC before, and for which a backup from another PC does not exist.

# WHAT HAPPENS WHEN A NEW SITE IS INSTALLED

Installing a new site involves the following events:

- Site-specific directories are created on the hard disk.
- Site-specific information (information about network ID, telephone number, ID code, etc.) is entered in the WN3000.ini file.
- The network size (the number of **BACnet** Routers) is specified.
- The **BACnet** Routers and Field Controllers are named.

The **Configuration** program performs all these steps. For further details, see *MAN-0041 Configuration User Manual.* 

Note: Do not manually make entries to the WN3000.ini when installing a site on the PC. All necessary changes will be made to the WN3000.ini file by the Configuration utility.

Installing a new site on the PC involves the following procedures:

- Naming the new site in the Configuration program.
- Entering the size of the site (number of BACnet Routers) in the Configuration program.
- Naming the BACnet Routers and Field Controllers in the Configuration program.
- If the site is not a remote site, it can be configured as the default site (see *System Configuration* on page 33).
- Restarting **Microsoft Windows** and the **CXpro<sup>HD</sup>** for the changes to take effect.

# SITE BACKUP

Making a site backup means making a copy of all site-relevant data on the PC onto removable media such as network, USB flash drive, external Hard Disk, or tape. A site can then be recreated on another PC running CXpro<sup>HD</sup> from this site backup.

# Making a site backup

To backup a site, right-click on the site in the Site Tree , and select Backup Site from the context menu:



You will be prompted for a location to save the backup file:

⇒ T → ThisPC >	Local Disk (C) > CXproHD	V D Search CA	ргоно да
Deganise 👻 New folder			III • 🚯
This PC	<ul> <li>Name</li> </ul>	Date modified	Type S
3D Objects	10020601	04/12/2018 14:55	File folder
E Desktop	APPLBACN	04/12/2018 14:07	File folder
Documents	Archive	04/12/2018 14:07	File folder
Downloads	BACNETIP	04/12/2018 14:07	File folder
h Music	BACNSERI	04/12/2018 14:07	File folder
E Dictores	Bitmaps	04/12/2018 14:07	File folder
I Materia	CAMPBLOR	04/12/2018 15:58	File folder
Tipeos	Help	24/04/2019 08:46	File folder
Local Disk (C:)	PLOFFICE	02/05/2019 12:56	File folder
CXproHD	STORES	01/02/2019 11:50	File folder
10020601	Symbols6	15/03/2019 12:21	File folder
APPLBACN	System	02/05/2019 10:16	File folder
Archive	Temp	01/02/2019 12:01	File folder
BACNETIP	Template	04/12/2018 14:07	File folder
RACINSERI	UC32Mecros	15/03/2019 12:23	File folder
Ritmans	Utilities	24/04/2019 08:46	File folder
CAMPBLOR	~ <		)
File name PL Office.C/8			
Save as hone: CX000HD Back	up (*.C/B)		~

Select any suitable device or folder and click Save .

# Restoring a Site from a backup file

To restore a site from a backup, right-click on the Sites node in the Site Tree, and select Restore Site from the context menu:

Site List		џ	x
⊡ <mark>€</mark>	Discover Site		I
	Import V7 Sites		
<u>₽</u> <b>₽</b> _	Restore Site		
<u><u></u>turta de la composición de</u>	ampus block R	_	
⊨… <del>₽</del> ₀ ₽	L Office		

Choose the required backup file and click **Open** :

→    ↑    ↑    This PC → Local I	Disk (C:) > CXproHD	✓ ð Search CXp	roHD ,0
rganise 👻 New folder			lii • 🔟 🌘
www.	🖉 ^ Name ^	Date modified	Туре
manuals	10020801	04/12/2018 14:55	File folder
source	APPLBACN	04/12/2018 14:07	File folder
source	Archive	04/12/2018 14:07	File folder
temp	BACNETIP	04/12/2018 14:07	File folder
	BACNSERI	04/12/2018 14:07	File folder
Desktop	Bitmaps	04/12/2018 14:07	File folder
ConeDrive	CAMPBLOR	04/12/2018 15:58	File folder
🤱 Eugene Peelo	Help	24/04/2019 08:46	File folder
💻 This PC	PLOFFICE	02/05/2019 12:56	File folder
3D Objects	STORES	01/02/2019 11:50	File folder
Desktop	Symbols6	15/03/2019 12:21	File folder
Documents	System	02/05/2019 10:16	File folder
Developeda	Temp	01/02/2019 12:01	File folder
- Downloads	Template	04/12/2018 14:07	File folder
Music	UC32Macros	15/03/2019 12:23	File folder
E Pictures	Utilities	24/04/2019 08:46	File folder
Videos			
Local Disk (C:)			
CXproHD			
_	* *		
File name:		<ul> <li>CXproHD</li> </ul>	Backup (*.CXB) 🛛 🗸

If no site with the same name exists, then the restored site is added to the system as a new site.

If a site by the same name exists, the user will be asked to choose either to overwrite the existing site or to create a new site.

- If you choose to overwrite the site that has the same name, the existing site will be completely overwritten. You will be asked to confirm that you want to proceed.
- If you choose to create a new site, you will be asked to enter a new name, and a new site will be added to the site tree. The chosen name must be unique.

You can cancel the restore process at any time.

# SITE DISCOVERY

**Strategy** block data can now be uploaded from **Cylon** controllers and re-assembled into an easy-to-view layout. This is useful when you have a **Site** where you do not have existing **Strategy** drawings or other information.

The purpose of the discovery process is to determine all of the Subnets (i.e. a Fieldbus connected to a BACnet Router) on a Site.

**Note:** All Subnets are searched so that the integrity of the data passed between Subnets (e.g. wide globals) remains intact. This happens even if you are looking for information on a single Subnet.

This process can be lengthy, so please ensure that sufficient time is allocated for it.

However, you do not have to upload all Subnets at one time. If you specify a Subnet Range for a specific upload, you can retrieve the other Subnets at a later point in time.

The upload process is started from the Site Tree, either from the Sites Icon (if the Site is not already in the tree) or from the relevant Site node.

# If the Site is not yet configured in the Site Tree

Click on the Sites icon in the Site Tree , and select Discover Site



This opens the Discovery Site Details dialog with all fields editable.

Discovery Site E	Details ×
Enter the details of the site you would like to disc large number of devices, please ensure the Timeo	cover below. For BACnet Sites with a ut value is large enough.
Site Details Site Name Site Directory Site Number 4 (Next free: 4) Device ID Range 1 to 4194302 Wait Timeout (s) 25 MSTP Network	⊂ Network Type ← BACnet Serial ← BACnet IP
	Discover Cancel

Enter the Site Name and Site Directory directory.

If you do not want to retrieve all Fieldbusses on the Site, specify a Subnet Range .

Sites can be uploaded either through TCP/IP or through a serial connection. For TCP/IP connections, include the IP Address and verify the port. Port 4950 is the default.

When configured, click Discover .

# If the Site is already configured in the Site Tree

If the Site is represented in the Site Tree – i.e. if it has been configured locally configured using the Configuration Utility (CCConfig), click on its node in the Site Tree and select Upload Site :

Site List	<b>Д</b>
⊡ Sites	
ᇦ… <mark>물</mark> BACnet IP	
BACnet Serial	
Export Aspect Data	
Create BACnet EDE Data	
모 오 이	
Sample Apps BACast	
E O01 - Wet Systems	
Discovery Site	e Details
Please ensure the information is correct for th BACnet sites, ensure the Timeout value is large	e site you would like to discover. For enough.
Site Details	Network Type
Site Name Campus block R	C BACnet Serial
Site Directory CAMPBLOR	BACnet IP
Site Number 5	
Device ID Range to 4194302	
Wait Timeout (s) 25	
MSTP Network	

The **Discovery Site Details** dialog will be displayed as before, but in this case, the **Site** details are not editable.

When configured, click Discover .

After the discovery process is started, the Site Discovery Progress dialog appears showing its progress:

	Site Disco	overy Progress
Below is the pr attempting to	ogress of the discovery pro communicate with another	ocess. Please wait until this is finished before site or press cancel to finish the process early.
Site Details		Summary
Name	Campus block R	"I-Am" Received Count 0
Number	5	Properties Read Count 0
Network	BACnet	
– Controller Di	scovery	
	Calling Whols on Network	
	Reading Device properties.	
Attempting to	connect to site < Campus b	lock R> Cancel

If you click Cancel to stop the process, any uploaded information is discarded and not applied to the Site in CXpro<sup>HD</sup>.

When the discovery has concluded, the discovered Fieldbusses /BACnet Routers are displayed in the Discovery Results dialog:

JACE L	Name Number Network	8 TCP/	er  IP		Summary (	Comms Controller Coun Field Controller Count	t 1 2	
	Name	Num	Default Type	UC32	No. Types	Version	IP Address	
2	001 - UC32Net	1	UC32.netK/WEB	Y	2	net WM 2.03.03	192.168.5.46	Configure
•	001 - UC32.24	1	UC32.24	Y	3	UC32.246.2.1		Configure
	002 - UC32. 16	2	UC32.16	Y	2	UC32.16 6.2.1		Configure

The **Export to CSV** feature provides a convenient way to get subnet information and firmware versions of controllers in the networks in CSV format that can be easily imported into Microsoft Excel.

If all known BACnet Routers are displayed and online in the Discovery Results dialog, click Continue to upload Strategy information.

# ASPECT<sup>®</sup> / INTEGRA<sup>™</sup> EXPORT

This feature saves data for a **Controller**, **Fieldbus** (**Subnet**), or **Site** into a JSON-formatted text file for import into ASPECT<sup>®</sup> or INTEGRA™, allowing applications to be automatically configured in **ASPECT<sup>®</sup>-Studio** or **INTEGRA™ IT-8000**.

# **Starting the Export**

To export a Field Controller, BACnet Router, or Site, right-click on its node in the Site Tree and choose Export ASPECT/INTEGRA Data .

⊕ - 월 B/ ⊕ - 월 B/	BACnet IP BACnet Serial
	Discover Site
± <b>1</b> ā	Export Aspect/Integra Data
	Upgrade BACnet Units

If a Field Controller is selected, that controller's information is exported to the ASPECT<sup>®</sup> / INTEGRA<sup>m</sup> . json file, along with the parent network and parent site information as required to correctly import into ASPECT<sup>®</sup> or INTEGRA<sup>m</sup>.

If a **Fieldbus** is selected, information for all controllers in that **Fieldbus** is exported along with the parent site information as required to correctly import into Aspect.

If a Site is selected, information for all Controllers on all Fieldbusses within that site will be exported.

The points that will be exported will be those that are specified in the Export column of the BACnet Points dialog. The BACnet Points dialog is opened by clicking on BACnet Points in the Strategy tab of the ribbon – see *How to expose Points on a BACnet system* on page 139.

Distories	Export	Point Name	Point Addr	Point Type
~		Room Setting	5	Analog Setpoint
¥		MaxHWater	28	Analog Virtual
~		Adder/Scaler Block 19 Output	29	Analog Virtual
¥	<b>v</b>	WeatherCom Block 8001 Inpu	30	Analog Virtual
✓		Heating Water Temp	2	Analog Input
2	14	Temperature	3	Analog Input
~	L'S	Alarm Enable	2	Digital Setpoint
2		DigVirt_3	3	Digital Virtual
2	님	Schedule No. 1 (On)	4	Digital Virtual
Cnet Po Max Use Avai Expo	int Usage - imum BAC d BACnet lable BACr ort Total	net 224 10 net 214 2	ary Unit String I Maximum Bir Used Binary I Available Bin	Usage hary Unit 32 Unit 3 any Unit 29
Max	Unexpose	d Setpoint and BACnet 324	Unexpos	ed 0
Avail	able Setpo	ints / BACnet Points 314		

After exporting, set a name for the export file that you want. By default, it is set to the name of the Site. The filename extension must remain as .json for easy import into **ASPECT**<sup>®</sup> or **INTEGRA™**.

Save Save	As	×
( ) → ↑ ↓ « CXproHD → CAMPBLOR	✓ C Search CAMPBLOR	,p
Organise 🔻 New folder	· == ·	0
AITEMP CXproHD CXproHD APPLBACN BACNETIP BACNSERI BItmaps CAMPBLOR ARCHIVE	ARCHIVE ARCHIVE ARCHIVE ABASE DRAWINGS KEYPAD MACROS Strat5 STRATEGY	~
File name: Campus block R.json Save as type: Hide Folders	Save Cancel	~

After setting the filename, click Save .

The process will begin to export information. The **Creating Aspect Data**... dialog will be displayed to show the progress of the export:

Creating Aspect Data	
001 - UC32netK - 007 - UC3224	
Processing: 6 of 12	Stop
001 - UC32netK - 012 - UC3224: Datalog block 14 has a connected point that is not named.	^
001 - UC32netK - 012 - UC3224: Datalog block 250 has a connected point that is not named. 001 - UC32netK - 012 - UC3224: Datalog block 251 has a connected point that is not named.	
001 - UC32netK - 012 - UC3224: Datalog block 252 has a connected point that is not named. 001 - UC32netK - 012 - UC3224: Datalog block 253 has a connected point that is not named.	
UUI - UL32netK - UI2 - UL3224: In path "7L/Aspect_v_Unitron/UUI_UL32netK/UI2_UL3224", "reset 001 - UC32netK - 011 - UC3224: Datalog block 14 has a connected point that is not named. 001 - UC32netK - 011 - UC3224: Datalog block 131 has a connected point that is not named.	et" is a reserved word
001 - UC32netK - 011 - UC3224: Datalog block 151 has a connected point that is not named	>
	Close

For any errors or warnings encountered, you will see the network (Fieldbus) name, the name of the controller, and the action that should be taken. Correct these errors in the appropriate Strategy or configuration and then start the Export process again.

You may stop the export process at any time and review the errors and warnings.

You may copy the errors and warnings from the dialog into a document or email.

When finished, click **Close** to complete the process.

#### Import into ASPECT<sup>®</sup>-Studio and INTEGRA<sup>™</sup>-ProPack

Refer to MAN0129 ASPECT®-Studio for details about importing the .json data into ASPECT®.

Refer to MAN0140 INTEGRA™ ProPack for details about importing the .json data into INTEGRA™.

# Launching CXpro<sup>HD</sup> from INTEGRA<sup>™</sup>-ProPack

When an export file from **CXpro<sup>HD</sup>** is imported into an **IT-8000**, it is then possible to launch **CXpro<sup>HD</sup>** from the **INTEGRA™** UI – targeting a specific controller for engineering or debugging.

In order to do this, ensure you have **CXpro<sup>HD</sup>** installed on your computer, and **INTEGRA™** version 4.7 or greater is installed on the **IT-8000** or supervisor. Also, ensure that the **CylonService** is installed.

You must also have a copy of the **CXpro<sup>HD</sup>** project and **strategies** in **CXpro<sup>HD</sup>**.

Note: The CylonService uses the site name and device instance numbers to locate the strategy in CXpro<sup>HD</sup>, so you must ensure that the site name in the INTEGRA<sup>™</sup> station matches the site name in CXpro<sup>HD</sup>. To verify or edit the site name in the INTEGRA<sup>™</sup> station, open the property sheet for CylonBacnetNetwork :

Pack)	: Config : Drivers	: CylonBacnetNetwork
Pr	roperty Sheet	
CylonBacnetNetwork (Cylon Bacnet Network)		
	🗎 Status	{ok}
	🗎 Enabled	🔵 true 📼
	📔 Fault Cause	
Þ	🖵 Health	Ok [06-May-19 10:34 AM EDT]
- Þ	Alarm Source Info	Alarm Source Info
- Þ	Monitor	Ping Monitor
- Þ	旦 Bacnet Comm	Bacnet Stack
- Þ	💼 Local Device	Local Bacnet Device [device:10000]
l ⊢ ŀ	X Tuning Policies	Bacnet Tuning Policy Map
	🗎 Site Name	ProPack
	🍞 uploadOnStart	🔵 true 🔽
►	INTEGRA	BacnetDeviceFolder:INTEGRA

To launch **CXpro<sup>HD</sup>**, right-click on the Cylon controller and choose Launch CXproHD :



**CXpro<sup>HD</sup>** will open at the project and the last-saved **strategy** for the selected controller, allowing you to debug, make code changes, and download it to the controller.



# SECTION 13: APPENDIX :: ADDING UNITS OF MEASUREMENT TO THE SYSTEM

# ADDING UNITS OF MEASUREMENT

Additional units of measurement may be added to the existing list of units in a site to allow for a greater range of applications. Units must be added to the site.ini file in the C:\CXproHDCXproHD(SITENAME)\SYSTEM directory

Note: Before changing the site.ini file, make a backup copy (for example, site.ini.bak).

The site.ini file can be edited in a word-processing program such as **Microsoft Windows Notepad**, or **Microsoft Word**. If you use Word to edit the file, make sure to save the file as a "Text Only" document.

# How to add units of measurement to the system

- Make a backup copy of site.ini.
- Open site.ini, using a word processing program.
- Search for the [AnalogUnits] section if adding analog units, and the [DigitalUnits] section if adding digital units.
- Either
  - o edit one of the entries marked "spare"

(e.g. change UNITS61="Spare1" to something like UNITS61="m/s")

#### <u>or</u>

o append the new units to the list of units

(for example, add something like UNITS74="m/s" to the end of the list of analog units).

If you add to the list in this manner, be sure also to increment the NumberUnits parameter so that it matches the final number of units. Ensure the number at the end of the units variable (e.g. UNITS74) has a number at the end that matches its place in the list of units.

- Save the amended site.ini file.
- Close and restart **CXpro<sup>HD</sup>**, to allow the changes to take effect. The new units can then be selected from list boxes for point configurations.

# EXAMPLE OF ADDING UNITS TO ANALOG UNITS LIST

Old analog units list:	New list after changing:
[AnalogUnits]	[AnalogUnits]
NumberUnits=19	NumberUnits=21
Title="IU"	Title="Unit"
UNITS1=" "	UNITS1=" "
UNITS2=" %"	UNITS2=" %"
UNITS3=" %rH"	UNITS3=" %rH"
UNITS4=" "C"	UNITS4=" "C"
UNITS5=" Bits"	UNITS5=" Bits"
UNITS6="g/kg"	UNITS6=" g/kg"
UNITS7="Hz"	UNITS7=" Hz"
UNITS8=" kj/kg"	UNITS8=" kj/kg"
UNITS9="kWh"	UNITS9="kWh"
UNITS10=" L/s"	UNITS10=" L/s"
UNITS11=" Min"	UNITS11=" Min"
UNITS12=" mV"	UNITS12=" mV"
UNITS13=" Pa"	UNITS13=" Pa"
UNITS14="Sek"	UNITS14="Sek"
UNITS15=" Std"	UNITS15=" Std"
UNITS16=" Volt"	UNITS16=" Volt"
UNITS17=" bar"	UNITS17=" bar"
UNITS18=" K"	UNITS18=" K"
UNITS19=" Uhr"	UNITS19=" Uhr"
	UNITS20=" m/s"
	UNITS21=" kg/m3"

Note: Units are also listed in the C:\CXproHDCXproHDXp

Note: Take care when editing site.ini not to change the section headings [AnalogUnits], [DigitalUnits], etc. in any way, because this can cause errors in the Cylon Software system.
# SECTION 14: APPENDIX :: FILE MANAGEMENT



## FILE MANAGEMENT IN CXPROHD

On a large site with multiple BACnet Routers where more than one engineer will be commissioning software at any one-time file management becomes very important.

You must ensure that no one modifies the same strategies / global files that an engineer is currently commissioning. To guard against this, we would recommend that all files are stored on a central computer and only the files required for commissioning are copied onto the engineer's laptop. We would also recommend that each engineer is allocated a single BACnet Router to work on at any one time. At the end of each day/commissioning period, the data files for the BACnet Router are copied back onto the central computer.

The data files required to commission a single LAN are as follows:

C:\CXproHDCXpro <sup>HD</sup> \[SiteN	ame]\dbase \*	Where * is the address of the BACnet Router to be commissioned.
All files under		Where <b>***</b> is the address of
C:\CXproHDCXpro <sup>HD</sup> \	[SiteName]\strat5\***	the BACnet Router to be commissioned.

The same files should be copied back to the central computer at the end of each day/commissioning period.

# SECTION 15: APPENDIX :: BACNET EXPLORERS

**CXpro<sup>HD</sup>** includes two utilities that facilitate the commissioning of BACnet Sites: the integrated **Discovery Tool**, accessible from the **Site Tree**, and the separate application **NB-Pro**.

### NB-PRO

**NB-Pro** is a generic commissioning environment for BACnet controllers. Using **NB-Pro**, users can setup and configure devices to create control programs and strategies for building automation systems, including Cylon BACnet. For details see *MAN0122 NB-Link & NB-Pro*.

Note: For NB-Pro to work with CXpro<sup>HD</sup>, you must open the Settings menu NB-Pro and select Network Configuration . In the Network Configuration dialog, select the Remote IP radio button in the Communicate Via: section so that NB-Pro does not attach to the BACnet UDP port of the PC as this would block CXpro<sup>HD</sup>. Also, register NB-Pro as a foreign device on a CBR on the network by entering the CBR's IP address in the Network Configuration dialog's BBMD Device field.

### DISCOVERY TOOL

The purpose of the **Discovery Tool** is to allow users to see all live BACnet devices, objects, and properties on the network via **CXpro<sup>HD</sup>**. It also allows some or all of the discovered objects to be added to an existing **Engineering Centre** Site or allow a new Site to be created with the discovered objects.

For existing sites, this tool is used to compare the site configuration with the devices that are live on the network. It is possible to change the present\_value property of some objects.

#### **BACnet Explorer**

The Explorer is an extension of the Discovery Tool. It is available in **CXpro<sup>HD</sup>** by right-clicking on a BACnet Site in the Site Tree and selecting Discover Site .



This opens the **Site Discovery** dialog, which is prefilled with the selected Site's information:

Site Details		- Network Type -
Site Name	East Hall	C Serial Connection
Site Directory	EASTHALL	C Unitron
one photology		C BACnet
Site Number	4	Remote Connection
Address Range	to 4194302	C Unitron TCP/IF
Wait Timeout (s)	25	te BAUnet IP
MSTP Network N	, <u> </u>	

If the Discover Site option is selected from the context menu of the Site Tree's root node,



then the Site Discovery dialog will be blank and can be used to create a new Site.

enough.		
Site Datains Site Name Site Directory Site Number Address Range Wait Timeout (s) MSTP Network N	1 to 4194302	Network Type Serial Connection Unitron BACnet Remote Connection Unitron TCP/IP BACnet IP

The Site Discovery dialog has the following fields:

#### **Network Type**

(If an existing Site is selected, this selection cannot be changed).

If a site is not selected, select a Network Type that will apply if you choose to create a site from the Explorer during the current exploration:

- Network 1 for Serial and Modem Sites
- Network 2 for TCP/IP or BACnet Sites

#### Site Name

(If an existing Site is selected, this field will not be editable).

If a site is not selected, enter a new Site Name here. If you choose to create a site from the Explorer during the current exploration, this is the name that will be used for it.

#### **Site Directory**

The Site Directory is automatically generated from the Site Name, but it can also be user-defined. Do not use special characters in the Site Directory Name.

#### Site Number

(If an existing Site is selected, this field will not be editable).

If a site is not selected, specify a Site Number. If you choose to create a site from the Explorer during the current exploration, this is the Site Number that will be used for it.

#### **Address Range**

This can be used to limit the Discovery process. Only BACnet addresses within this range will be tested.

#### Wait Timeout (s)

This sets the length of time that the process will listen for I-Am responses during discovery.

Larger Sites require higher Wait Timeout(s) to explore the entire site (default 10 seconds)

#### Network

The user can choose a specific network to discover in this dialog box. If the user enters a network number, only devices on that network will be displayed. Leave this blank if you want to show devices on all networks.

The **Discover** button will launch the progress dialog.



A Whols call is made, and then the system waits for the specified timeout (default is 10 seconds) after which it reads the BACnet information for each Device that responded with an I-Am message. When this is complete, the results dialog opens:

Site Details	This is the BACnet	Explore	r dialog.						
Name BAChetexplorer		- April 1	alalogi						
Number 5 Num. Devices 9									
BACnetExplorer	Name	MAC	Def. Type	Types	Model	ID	Vendor	Network	IP Addr
VI Cylon BACnet Router - Chris (60	Cylon BACnet Ro	1	CBR	3	Cylon BACnet R	6000	171	0	192.168.6.38
	Unitron Slave UC	1	UC32.24 B	1	Unitron Virtual	1220	171	61000	
	Controller type U	14	UC32.24 B	2	UC32.24	1054	171	60000	
🕀 🗹 🖾 Unitron Slave UC1 (2) (1220	Cylon BACnet Ro	2	CBR	3	Cylon BACnet R	49	171	0	192.168.6.40
🗄 🗹 🖾 Controller type UC32.24 (10	Controller type U	1	UC32.24 B	2	UC32.24	6767	171	51	
Cylon BACnet Router 49 (49)	Controller type U	2	UCU12 BAC	2	UCU12 Culor B&Creat D	3/52	1/1	51	102 169 6 25
Bu C C Object-List	001 - UC3224 BA	1	LIC32.24.B	2	LIC32.24	141078	171	51	192.100.0.35
	002 - CBT12	2	UCU12 BAC	2	UCU12	141079	171	51	
Controller type UC32.24 (6)	002 00112	-	00012 0/10/11	-	00012	212075		51	
🗄 🗹 🖾 Controller type UCU12 (375)									
🗹 党 Cylon BACnet Router 49 (14107									
🕂 🗌 🗐 Object-List									
E 001 - UC3224 BACnet (1410									
⊞ 💽 🕒 002 - CBI 12 (141079)									
• • • • • • • • • • • • • • • • • • •									
		1			Add Cale				Close

The results dialog contains two panels:

- The left panel contains a tree view list of the BACnet devices and objects discovered.
- The right contains information regarding the selected device or object.

It is possible that not all devices would be discovered during the specified Wait Timeout(s) ., so if necessary you can re-scan the network for further devices by clicking the **Rescan Network** button. The Site Details dialog will open again so that the settings for Address Range , Wait Timeout(s) and Network number can be adjusted. Devices that have already been discovered will be skipped, so that further devices may be discovered even if none of the settings are changed.

The tree view is similar to the existing site list in other applications. The site is the root node of the tree, followed by the routers and then devices under those. Under the device nodes, there are other nodes in the Object List. Expanding this will show each object read in from the parent device.

As an extension of the **Site Discovery Tool**, the Explorer allows devices to be added to the Site specified in the top left corner of the **Cylon BACnet Explorer** dialog (which may be an existing site or a new site that will be created when devices are added).

To add devices to the selected site, check the box beside each required device in the Site Tree and click on the Add Selected Devices to Site button. To quickly select all of the discovered devices check the Select all devices to add to Site box beneath the Site Tree. Non-Cylon devices will be added as virtual controllers and have a Cylon address of 131 or above.

When the root of the tree view is selected, the right panel contains a list of the BACnet devices found, along with: device name, MAC address, vendor ID, model name, IP or MSTP Address, Network, and estimated Controller Type.

BACnet Explorer           Number         9           Num. Devices         8	This is the BACn item in the list. T Any newly disco Green means the between the der	et Exploi o begin vered de at the de vice info	rer dialog. Belo reading in the evices will be in evice discoverent rmation discov	ow is the list of object list of a white. Device of matches the ered and the o	devices that were dis device expand its nod is that have already be addressing of the site device information in th	covered. To e le in the Tree een configured configuration le site configu	dit any of t View. d will be hig n. Red mear ration.	he details d hlighted in G ns there has	ouble click on a ireen or Red. i been a clash
BACnet Explorer	Name	MAC	Type	No. Types	Model	Instance	Vendor	Netw	IP Addr
U Cylon BACnet Router 49 (3000)	Cylon BACnet Ro	1	CBR	6	Cylon BACnet P	3000	171	515	192,168.6
	Controller type U	4	CBT13VAV	1	UCU13	2221	171	515	1921100101
🗄 🛄 Object-List	Cylon BACnet Ro	2	CBR	6	Cylon BACnet R	49	171	77	192.168.6.
🗄 🗹 🖾 Controller type UCU13 (222	Controller type U	1	CBM24	1	UC32.24	141078	171	77	
University of the second secon	UCU12 CT12229	2	CBT12	1	UCU12	141079	171	77	
H. Object-List									
Controller type UC32.24 (14									
🗄 🖓 🖾 UCU12 CT12229032A (1410									
( ) )									
	•								•
Select all devices to add to Site	Rescan Network	1			Add Selecte	d Devices to s	Site		Close

There is also a column (**No. Types**) which shows the number of possible Cylon controller types this device could be.

Cylon devices are initially set as a **CBM24** controller type, but this can be changed in the **Controller Properties** dialog. The 'Type' of a non-Cylon device cannot be changed in the **Controller Properties** dialog, but if they are added to the Site, they will appear as **CBM24** in **CXpro<sup>HD</sup>**, and this can be changed in the **Configuration utility (CCConfig)**.

To open the **Controller Properties** dialog, double-click on the device in the right-hand panel.

Controller Properties		Co	ontroller Properties	<b></b>
Controller Details	BASRT-B	ſ	-Controller Details	Controller type UC3224
Model	BASRT-B		Model	UC32.24
Address	4		Address	1
Possible Types	3rd Party 👻		Possible Types	CBM24 💌
Device Instance Number	1920		Device Instance Number	141078
ОК	Cancel		ОК	Cancel

You can then change the Name, Type, Address, and Device Instance Number before adding them to the site.

**Note**: This will only change the name of the device in the database on the PC, it will not change the name on the device itself.

When the device node of the tree is expanded or double-clicked, the object list of that device will be read in. As each object is received from the device it will be added as a child to that device node. At this stage, the right-hand panel will display the object list with a column for object ID, object type, object name, and present value and this list will be populated as objects are read in.

Iame BACnetExplorer Iumber 5 Ium. Devices 10	This is the BACnet Explor	rer dialog.			
B BACoetExplorer	Object Name	Object ID	Object Type	Value	
	Unitron Slave LIC1 (2)	1220	(8) Device	0.00	
Cylon BAChel Rouler - Chins	1.17 analog	17	(2) Analog Value	0.00	
🕀 🔄 🔲 Object-List	1.18 analog	18	(2) Analog Value	0.00	
🚊 - 🗹 💙 Unitron Slave UC1 (2) (1	1.19 analog	19	(2) Analog Value	0.00	
Unitron Slave UC1 (	1.20 analog	20	(2) Analog Value	0.00	
	1.21 analog	21	(2) Analog Value	0.00	
[] [] 1.1/ analog (1/)	1.22 analog	22	(2) Analog Value	0.00	
🔲 🗐 1.18 analog (18)	1.129 digital	129	(5) Binary Output	0.00	
1.19 analog (19)	1.130 digital	130	(5) Binary Output	0.00	
<b>1</b> 1 20 apples (20)	1.131 digital	131	(5) Binary Output	0.00	
1.20 al laiog (20)	1.132 digital	132	(5) Binary Output	0.00	
1.21 analog (21)	1.133 digital	133	(5) Binary Output	0.00	
🔲 🗾 1.22 analog (22)	1.154 digital	134	(5) Binary Output	0.00	
🔄 🔲 1.131 digital (131)					
🔲 👩 1.132 digital (132)					
I.134 digital (134)					
Controller type UC32.24					
🔲 👩 Controller type UC3					
BACnet RTC Trendle					
Cylon BACnet Router 49 (49)					
🗄 🗌 🗐 Object-List 🚽					

When an object is selected in the tree view, the properties of that object will be read from the device and the right-hand panel will contain the properties and values of that object.

From the results dialog, the user will be able to change the present value property for some of the objects.

Note: To refresh a specific object, right-click on that object.

#### **Check Against Existing Devices**

When using the **BACnet Explorer** on an existing site, any discovered devices must be checked against those that have already been configured. This is done by comparing the Device Instance Number of each discovered device against the Device Instance Number of any devices on the site configuration already.

For any discovered devices that have the same Device Instance Number as a device on the PC, there will be a comparison made between the MAC address discovered and the Cylon address.

- If these match, the device will be highlighted in the list in green to signify that the devices match. A matching device cannot be edited.
- If they do not match, then the device in the list control will be highlighted in red to alert the user to this mismatch. The user will be given a choice to resolve the mismatch
- If the Device Instance Number does not match any other ID on the PC, then this discovered device will not be highlighted and will be left white. Non-matching devices can be edited.

#### **Changing the Present\_Value Property**

The present value can only be written to commandable BACnet objects. **Commandable** objects always have the 'present value' property and two additional properties – Priority Array and Relinquish Default.

- Analog Output, Binary Output, and Multi-State Output objects are always commandable.
- Analog Value, Binary Value, and MultiState Value objects can be **commandable**, but this is decided by the vendor.

To change the present value of a **commandable** object, double-click on the present value property in the right panel. If the object has the required properties, this will open the **Change Present Value Dialog**:

Change Present Value Dialog				×
Below is the Priority Array of the		Priority	Value	
selected object. To change a value, select the checkbox and		1	NULL	
enter the new value. Leave the		2	NULL	
value blank or set to "NULL" if		3	NULL	
value,		4	NULL	
		5	NULL	
- Object Details		6	NULL	
Device ID 1054		7	NULL	
	₽	8	NULL	
Object Name Analog		9	NULL	
Object Instance 10	민민	10	NULL	
	민민	11	NULL	
Object Type (1) Analog Outpu	민민	12	NULL	
Present Value 12.57	밀	13	NULL	
Present Value 12.57	밀	14	NULL	
	델	15	12.567	_
		16	2.58	
Change Selected Values		Close		

The table on the right-hand side of this dialog shows the current priority array of the object. To change or relinquish the value, you must select the checkbox beside the relevant priority index. By selecting the checkbox, you can edit the value at that array. To relinquish that value, clear the contents in the box or set it to "NULL".

When the **Change Selected Values** button is clicked, the value for any priorities whose checkbox is ticked will be sent to the BACnet object. This will update the priority array on the device and to show this, the list items, present\_value and priority\_array, in the Explorer dialog will be updated too.

# SECTION 16: COMMISSIONING CONTROLLERS WITH CXPRO<sup>HD</sup>

### HOW TO CONFIGURE A CONTROLLER'S BACNET SETTINGS

When a **Field Controller** is first commissioned, its address must be set by connecting **CXpro<sup>HD</sup>** directly to the controller by **RS232** link (**Service Port**). If points on the controller are to be exposed on a **BACnet** network, or if **CXpro<sup>HD</sup>** is to communicate with the **Field Controller** by **BACnet Tunneling**, then the **Field Controller**'s **BACnet** address (**Device Instance Number**) must also be set.

These device settings, and others, can be set from **CXpro<sup>HD</sup>** as follows:

**Note**: Some parameters can be set over Ethernet connection, but Controller Address and Baud Rate can **only** be set when the Engineering PC is connected to the controller by RS232 link.

In **CXpro<sup>HD</sup>**, select **BACnet Configuration** from the **Controller** tab of the **Ribbon** 



This opens the **BACnet Configuration** dialog, which defines how the **Controller** will communicate on the **BACnet** network, and how it will communicate with **CXpro<sup>HD</sup>** for configuration over **BACnet**.

In this dialog, each current value and the proposed new values can both be displayed at once. Defaults can also be automatically generated.

	Controller	Config	New
Controller	Controller	1	
Device Instance		666111	1
Device Name		001 - 001 - CBM24	1
Site		4	
Comms Ctrl		1	
MS/TP Max Masters			
APDU Timeout			
MS/TP Baud Rate			
		Use C	onfig Values
		Receive	Send
Reading from controlle	r		
			Close

**Note:** Only Device Name, Router Address, and MSTP Max Masters will be editable when the Engineering PC is connected over Ethernet. In order to edit the other parameters, it must be connected by RS232 serial link.

The parameters that define how the Controller communicates on the BACnet system are:

#### • Device Instance

Enter the required **BACnet** address (0 – 4194303).

**Note:** The number set here in the Field Controller (when connected serially) must match the Device Instance Number set in CXpro<sup>HD</sup>.

#### • Device Name

Any descriptive text.

• Tunneling Properties: Site and Comms Ctrl

**Note**: All of the Cylon controllers throughout the BACnet system **must** have the same **CXpro<sup>HD</sup>** "Site Number".

In the Device Properties dialog set the Site and Comms Ctrl matching the position of this Controller in the Site defined in the Cylon Configuration utility (CCConfig).

#### • MSTP Max Masters

This must be equal to or greater than the highest address used on the BACnet **MS/TP** fieldbus, because this controller will not pass data to devices with addresses higher than this. The optimum situation is that this value is set in all devices to exactly the value of the highest address on the fieldbus. (1 - 127)

Note: It is recommended that you address your controllers consecutively starting at 1, with the MAX Master value matching the Maximum Controller address value. For optimum efficiency, there should be no gaps in the device addresses.

#### • APDU Timeout

(0 ... 60 seconds) this value should be left at its default unless there is a problem.

**CXpro<sup>HD</sup>** includes a utility to quickly commission the MAC, Max Masters, Device IDs and Names of Cylon controllers. The utility can be launched by right-clicking on a Site or a Router in the Site List :



#### **Note**: The devices must be configured within **CXpro<sup>HD</sup>** before they can be accessed by this utility.

If launched from a router, only the devices on that subnet will be pinged. If launched from the site, all devices on the site will be pinged.

	net Devices										
I Devices		Seria	al Number	Network	MAC	Device ins N	Name	Max Masters	Strategy Type		
CBV US - Integ	ıral Actuator	CX16 CU12	i744168C 2142008F	515 515	1 30	4000 C 3001 C	CBX Chris Desk CBM desk test	50 127	CBV US - Integral Actuator Strategy ID: 0		
)ffline / Misconfig Serial Number	gured Devices	MAC	Instance (P	PC) Inst	tance (Ctrl)	Name	Type (PC)	Type (Ctrl)	Strategy Type	Issues	Apply
	515	2									
			3443			001 - 003 - CB	3 CBM08		Strategy ID: 0	Offline	
	515	2	3443 4000000			001 - 003 - CB 001 - 002 - CB	3 CBM08 3X CBX-8R8		Strategy ID: 0 Strategy ID: 0	Offline Offline	
٢	515	2	3443 4000000			001 - 003 - CB 001 - 002 - CB	3 CBM08 3X CBX-8R8		Strategy ID: 0 Strategy ID: 0	Offline Offline	
۲	515	2	3443 4000000			001 - 003 - CB 001 - 002 - CB	8 CBM08 IX CBX-8R8		Strategy ID: 0 Strategy ID: 0	Offline Offline	Reconcile Issues

When pinging is complete, the **Commission BACnet Devices** dialog is displayed:

ommission BACn	et Devices								
ll Devices		Serial Number CU12142008F	Network 515	MAC 30	Device ins 3001	Name CBM desk test	Max Masters 127	Strategy Type Strategy ID: 0	
Offline / Misconfigu	ured Devices —								Apply
Serial Number	Network	MAC Instance	(PC) Inst	ance (Ctrl)	Name	Type (PC)	Type (Ctrl)	Strategy Type	Issues
	515	3 3443			001 - 003 - 0	CB CBM08		Strategy ID: 0	Offline
	515	2 4000			001 - 002 - 0	CBX CBX-8R8		Strategy ID: 0	Offline
CX16744168C	515	1 405	4000	)	CBX Chris De	esk CBX-8R8	CBX-8R8	CBV US - Integral Actuator	Device instance does not m
<									>
									Reconcile Issues
Rescan Tin	neout (s) 5								Close

The upper-right pane of the **Commission BACnet Devices** dialog lists all of the devices configured in the **CXpro<sup>HD</sup> Site** that has been successfully discovered on the BACnet network.

The lower pane of the Commission BACnet Devices dialog lists devices that are configured in the CXpro<sup>HD</sup> Site but have not been successfully identified on the BACnet network. Devices that partially match the CXpro<sup>HD</sup> Site configuration are highlighted in red – for example, a device has been found that matches the MS/TP Network Number and MAC Address of a configured device, but the Device Instance Number does not match.

If you want any of the devices highlighted in red to be included in the Commissioning process, tick the checkbox to the right of red highlight. When all such devices have been selected, click the **Reconcile Issues** button.

The configuration of the device in the **CXpro<sup>HD</sup> Site** will be updated to match the corresponding discovered device, and the device listing will move to the top-right pane:

Commission BACnet Devices								
All Devices	Serial Number N CX16744168C 5 CU12142008F 5	letwork MAC 15 1 15 30	Device ins 4000 3001	Name CBX Chris Desk CBM desk test	Max Masters 50 127	Strategy Type CBV US - Integral Actuator Strategy ID: 0		
Offline / Misconfigured Devices	,							Apply
Serial Number Network MA 515 3 515 2	AC Instance (PC) 3443 4000000	Instance (Ctrl)	Name 001 - 003 - 0 001 - 002 - 0	Type (PC) CB CBM08 CBX CBX-8R8	Type (Ctrl)	Strategy Type Strategy ID: 0 Strategy ID: 0	Issues Offline Offline	
¢								> Reconcile Issues
Rescan Timeout (s) 5								Close

# **Note**: If reconciling might create duplicate IDs, the conflicting offline devices are renumbered to a value above 4000000 to ensure that they will be unique.

If no match is found for the MS/TP Network Number and MAC Address of a configured device, that device is listed in the lower pane as Offline, marked with a grey background and cannot be included in the Reconcile Issues process.

To retry pinging offline devices, click the **Rescan** button on the bottom left of the dialog.

The upper-left pane of the Commission BACnet Devices dialog shows categorized devices found organized by strategy ID.

- All Devices	Ser
- Single Duct VAV	123
Ean Col	123
RTI	123
-110	123
	123
	123

Commission product periods

This groups devices by the type of **strategy** they contain (e.g. single or dual duct VAV, or **RTU**s, Fancoils, etc), so that common properties can be edited together.

Clicking on All devices will show only the properties that are common to all devices of MAC, Max masters, Device ID, Name, Serial Number, and Strategy Type.

Clicking on a **strategy** type in the left-hand pane means that additional parameters common to that **strategy** type will become available in the right-hand pane:

- Al Devices	Serial Number	MAC	Max Masters	Device ID	Name	Туре	Input Config	Output Config
- Single Duct VAV	12345671	1	127	12341	VAVST386	137	48	18
- Eao Col	12345672	2	127	12342	VAVST388	137	48	18
BTU	12345673	3	127	12343	VAVST390	137	48	18
	12345674	4	127	12344	VAVST392	137	48	18
	12345675	5	127	12345	VAVST394	137	48	18
	12345676	6	7	12346	VAVST396	137	48	18

Each of the fields can be edited individually.

However, it is also possible to copy a single value to multiple controllers at once, so that device types that are installed identically - for example, VAVs – can be configured in bulk very quickly (similar to copy & paste in a spreadsheet program).

When appropriate, editing a single field will be assisted by a properties window that indicates what the setting value will mean:

Jenar Namber	MAC	Max Masters	Device ID	Name	Туре	Input Con	Output Config
12345671	1	127	12341	VAVST386	137	48	18
12345672	2	127	12342	VAVST	107	10	10
12345673	3	127	12343	VAVS1 VAVS1	F386 Config F	Properties	
12345674	4	127	12344	VAVS1 AL	xillarv heat	True	
12345675	5	127	12345	VAVS1 Co	ntrol Method	Standard	
12345676	6	7	12346	VAVS1			
				Contr	ol Method	ruence applied to	this

vices

When all of the fields have been configured, click the **Apply** button, and the full set of edited parameters will be sent to all controllers. A progress dialog will be displayed, indicating progress and highlighting any failures:

Serial N	MAC	Max Masters	Device ID	Name	Progress
2345671	1	127	12341	VAVST386	Complete
12345672	2	127	12342	VAVST388	Controller write failure.
12345673	3	127	12343	VAVST390	Complete
12345674	4	127	12344	VAVST392	In Progress
12345675	5	127	12345	VAVST394	
12345676	6	7	12346	VAVST396	





#### **UNITED STATES**

ONE TECHNOLOGY LANE EXPORT, PA 15632 PHONE: (724) 733-2000 FAX: (724) 327-6124

1 SUNDIAL AVE - SUITE 219 N MANCHESTER, NH 03103

75 WADE GREEN BUSINESS PARK 1301 SHILOH ROAD NW, SUITE 1411 KENNESAW, GA 30144

#### IRELAND

#### CYLON CONTROLS LTD

CLONSHAUGH BUSINESS & TECHNOLOGY PARK CLONSHAUGH DUBLIN 17 IRELAND T + 353 1 245 0500 F + 353 1 245 0501 E INFO@CYLON.COM

#### UK

 CYLON CONTROLS UK LTD

 ENDEAVOUR HOUSE

 COOPERS END ROAD

 ST ANSTED

 ESSEX CM24 1SJ

 UNITED KINGDOM

 T + 44 870 178 1800

 F + 44 870 403 6570

 E INFO@CYLON.COM

WWW.CYLON.COM WWW.CYLON-AUTOMATRIX.COM