Millipore®

Preparation, Separation,
Filtration & Testing Products

User Guide

Mobius® Chrom 20 System with Flexware® Assemblies

MERCK

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System Overview

Introduction

Mobius® Chrom 20 System with Flexware® Assemblies are fully automated industrial systems that deliver optimal operational flexibility. Unlike traditional single-use technology, the systems are quick and easy to set-up, requiring only a minimum number of components.

The system utilizes Flexware® single-use flow paths that minimize the risk of cross contamination and the risk of operator error by minimizing the number of connections required.

The system is controlled by the Common Control Platform® (CCP®) software.

A Flexware® Clamshell Assembly Lift and Flexware® Clamshell Assembly Storage Rack are available for moving, storing, installing and removing the Flexware® Clamshell Assembly. The lift and rack must be ordered separately.

This guide describes all hardware options and the Flexware® Assemblies for Mobius® Systems. It also provides instructions for using the system including the CCP® software options and instructions.

This user guide is accompanied by a electronic support containing electrical schematics, and technical documentation for the following components:

- Pumps
- Pressure Sensors
- Temperature and Conductivity Sensors
- pH Sensor
- UV Sensor
- Flowmeters
- Touch Screen
- Automated Pinch Valves
- Automated Pressure Control Valve
- Bubble Trap Level Sensors
- End Product Air Sensor
- Precolumn Bubble Sensor

Mobius® Chrom 20 System with Flexware® Assemblies

The Mobius® Chrom 20 System with Flexware® Assemblies is a fully automated chromatography system designed to achieve optimum separation and purification of monoclonal antibodies, vaccines, plasma and therapeutic proteins while offering a high degree of operational flexibility.

This Mobius® Chrom 20 System with Flexware® Assemblies is available with a feed flow range of 4 to 20 L/min with single-use flowmeters.

Each system consists of a Base with a Flexware® Clamshell Assembly, Bubble Trap Support, Pump Cart and Manifold, a Filter Support Kit, a pre and post column instrument Kit and a Flexware® Assembly for Mobius® Systems.

System Specifications

Mobius® Chrom 20 System with Flexware® Assemblies

Mechanical Specifications

Mobius® Chrom 20 System with Flexware® Assemblies for Chromatography

Specification		Mobius® Chrom 20 System
System Dimensions	Pump & base carts connected H x W x D in mm	1727 x 1715 x 800 + 20 mm
Net Weight	Base with Flexware® Clamshell Assembly	365 kg
	Pump Base with 2 Pumps with Manifold	160 kg
Materials of Construction	**Wetted Components**	
	Tubing	Silicone
	Flexware® Clamshell Assembly	Pureflex™ Film and polyethylene fittings
	Pump Head	EPDM, Santoprene® and polypropylene
	Connectors	Polypropylene
	Flowmeter	Polysulfone and Hastelloy C22 electrodes
	UV, Conductivity and pH Sensor (SUC)	Polysulfone Quartz, EPDM and stainless steel 316L (pins only)
	Non-wetted Components	
	Bases	Stainless steel 304L (where applicable)
	Flexware® Clamshell Assembly (rear)	POM
	Flexware® Clamshell Assembly (front)	PMMA
	Valve Pads	Silicone
Casters		8 (4 free, 4 locking)
Connections	Inlets (10) TC	¾ inch TC
	Outlets, 3 Fractions + 1 waste, TC	¾ inch TC
	Filters	¾ inch TC
	Column	¾ inch TC
	Pneumatic	Quick connector with pneumatic fitting (flexible hose Ø12mm OD supplied by customer)
Valves	On/Off Valves	Inside Flexware® Clamshell Assembly: Automatic Pneumatic piston
		Inlet Manifold: Automatic Pinch Valve for ⅝ ID
	Valve control (after Bubble Trap)	Pneumatic piston with pressure regulator
Pumps	Model	Quattroflow 1200S x 2 (for gradient)
	Maximum Pressure	4 bar

Specification	Mobius® Chrom 20 System
Flow Range (L/min)	4 to 20
Pump Control	Fixed Position (speed in %) or Flowcontrol

Operating Specifications

Mobius® Chrom 20 System with Flexware® Assemblies for Chromatography

Specification		Mobius® Chrom 20 System
Total Operating Time	Mobius® Chrom 20 System with Flexware® Assemblies	Do not exceed 24 hours
		50 cycles (50 valve openings and 50 valve closings) per valve. The integrity of the installation may be compromised if used for more than 50 cycles.
	Valve Pads	Do not exceed 1200 cycles or six months.
Product Temperature Range		2 to 30° C
Maximum Pressure	Pump 1 Manifold	0 to 2 bar
	Pump Assembly	0 to 4 bar
	Pump 2 Manifold	0 to 2 bar
	Bubble Trap Assembly	0 to 4 bar
	Flexware® Clamshell Assembly	0 to 4 bar
	Precolumn Filter Assembly	0 to 4 bar
	Post Column Instrumentation Assembly	0 to 2 bar
	Precolumn Instrumentation Assembly	0 to 4 bar
	Column Assembly	0 to 4 bar
System Operating Temperature		20° C to 30° C
Operating Humidity		10 to 90% (non condensing)
Power Supply	Base	220-240VAC, 50/60 Hz, 1 phase, 3.9 A or 100–120VAC, 50/60 Hz, 1 phase, 8.4 A
		Maximum consumption 2.9 KW

Specification		Mobius® Chrom 20 System
Pneumatic Air Supply	Base	6 bar minimum, 10 bar maximum, oil free
		Maximum consumption 4 L/min

Instrument Specifications

Tags refer to the labels on the system hardware.

Mobius® Chrom 20 System with Flexware® Assemblies for Chromatography

Specification	Tag	Range/Setting/ Type/Accuracy	Process Connection
Pressure Indicators	PIT001 PIT002 PT003	0–4 bar +/-0.2 bar	Non-intrusive
High Pressure Switches	PSH001 PSH002	4.2 bar	Non-intrusive
Single-Use Flowmeters	FT001 FT002	+/-2% MV between 4 L/min and 20 L/min	In-line
Temperature Sensors	TE201	2–30° C +/-1° C	Combined with conductivity sensor
Single-use Conductivity Sensors	AE102 AE201A AE201B	Process: 0 to 100 mS/cm +/-2% FS Cleaning: 0–50 µS/cm +/-2% FS	In-line
pH Sensors	AE103 AE202	3-9 pH +/-0.1 pH	In-line
Air Sensors	XS001 XS002	N/A	Non intrusive
UV Sensors Do not use UV Sensors in a condensing atmosphere. Condensation may lead to erroneous sensor readings	AE203/204	AF45 : 0-3 Au +/-2% FS OPL: 1 or 2.5 mm Wavelength: 280 nm AF46 : 0-2 Au +/-2% FS OPL: 1 or 2.5 mm Wavelength: Dual (280/300 nm or 254/280 nm)	In-line

Automation Specifications

Specification		Mobius® Chrom 20 System
Control Platform	PLC	Allen Bradley Compact Logic
	Control software system	Windows® 10 Operating System
	Operator interface panel type	iFix® Software
Operator Interface		19 in. multi-touch screen

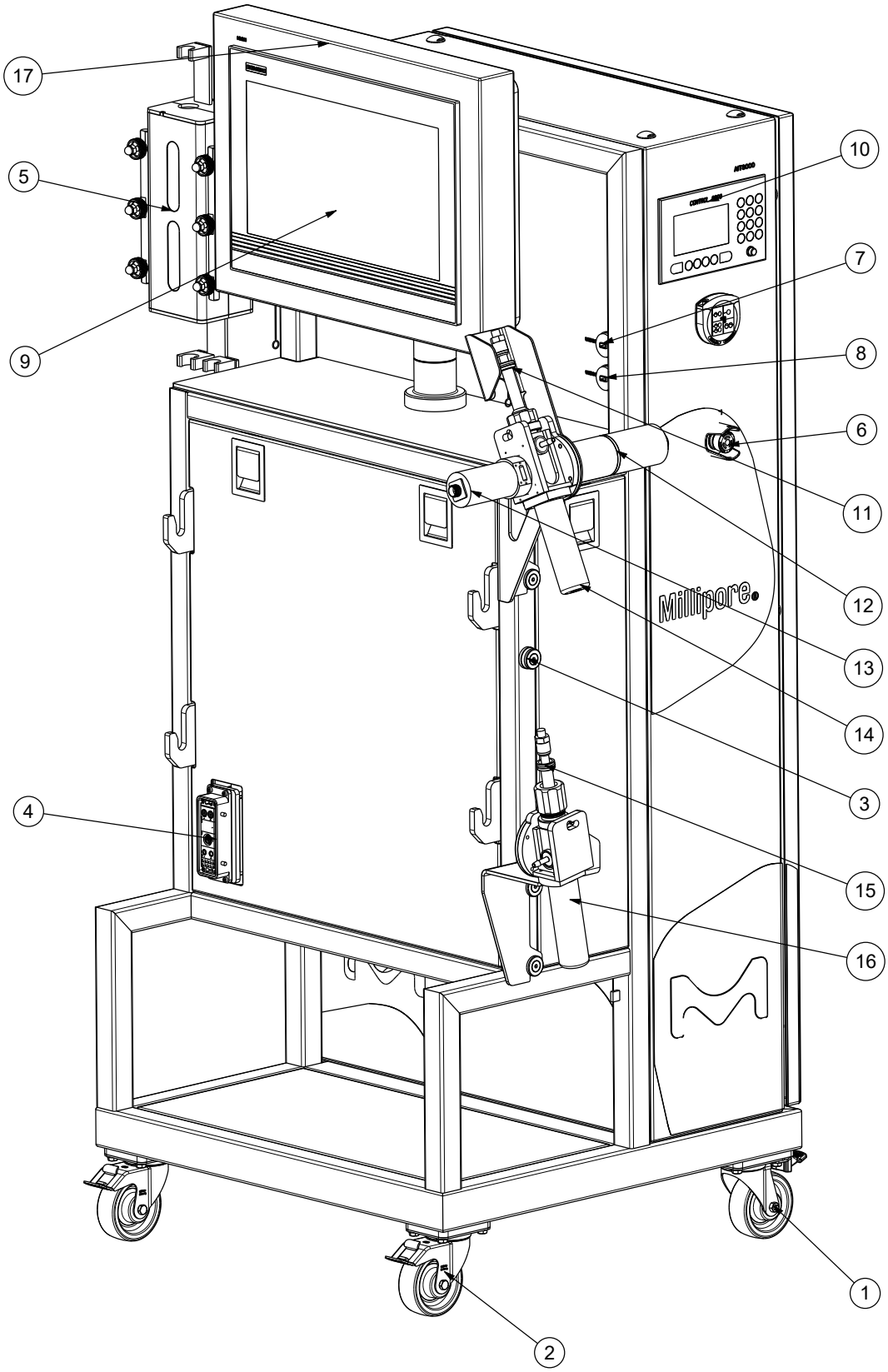
Storage Requirements

Parameter	Requirement
Temperature Range	2 to 30° C
Humidity Range	10 to 90%
Cleaning	Unit must be thoroughly cleaned prior to storage.
Flexware	Flexware kit must be stored at ambient temperature (20-30° C).

System Components

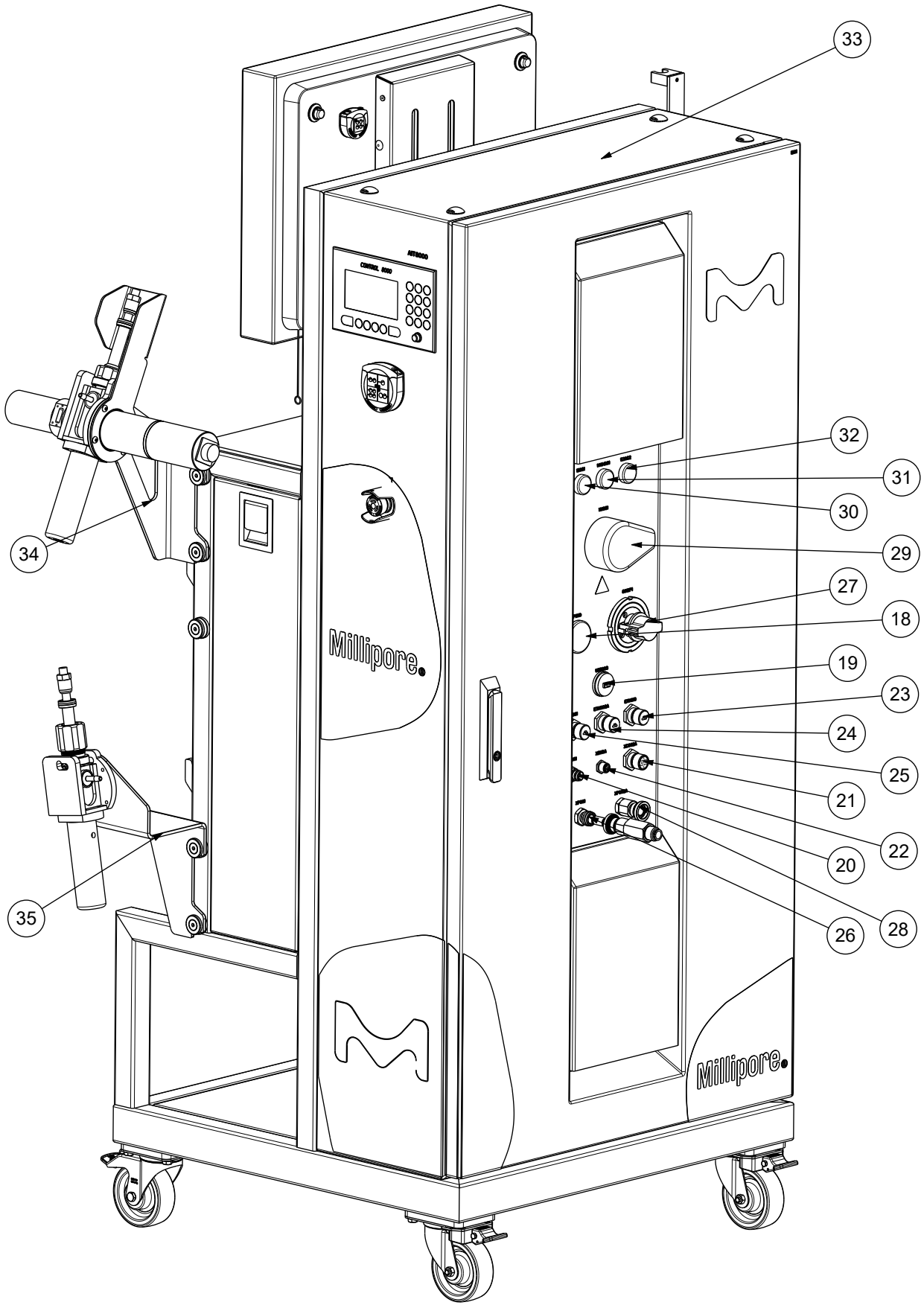
BASE WITH INSTRUMENTATION AND BUBBLE TRAP SUPPORT

Key Number	Tag (Labeled on the System)	Description
1	none	Fixed Wheel
2	none	Swivel Wheel with Lock
3	none	Column Instrumentation Mounting Pins
4	XC009	Flexware® Clamshell Assembly Power Connector
5	none	Bubble Trap Support
6	ES001	Emergency Stop
7	USB001	Mouse Port
8	USB002	Keyboard Port
9	HMI01	Touch Screen
10	AIT8000	Column Instrumentation Control
11	AE202	Post Column pH Sensor
12	AE203/2014-2	UV Lamp
13	AE203/204-1	UV Sensor
14	AE201/TE201	Post Column Conductivity and Temperature Sensor
15	AE103	Pre Column pH Sensor
16	AE102	Pre Column Conductivity
17	IB01	Control Box Access Panel



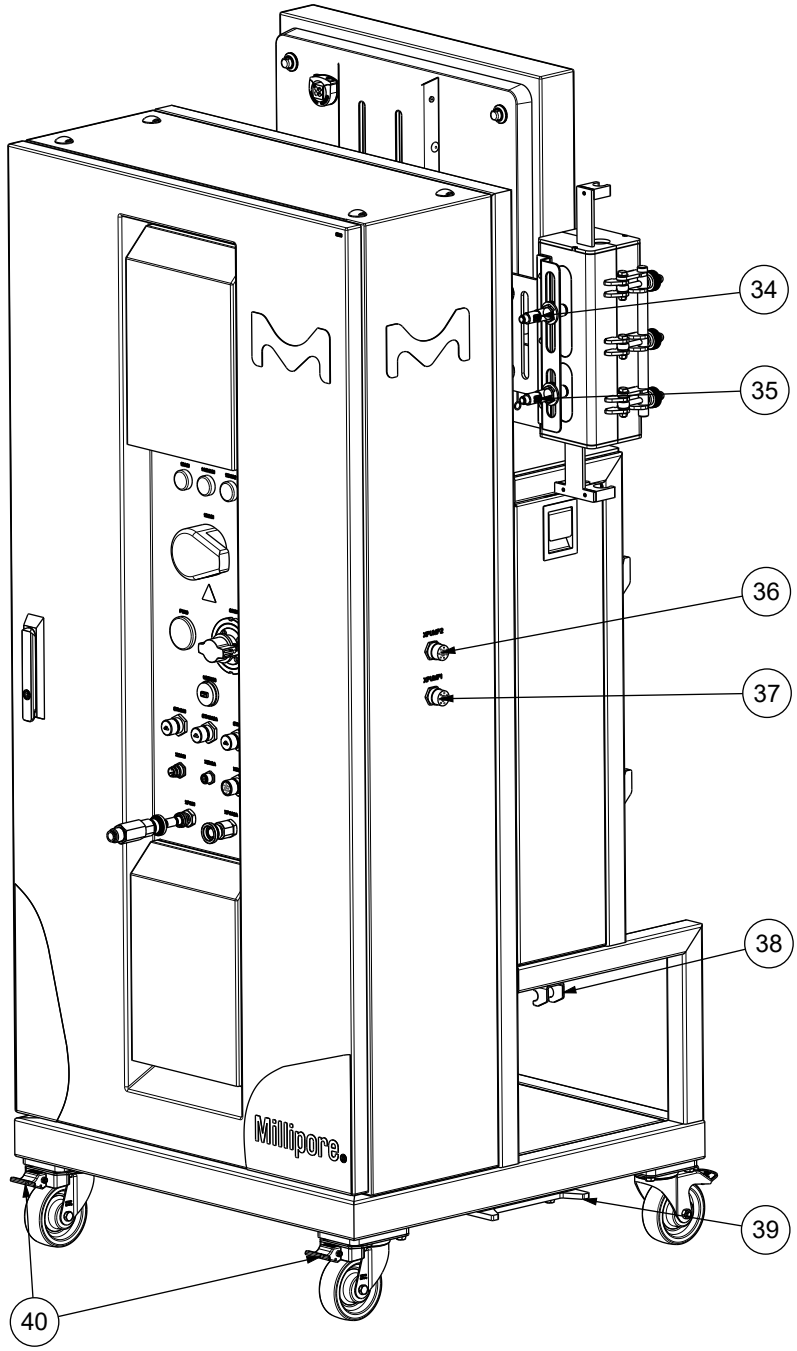
Mobius® Chromatography System Base (front view)

Key Number	Tag (Labeled on the System)	Description
18	PI010	System Air Pressure Gauge
19	USB003	Print Port
20	XC001	Electrical Power Connection
21	XC002A	Pump Base Electrical Connection
22	XBUSA	Murr Communication to Base
23	ETH010	Network Connection (connect to user domain, printers, security, etc.)
24	ETH002A	Tank Cart Ethernet Connection
25	ETH001	Ethernet Connection for PLC
26	XP001	Air Inlet Connection
27	8O1SP1	Pneumatic Switch
28	XP002A	Air outlet Connection for Manifold
29	101SG1	Electrical Power Switch
30	150S1	Reset Buzzer
31	140H001	Power On light
32	530S2	Acknowledge Alarms
33	MB01	Electrical Box
34	none	Holder Post Column Instrument
35	none	Holder Pre Column Instrument



Mobius® Chromatography System Base (rear right view)

Key Number	Tag (Labeled on the System)	Component
34	LSH001	Bubble Trap High Level Sensor
35	LSL002	Bubble Trap Low Level Sensor
36	XPUMP2	Pump 2 1200 Electrical Connection
37	XPUMP1	Pump 1 1200 Electrical Connection
38	None	Hook Inter Base Locking Device
39	None	Inter Base Centring
40	None	Wheel Directional Lock

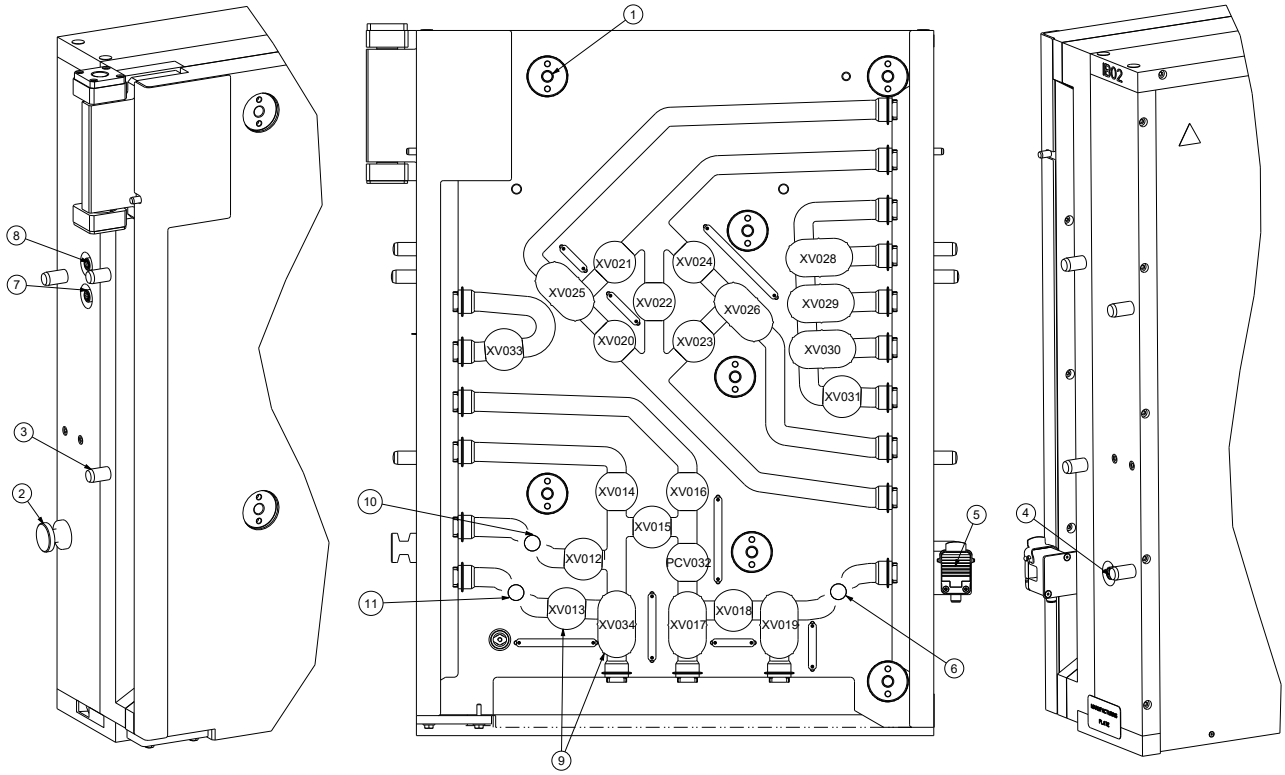


Mobius® Chromatography System Base (rear left view)

Flexware® Clamshell Assembly

Key Number	Tag (Labeled on the System)	Component
1	ZS001, ZS002, ZS003, ZS004, ZS005, ZS006, ZS007	Internal Lock with Sensor (7 places)
2	None	Centring Pin for Base Cart
3	None	Pin for Flexware® Clamshell Assembly Lift
4	XS002	Precolumn Bubble Sensor Connection
5	XS002	Precolumn Bubble Sensor
6	PT003	Precolumn Pressure Sensor
7	LSL017	Bubble Trap Low Level Sensor Connection
8	LSH016	Bubble Trap High Level Sensor Connection
9	None	Silicone Valve Pads
10	PIT/PSH 002	Pressure Switch Sensor
11	PIT/PSH 001	Pressure Switch Sensor
-	XV012	Normally Open Valve
-	XV013	Normally Open Valve
-	XV014	Normally Open Valve
-	XV015	Normally Closed Valve
-	XV016	Normally Open Valve
-	XV017	Normally Closed Valve
-	XV018	Normally Open Valve
-	XV019	Normally Closed Valve
-	XV020	Normally Closed Valve
-	XV021	Normally Closed Valve
-	XV022	Normally Open Valve
-	XV023	Normally Closed Valve
-	XV024	Normally Closed Valve
-	XV025	Normally Closed Valve
-	XV026	Normally Closed Valve
-	XV028	Normally Closed Valve
-	XV029	Normally Closed Valve

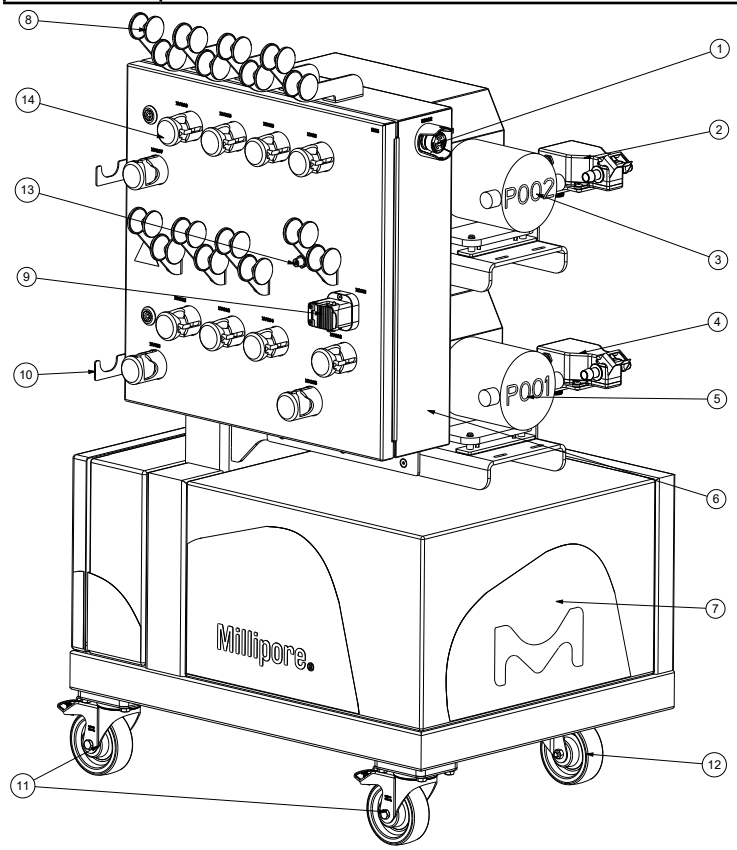
Key Number	Tag (Labeled on the System)	Component
-	XV030	Normally Closed Valve
-	XV031	Normally Open Valve
-	XV033	Normally Closed Valve
-	XV034	Normally Closed Valve
-	PCV032	Normally Open Control Valve



Mobius® Chromatography System Flexware® Clamshell Assembly

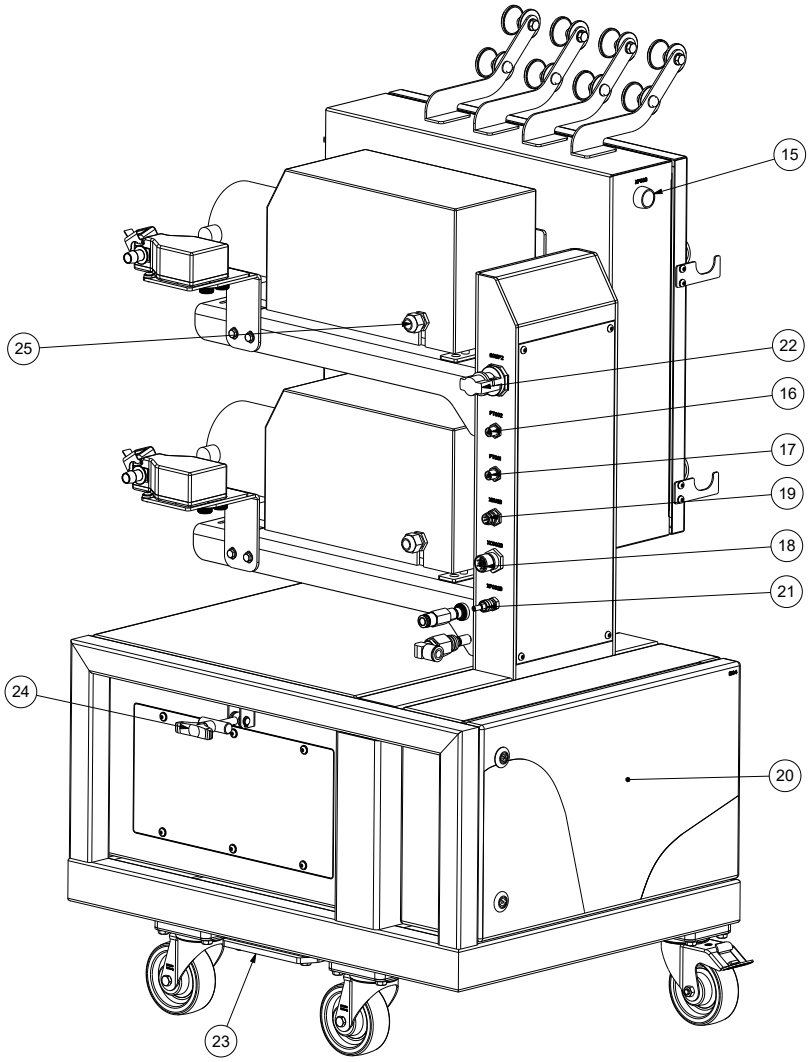
PUMP CART WITH MANIFOLD, PUMPS AND FLOWMETERS

Key Number	Tag (Labeled on the System)	Component
1	ES002	Emergency Stop
2	FT002	Flowmeter SU
3	P002	Pump P002 Support
4	FT001	Flowmeter SU
5	P001	Pump P001 Support
6	IB05	Manifold Box
7	None	M Box
8	None	Tubing Roller Guide
9	XS001	End Product Air Sensor
10	None	Flexware® Support
11	None	Swivel Wheel with Lock
12	None	Swivel Wheel
13	XS001	End Product Air Sensor Connection (Key No. 17)
14	XV001, XV002, XV003, XV004, XV005, XV006, XV007, XV008, XV009, XV010, XV011	Normally Closed Valves



Mobius® Chromatography Pump Cart with Manifold and Single-use Flowmeter (front left view)

Key Number	Tag (Labeled on the System)	Component
15	XP003	Emergency Release Button
16	FT002	Flowmeter Connector
17	FT001	Flowmeter Connector
18	XC002B	Electrical Connector
19	XBUSB	Murr Communication to Base
20	IB04	Pump Base Electrical Box
21	XP002B	Compressed Air Inlet (from Base)
22	801SP2	Pneumatic ON/OFF Switch
23	None	Pbase Centring
24	None	Inter Base Locking Device
25	None	Pump Alimentation Cable

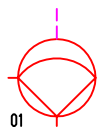


Mobius® Chromatography System Pump Cart with Manifold and Single-use Flowmeter (rear right view)

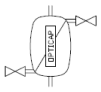
Piping and Instrumentation Diagram (P&ID) Legend

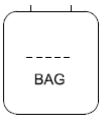
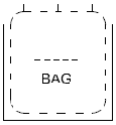
Tag (Labeled on the System)	Component
P	Pump
S	Pump Speed Variator
XV	Automatic Valve
PCV	Pressure Control Valve
PRV	Pressure Reducing Valve
T	Temperature Sensor + Function
P	Pressure Sensor + Function
L	Level Sensor
F	Flow Sensor
A	Analyzer
X	Digital

Tag (Labeled on the System)	Function
I	Indicator
C	Control
E	Element
T	Transmitter
L	Low Value
H	High Value
LL	Low Low Value
HH	High High Value
SH	Switch on High Value
SL	Switch on Low Value
Q	Totalizer

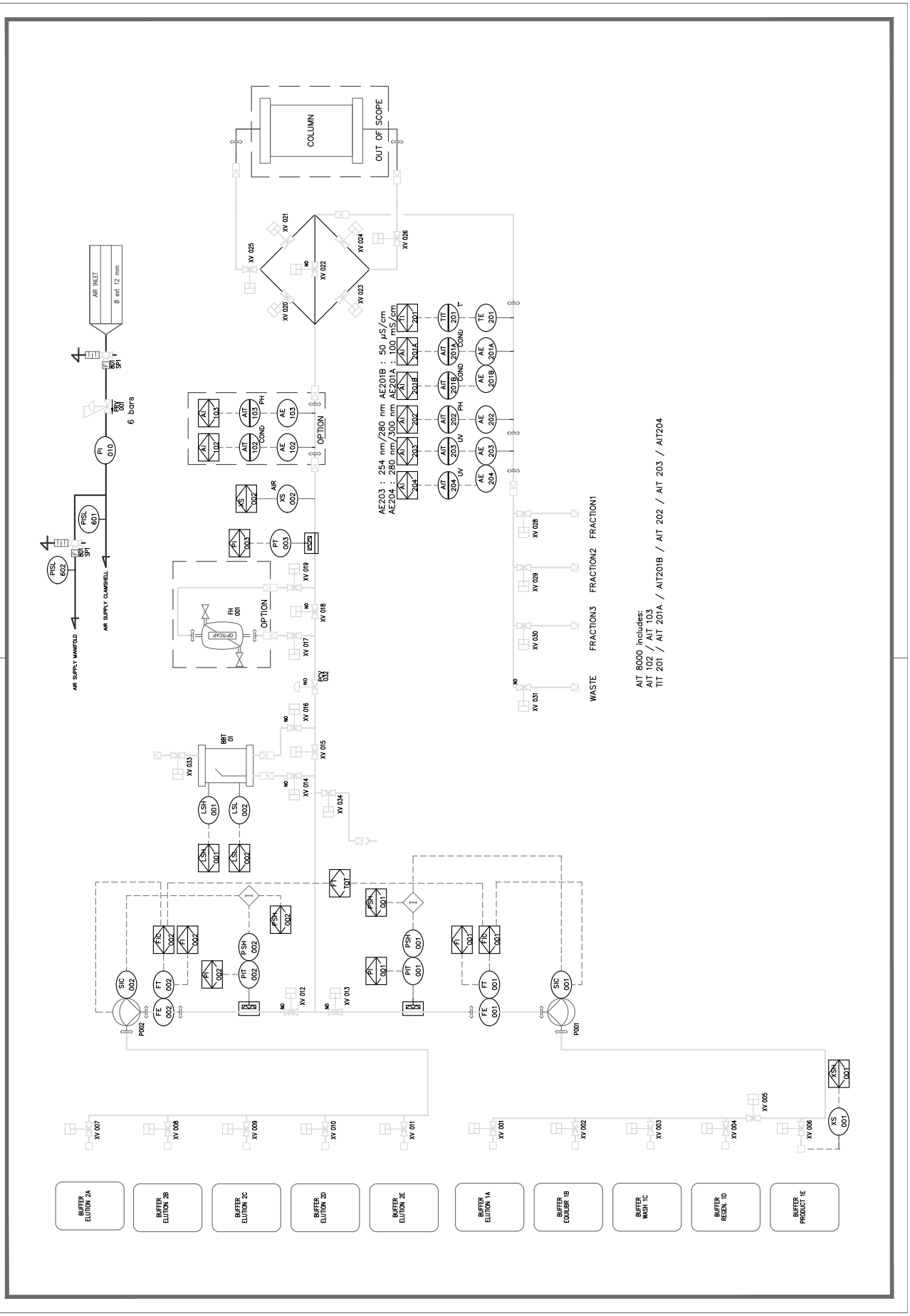
Symbol	Description
	Diaphragm Pump

Symbol	Description
	Sampling Port

Symbol	Description
	Mixer
	Millipak® Filter
	Opticap® Filter
	Pellicon® Holder R=Retentate Port, F=Feed Port, P=Permeate (High Port), PD=Permeate Drain
	HB Connector
	TC Connector
	Low Dead Volume Connector
	Male MPC Connector
	Female MPC Connector

Symbol	Description
	Plug
	Pinch Clamp (valve identification tags for P&ID reference only)
	Control Valve
	Normally Open On/Off Valve
	2D Container
	3D Container
	Plastic Holder (for 2D or 3D Containers)
	Interlock Logical Symbol
	OR Logical Symbol
	AND Logical Symbol

Mobius® System Piping and Instrumentation Diagram (P&ID)


COLUMN
OUT OF SCOPE
AIR INLET
6 bars
OPTION
AIR SUPPLY MANIFOLD
AIR SUPPLY CLAMSHELL
AE203 : 254 nm/280 nm AE201B : 50 µS/cm
AE204 : 280 nm/300 nm AE201A : 100 mS/cm
FRACTION1
FRACTION2
FRACTION3
WASTE
AIT 8000 includes:
AIT 102 / AIT 103
TIT 201 / AIT 201A / AIT201B / AIT 202 / AIT 203 / AIT204
BUFFER ELUTION 2A
BUFFER ELUTION 2B
BUFFER ELUTION 2C
BUFFER ELUTION 2D
BUFFER ELUTION 2E
BUFFER ELUTION 1A
BUFFER EQUILIBR 1B
BUFFER WASH 1C
BUFFER REGEN 1D
BUFFER PRODUCT 1E

Assembling and Setting Up the Hardware

Introduction

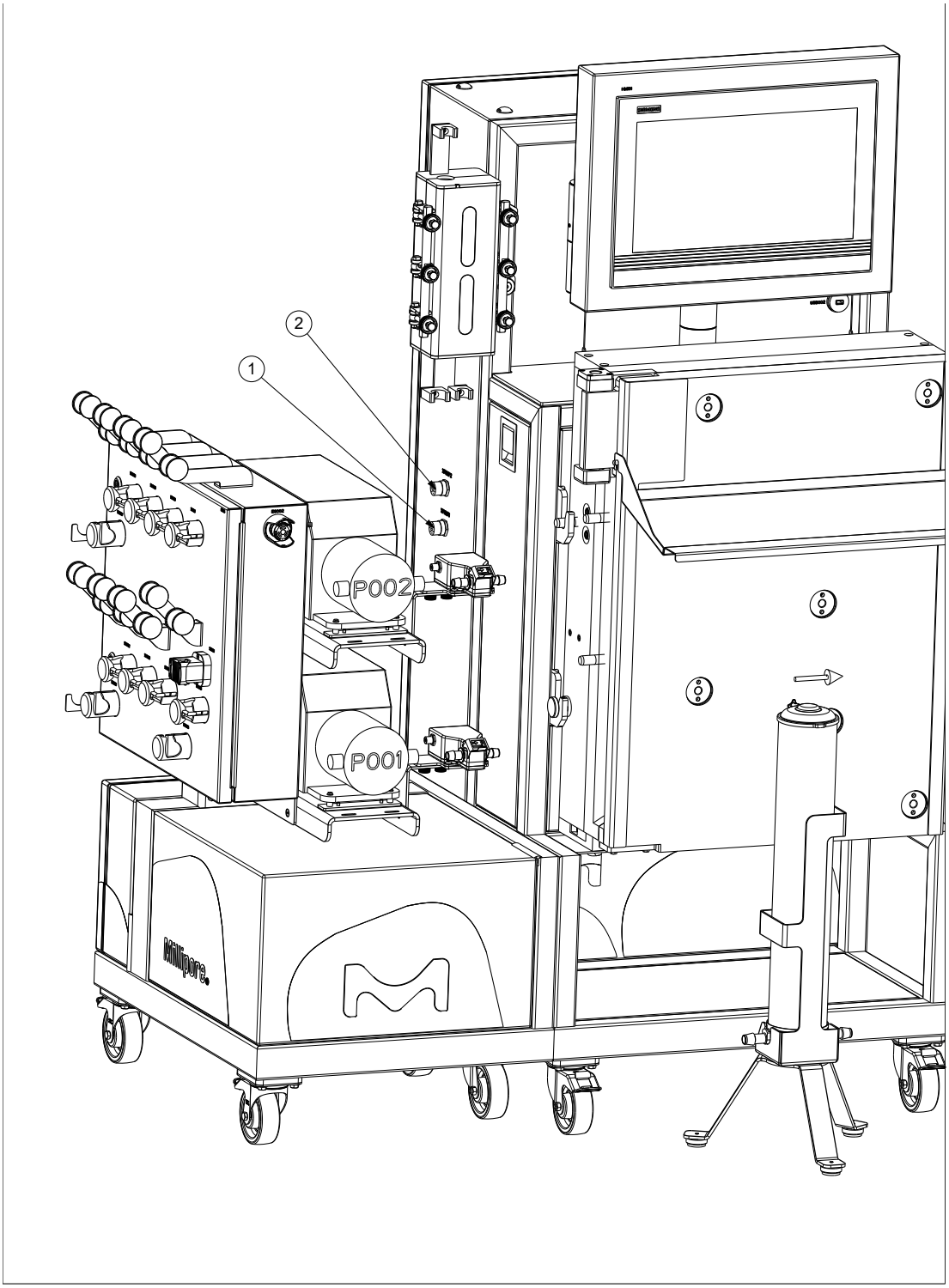
The Mobius® Chrom 20 System with Flexware® Assemblies is a modular system that includes the pump cart with the manifold and the base. Assemble and connect the bases in the order presented in this chapter.

Note Before installation of the system ensure that the area is free of any objects and there is enough space to install the system.

Floor must be levelling (less than 2% slope)

Assembling the Pump Cart

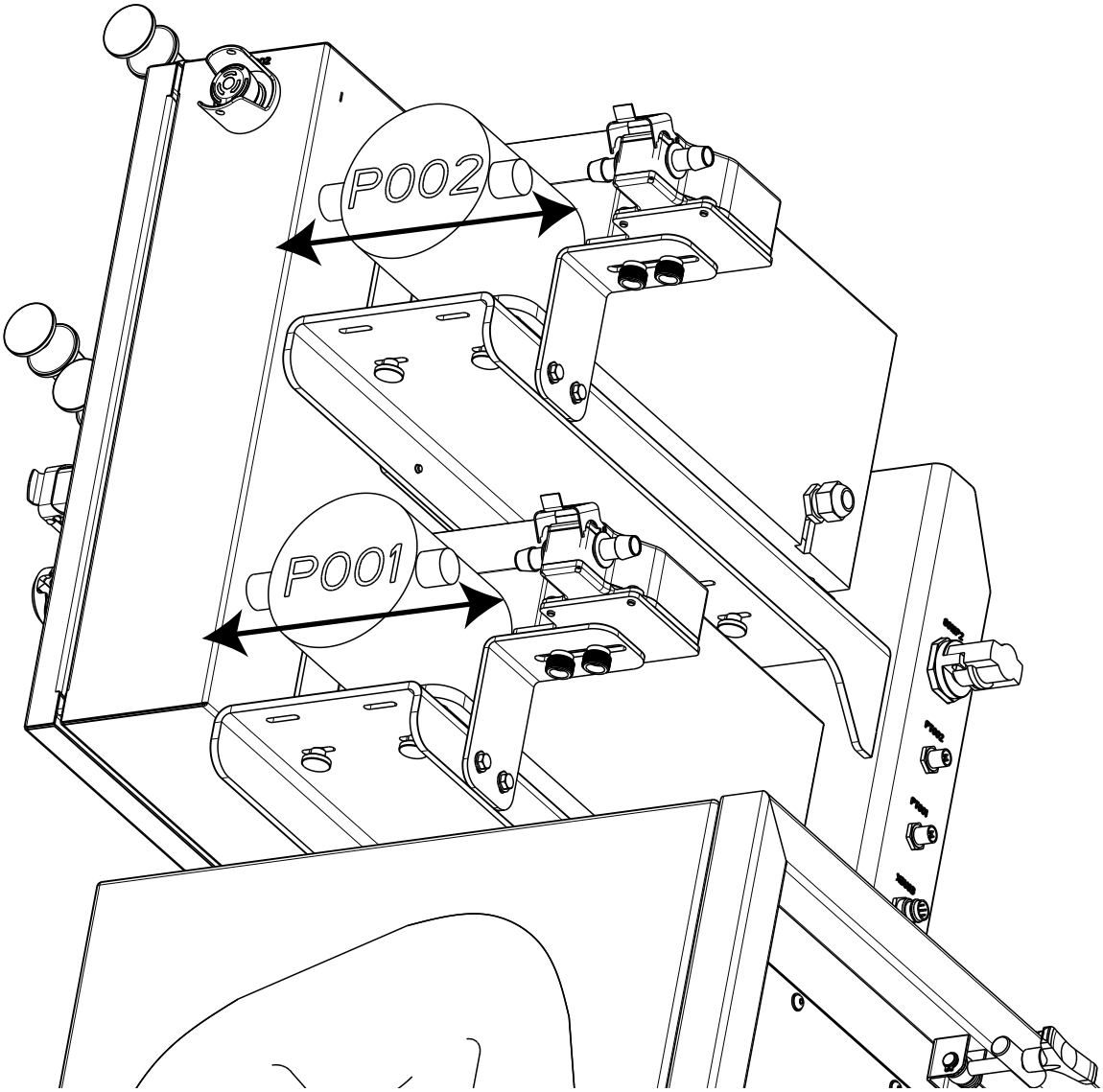
Connecting the Pumps



1. Unpack P001 pump cable and connect it to connector P001 on the base cart
2. Unpack P002 pump cable and connect it to connector P002 on the base cart

Sliding the Pumps

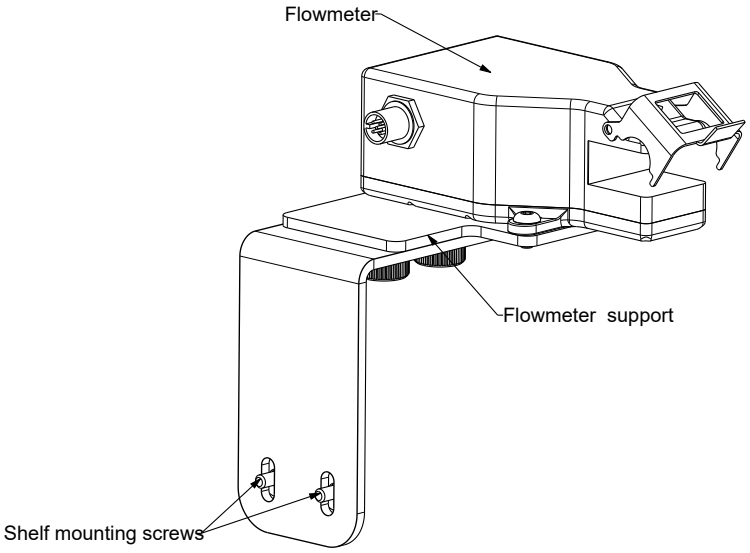
1. Loose P001/P002 pump front and rear screws
2. Adjust P001/P002 pump position by sliding to left or right
3. Tighten P001/P002 pump front and rear screws



Connecting the Flowmeters

Installing the Single-use Flowmeters

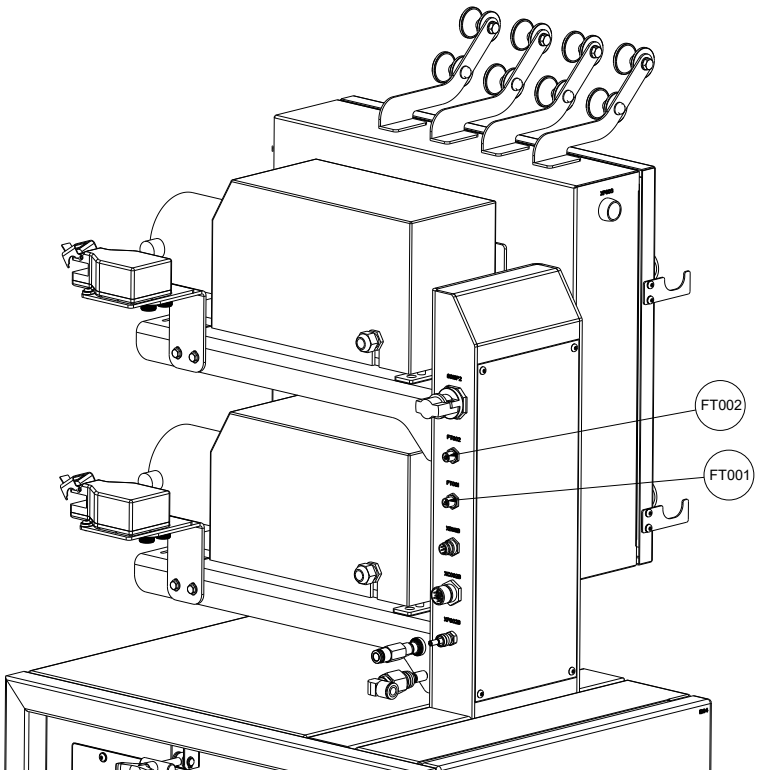
1. Install the flowmeter supports onto the pump support with the screws and nuts on the flowmeter support, using a no. 6 socket wrench.



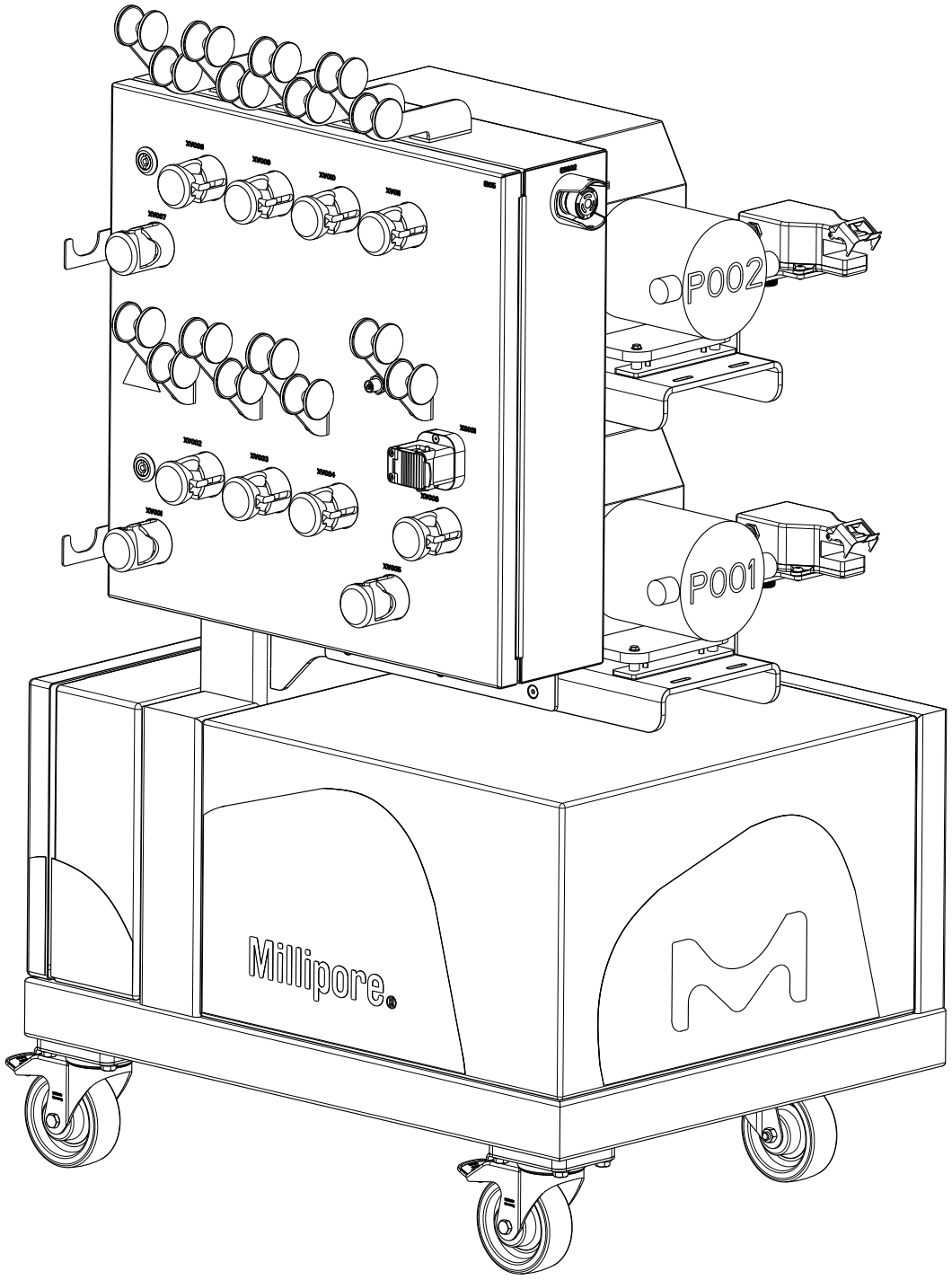
2. Install the flowmeter FT002 onto the flowmeter support located on the P002 pump support. Install the flowmeter FT001 onto the flowmeter support located on the P001 pump support.

3. Connect the flowmeters to the electrical connections on the rear of the pump base (P001 flowmeter on FT001 / P002 flowmeter on FT002).

4. Each time a new flowmeter is installed, enter the Qmax value (displayed on the label of the flowmeter) in the maintenance faceplate (see Entering the QMax Factor).



Flowmeter Transmitter Connections

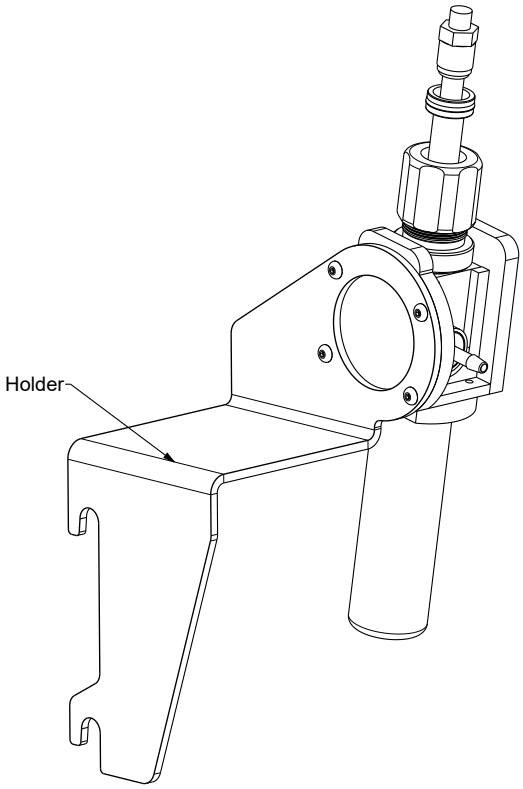


Assembled Pump Cart with Single-use Flowmeters

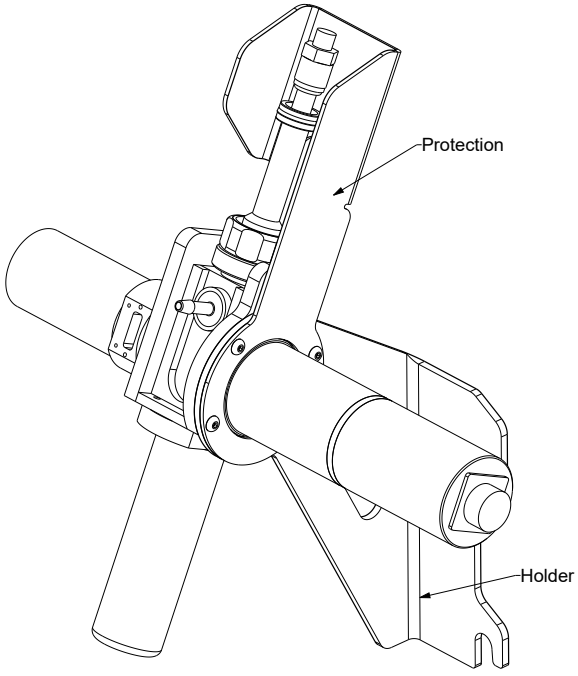
Assembling the Base

Installing the Instrument Holders

Single-use instruments require different holders. The appropriate holder must be hooked on the top and bottom of the base side panel.



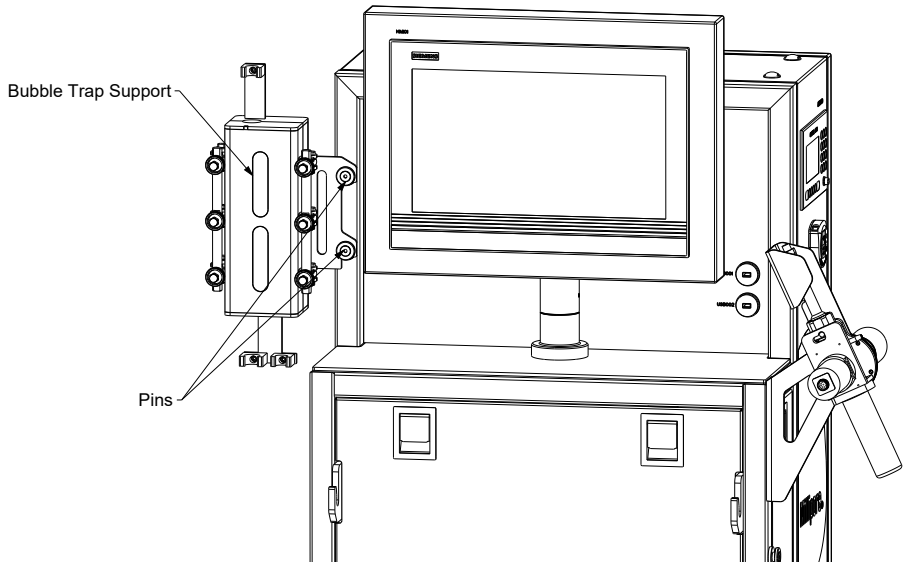
Pre-column Single-use Instrumentation with Holder



Post-column Single Use Instrumentation with holder

Installing the Bubble Trap (BBT) Support

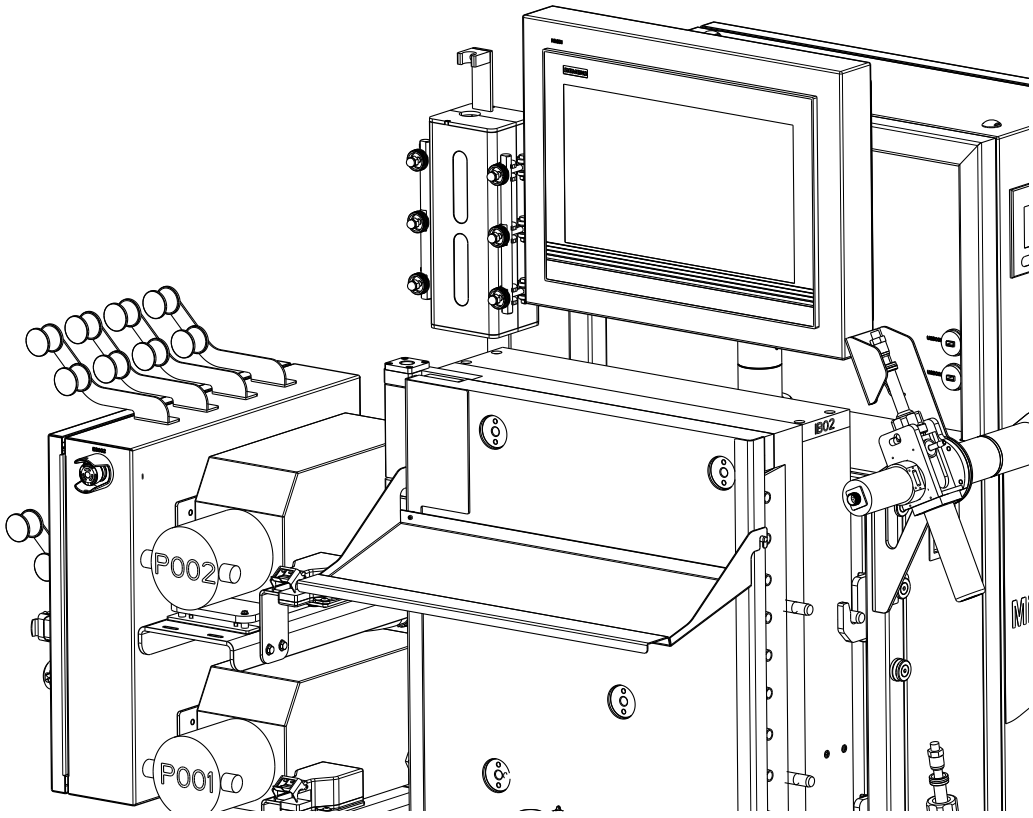
1. Hook the Bubble Trap Support (BBT001 support) onto the pins located on the left side of the Base.



Installing the BBT Support on the Base

Installing the Keyboard Holder

Hook the keyboard holder onto the pin located on both sides of the Flexware® Clamshell Assembly.

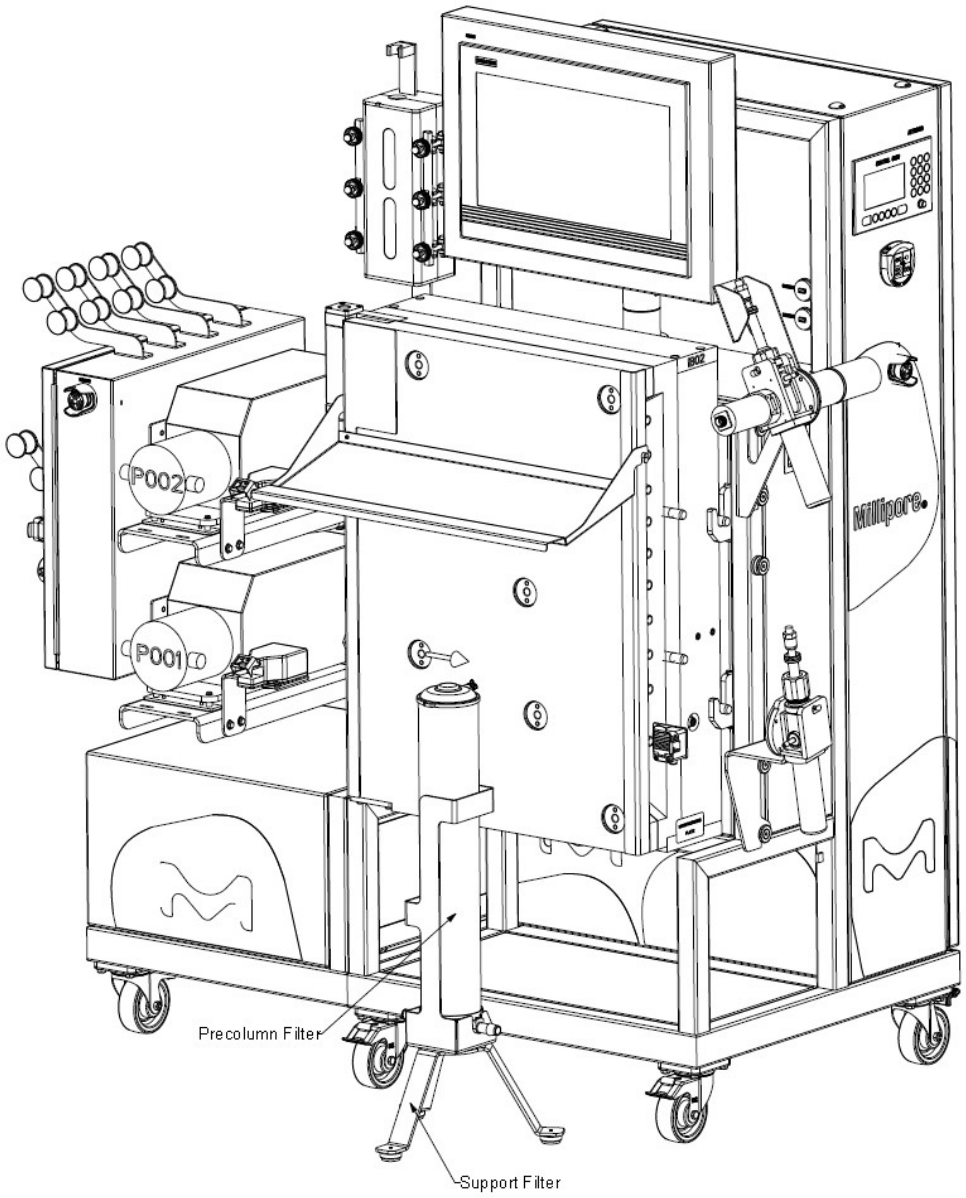


Installing the Keyboard Holder

Installing the Pre-column Filter Support

Filter Support Location

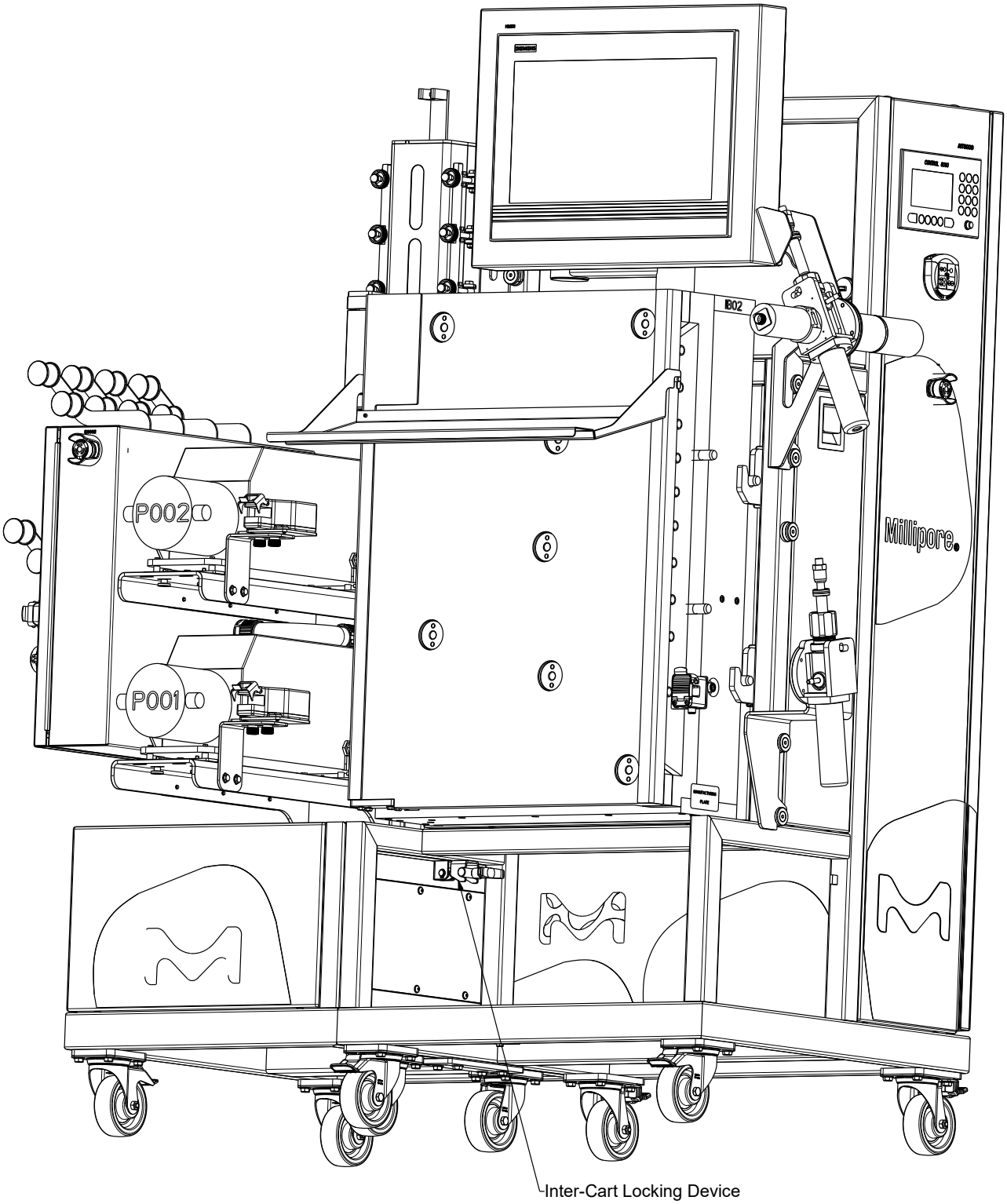
1. Place the pre-column filter support on the floor.



Pre-column Filter Support

Connecting the Cart

To connect the two cart, position the base and lock the wheels. Push the pump cart towards the base until the inter-base locks slide together and engage. Turn the thumbscrews on the lock clockwise to tighten. Lock the pump base wheels.

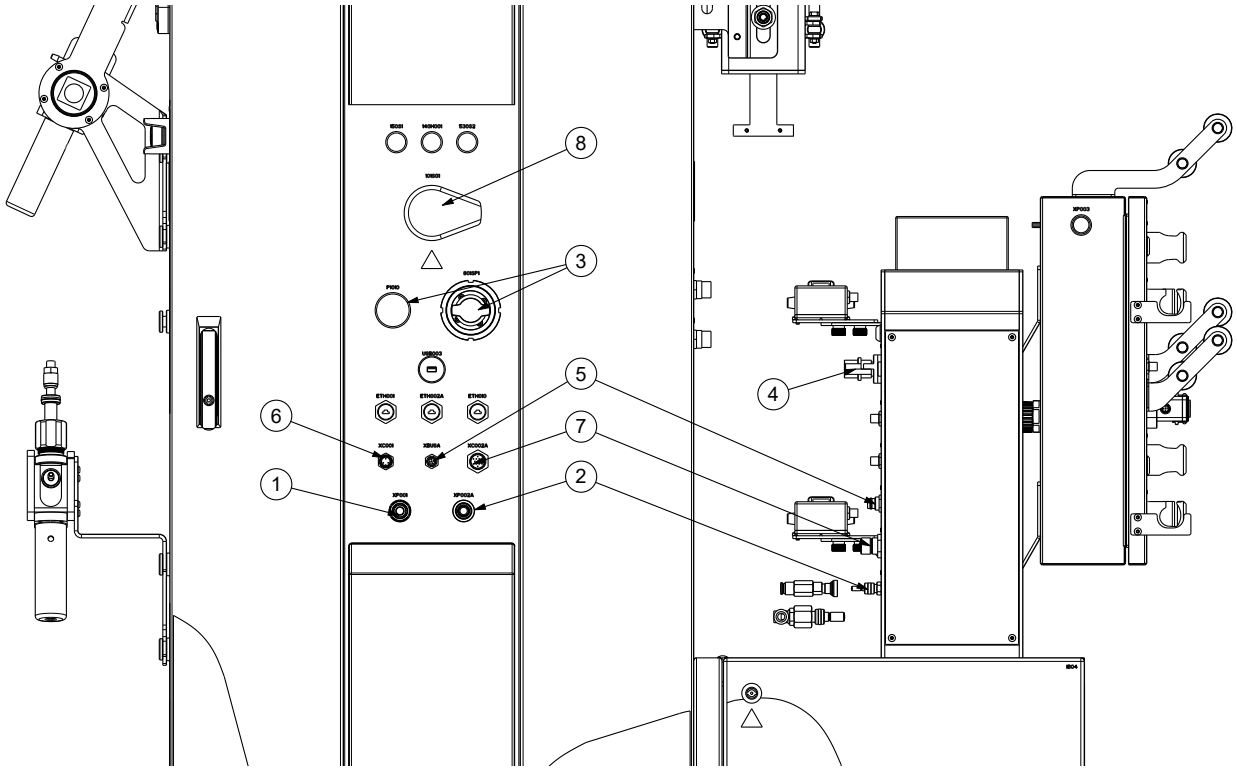


Connecting the Pump Cart with the Base

Connecting to Power, Pneumatic and Ethernet Sources

1. Connect XP001 on the base to an appropriate compressed air source with ≥ 6 bar pressure.
2. Connect XP002A on the base to XP002B on the pump base.
3. Turn 801SP1 on the rear of the Base ON. Pressure Sensor PI010 should indicate a pressure ≥ 6 bar.
4. Turn 801SP2 on the pump base ON.
5. Connect XBUSA on the base to XBUSB on the pump base.
6. Connect XC001 on the base to the external power supply.
7. Connect XC002A on the base to XC002B on the pump base.
8. Turn the main power switch 101SG1 ON.

The following drawing shows the utilities connections for the system.



Utilities Connections

Power Up

Check that emergency stop button is unlocked.

Turn the power supply switch to “ON” position on main electrical box MB01. The power indicator should light up.

Supervision screen, PC and PLC should then be under power. PC should start loading programs. Application launches automatically.

From main screen touch the “user” icon (see below), touch “login” icon and enter the name of the user with corresponding password.

Push the “reset emergency stop” button on the rear of the system to power up the process.

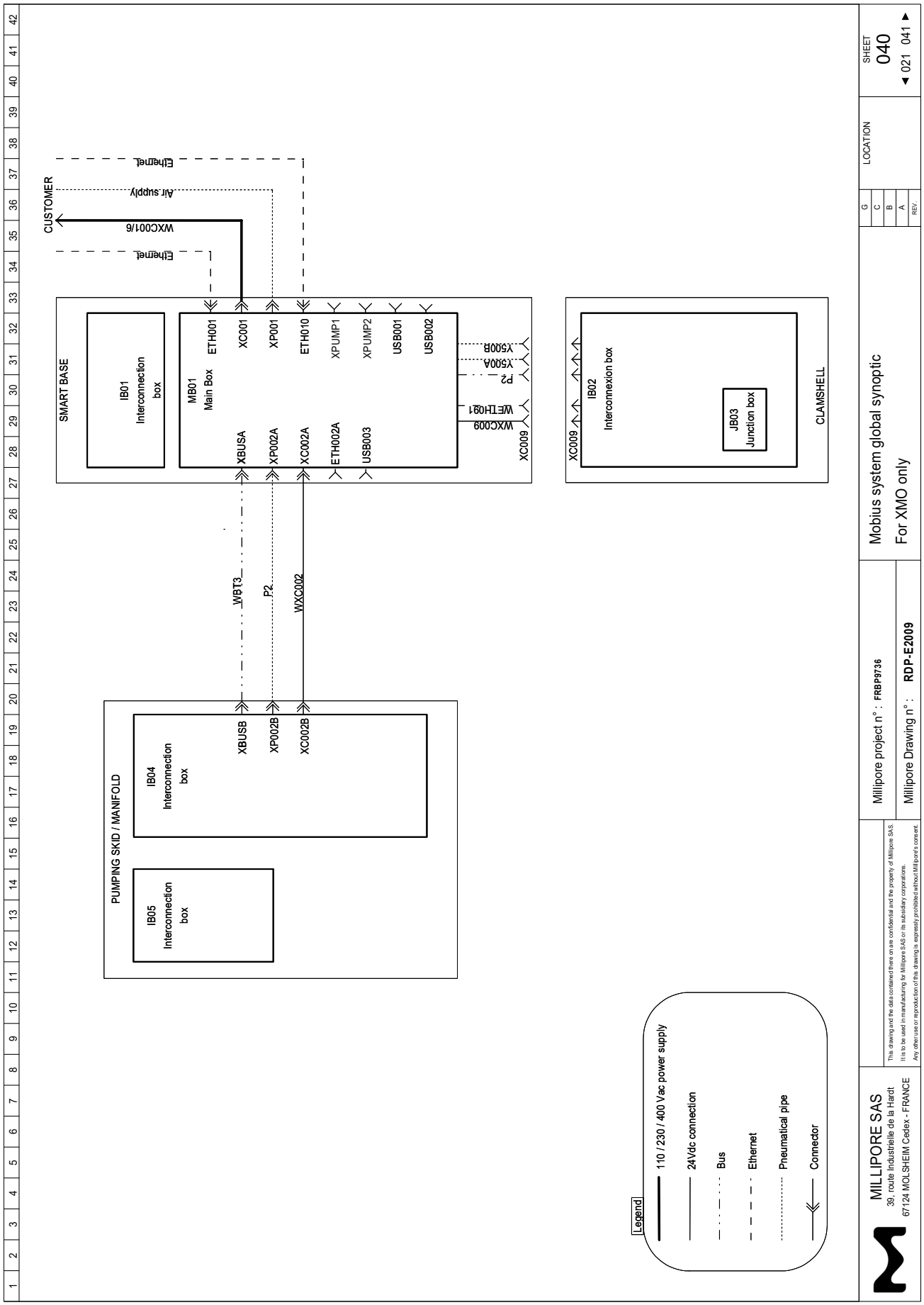
Acknowledge all alarms by clicking on the OK button at the right of the alarm banner.

System is ready.

Shut Down

From main screen touch “user” icon (see below) and select shut down windows.

After the screen is off, turn the power supply switch to the “OFF” position. The blue light and the white lights should turn off.


CUSTOMER
Ethernet
Air supply
WXC001/6
Ethernet
SMART BASE
IB01 Interconnection box
MB01 Main Box
ETH001
XC001
XP001
ETH010
XPUMP1
XPUMP2
USB001
USB002
XBUSA
XP002A
XC002A
ETH002A
USB003
XC009
WXC009
WETH001
P2
Y500A
Y500B
WBT3
P2
WXC002
PUMPING SKID / MANIFOLD
IB04 Interconnection box
IB05 Interconnection box
XBUSB
XP002B
XC002B
XC009
IB02 Interconnexion box
JB03 Junction box
CLAMSHELL
Legend
110 / 230 / 400 Vac power supply
24Vdc connection
Bus
Ethernet
Pneumatical pipe
Connector
MILLIPORE SAS
39, route Industrielle de la Hardt
67124 MOLSHEIM Cedex - FRANCE
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Installing the Flexware® Clamshell Assembly

The base is delivered with one Flexware® Clamshell Assembly installed. The Flexware® Clamshell Assembly can be removed and replaced with a different unit if required. Install and connect the Flexware® Clamshell Assembly in the order presented in this guide.

All Flexware® Assemblies must be removed from the Flexware® Clamshell Assembly before loading and unloading it onto the system.

The Flexware® Clamshell Assembly is heavy (approximately 115 kg). Use the Flexware® Clamshell Assembly lift to move the Flexware® Clamshell Assembly. If the lift is not used, follow local regulations regarding lifting limits.

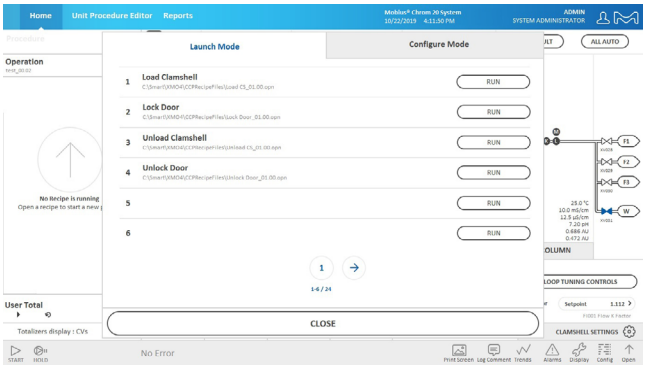
Note The system must be connected to both power and compressed air to remove or install the Flexware® Clamshell Assembly.

Removing the Flexware® Clamshell Assembly in a Base

Refer to the Common Control Platform® Overview section of this manual for instructions on logging in to the system and navigating through the screens.

1. After logging on to the system, select the Recipe Pool icon.

2. The Recipe Pool Launch Mode screen will appear. Select the Unload the Flexware® Clamshell Assembly recipe.



3. Follow the instructions on the system, disconnect everything from the Flexware® Clamshell Assembly and remove the Flexware® Clamshell Assembly from the Base.

4. Once the Flexware® Clamshell Assembly is removed and the recipe completed, install the new one following the directions in the Install the Flexware® Clamshell Assembly into an Empty Base section.

Installing the Flexware® Clamshell Assembly into an Empty Base

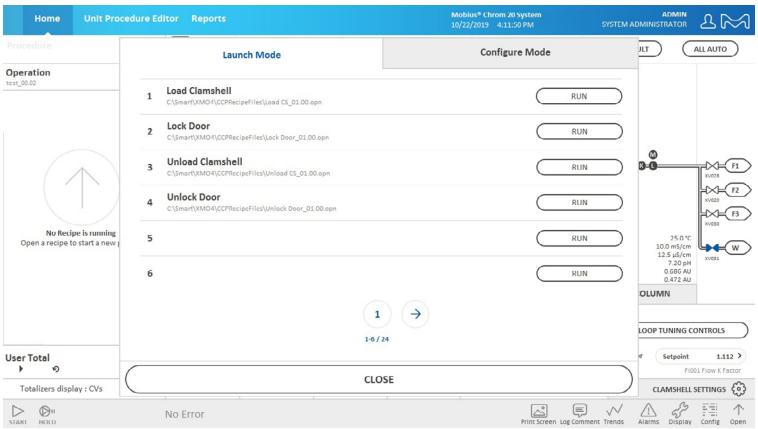
The base and the pump cart must be fully assembled, locked together and connected to an appropriate power and compressed air sources before proceeding. Remove the plug on the Flexware® Clamshell Assembly power cord before installing the Flexware® Clamshell Assembly into the Base.

Refer to the Common Control Platform® Overview section of this manual for instructions on logging in to the system and navigating through the screens.

1. After logging on to the system, select the Recipe Pool icon.

Note If the system is in HOLD state due to the YA08 critical alarm (Node 1 Communication Failure Alarm), disable the YA08 alarm and acknowledge alarms (button OK) to resume the HOLD state and start the recipe.

2. The Recipe Pool Launch Mode screen will appear. Select the Load Flexware® Clamshell Assembly recipe.



3. Follow the instructions pop up, install the Flexware® Clamshell Assembly into the base.

4. Once the Flexware® Clamshell Assembly is installed, follow the instructions on the system.

5. Turn the system off by closing the CCP® 6 application, closing the Windows® application and powering down the CPU down.

Connecting Bubble Trap to the Flexware® Clamshell Assembly

Connect the sensors LSL002 and LSH001 on the bubble trap support to the LSL002 and LSH001 connectors on the Flexware® Clamshell Assembly. The height of the sensor should be adjusted during the system start up.

Power Up the System

Once the Flexware® Clamshell Assembly in installed into the Base, and all the connections are made, restart the system.

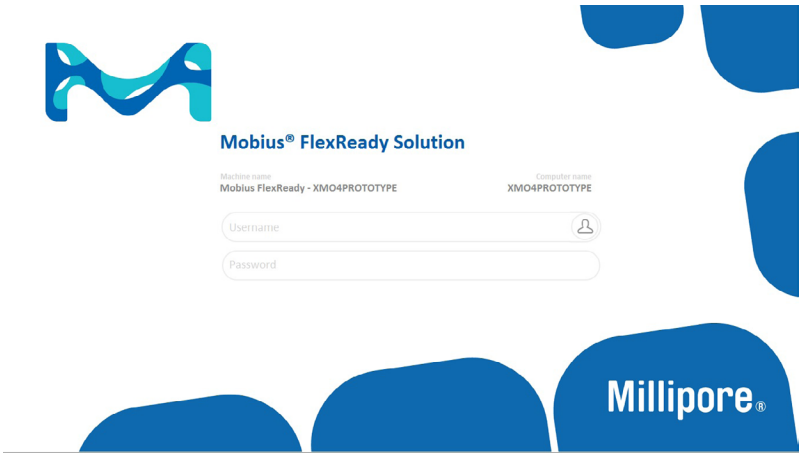
Using the Common Control Platform® Software

Starting the System

This system is for industrial use only and cannot be used in a residential environment.

Once the system is installed, power up the system. Powering up the system starts up the Common Control Platform® (CCP®) software. The Startup login prompt displays after the system has completed the start-up process.

Note Restart the system at least once every 30 days to ensure top performance.



Log into the User Interface by entering a username and password at the Login Prompt.

Every user should have a unique login name and password assigned to them by the system administrator. Enter the username and password and click the Login button.

If the login fails, the “Unknown user name or bad password” message will appear.

If an attempt is made to gain access to the user interface with unauthorized login information, an unauthorized access message will appear.

After logging in, the login prompt closes and the process display opens.

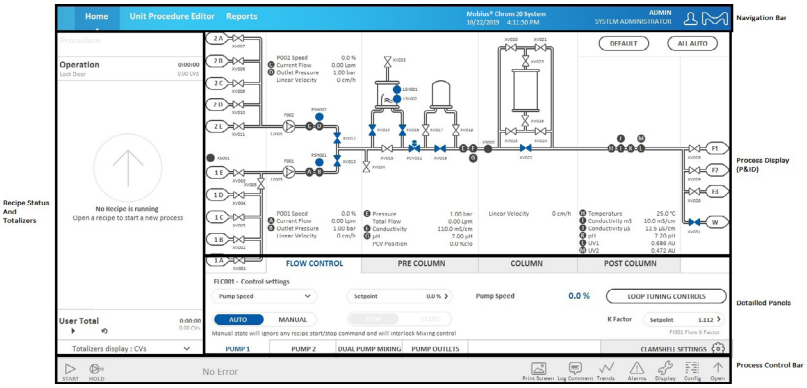
Note If login at startup has been disabled from the system settings screen, then this login prompt does not appear and Process display opens directly instead.

User Interface

The user interface includes a tool bar, piping and instrumentation diagram (P&ID) and various user selectable status displays. The user must have the appropriate security privileges to open certain displays.

There are five main sections of the User Interface:

- The Navigation Bar
- The Process Display (P&ID)
- The Detailed Panels
- The Process Controls Bar
- The Recipe Status and Totalizers Display



The user interface will reflect the options installed on the system.

Note Recipe Editor and Unit Procedure Editor refer to the same function. Both names are used in the system software.

Navigation Bar

Navigation bars organizes the controls as shown in the following table. The buttons on the tool bars carry out specific actions. Click on the desired tool bar button to perform the action.

Button	Description
Home	No action
Unit Procedure Editor	Opens the Recipe Editor to edit operations and procedures.
Reports	Opens the Reports Editor to edit reports.
Mobius® Chrom 20 System 10/22/2019 4:11:50 PM	Opens the System Information popup.
ADMIN SYSTEM ADMINISTRATOR	Displays the user ID and group account.
	Opens the User settings window.

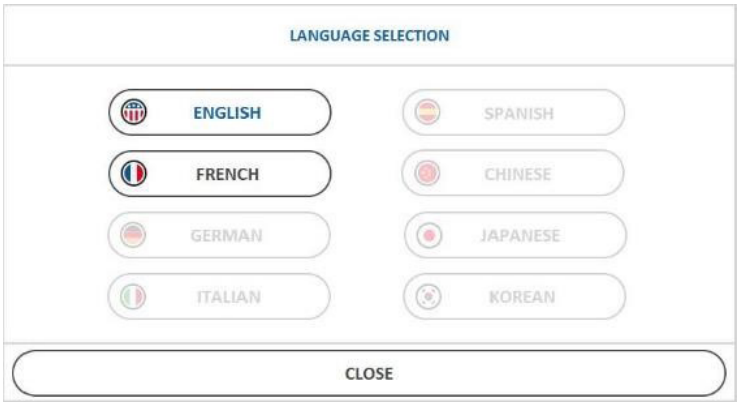
Touch the USER icon  to access the following options (list of available buttons depends on user access rights):

Button	Description
HELP	Opens the on-line user manual.
SWITCH USER	Opens login screen. When the no user is connected, the text of this button is « login »
LOGOUT	Logs current user out of system.
CHANGE PASSWORD	Opens change password window.
LANGUAGE	Allows different language selection. The text of the User Interface, Recipe Editor and Report Client changes to the selected language.
SYSTEM SETTINGS	Opens System Settings Window.
CLOSE APPLICATION	Closes the current application.
SHUTDOWN WINDOWS	Closes Windows application.

Changing the Language

Languages other than English may be specified when a system is ordered.

The Change Language icon in the USER MENU opens the Language Selection screen. There are eight different language options. When the language is changed, the texts of interface at User Interface, Recipe Editor and Report Client will all be changed to the selected language.



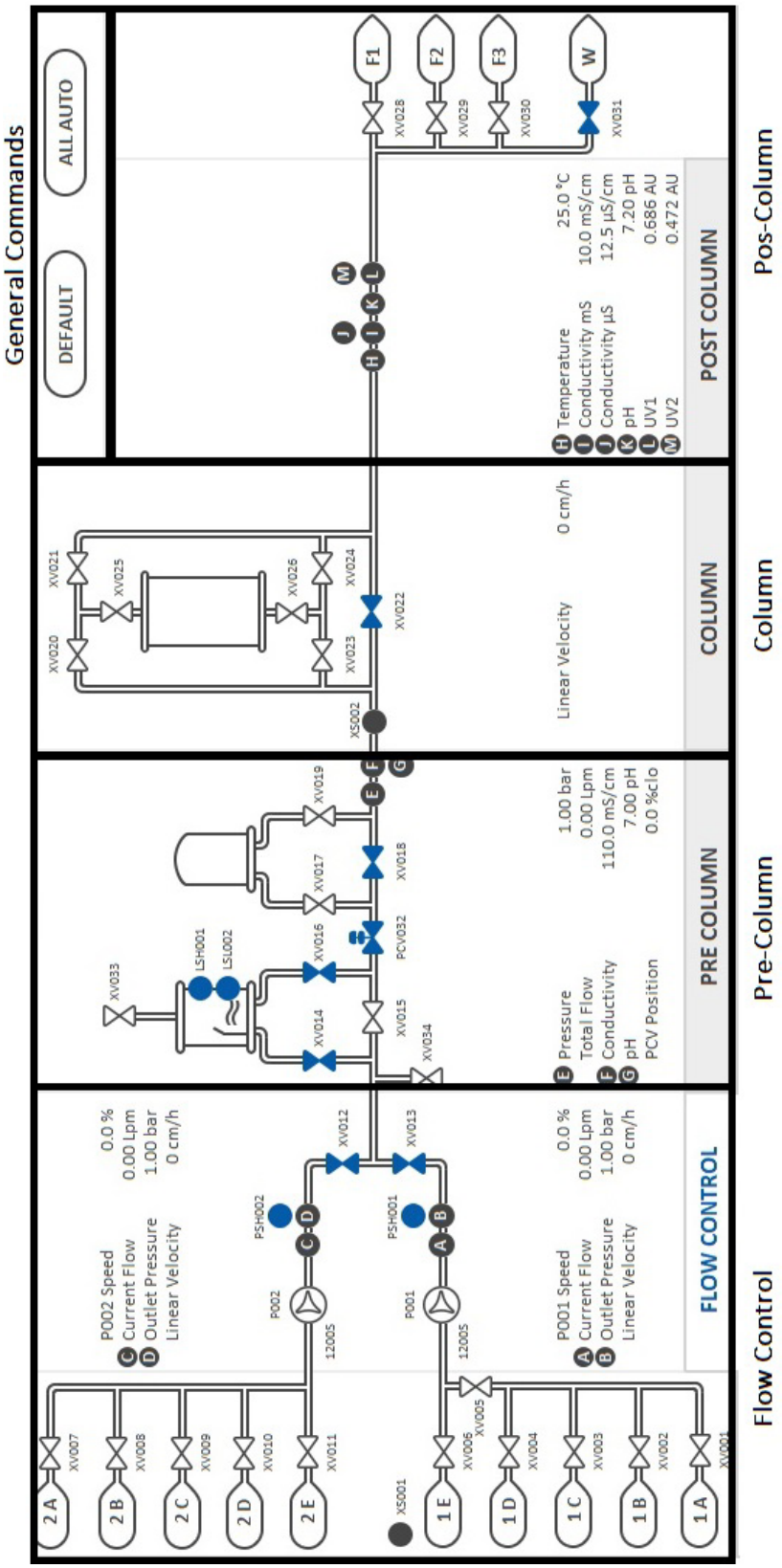
Only one non-English language is set up as a primary language. When the primary language is chosen, both the interface texts and the Batch Report content can be in the primary language. This allows a Batch Report to be printed in both the primary language and English. The primary language is specified when the software is installed.

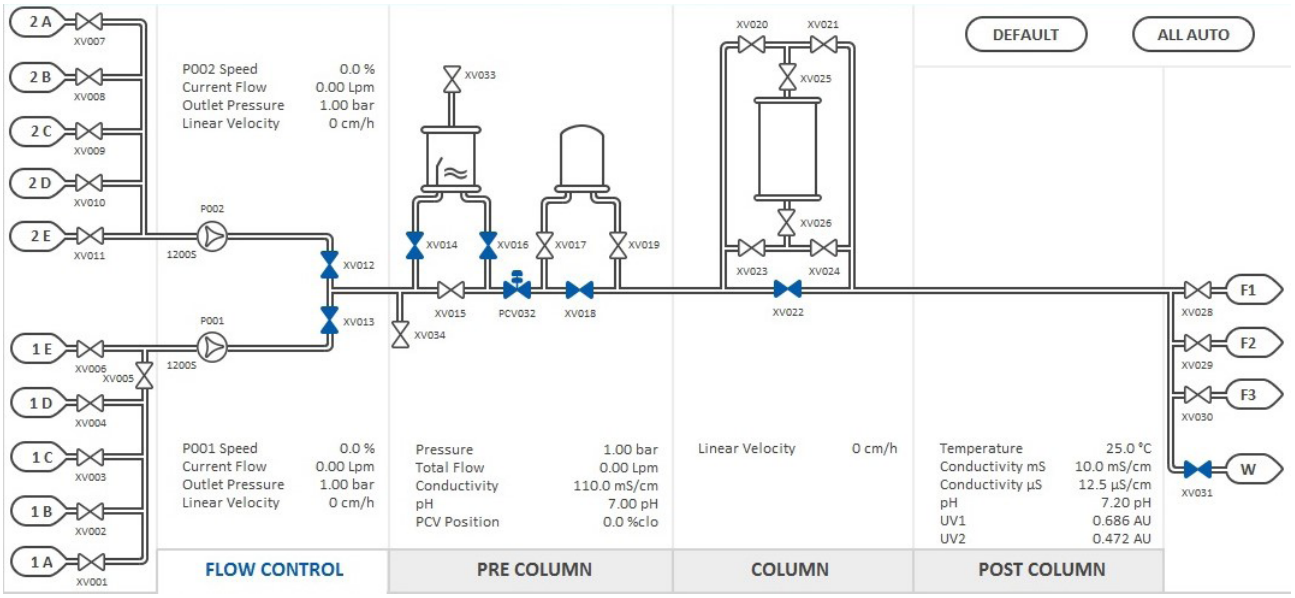
Note The system will not translate the Batch Report into any language other than English and the primary language.

Process Display (P&ID)

The P&ID screen dynamically displays all process conditions, analog and digital values and pump status.

Thanks to the display setup screen, it is possible to choose whether to show sensor tags or labels as well as displaying sensor locations.





Button	Description
DEFAULT	Set the system to its default state (confirmation required). The default state includes control of valves and flow path: • Pump off • All manifold inlets closed • Bubble trap online • Filter bypassed • Column bypassed • Waste outlet on-line • All other fractions closed • Valves in the manual control state, remain manually controlled The Pressure Control Valve (PCV032) is NOT affected by the Default button.
ALL AUTO	Set all system equipment (valves and pumps) to their auto mode and to the state defined by the recipe, undoing any manual changes.

Piping

Symbol	Description
	Closed Pipe
	Open Pipe
	Open Pipe with Flow

Digital 2-way Valves

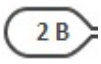
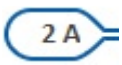
Clicking on a digital 2-way valve symbol opens its control popup.

Auto Mode Symbol	Manual Mode Symbol	Description
		Closed Valve
		Open Valve

Control Valves

Symbol	Description
	Fully Closed Control Valve (100% Clo)
	Partially Open Control Valve
	Fully Open Control Valve (0%Clo)
	Non Critical Fault
	Critical Fault

Inlets

Symbol	Description
	Closed Inlet
	Open Inlet

Inlet Flow Path Buttons

To place an inlet on-line, click on the desired inlet button (labelled 1A-1E or 2A-2E).

When Gradient Control is Off and an inlet is clicked to open, the related flow path is selected and all other inlets are closed.

When Gradient Control is On and an inlet is clicked to open, the related flow path is selected and the other inlets in that section (1 or 2) are closed but the inlets in the other section are unaffected.

Caution The valves are a pinching hazard. Be sure they are clear of fingers to avoid serious physical damage.

XS001 – Product Inlet Air Detection

This icon displays the state of the Product Inlet Air Detector. It is blue when feed is detected.

Pumps

The two pumps available with the system are labelled P001 and P002 in the Process Display. P001 is the primary pump and P002 is the secondary pump. The pumps' graphic displays change depending on the state of the pump run and interlock statuses.

Clicking on a pump symbol opens its control detailed panel.

Auto Mode Symbol	Manual Mode Symbol	Description
		Pump OFF
		Pump ON
		Non Critical Fault
		Critical Fault
		Interlock

The pump is interlocked when it is called to run (determined by auto/manual mode and setpoint) but the flow path is not opened or the process is held. The pump will not run until the interlock is cleared.

Pump Control

When pump speed is controlled by Flowrate or Linear Velocity, then a circle is added to the pump symbol and shows the current control mode:

Symbol	Control Mode
	Pump Speed Controlled by Flowrate
	Pump Speed Controlled by Linear Velocity
	Pump Speed Controlled by Mixing. When Mixing control is interlocked the added circle is blinking.
	Pump running according to its speed setpoint (no circle is added).

Bubble Trap

Clicking on the Bubble Trap symbol opens its control detailed panel.

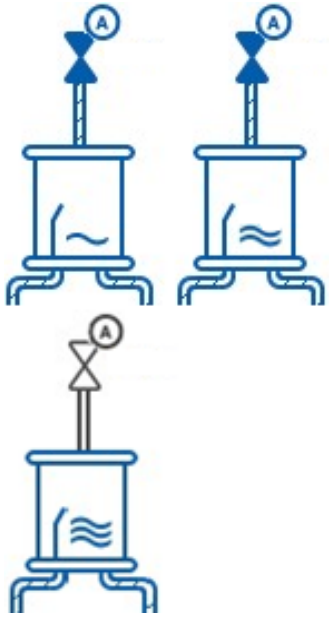
Liquid Level

Closed Flowpath	Open Flowpath	Description
		Liquid level is above the high-level sensor.
		Liquid level is above the low-level sensor and below the high level.
		Liquid level is below the low-level sensor.

Alarms

Non-critical	Critical	Description
		High Level Alarm
		Low Level Alarm

Auto Vent

Symbol	Description
	Auto Vent is enabled. The vent valve is automatically controlled in order to maintain liquid in the bubble trap at its operating level. The valve opens when liquid is below the low-level sensor. The valve closes when liquid is above the high-level sensor.
	Auto Vent is disabled. For bubble trap performance, it is not recommended to disable the auto vent function.

Filter

Clicking on the Filter symbol opens its control detailed panel.

Closed Flowpath	Open Flowpath	Description
		Pre-column filter

Column

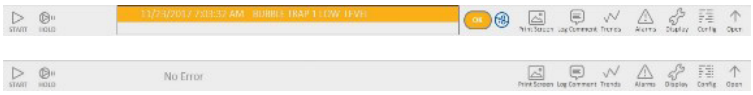
Clicking on a Column symbol opens its control detailed panel.

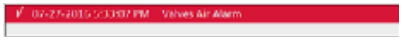
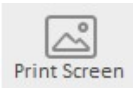
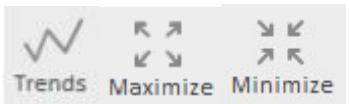
Column – Flowpath

Symbol	Description
	No valid flowpath is selected
	Column Forward flowpath is selected
	Column Reverse flowpath is selected

Process Controls Bar

The content of the Process Controls Bar varies based on the current system status (alarm presence, recipe running, …).



Symbol	Description
	**START** Starts the current recipe. **ABORT** Aborts the current recipe.
	**HOLD** Sets the system to hold state. **RESUME** Resumes from hold state.
	**PAUSE** Pauses the currently running recipe. **RESUME** Resumes the running recipe from pause.
	Opens the recipe step jump popup. Visible when an operation or procedure is being executed. A jump step can occur to any valid step in the same phase, but not to a different phase.
	Opens the Alarm history popup.
	Acknowledges current alarms. If at least one unacknowledged critical alarm is present, then the button appears in red.
	Stops the alarm buzzer.
	Creates a screenshot and save it as a jpg file. The default file location is: D:\Millipore\PrintScreens Filename is automatically created based on the current date & time.
	Records a comment within the System events.
	Trends opens the Trend chart panel. Maximize Switch from the trend chart panel to the full screen chart. Minimize Switch from the full chart window to the panel chart.
	Opens alarm status display.
	Opens display setup popup.

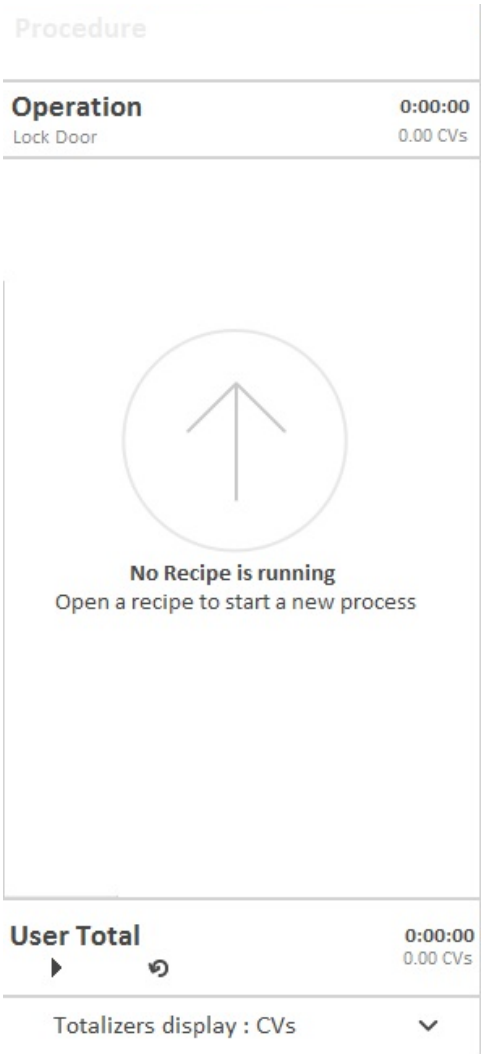
Symbol	Description
	Opens parameters save and restore popup.
	Opens the recipe pool popup. The recipe pool includes open/close door recipes and lock/unlock Flexware® Clamshell Assembly recipes.

Recipe Status and Totalizers

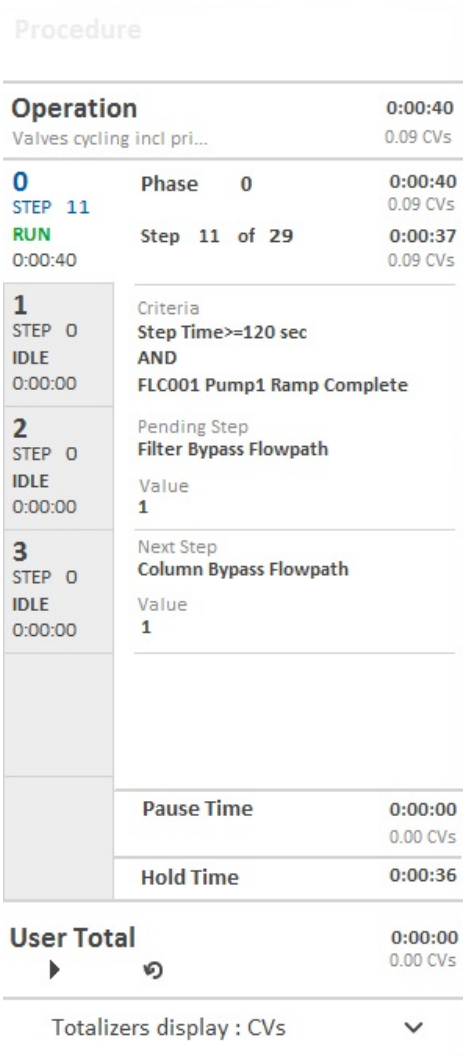
The Recipe Status and Totalizers display shows process information:

- Recipe name, path, durations, current phase, step…
- Liquid totalizers (Volume or CVs) for fluid lines

When no recipe is running, it shows the previous recipe name and duration and allow to open the recipe pool.



Recipe Status – No recipe running, totalizers hidden



Recipe Status – Recipe running, CVs totalizers

When a recipe is running, the left part of the display shows the following information for each phase tab:

- the number of the phase
- the number of the step
- the phase status (IDLE, RUN, PAUSE, HOLD)
- the phase timer

When a phase is running, the number of the phase and the number of the step are highlighted in blue. The right part of the display shows the running step information of the phase:

- the actual step
- the step timer
- the name of the action
- the setpoint value of the action

If criteria are defined for the step, these are displayed below:

- the first criteria of the action
- the mathematical operator
- the second criteria of the action

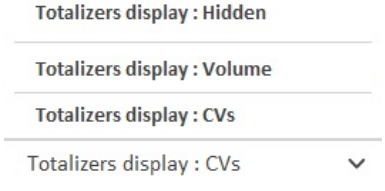
For the phase zero only, the next step action, with its setpoint value, is displayed on the bottom right of the screen.

For all other phases, two buttons are displayed on the two bottom corners.

A round pause button on the bottom left corner enables the user to pause the running phase.

A round abort button on the bottom right corner enables the user to stop the running phase.

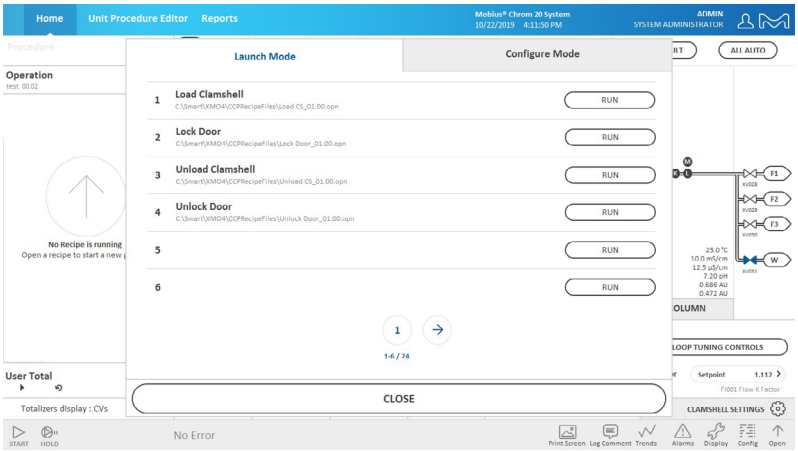
When a launched operation or procedure is finished, an Enter Run Header Data window will appear to allow the addition of comments.

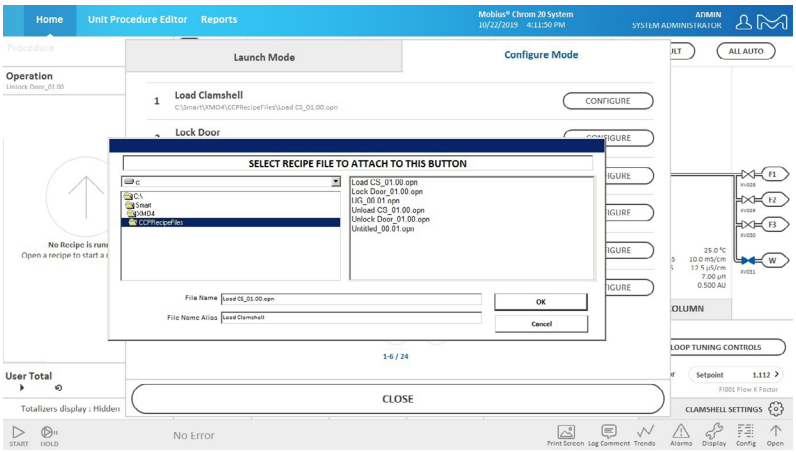
Symbol	Description
	Opens the Recipe Pool to download and start a recipe.
	Opens the Recipe Phase tab information.
	Starts, Stops or resets the user totalizer.
	Chooses the totalizers display mode.
	Pauses or Restarts a running recipe phase.
	Aborts a running recipe phase.

Recipe Pool Screen

The Recipe Pool screen has 6 Recipe buttons and a Launch/Configure Mode tab.

- In Configure mode, each of the 6 Recipe buttons can be configured with an existing recipe. In Launch mode, if no other operation is running when a given Recipe button is clicked, the associated recipe is downloaded and run.
- In Launch mode, each of the 6 Recipe buttons display the name of the operation that will be launched when it is clicked.





Using the Recipe Editor

Introduction

The Recipe Editor is where operations (sequences of actions) and procedures (sequences of operations) are created and managed. The building blocks of operations are individual actions. A series of actions are listed sequentially to form an operation. In addition, operations can be linked in series to form a procedure. The operation or the procedure file is downloaded to the PLC for subsequent execution through the User Interface.

There are actions for virtually all controls on the system, as well as time-based, volume-based and event-based criteria, which can be used to control transitions from step to step.

The actions are organized into the following functional groups:

- Flowpath-Inlets
- Flowpath-System
- Valve Control
- Flexware® Clamshell Assembly Control
- FlowControl-Pump1
- FlowControl-Pump2
- FlowControl-Mixing
- PreColumn-PCV
- PreColumn
- Column
- PostColumn-Peak Detection
- Analog Alarms
- Discrete Alarms
- Miscellaneous
- Operations and Phase Control
- Messaging

Launching the Recipe Editor

Launch the Recipe Editor by clicking on the Recipe Editor icon in the User Interface. The main window of the editor opens as shown below.

Tool Bar

functionality of the icons in the Recipe Editor Toolbar is described below.

Icon	Description
	Create a new procedure or edit an existing one
	Download current procedure into the PLC
	Exit the recipe editor
	Create a new operation
	Open and edit an existing operation
	Save current operation
	Edit header of current operation
	Print current operation
	Download current operation into PLC
	Cut Selection and place in clipboard
	Copy selection
	Paste contents of clipboard. Applies cut and copied text as a whole line.
	Search tool
	Switch between the keyboard mode or the touch screen mode.
	This is a selection of the configuration file for the system. These settings are preconfigured at the factory and should not be changed.

Icon	Description
	Switches to Work space.
	Edit Phase 0
	Edit Phase 1
	Edit Phase 2
	Edit Phase 3
	Edit Phase 4
	Edit Phase 5
	Edit Linear Gradient (for Chrom 20 only)
	Open On-line Manual

Steps

The numbered rows in the Operation Area are the steps of the operation. During the execution of an operation, the various steps are implemented in the order they are listed, unless the jump has been programmed in or manually selected to jump to a particular step.

A single step includes the following columns:

- A number to define the position of the step in the operation. The recipe editor allows up to 250 lines in a phase.
- A user-defined label for the step. The CCP® software allows up to twenty steps to be labeled in a phase. The labels allow the user to branch to different steps in an operation.
- Criteria 1 and Criteria 2, which could be based on either time, volume or specific events.
- Boolean operators AND and OR to link the two criteria.
- The action to be executed at the step.
- Value: Most actions involve setting appropriate values to variables.
- EGU (Engineering Units) for the value field, where applicable.
- A field for entering comments or prompts. Comments enhance the readability of a programmed operation. Prompts allow messaging on the screen.

Creating a Step

1. Click anywhere on the line in the tabular environment in which the action is to be added/ inserted. The line should now be highlighted in yellow.

2. Click on the appropriate action group in the Select Action Group list on the top left side of the Recipe Editor. The actions in the highlighted action group will be listed in the Select Action list on the right side of the recipe editor.

3. Scroll through the actions in the Select Action list and click on the desired action.

4. Click on the insert action button to transfer the selected action to the highlighted line. The line will now be referred to as a step.

5. If the step needs to be labeled, click on the label column. A drop-down list will appear with the numerals 1–20. Choose an appropriate number to label the Step.

Note No two steps can have the same label.

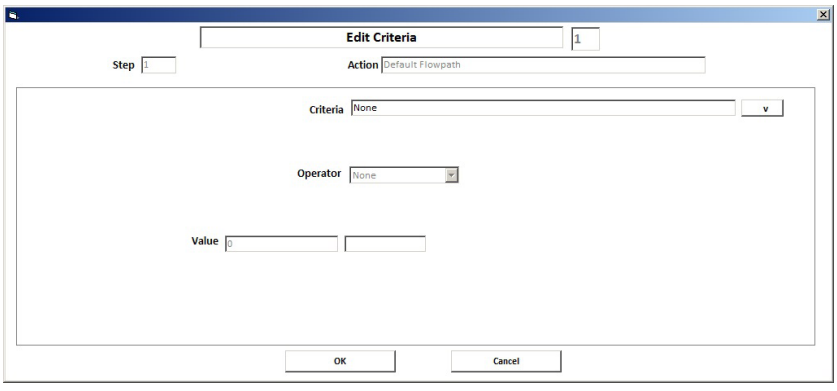
6. If the action in the step is to be executed based on some criterion, click on the Criteria 1 column. An edit box will appear. Click on the Criteria field in the edit box and a drop-down menu containing a list of all the criteria will appear. Scroll through the list to select the desired criterion. Then, choose the appropriate operator in the operator field and finally enter the appropriate value in the value field. The units in the value field will depend on the selected criterion. For instance, if the criterion is based on time, then the value will be in seconds.

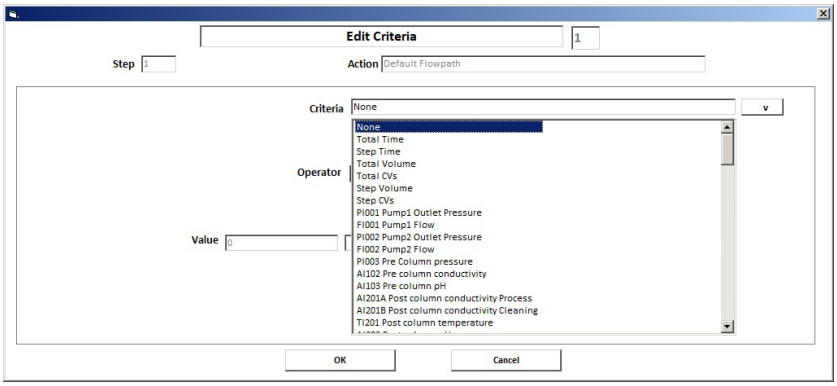
7. If a second criterion is necessary, repeat the step above. Then click on the column labeled Bool and choose the appropriate Boolean operator (AND or OR) to link the two criteria.

8. If the action in the step involves setting values to variables (e.g. set points for flow rates, gradients etc.), click on the column labeled Value. A data entry box will pop up. The form of the box will depend on the state of the popup keyboard toggle button (monitor or keyboard). Use the box to enter the appropriate values.

9. If the action in the step involves a messaging criterion, click on the Comments/Prompt column. This should launch a data entry box. Enter the appropriate string to appear in the messaging window.

10. Click on the Comments/Prompt column to add comments.





The buttons on the top right-hand side of the application environment perform the functions described in the following table.

Icon	Description
Insert Action	Transfers the selected action onto the highlighted step. Any action previously displayed as the highlighted step is transferred to the next step.
Append Action	Transfers the selected action to the step immediately below the highlighted step.
Update Action	Overwrites the current action in the highlighted step with the selected action.
Delete Action	Deletes the current action in the highlighted step.

Note To select the contents of a step for cutting and pasting, click on the line number of the step.

Creating a Phase

Phases are sets of steps that allow the user to break the recipe into multiple phases. This allows the set of steps to be used multiple times within an operation.

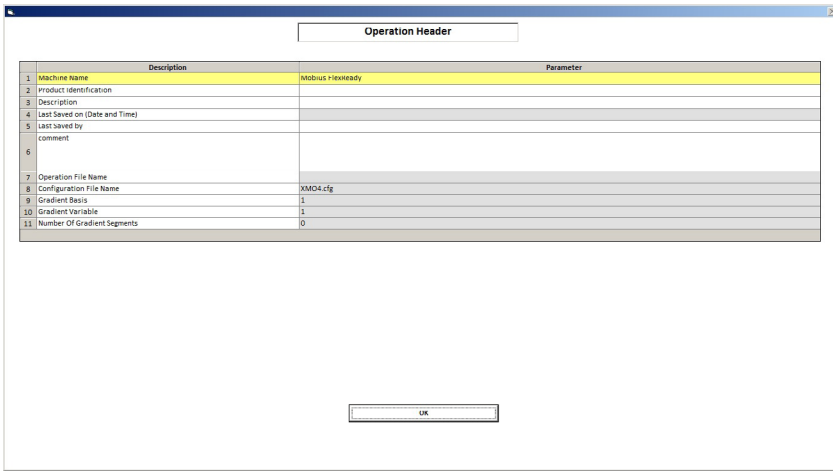
- There can be a maximum of six phases in an operation.
- Phase 0 is the main phase. When an operation is run, it starts executing actions listed in Phase 0. When creating a new operation or opening an existing one, the application environment opens with Phase 0.
- From Phase 0, Phases 1–5 can be started, stopped, paused or resumed.
- Phases can be run in parallel or in series.
- The current status of a phase is viewed with the Operation Status window.

Operation Header

The Operation Header contains information that helps the user understand what the operation is designed to do. The information is saved with the operation. To access the Operation Header, click the Header icon in the Recipe Toolbar ( )or click Operation, then Header in the Recipe Editor menu bar.

Any of the white fields can be populated with relevant information. When clicking on any of these fields, the data entry form appears and the desired information can be submitted.

Note The field for “Last Saved by” must be populated before the operation can be saved.



Saving Operation

To Save the operation, click the Save icon in the Recipe Toolbar or click Operation and then Save As in the Recipe Editor menu bar. Type a name for the operation in the subsequent dialog box.

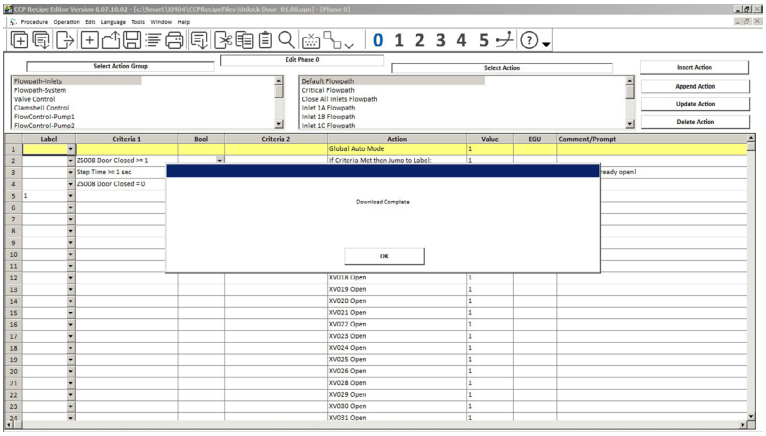
The operation will be stored with an ".opn" extension. The default directory for the *.opn and *.pdr files is "C:\SMART\Chrom20\CCPRecipeFiles". Exported recipes are stored in the corresponding "CCPRecipeExport" folder.

Running an Operation

Downloading the Operation

To execute the operation, it must be downloaded to the PLC. To accomplish this, click the Download Operation icon in the toolbar or click Operation and then Download Operation in the Recipe Editor menu bar. The system will display a dialog box to indicate that the download is completed.

Note The download will not be completed if the system is Held or if the operation has not been saved. Windows® operating system will pop-up to alert the user of any issues that prohibit the download.



Running the Operation

To run the operation downloaded to the PLC, exit the recipe editor by clicking on the Exit icon in the Recipe Editor toolbar and return to the Process Display.

Note Always check the Process Display for proper system status before running an operation. Ensure that no manual forces have been applied to valves, as these will override any operation criteria that are specified. The proper setting for these is Auto.

In the Process Display, click on the Run icon in the tool bar. This causes the Run Header Data Form to display and allows the user to enter the Run Header data.

This form allows the operator to enter run header data to identify the run. Once again, the rows in white can be edited. The CCP® software batch reporting utility identifies each run with a unique run ID. By default, the software supplies a unique run ID by providing a date and time stamp. The user can replace this ID with her or his own unique identifier. For more details on this form, refer to the chapter on Batch Reporting.

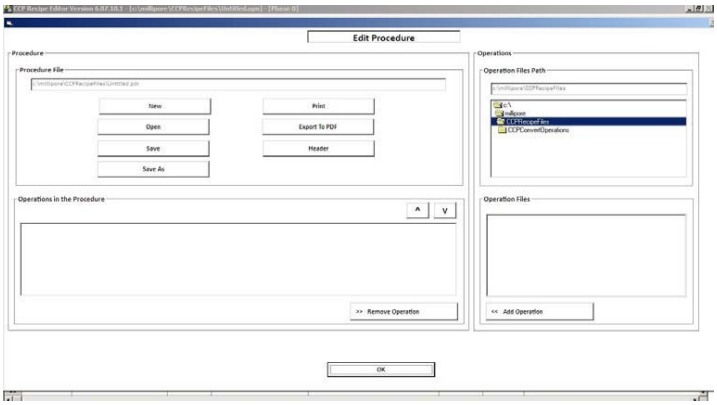
Clicking on the OK button on the Run Header Data form closes it, returns the operator to the Process Display and begins execution of the operation stored in the PLC.

Managing Procedures

Creating a Procedure

To create a procedure, click on Procedure and then Edit Procedure in the Recipe Editor Menu bar or click the icon in the tool bar.

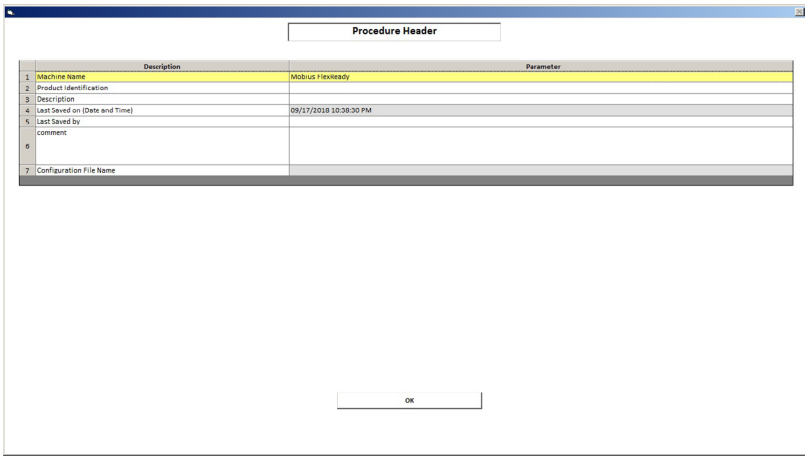
The Edit Procedure window opens.



In the lower right corner of the form, the Operation Files list box presents all the operations currently stored within the path indicated in the Operation Files Path list box. To add an Operation to the Procedure, select the Operation from the list of Operations on the right and click the Add Operation Button. The Operation is added to the Operations in the Procedure list box located in the lower left corner of the form. To remove operations from this list, click on Remove Operation.

Note If the Audit Trail is activated, only validated operations will be present in the Operation Files list box.

To edit the Procedure Header, click on the Header button. Like an operation, the Last Saved By field must be filled to save and download the procedure.



Edit a Procedure

To Edit an existing Procedure, click Open on the Edit Procedure Form. A window opens with a list of existing Procedures. Click on the Procedure that must be edited and click OK.

The Edit Procedure Form is shown with the Operations in the Procedure section populated with the operations that are in the procedure. The Procedure can be edited by adding or removing operations from the procedure.

Clicking the Save button will save the procedure with the same name. Clicking Save As will allow the user to save the procedure with a different name

Downloading the Procedure to the PLC

Click on Procedure, then Download Procedure in the Recipe Editor menu bar or click the icon in the tool bar.

Notes A recipe must be saved on the system, in the default folder, before it can be exported to an external device such as a USB key. Contact your administrator if an export is needed.

Running the Procedure

Click the Run icon in the process window and the Run Header data dialog box will launch. Close the dialog box and the procedure currently downloaded to the PLC will be executed. The Operation Status window displays information about the current operation of the procedure being executed.

Recipe Editor- Actions Summary

The following tables gives the list of the available actions for each action group:

Flowpath-Inlets	
Inlet 1B Flow Path	Flowpaths
Inlet 1C Flow Path	
Inlet 1D Flow Path	
Inlet 1E Flow Path	
Inlet 2A Flow Path	Set the Pump2 line flowpaths
Inlet 2B Flow Path	
Inlet 2C Flow Path	
Inlet 2D Flow Path	
Inlet 2E Flow Path	

Flowpath-System	
Pump P001 Process Flowpath	Sets the system flowpaths
Pump P001 Drain Flowpath	
Pump P002 Process Flowpath	
Pump P002 Drain Flowpath	
Dual Pump Process Flowpath	
Dual Pump Drain Flowpath	
Bubble Trap Online Flowpath	
Bubble Trap Bypass Flowpath	
Bubble Trap Vent Flowpath	
Bubble Trap Clean Flowpath	
Bubble Trap Drain Flowpath	
Bubble Trap User Flowpath	Sets the system flowpaths
Filter Online Flowpath	
Filter Bypass Flowpath	
Filter User Flowpath	
Column Forward Flowpath	
Column Reverse Flowpath	
Column Bypass Flowpath	
Column User Flowpath	
Fraction Waste Flowpath	
Fraction 3 Flowpath	
Fraction 2 Flowpath	
Fraction 1 Flowpath	
System Drain Flowpath	
User 1 Flowpath	
User 2 Flowpath	
User 3 Flowpath	

Valve Control	
XV005 Close	Open and close valves
XV006 Open	
XV006 Close	
XV007 Open	
XV007 Close	
XV008 Open	
XV008 Close	
XV009 Open	
XV009 Close	
XV010 Open	
XV010 Close	
XV011 Open	
XV011 Close	
XV012 Open	
XV012 Close	
XV013 Open	
XV013 Close	
XV014 Open	
XV014 Close	
XV015 Open	
XV015 Close	
XV016 Open	
XV016 Close	
XV017 Open	
XV017 Close	
XV018 Open	
XV018 Close	
XV019 Open	
XV019 Close	
XV020 Open	
XV020 Close	
XV021 Open	
XV021 Close	
XV022 Open	
XV022 Close	
XV023 Open	
XV023 Close	
XV024 Open	
XV024 Close	

Valve Control	
XV025 Open	Open and close valves
XV025 Close	
XV026 Open	
XV026 Close	
XV028 Open	
XV028 Close	
XV029 Open	
XV029 Close	
XV030 Open	
XV030 Close	
XV031 Open	
XV031 Close	
XV033 Open	
XV033 Close	
XV034 Open	
XV034 Close	

Flexware® Clamshell Assembly Control	
Y500A Unlock CS On	Flexware® Clamshell Assembly Control: Open/Close the door Unlock/Lock the multicontact
Y500A Unlock CS Off	
Y500B Unlock CS On	
Y500B Unlock CS Off	
Y501A Connect Multicontact On	Flexware® Clamshell Assembly Control: Open/Close the door Unlock/Lock the multicontact
Y501A Connect Multicontact Off	
Y501B Connect Multicontact On	
Y501B Connect Multicontact Off	

Flow Control-Pump1	
Pump P001 Stop	P001 Control: Start/Stop commands Control loop modes and related setpoints Control loop parameters Deviation alarms
Pump P001 Run	
Pump P001 Control by Speed	
Pump P001 Control by Volumetric Flow Rate	
Pump P001 Control by Linear Velocity	
Pump P001 Speed Set Point	
Pump P001 Volumetric Flow Set Point	
Pump P001 Linear Velocity Set Point	
Pump P001 Ramp Rate	
Pump P001 Deadband	
Pump P001 Loop Gain (10-3)	
Pump P001 Loop Integral (10-3)	
Pump P001 Loop Derivative (10-3)	
Pump P001 Loop Deadband	
Pump P001 Loop Stable Time	
Pump P001 Deviation HI Alarm	
Pump P001 Deviation HIHI Alarm	
Pump P001 Deviation Alarm Enable	
Pump P001 Deviation Alarm Disable	

Flow Control-Pump2	
Pump P002 Stop	P002 Control: Start/Stop commands Control loop modes and related setpoints Control loop parameters Deviation alarms
Pump P002 Run	
Pump P002 Control by Speed	
Pump P002 Control by Volumetric Flow Rate	
Pump P002 Control by Linear Velocity	
Pump P002 Speed Set Point	
Pump P002 Volumetric Flow Set Point	
Pump P002 Linear Velocity Set Point	
Pump P002 Ramp Rate	
Pump P002 Deadband	
Pump P002 Loop Gain (10-3)	
Pump P002 Loop Integral (10-3)	
Pump P002 Loop Derivative (10-3)	
Pump P002 Loop Deadband	P002 Control: Start/Stop commands Control loop modes and related setpoints Control loop parameters Deviation alarms
Pump P002 Loop Stable Time	
Pump P002 Deviation HI Alarm	
Pump P002 Deviation HIHI Alarm	
Pump P002 Deviation Alarm Enable	
Pump P002 Deviation Alarm Disable	

Flow Control-Mixing	
Mixing Enable	Mixing Control: Start/Stop commands Control loop modes and related setpoints Control loop parameters Deviation alarms
Mixing Disable	
Mixing Start Pumps	
Mixing Stop Pumps	
Mixing Control Pumps by Speed	
Mixing Control Pumps by Volumetric Flow	
Mixing Control Pumps by Linear Velocity	
Mixing Control Pumps Speed Set Point	
Mixing Control Pumps Volumetric Flow Set Point	
Mixing Control Pumps Linear Velocity Set Point	
Mixing Percentage Mode	
Mixing Conductivity Mode	
Mixing Percentage Set Point	
Mixing Conductivity Set Point	
Mixing Primary Conductivity Snapshot	
Mixing Primary Conductivity Set Point	
Mixing Secondary Conductivity Snapshot	
Mixing Secondary Conductivity Set Point	
Mixing Conductivity DeadBand Set Point	
Mixing Conductivity Stable Time Set Point	
Mixing Total Flow DeadBand Set Point	
Mixing Total Flow Stable Time Set Point	
Mixing Closed Loop Proportionnal Factor	
Mixing Lookup Table ON	
Mixing Lookup Table OFF	
Mixing Lookup Table Create Segment	
Mixing Lookup Table Number of Segment	
Mixing TotalFlow Deviation Alarm Enable	
Mixing TotalFlow Deviation Alarm Disable	
Mixing TotalFlow Deviation HI Alarm	

Flow Control-Mixing	
Mixing TotalFlow Deviation HIHI Alarm	Mixing Control: Start/Stop commands Control loop modes and related setpoints Control loop parameters Deviation alarms
Mixing Conductivity Deviation Alarm Enable	
Mixing Conductivity Deviation Alarm Disable	
Mixing Conductivity Deviation HI Alarm	
Mixing Conductivity Deviation HIHI Alarm	
Linear Gradient Start	
Linear Gradient Abort	
Linear Gradient Pause	
Linear Gradient Resume	

PreColumn-PCV	
PCV032 Pressure valve Position set point	Pre-column Pressure Control
PCV032 Pressure valve Full Open	
PCV032 Pressure valve Full Close	
PCV032 Pressure valve Ramp Rate	
PCV032 Pressure valve Deviation HI Alarm	
PCV032 Pressure valve Deviation HIHI Alarm	
PCV032 Pressure valve Deviation Alarm Enable	
PCV032 Pressure valve Deviation Alarm Disable	

Column	
Bubble Trap Auto Vent ON	Bubble trap auto vent control
Bubble Trap Auto Vent OFF	

PostColumn-Peak Detection	
Peak Detection Enable	Peak detection control: Enable/disable peak detection Sets end of peak detection mode either based on an absolute value or based on a percentage of the height Sets start and end setpoints Sets the UV sensor to be used for detection Sets the inflection detection setpoints
Peak Detection Disable	
End Peak Based on Setpoint	
End Peak Based on Height	
Start Peak Set Point	
End Peak Set Point	
End Peak % Height Set Point	
Peak Rising Time	
Peak Falling Time	
Stability Timer Enable	
Stability Timer Disable	
Stability Deadband	
Set UV1(AI203) Signal for Peak Detection	
Set UV2(AI204) Signal for Peak Detection	
UV Baseline Zero On	

PostColumn-Peak Detection	
Peak Inflection Detection Enable	Peak detection control: Enable/disable peak detection Sets end of peak detection mode either based on an absolute value or based on a percentage of the height Sets start and end setpoints Sets the UV sensor to be used for detection Sets the inflection detection setpoints
Peak Inflection Detection Disable	
Peak Inflection Percentage	
Peak Inflection DeadTime	

Analog Alarms	
Enable PI001 Pump1 Outlet Pressure Alarm	Enable/Disable analog alarms Sets analog alarms setpoints
Disable PI001 Pump1 Outlet Pressure Alarm	
PI001 Pump1 Outlet Pressure LOLO	
PI001 Pump1 Outlet Pressure LO	
PI001 Pump1 Outlet Pressure HI	
PI001 Pump1 Outlet Pressure HIHI	
Enable FI001 Pump1 Flow Alarm	
Disable FI001 Pump1 Flow Alarm	
FI001 Pump1 Flow LOLO	
FI001 Pump1 Flow LO	
FI001 Pump1 Flow HI	
FI001 Pump1 Flow HIHI	
Enable PI002 Pump2 Outlet Pressure Alarm	
Disable PI002 Pump2 Outlet Pressure Alarm	
PI002 Pump2 Outlet Pressure LOLO	
PI002 Pump2 Outlet Pressure LO	
PI002 Pump2 Outlet Pressure HI	
PI002 Pump2 Outlet Pressure HIHI	
Enable FI002 Pump2 Flow Alarm	
Disable FI002 Pump2 Flow Alarm	
FI002 Pump2 Flow LOLO	
FI002 Pump2 Flow LO	
FI002 Pump2 Flow HI	
FI002 Pump2 Flow HIHI	
Enable PI003 Pre-column Pressure Alarm	
Disable PI003 Pre-column Pressure Alarm	
PI003 Pre-column Pressure LOLO	
PI003 Pre-column Pressure LO	
PI003 Pre-column Pressure HI	
PI003 Pre-column Pressure HIHI	

Analog Alarms	
Enable AI102 Pre column conductivity Alarm	Enable/Disable analog alarms Sets analog alarms setpoints
Disable AI102 Pre column conductivity Alarm	
AI102 Pre column conductivity LOLO	
AI102 Pre column conductivity LO	
AI102 Pre column conductivity HI	
AI102 Pre column conductivity HIHI	
Enable AI103 Pre column pH Alarm	
Disable AI103 Pre column pH Alarm	
AI103 Pre column pH LOLO	
AI103 Pre column pH LO	
AI103 Pre column pH HI	
AI103 Pre column pH HIHI	
Enable AI201A Post column conductivity process Alarm	
Disable AI201A Post column conductivity process Alarm	
AI201A Post column conductivity process LOLO	
AI201A Post column conductivity process LO	
AI201A Post column conductivity process HI	
AI201A Post column conductivity process HIHI	
Enable AI201B Post column conductivity cleaning Alarm	
Disable AI201B Post column conductivity cleaning Alarm	
AI201B Post column conductivity cleaning LOLO	
AI201B Post column conductivity cleaning LO	
AI201B Post column conductivity cleaning HI	
AI201B Post column conductivity cleaning HIHI	
Enable TI201 Post column temperature Alarm	
Disable TI201 Post column temperature Alarm	
TI201 Post column temperature LOLO	
TI201 Post column temperature LO	
TI201 Post column temperature HI	
TI201 Post column temperature HIHI	
Enable AI202 Post column pH Alarm	
Disable AI202 Post column pH Alarm	
AI202 Post column pH LOLO	
AI202 Post column pH LO	
AI202 Post column pH HI	
AI202 Post column pH HIHI	
Enable AI203 Post column UV1 Alarm	

Analog Alarms	
Disable AI203 Post column UV1 Alarm	Enable/Disable analog alarms Sets analog alarms setpoints
AI203 Post column UV1 LOLO	
AI203 Post column UV1 LO	
AI203 Post column UV1 HI	
AI203 Post column UV1 HIHI	
Enable AI204 Post column 1 UV2 Alarm	
Disable AI204 Post column 1 UV2 Alarm	
AI204 Post column UV2 LOLO	
AI204 Post column UV2 LO	
AI204 Post column UV2 HI	
AI204 Post column UV2 HIHI	
Enable FI003 Total Flow Alarm	
Disable FI003 Total Flow Alarm	
FI003 Total Flow LOLO	
FI003 Total Flow LO	
FI003 Total Flow HI	
FI003 Total Flow HIHI	
Enable LV003 Linear Velocity Alarm	
Disable LV003 Linear Velocity Alarm	
LV003 Linear Velocity LOLO	
LV003 Linear Velocity LO	
LV003 Linear Velocity HI	
LV003 Linear Velocity HIHI	
Enable LV001 Pump1 Linear Velocity Alarm	
Disable LV001 Pump1 Linear Velocity Alarm	
LV001 Pump1 Linear Velocity LOLO	
LV001 Pump1 Linear Velocity LO	
LV001 Pump1 Linear Velocity HI	
LV001 Pump1 Linear Velocity HIHI	
Enable LV002 Pump2 Linear Velocity Alarm	
Disable LV002 Pump2 Linear Velocity Alarm	
LV002 Pump2 Linear Velocity LOLO	
LV002 Pump2 Linear Velocity LO	
LV002 Pump2 Linear Velocity HI	
LV002 Pump2 Linear Velocity HIHI	
Enable AI01 Exchange AI#1 Alarm	
Disable AI01 Exchange AI#1 Alarm	
AI01 Exchange AI#1 Alarm LOLO	
AI01 Exchange AI#1 Alarm LO	

Analog Alarms	
AI01 Exchange AI#1 Alarm HI	Enable/Disable analog alarms Sets analog alarms setpoints
AI01 Exchange AI#1 Alarm HIHI	
Enable AI02 Exchange AI#2 Alarm	
Disable AI02 Exchange AI#2 Alarm	
AI02 Exchange AI#2 Alarm LOLO	
AI02 Exchange AI#2 Alarm LO	
AI02 Exchange AI#2 Alarm HI	
Enable AI03 Exchange AI#3 Alarm	
Disable AI03 Exchange AI#3 Alarm	
AI03 Exchange AI#3 Alarm LOLO	
AI03 Exchange AI#3 Alarm LO	
AI03 Exchange AI#3 Alarm HI	
Enable AI04 Exchange AI#4 Alarm	
Disable AI04 Exchange AI#4 Alarm	
AI04 Exchange AI#4 Alarm LOLO	
AI04 Exchange AI#4 Alarm LO	
AI04 Exchange AI#4 Alarm HI	

Discrete Alarms	
PSL601 Valves Air Defect Alarm Enable	Enable/Disable digital alarms
PSL601 Valves Air Defect Alarm Disable	
PSL602 Manifold Valves Air Defect Alarm Enable	
PSL602 Manifold Valves Air Defect Alarm Disable	
XS001 End Product Detection Alarm Enable	
XS001 End Product Detection Alarm Disable	
XS002 Pre Col. Air Presence Alarm Enable	
XS002 Pre Col. Air Presence Alarm Disable	
LSH001 BBT Level High Alarm Enable	
LSH001 BBT Level High Alarm Disable	
LSL002 BBT Level Low Alarm Enable	
LSL002 BBT Level Low Alarm Disable	
SIC001DF Pump1 Fault Alarm Enable	
SIC001DF Pump1 Fault Alarm Disable	
SIC002DF Pump2 Fault Alarm Enable	
SIC002DF Pump2 Fault Alarm Disable	
AA008 C8000 Defect Alarm Enable	
AA008 C8000 Defect Alarm Disable	
DF24VDC 24 VDC defect Alarm Enable	
DF24VDC 24 VDC defect Alarm Disable	
DF48VP001 Pump 1 VDC defect Alarm Enable	

Discrete Alarms	
DF48VP001 Pump 1 VDC defect Alarm Disable	Enable/Disable digital alarms
DF48VP002 Pump 2 VDC defect Alarm Enable	
DF48VP002 Pump 2 VDC defect Alarm Disable	
LV01_Err Pump1 Linear Vel. SP Alarm Enable	
LV01_Err Pump1 Linear Vel. SP Alarm Disable	
LV02_Err Pump2 Linear Vel. SP Alarm Enable	
LV02_Err Pump2 Linear Vel. SP Alarm Disable	
ZS008 Door Closed Defect Alarm Enable	
ZS008 Door Closed Defect Alarm Disable	
ZSDF Flexware® Clamshell Assembly Locking Defect Alarm Enable	
ZSDF Flexware® Clamshell Assembly Locking Defect Alarm Disable	
YA01 PC to PLC Comm Failure Alarm Enable	
YA01 PC to PLC Comm Failure Alarm Disable	
YA02 CCP Runtime Comm Failure Alarm Enable	
YA02 CCP Runtime Comm Failure Alarm Disable	
YA03 Historical Collection Alarm Enable	
YA03 Historical Collection Alarm Disable	
YA04 Hard Drive Overload Alarm Enable	
YA04 Hard Drive Overload Alarm Disable	
YA05 Database Overload Alarm Enable	
YA05 Database Overload Alarm Disable	
YA06 Node 0 Communication Failure Alarm Enable	
YA06 Node 0 Communication Failure Alarm Disable	
YA07 Node 0 Internal Defect Alarm Enable	
YA07 Node 0 Internal Defect Alarm Disable	
YA08 Node 1 Communication Failure Alarm Enable	
YA08 Node 1 Communication Failure Alarm Disable	
YA09 Node 1 Internal Defect Alarm Enable	
YA09 Node 1 Internal Defect Alarm Disable	
YA12 Database Corrupted Alarm Enable	
YA12 Database Corrupted Alarm Disable	
YA13 Unauthorized accesses Alarm Enable	
YA13 Unauthorized accesses Alarm Disable	
PI001 Signal Failure Alarm Enable	
PI001 Signal Failure Alarm Disable	
FI001 Signal Failure Alarm Enable	
FI001 Signal Failure Alarm Disable	
PI002 Signal Failure Alarm Enable	

Discrete Alarms	
PI002 Signal Failure Alarm Disable	Enable/Disable digital alarms
FI002 Signal Failure Alarm Enable	
FI002 Signal Failure Alarm Disable	
PI003 Signal Failure Alarm Enable	
PI003 Signal Failure Alarm Disable	
AI102 Signal Failure Alarm Enable	
AI102 Signal Failure Alarm Disable	
AI103 Signal Failure Alarm Enable	
AI103 Signal Failure Alarm Disable	
AI201A Signal Failure Alarm Enable	
AI201A Signal Failure Alarm Disable	
AI201B Signal Failure Alarm Enable	
AI201B Signal Failure Alarm Disable	
TI201 Signal Failure Alarm Enable	
TI201 Signal Failure Alarm Disable	
AI202 Signal Failure Alarm Enable	
AI202 Signal Failure Alarm Disable	
AI203 Signal Failure Alarm Enable	
AI203 Signal Failure Alarm Disable	
AI204 Signal Failure Alarm Enable	
AI204 Signal Failure Alarm Disable	
PCV032 Signal Failure Alarm Enable	
PCV032 Signal Failure Alarm Disable	

Miscellaneous	
None	When executed, this action produces no changes in the status of the unit. This action is primarily used to assign a label to a step for logic branching, or between consecutive prompts.
Enable All Alarms	When executed, enables all alarms.
Disable All Alarms	When executed, disables all alarms.
Enable All Analog Input Signal Failure Alarms	When executed, enables all Signal Failure alarms.
Disable All Analog Input Signal Failure Alarms	When executed, disables all Signal Failure alarms.
Global Auto Mode	Sets all equipment to their auto mode.
Go to Default	Sets the system to its default state.
Chart Mark	When executed, adds a chart mark to the Real Time display, and the Historical and Alarm/Event logs.
Log Comment	Add a comment to the event log. The message contents can be defined in the comment/prompt column of the phase's spreadsheet.

Miscellaneous	
Holdup Volume	Sets the volume of fluid held in the system flowpath
HETP Start	Flags the start of HETP data to be used by the HETP report.
HETP End	Flags the end of HETP data to be used by the HETP report.
Start User Totalizers	Starts the user totalizer
Stop User Totalizers	Stops the user totalizer
Reset User Totalizers	Resets the user totalizer
Log User Totalizers	Logs the user totalizer
User Non Critical Alarm 1	Triggers the User non critical alarm #1
User Critical Alarm 1	Triggers the User critical alarm #1
User Non Critical Alarm 2	Triggers the User non critical alarm #2
User Critical Alarm 2	Triggers the User critical alarm #2
Set Exchange AO #1 Value	Sets the analog output exchange value #1
Set Exchange AO #2 Value	Sets the analog output exchange value #2
Set Exchange AO #3 Value	Sets the analog output exchange value #3
Set Exchange AO #4 Value	Sets the analog output exchange value #4
Exchange DO #1 On	On Sets the digital exchange value Off Resets the digital exchange value
Exchange DO #1 OFF	
Exchange DO #2 On	
Exchange DO #2 OFF	
Exchange DO #3 On	
Exchange DO #3 OFF	
Exchange DO #4 On	
Exchange DO #4 OFF	
Exchange DO #5 On	
Exchange DO #5 OFF	
Exchange DO #6 On	
Exchange DO #6 OFF	
Exchange DO #7 On	
Exchange DO #7 OFF	
Exchange DO #8 On	
Exchange DO #8 OFF	

Operations and Phase Control	
If Criteria Met then Jump to Label:	If the criteria are met, the operation jumps to another labeled action
System Hold	Sets the system to hold state
Operation Abort	Aborts the running operation
Operation Pause	Pauses the running operation

Operations and Phase Control	
Phase 1 Start	Start Starts phase X Stop Stops phase X Pause Pauses phase X Resume Resumes phase X
Phase 1 Stop	
Phase 1 Pause	
Phase 1 Resume	
Phase 2 Start	
Phase 2 Stop	
Phase 2 Pause	
Phase 2 Resume	
Phase 3 Start	
Phase 3 Stop	
Phase 3 Pause	
Phase 3 Resume	
Phase 4 Start	
Phase 4 Stop	
Phase 4 Pause	
Phase 4 Resume	
Phase 5 Start	
Phase 5 Stop	
Phase 5 Pause	
Phase 5 Resume	
No Default on Complete	Does not set the system to the default state on the completion of an operation
Default on Complete	Sets the system to the default state on the completion of an operation
Criteria Flag 1 On	Criteria flags can be used to create user-defined criteria On Sets the criteria flag. Off Resets the criteria flag.
Criteria Flag 1 Off	
Criteria Flag 2 On	
Criteria Flag 2 Off	
Criteria Flag 3 On	
Criteria Flag 3 Off	
Criteria Flag 4 On	
Criteria Flag 4 Off	
Criteria Flag 5 On	
Criteria Flag 5 Off	

Messaging	
Phase 0 Prompt with OK Button	When executed, those actions display a dialog box containing a message and answer buttons (either OK only or Yes/No). The message contents is defined via the comment/prompt column of the selected phase's spreadsheet.
Phase 0 Prompt with Yes/No Buttons	

Recipe Editor- Criteria Summary

The criteria in the Recipe Editor environment are intended to be self-explanatory.

Criterion	Description
None	This criterion (empty field) makes the transition true, i.e., the action associated with the step where this criterion stands will always be executed.
Total Time	Checks the value of the time elapsed from the start of the operation.
Step Time	Checks the value of the time elapsed from the start of the current step.
Criteria 1 True Time	Checks how long the criterion 1 is true. Available for criteria 2 column only.
Total Volume	This criterion checks the value of the volume of fluid that has passed through the line from the start of the operation.
Step Volume	This criterion checks the value of the volume of fluid that has passed through the line from the start of the current step.
Total CVs	This criterion checks the value of the column volumes of fluid that have passed through the line from the start of the operation.
Step CVs	This criterion checks the value of the column volumes of fluid that have passed through the line from the start of the current step.

PI001 Pump1 Outlet Pressure	Analog and digital values can be compared to a user defined value through mathematical operators (=, >=, <=) in order to produce the desired criterion.
FI001 Pump1 Flow	
PI002 Pump2 Outlet Pressure	
FI002 Pump2 Flow	
PI003 Pre column pressure	
AI102 Pre column conductivity	
AI103 Pre column pH	
AI201A Post column conductivity Process	
AI201B Post column conductivity Cleaning	
TI201 Post column temperature	
AI202 Post column pH	
AI203 Post column UV1	
AI204 Post column UV2	
PCV032 position feedback	
FI003 Total Flow	
LV001 Pump1 Linear Velocity	
LV002 Pump2 Linear Velocity	
LV003 Linear Velocity	
Ratio Post Column UV1/UV2	
Exchange AI#1	
Exchange AI#2	

Exchange AI#3	Analog and digital values can be compared to a user defined value through mathematical operators (=, >=, <=) in order to produce the desired criterion.
Exchange AI#4	
Exchange DI#1	
Exchange DI#2	
Exchange DI#3	
Exchange DI#4	
Exchange DI#5	
Exchange DI#6	
Exchange DI#7	
Exchange DI#8	

XS001 End Product Detected	Checks End of Product
XS002 Pre Column Air Presence	Checks Air Presence before the column 1
ZS008 Door Closed	Checks the door of the Clamsheel is closed
ZS001 Flexware® Clamshell Assembly Locking 1 Closed	Check Flexware® Clamshell Assembly locks are closed
ZS002 Flexware® Clamshell Assembly Locking 2 Closed	
ZS003 Flexware® Clamshell Assembly Locking 3 Closed	
ZS004 Flexware® Clamshell Assembly Locking 4 Closed	
ZS005 Flexware® Clamshell Assembly Locking 5 Closed	
ZS006 Flexware® Clamshell Assembly Locking 6 Closed	
ZS007 Flexware® Clamshell Assembly Locking 7 Closed	
Start of Peak Detected	True when Start of Peak has been detected
End of Peak Detected	True when End of Peak has been detected
Peak Inflection Detected	True when Peak Inflection has been detected
Peak Stable Time	Checks for how long the UV value is stable
End of Linear Gradient	Check if Linear Gradient is finished
Mixing Conductivity within deadband	Within deadband: Checks if the control loop process value has reached its setpoint setpoint +/- the deadband Stable: Checks if the control loop process value is within the deadband for longer than the stable time
Mixing Conductivity Stable	
Mixing Total Flow within deadband	
Mixing Total Flow Stable	
FLC001 Pump1 Ramp Complete	
FLC001 Pump1 within deadband	
FLC001 Pump1 Control Stable	
FLC002 Pump2 Ramp Complete	

FLC002 Pump2 within deadband	
FLC002 Pump2 Control Stable	
Valve PCV032 Ramp Complete	
Valve PCV032 within deadband	
Valve PCV032 Control Stable	
Goto Default on End Enabled	Checks if Goto Default on complete is enabled
Goto Default on End Disabled	Checks if Goto Default on complete is disabled

Criteria Flag 1 On	Checks the flags set by the criteria flags actions
Criteria Flag 1 Off	
Criteria Flag 2 On	
Criteria Flag 2 Off	
Criteria Flag 3 On	
Criteria Flag 3 Off	
Criteria Flag 4 On	
Criteria Flag 4 Off	
Criteria Flag 5 On	
Criteria Flag 5 Off	
Exchange AI#1	Analog and digital values received from the External I/O can be compared to a user defined value through mathematical operators (=, >=, <=) in order to produce the desired criterion.
Exchange AI#2	
Exchange AI#3	
Exchange AI#4	
Exchange DI#1	
Exchange DI#1	
Exchange DI#1	
Exchange DI#1	
Exchange DI#1	
Exchange DI#1	
Exchange DI#1	
Exchange DI#1	
Phase 1 Complete	Checks if Phase 1 is complete
Phase 2 Complete	Checks if Phase 2 is complete
Phase 3 Complete	Checks if Phase 3 is complete
Phase 4 Complete	Checks if Phase 4 is complete
Phase 5 Complete	Checks if Phase 5 is complete
Phase 1 Total Time	Checks Phase X duration, volume totalizer or CVs totalizer
Phase 1 Total Volume	
Phase 1 Total CVs	
Phase 2 Total Time	
Phase 2 Total Volume	
Phase 2 Total CVs	
Phase 3 Total Time	
Phase 3 Total Volume	
Phase 3 Total CVs	

Phase 4 Total Time	
Phase 4 Total Volume	
Phase 4 Total CVs	
Phase 5 Total Time	
Phase 5 Total Volume	
Phase 5 Total CVs	

Phase 0 Prompt OK	Checks the answer buttons associated with a message-based dialog box. Phase prompt criteria may be used only in the next step after a step with a prompt that is being examined. Only one of the criteria Phase Prompt Yes and Phase Prompt No can be used following a phase prompt.
Phase 0 Prompt Yes	
Phase 0 Prompt No	

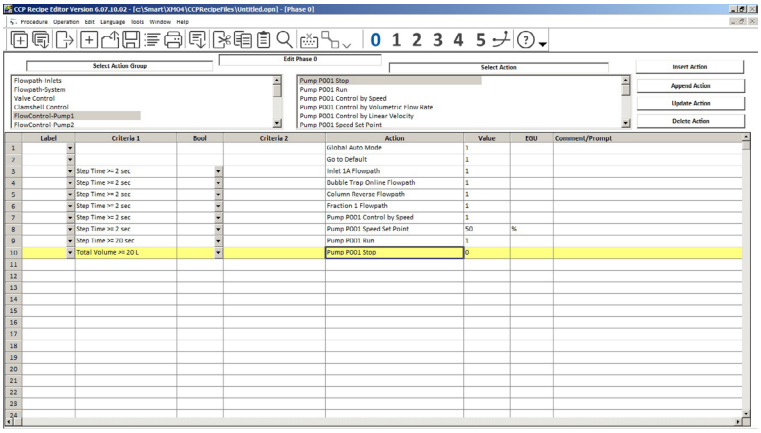
Sample Operation Creation

The following example illustrates the creation of an operation for the system. For details on what Actions and Criteria are available with the system, see the previous sections of this document titled Recipe Editor Actions Summary and Recipe Editor Criteria Summary.

To create a simple operation to do the following:

1. Place the system in Global Auto Mode
2. Place the system in Default state.
3. Wait 2 seconds, put Inlet 1A online.
4. Wait 2 seconds, put Bubble Trap online.
5. Wait 2 seconds, put Column operated in reverse.
6. Wait 2 seconds, put Fraction 1 open.
7. Wait 2 seconds, set the Pump to speed control mode.
8. Wait 2 seconds, set a speed of 50%.
9. Wait for operation to run for 20 sec, start the pump.
10. Wait for 20 liters to pass through the system, stop the pump.

The actions are shown listed in order below:



Set the system to Global Auto and Default (Step 1 & 2) at the start of an operation, to ensure that the status of components is known.

CAUTION Valves that have been manually forced (not set on Auto) will not be affected by the System Default. Having the Global Auto step or clicking the All Auto button may be used to set the valves to Auto, but always visually check the Process Display to make sure that all valves are in their correct state before executing an operation!

Next, the flowpath is defined (Steps 3–6), starting from the inlet and moving sequentially to the bubble trap, column and finally the outlet. Having established a valid flowpath, the pump parameters are set (Steps 7–8). It is important to set these before starting the pump. Finally, the pump is started (Step 9).

The steps use a step time of 2 seconds to allow their occurrence at discrete times rather than rapidly one after another (see below).

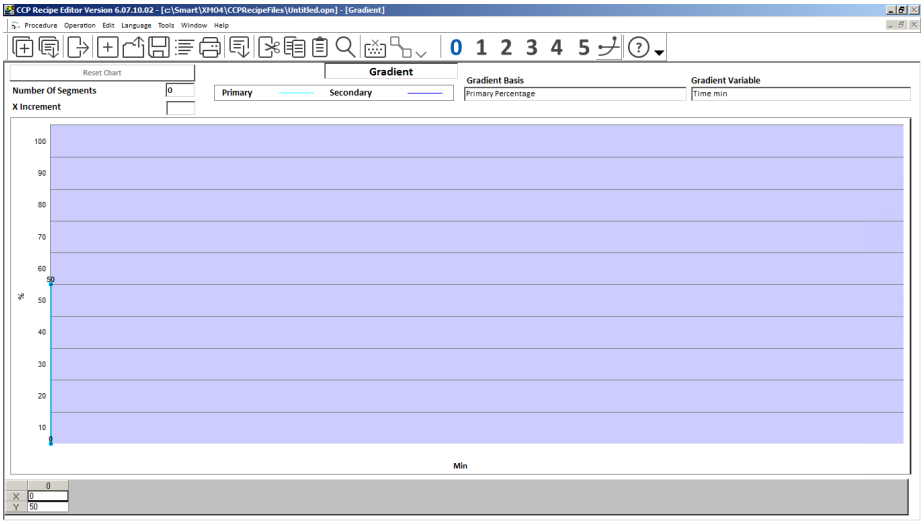
Note The computer is faster than hardware such as pumps and valves. Allow adequate time (1 or 2 seconds minimum) for an action to take place before proceeding to another step. This holds true for the end of an operation. If you specify that a valve closes at the end of an operation, the computer may send this command, and then end the operation before the last action (valve closing) physically takes place. You may specify None as the last action, and list a wait time as the criterion, or select Go to Default as the final action to ensure that all actions have completed. It is good practice to use Go to Default at the start of an operation.

When operating the system in flow control mode, allow adequate time for the flow rate to stabilize, prior to bypassing the bubble trap. The system will automatically hold the pump at the same speed it is operating at when the bubble trap is bypassed. This is because the control will become unstable when not using the bubble trap.

Gradient Phase

One of the capabilities of the system is the ability to form gradients based on conductivity. It allows a gradient to be defined in terms of the conductivity (in µS) of the fluid entering the column. The software employs a hybrid feed-forward-feedback algorithm to manipulate the gradient valve to achieve the desired conductivity. In addition to gradients based on conductivity, users can program gradients the traditional way by specifying the primary pump percentage (%pri). Linear gradients and/or combinations of step and linear gradients can be executed only through an operation.

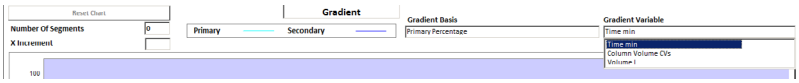
To program a gradient in an operation, click on the Gradient icon on the Recipe Editor toolbar to enter the Gradient Programming screen.



Clicking on the Gradient Basis entry box allows one to base the formation of the gradient on primary percentage or conductivity.

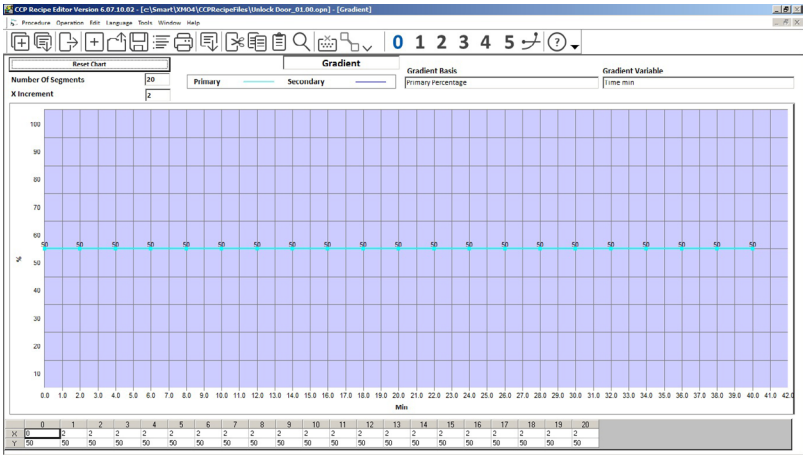
In the XMO system, the pump mixing ratio is defined in terms of the primary pump percentage. For instance, if the Control Loop Mode is set to Fixed Speed with a setpoint of 60% and the %pri is set to 80%, the primary pump would have a fixed speed output of 48% (80% of 60%) and the secondary pump would have a fixed speed output of 12% (20% of 60%).

Clicking on the Gradient Variable entry box enables the user to choose the appropriate x-axis for the gradient profile: Time, Volume or Column Volume.



CCP® software allows a gradient to have a maximum of 20 segments. The gradient segment entry box allows the user to set the appropriate number of segments for their profile. The X-axis increment entry box is employed to set the intervals for the X-axis. After making changes to these entry boxes, the Reset Chart button must be clicked for the changes to take effect. The Gradient Programming Screen after setting the following values and clicking the Reset Chart button is show below.

- Number of Segments = 20
- X Axis Increment = 2



The user can create the desired gradient profile in two ways:

- graphically by clicking and dragging the symbols (l and n) in the graphical area
- by entering the appropriate values of the gradient basis (Y) and gradient variable (X) in the table below the graph.

Changing the tabular entries will automatically update the graphical display.

Note The values of X in the table (other than in column 0) represent intervals and not totals.

Only one gradient profile is allowed per operation.

A segment is defined only by two ordinate (Y) values.

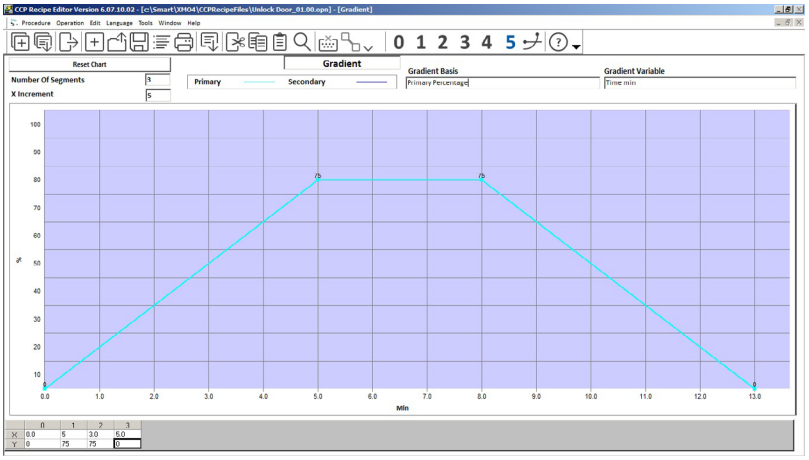
Creating a Gradient Profile

Example: Generate a gradient based on primary percentage: 0–75% over 5 minutes, hold at 75% for 3 minutes and 75–0% over 5 minutes.

To create this profile, we need to perform the following tasks:

1. Click on the Gradient icon in the Recipe Editor tool bar to enter the Gradient Programming window.
2. Click on the Gradient Basis entry box and choose Primary Percentage from the drop-down menu.
3. Click on the Gradient Variable entry box and choose Time Min from the drop-down menu.
4. Click on the Number of Segments entry box and enter “3” in the data entry box that pops up.
5. Click on the X-Axis Increment entry box and enter “5” in the data entry box that pops up.
6. Click on the Reset button. The table at the bottom of the screen should reset to 4 columns.
7. In the first column, enter “0” for X and “0” for Y.
8. In the second column, enter “5” for X and “75” for Y.
9. In the third column, enter “3” for X and “75” for Y.
10. In the fourth column, enter “5” for X and “0” for Y.

The programmed gradient is shown here:



Executing a Gradient from an Operation

For an operation to execute a programmed gradient, the following actions should be listed in the order given below in the appropriate phase of the operation. The Actions are found in the Gradient Action Group in the Operation screen.

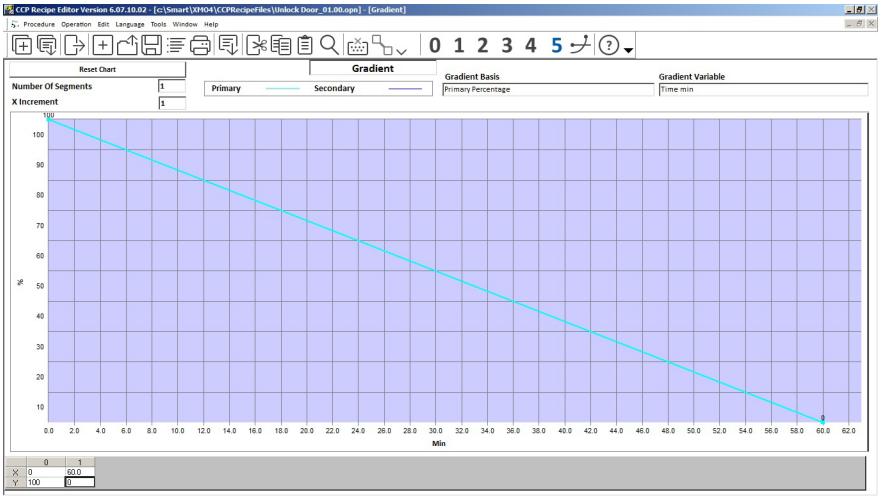
1. Define the Gradient Control Mode: via Percent or via Conductivity.
2. Define the setpoint for the previously chosen Gradient Control Mode.
3. Define the inlets for the Gradient Primary and Secondary Flow paths.
4. Enable linear gradient.
5. Enable Gradient.

Caution As soon as the inlets for the gradient are defined, the software executes the gradient based on the existing setpoint for percentage/conductivity Enabling the linear gradient should follow immediately after defining the inlets with no time/ volume/column volume delay.

Linear Gradient Test Operation

Steps in Phase 0

Step	Criteria 1	Action	Value	EGU
1		Global Auto Mode	1	
2		Go to Default	1	
3		Inlet 1A Flow Path	1	
4	Step Time ≥ 2 seconds	Bubble Trap Online Flow Path	1	
5	Step Time ≥ 2 seconds	Filter 1 Bypass Flow Path	1	
6	Step Time ≥ 2 seconds	Column Forward Flow Path	1	
7	Step Time ≥ 2 seconds	Fraction Waste Flow Path	1	
8	Step Time ≥ 2 seconds	Feed Pump P002 Control via Flow	1	
9	Step Time ≥ 2 seconds	Feed Pump P002 Control Flow Setpoint	0.3	Lpm
10	Step Time ≥ 2 seconds	Feed Pump P002 Control Pump Run	1	
11	Step Time ≥ 360 seconds	Inlet 1A Gradient Primary Flow Path	1	
12	Step Time ≥ 2 seconds	Inlet 2A Gradient Primary Flow Path	1	
13	Step Time ≥ 2 seconds	Pump Based Control via Flow	1	
14	Step Time ≥ 2 seconds	Pump Based Control Flow Setpoint	0.3	Lpm
15	Step CVs ≥ 2 seconds	Pump Based Control Pumps Run	1	
16	Step Time ≥ 2 seconds	Gradient Control via Percent	1	
17	Step Time ≥ 2 seconds	Gradient Control via On	1	
18	Sample Air Detected	Linear Gradient Start	1	
19	Step Time ≥ 3600 seconds	Gradient Control Off	0	
20	Step Time ≥ 360 seconds	Pump Based Control Pumps Stop	0	



Peak Detection

The peak detection capability of the system is based on the absolute values of the UV absorbance. The user can set the UV absorbance for the start of the peak and the end of the peak and can trigger actions based on their attainment. In addition, the software allows for the detection of sub-peaks within the main peak (e.g., shoulders on the front or tail of the main peak). The setpoints for the start and end of the sub-peak are also user-configurable. In addition, if the system has two wavelengths, peak detection can be based on either or both wavelengths.

Definition of Peak and Sub-peak Setpoints

Peak detection setpoints are based on the UV value above the baseline. These values must be defined in the recipe editor using the relevant actions, before peak detection is enabled (see the Peak Detection Action group). The end peak setpoints can also be computed by the system based on a configurable percentage of the maximum peak height. Detection of a peak or sub-peak can be enabled or disabled through operation recipe actions.

Definition of Peak and Sub-peak Start and End Points

A valid start of peak is detected when the UV value has been rising for at least one second and the start of peak setpoint has been reached for one second. Start of peak is used as an operation step criterion to allow the user to program the desired start of peak action.

A valid start of sub-peak is detected when the start of peak has been detected and the start of sub-peak setpoint has been reached for one second. Start of sub-peak is used as an operation step criterion to allow the user to program the desired start of sub-peak action.

A valid end of sub-peak is detected when the UV value has been falling for at least one second, the start of sub-peak has been detected and the end of sub-peak setpoint has been reached for one second. End of sub-peak is used as an operation step criterion to allow the user to program the desired end of sub-peak action.

A valid end of peak is detected when the UV value has been falling at least one second, the start of peak has been detected and the end of peak setpoint (absolute or % of maximum) has been reached for 1 second. End of peak is used as an operation step criterion to allow the user to program the desired end of peak action.

UV Stability Time

The UV signals can be monitored for stability using the UV Stability Timer. When the timer is enabled, the current UV value is captured and the timer is reset whenever the UV value changes by a configurable deadband. The timer value is used as a criterion for step advance. All stability timer functions are available as operation recipe actions.

UV Auto Zero

The UV Auto Zero function establishes an artificial zero (baseline), based on the current value of the UV signal. The resulting offset remains in effect until the original zero is re-established, when the function is turned off. The UV Auto Zero function is toggled on and off by clicking the Zero button on the Process display or by the use of the operation recipe actions UV Baseline Zero On and UV Baseline Zero Off.

Setting Up Peak Detection

To use the peak detection capabilities, the user must include the following recipe actions (found in the Peak Detection Action group) in the order given below, in the appropriate phase of the operation:

1. Define the start and end setpoints for the peak and sub-peak (if any). The software expects the sub-peak to be contained within the main peak. Thus, the setpoint for the start of the sub peak must be greater than the setpoint for the start of the peak and the setpoint for the end of the sub-peak must be greater than the setpoint for the end of the peak.

2. End peak setpoints can be defined either as explicit values or as a percentage of the maximum peak height (using the End Peak %Height Setpoint recipe actions).

3. Enable the detection of the peak and/or sub-peak by inserting the UV Peak Detection Enable and UV Sub-Peak Detection Enable actions in the operation.

An example of the use of phases can be seen below in an operation that collects a fraction when the start of peak is detected in Phase 0.

In Phase 0:

Action n	Setpoint for start of UV peak.
Action n+1	Setpoint for end of UV peak.
Action n+2	Enable UV peak detection.
Action n+3	If start of peak detected, start Phase 1.

In Phase 1:

Action 1	Open Fraction 1.
Action 2	Following a step Time/Volume/Column volume of “X seconds/L, open fraction waste”.

Remote Desktop Connection

Remote Desktop Connection enables connection to a remote computer.

For administrator details, refer to the Computer Administration document in the digital set of documents supplied with the system.

Batch Reporting

Introduction

The CCP® system provides the collection, storage, processing and reporting of batch production data, in accordance with international standards on batch control and current good manufacturing practices.

All recorded information pertaining to a batch is referred to as the batch history. CCP® software stores the batch history so that it is associated with the actual execution of the applied bioreactor protocol.

Batch specific information contained in the batch history includes:

- A copy of the actual protocol used to perform the process. It includes any changes made during the execution. This is basically event data including:
- Predictable events: Certain event data are logged during the execution of the operation. Predictable events include start/stop times of procedural elements.
- Unpredictable events: Any non-programmed operator intervention is logged, such as comments based on observations during system operation, entry of any results, sampling, etc. The log includes intervention type and user ID. Other unpredictable events logged are alarms, equipment failures or other abnormal conditions.
- Trends of measured process parameters such as temperature, pressure, etc.
- The event log for setpoint changes for controllers and peristaltic pumps when PID controller is disabled.

Launching the Report Client Application

To launch the CCP® Report Client application, which is used for batch reporting, click the Reports icon in the tool bar.

Report Client - Tool Bar

The functionality of the icons in the Recipe Editor Toolbar is described below.

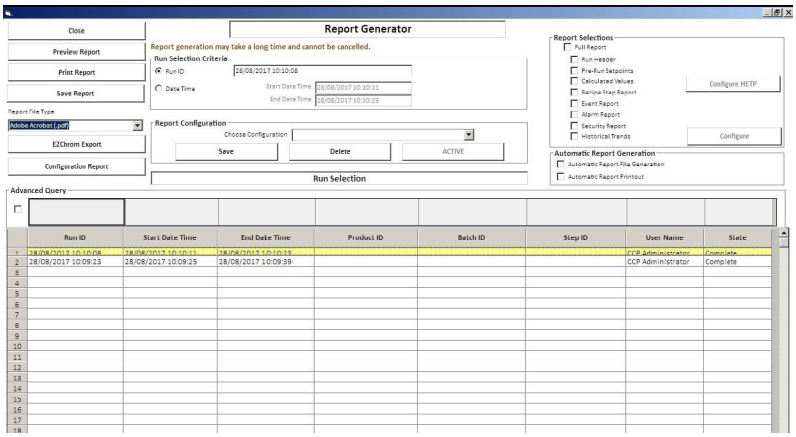
Icon	Description
	Open an existing report
	Open the report generator
	Exit the report client
	Open the verify tamper proof signature window
	Switch between the keyboard mode or the touch screen mode

Icon	Description
	Switches to Work space.
	Open On-line Manual
	Allow user to customize the toolbar

Generating a Report

Batch reports are created using the Report Generator. Click the Report Generator or, on the Report Client menu bar, click on Reports then Report Generator.

The Report Generator form appears.



Run Selection

The table in the lower part of the screen contains the data corresponding to runs archived by the system. Data can be sorted by Run ID, Start and End Date and Time of the run, Product ID, Batch ID, Step ID, User Name and State of the run.

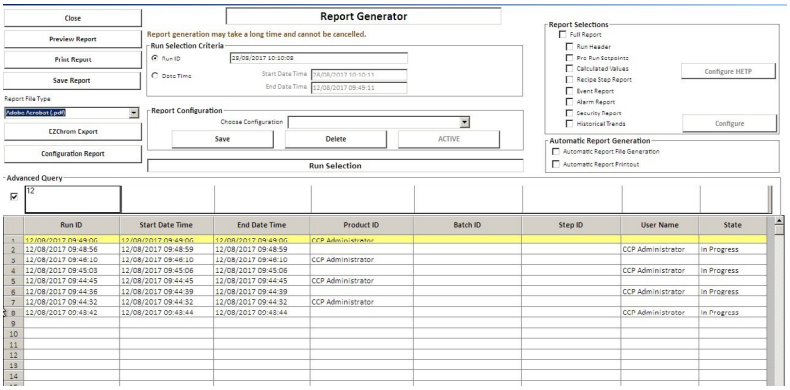
Sorting Batch Data

To sort the data within the same column, click the column header. Every subsequent click sorts the data in the reverse order, either ascending or descending.

Advanced Query

Checking the box located on the top left corner of the table activates the advanced query boxes placed on top of the column headers. When activated, the gray color of these boxes changes to white. To perform an advanced query within a particular column, click the white box located on top of the corresponding column header. A data entry form appears. Type any desired string of characters in the text box provided with this form and click OK.

As an example, the figure below shows the results of a query when the string “12” has been defined in the white query box corresponding to the Run ID column. The figure below shows the results of a query when the string “12” has been defined in the white query box corresponding to the Run ID column.



Note The string “12” is present in all Run ID descriptors present in this column.

Select a Run

To select a run for report generation, click the appropriate row (in any column) that contains the run information needed. The selected row is highlighted in yellow. The Run ID and the Start and End Dates and Times are updated in the Run Selection Criteria box located in the upper central part of the Report Generator form.

Select one of the buttons provided within the Run Selection Criteria box (Run ID and Date Time) to generate a particular report. The Run ID button generates a report for the particular run whose Run ID matches the description defined in the adjacent text box.

If the Run ID entered in the text box is not archived, an error message is presented when the user attempts to view the report.

Date Time Button

The Date Time button generates a report containing all the data bound by the lower and upper limits of the defined time window. If the time window spans over several days, the generated report will contain a large amount of both sensor and event data.

Report Configuration

Report Configuration Menu

The report configuration menu allows the user to save, recall and activate report configurations.

Note Only users with appropriate security privileges can save configurations.

Saving a Configuration

Click the Save button and enter a unique name. The current configuration will be saved for future recall.

Deleting a Configuration

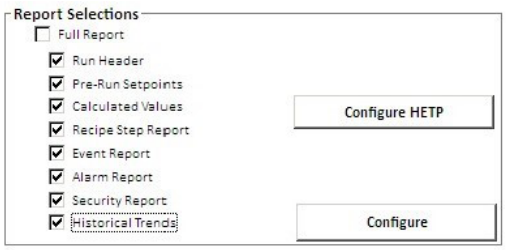
Click the Delete button to delete the currently selected configuration.

Activating a Configuration

Click the Make Active button to activate the configuration currently being displayed.

Report Selections Box

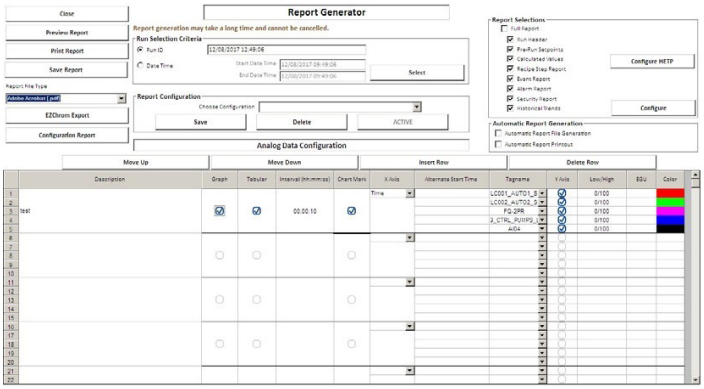
The Report Selections box, located in the upper right corner of the form, provides several check boxes that allow the user to select one or more sections for a particular report from the list provided. If all sections are required within a report, check the Full Report box in the upper right corner of the form.



Configuring Analog Data

When either the Full Report or the Historical Trend boxes are checked within the Report Selections box, the Configure button is enabled. The Configure button allows the user to define which sensor data archived by the unit is actually included within a particular report.

When the Configure button is clicked, the Analog Data Configuration table is displayed in the bottom part of the Report Generator form.

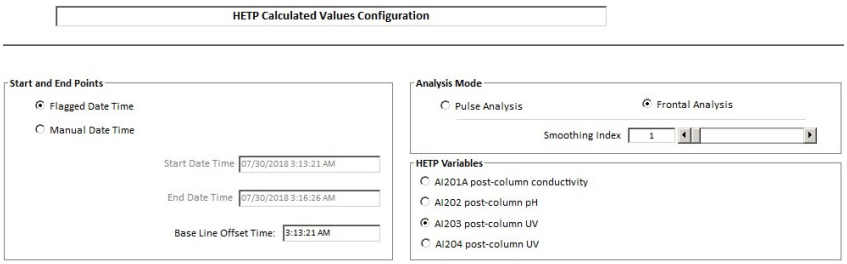


Columns in the Analog Data Configuration Screen

Column	Description
Description	A description of the data that will be included in the report.
Graph	A checkbox to select if the data is to be presented in a graph.
Tabular	A checkbox to select if the data is to be presented in tabular form.
Interval	The frequency of the data included within the report. In this case, one data point per 10 seconds is going to be included for all the tags in the chart groups.
Chart Mark	A checkbox to select if chart marks created during the process are going to be included in the chart.
X-Axis	A drop-down box to select the X-Axis variable. The choices are Time, CV and Volume.
Alternate Start Time	The time for which values will be returned for an individual tag that is different than the Start Time of the selected run.
Tag	The tag whose value will be returned.
Y-Axis	A checkbox to select if the tag's data is to be presented along the Y-Axis.
Low/High	The low and high range of the engineering units of the tag. Defaults to the tag range in the system but can be manually changed.
EGU	Engineering Units of the tag. Defaults to the tag EGU stored in the system but can be manually changed.
Color	Color of the trend for that tag. Can be manually changed.

Configuring HETP Report

When either the Full Report or the Calculated Values boxes are checked within the Report Selections box, the Configure HETP button is enabled. The Configure HETP button opens the HETP Report Configuration Screen. The user may then define the parameters for HETP calculations, including the Start and End Points, Analysis Mode and HETP Variable.



Start and End Points

To select Start and End Points for the HETP data, click the appropriate button to choose either Flagged Date Time (the start and end points of the selected run) or Manual Date Time (to input start and end dates and times manually, in the Start and End Date Time boxes).

Analysis Mode

Select Pulse Analysis or Frontal Analysis by clicking the appropriate button. In Pulse Analysis, the HETP peak data points are read directly from the historical data file. In Frontal Analysis, the HETP peak data points are read from the absolute value of the derivative of the historical data.

When Frontal Analysis mode is selected, a smoothing algorithm is applied to the raw historical data before the derivative of the data is calculated. The smoothing value is a moving average, which appears in the Smoothing Index box. This may be adjusted using the scroll bar below the box.

When Frontal Analysis mode is selected, the start point for calculating the derivative of the data is defined as an offset from the start time. The length of this offset may be defined in the Base Line Offset Time box, if Manual Date Time is selected.

HETP Variables

Four choices are available for the variable to be used for HETP calculations:

- AI201A post-column conductivity
- AI202 post-column pH
- AI203 post-column UV
- AI204 post-column UV

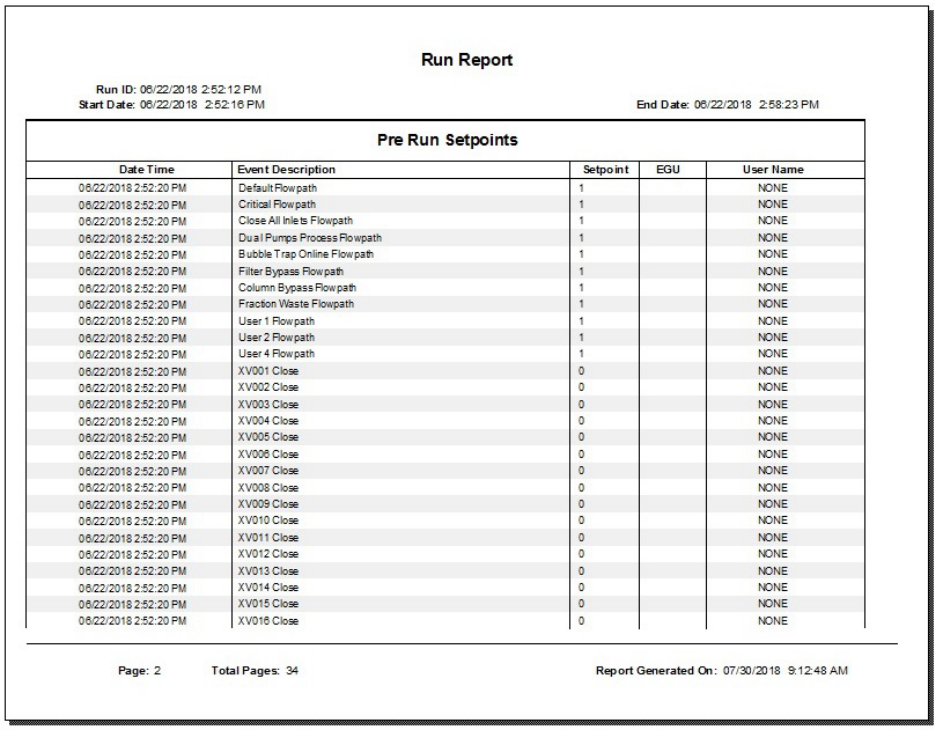
The chosen variable is selected by clicking on the appropriate button.

Automatic Report Generation

For automatic report generation at the end of a run, check the Automatic Report File Generation box within the Automatic Report Generation box. To send the report to the default printer at the end of the run, check the Automatic Report Printout box.

Report Preview

The final report can be previewed by clicking the Preview Report button on the top left corner of the Report Generator form. A sample of the final reports is shown below.



Run Report

Run ID: 06/22/2018 2:52:12 PM
Start Date: 06/22/2018 2:52:16 PM
End Date: 06/22/2018 2:58:23 PM

Pre Run Setpoints

Date Time	Event Description	Setpoint	EGU	User Name
06/22/2018 2:52:20 PM	Default Flowpath	1		NONE
06/22/2018 2:52:20 PM	Critical Flowpath	1		NONE
06/22/2018 2:52:20 PM	Close All Inlets Flowpath	1		NONE
06/22/2018 2:52:20 PM	Dual Pumps Process Flowpath	1		NONE
06/22/2018 2:52:20 PM	Bubble Trap Online Flowpath	1		NONE
06/22/2018 2:52:20 PM	Filter Bypass Flowpath	1		NONE
06/22/2018 2:52:20 PM	Column Bypass Flowpath	1		NONE
06/22/2018 2:52:20 PM	Fraction Waste Flowpath	1		NONE
06/22/2018 2:52:20 PM	User 1 Flowpath	1		NONE
06/22/2018 2:52:20 PM	User 2 Flowpath	1		NONE
06/22/2018 2:52:20 PM	User 4 Flowpath	1		NONE
06/22/2018 2:52:20 PM	XV001 Close	0		NONE
06/22/2018 2:52:20 PM	XV002 Close	0		NONE
06/22/2018 2:52:20 PM	XV003 Close	0		NONE
06/22/2018 2:52:20 PM	XV004 Close	0		NONE
06/22/2018 2:52:20 PM	XV005 Close	0		NONE
06/22/2018 2:52:20 PM	XV006 Close	0		NONE
06/22/2018 2:52:20 PM	XV007 Close	0		NONE
06/22/2018 2:52:20 PM	XV008 Close	0		NONE
06/22/2018 2:52:20 PM	XV009 Close	0		NONE
06/22/2018 2:52:20 PM	XV010 Close	0		NONE
06/22/2018 2:52:20 PM	XV011 Close	0		NONE
06/22/2018 2:52:20 PM	XV012 Close	0		NONE
06/22/2018 2:52:20 PM	XV013 Close	0		NONE
06/22/2018 2:52:20 PM	XV014 Close	0		NONE
06/22/2018 2:52:20 PM	XV015 Close	0		NONE
06/22/2018 2:52:20 PM	XV016 Close	0		NONE

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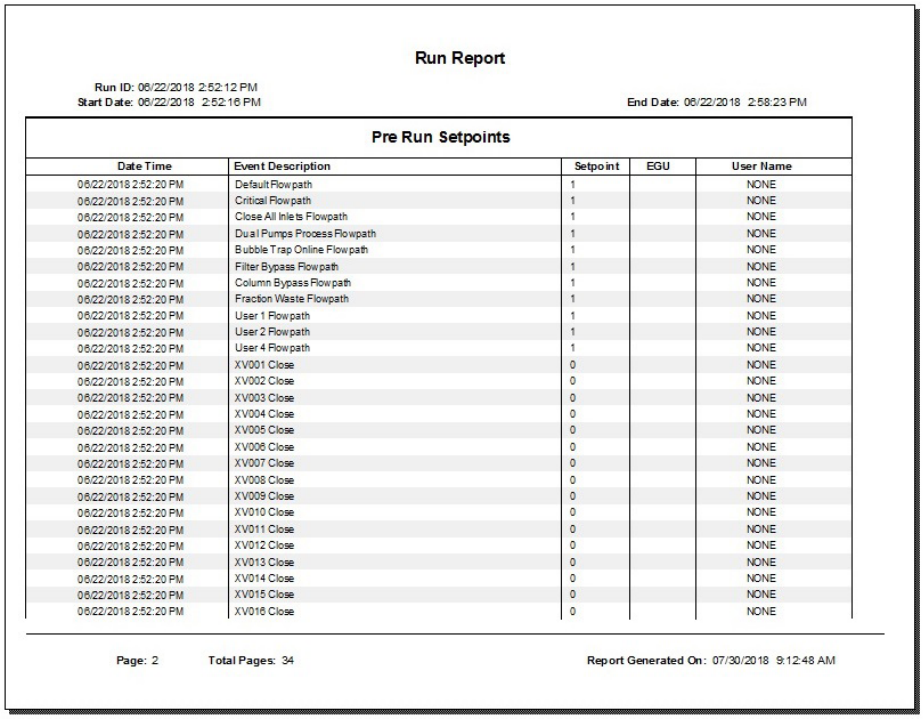
Click the Table of Contents icon on the tool bar to see the contents of a report. Navigation through the report is available by clicking on the tree nodes representing the sections and controls on report.

A Full Report preview is presented below.

Pre-run Setpoints Report



Run Report

Run ID: 06/22/2018 2:52:12 PM
Start Date: 06/22/2018 2:52:16 PM
End Date: 06/22/2018 2:58:23 PM

Pre Run Setpoints

Date Time	Event Description	Setpoint	EGU	User Name
06/22/2018 2:52:20 PM	Default Flowpath	1		NONE
06/22/2018 2:52:20 PM	Critical Flowpath	1		NONE
06/22/2018 2:52:20 PM	Close All Inlets Flowpath	1		NONE
06/22/2018 2:52:20 PM	Dual Pumps Process Flowpath	1		NONE
06/22/2018 2:52:20 PM	Bubble Trap Online Flowpath	1		NONE
06/22/2018 2:52:20 PM	Filter Bypass Flowpath	1		NONE
06/22/2018 2:52:20 PM	Column Bypass Flowpath	1		NONE
06/22/2018 2:52:20 PM	Fraction Waste Flowpath	1		NONE
06/22/2018 2:52:20 PM	User 1 Flowpath	1		NONE
06/22/2018 2:52:20 PM	User 2 Flowpath	1		NONE
06/22/2018 2:52:20 PM	User 4 Flowpath	1		NONE
06/22/2018 2:52:20 PM	XV001 Close	0		NONE
06/22/2018 2:52:20 PM	XV002 Close	0		NONE
06/22/2018 2:52:20 PM	XV003 Close	0		NONE
06/22/2018 2:52:20 PM	XV004 Close	0		NONE
06/22/2018 2:52:20 PM	XV005 Close	0		NONE
06/22/2018 2:52:20 PM	XV006 Close	0		NONE
06/22/2018 2:52:20 PM	XV007 Close	0		NONE
06/22/2018 2:52:20 PM	XV008 Close	0		NONE
06/22/2018 2:52:20 PM	XV009 Close	0		NONE
06/22/2018 2:52:20 PM	XV010 Close	0		NONE
06/22/2018 2:52:20 PM	XV011 Close	0		NONE
06/22/2018 2:52:20 PM	XV012 Close	0		NONE
06/22/2018 2:52:20 PM	XV013 Close	0		NONE
06/22/2018 2:52:20 PM	XV014 Close	0		NONE
06/22/2018 2:52:20 PM	XV015 Close	0		NONE
06/22/2018 2:52:20 PM	XV016 Close	0		NONE

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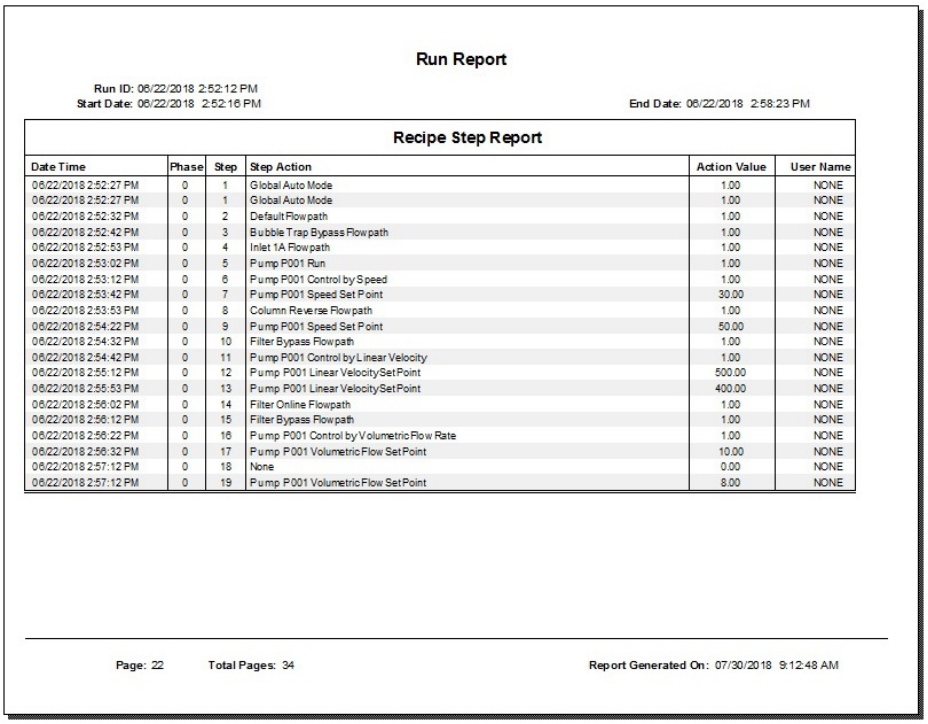
Recipe Step Report



Run Report

Run ID: 06/22/2018 2:52:12 PM
Start Date: 06/22/2018 2:52:16 PM
End Date: 06/22/2018 2:58:23 PM

Recipe Step Report

Date Time	Phase	Step	Step Action	Action Value	User Name
06/22/2018 2:52:27 PM	0	1	Global Auto Mode	1.00	NONE
06/22/2018 2:52:27 PM	0	1	Global Auto Mode	1.00	NONE
06/22/2018 2:52:32 PM	0	2	Default Flowpath	1.00	NONE
06/22/2018 2:52:42 PM	0	3	Bubble Trap Bypass Flowpath	1.00	NONE
06/22/2018 2:52:53 PM	0	4	Inlet 1A Flowpath	1.00	NONE
06/22/2018 2:53:02 PM	0	5	Pump P001 Run	1.00	NONE
06/22/2018 2:53:12 PM	0	6	Pump P001 Control by Speed	1.00	NONE
06/22/2018 2:53:42 PM	0	7	Pump P001 Speed Set Point	30.00	NONE
06/22/2018 2:53:53 PM	0	8	Column Reverse Flowpath	1.00	NONE
06/22/2018 2:54:22 PM	0	9	Pump P001 Speed Set Point	50.00	NONE
06/22/2018 2:54:32 PM	0	10	Filter Bypass Flowpath	1.00	NONE
06/22/2018 2:54:42 PM	0	11	Pump P001 Control by Linear Velocity	1.00	NONE
06/22/2018 2:55:12 PM	0	12	Pump P001 Linear Velocity Set Point	500.00	NONE
06/22/2018 2:55:53 PM	0	13	Pump P001 Linear Velocity Set Point	400.00	NONE
06/22/2018 2:56:02 PM	0	14	Filter Online Flowpath	1.00	NONE
06/22/2018 2:56:12 PM	0	15	Filter Bypass Flowpath	1.00	NONE
06/22/2018 2:56:22 PM	0	16	Pump P001 Control by Volumetric Flow Rate	1.00	NONE
06/22/2018 2:56:32 PM	0	17	Pump P001 Volumetric Flow Set Point	10.00	NONE
06/22/2018 2:57:12 PM	0	18	None	0.00	NONE
06/22/2018 2:57:12 PM	0	19	Pump P001 Volumetric Flow Set Point	8.00	NONE

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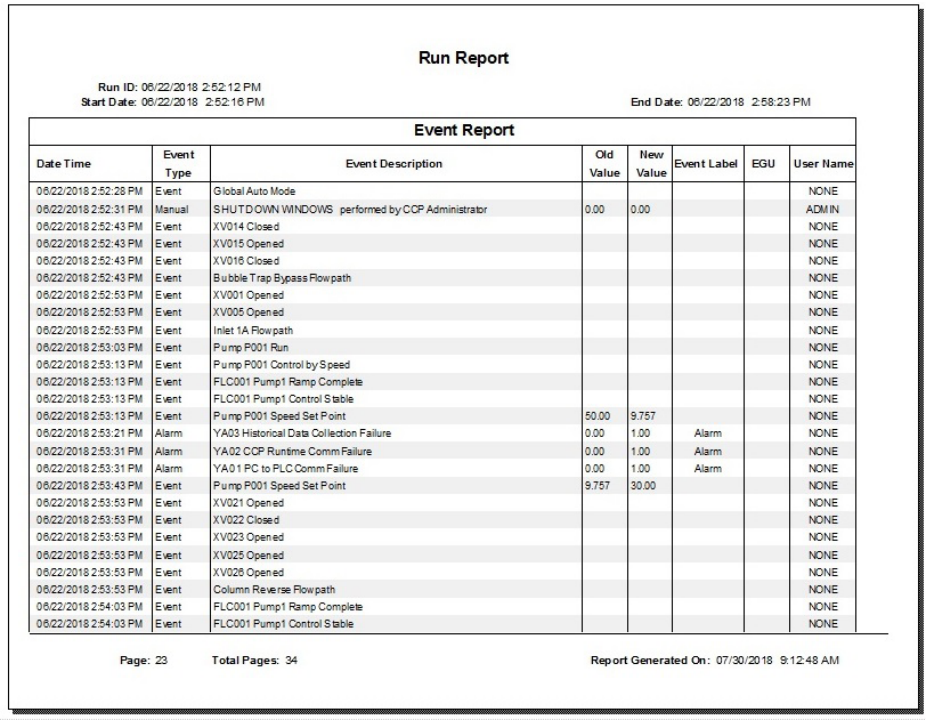
Event Report



Run Report

Run ID: 06/22/2018 2:52:12 PM
Start Date: 06/22/2018 2:52:16 PM
End Date: 06/22/2018 2:58:23 PM

Event Report

Date Time	Event Type	Event Description	Old Value	New Value	Event Label	EGU	User Name
06/22/2018 2:52:28 PM	Event	Global Auto Mode					NONE
06/22/2018 2:52:31 PM	Manual	SHUTDOWN WINDOWS performed by CCP Administrator	0.00	0.00			ADMIN
06/22/2018 2:52:43 PM	Event	XV014 Closed					NONE
06/22/2018 2:52:43 PM	Event	XV015 Opened					NONE
06/22/2018 2:52:43 PM	Event	XV016 Closed					NONE
06/22/2018 2:52:43 PM	Event	Bubble Trap Bypass Flowpath					NONE
06/22/2018 2:52:53 PM	Event	XV001 Opened					NONE
06/22/2018 2:52:53 PM	Event	XV005 Opened					NONE
06/22/2018 2:52:53 PM	Event	Inlet 1A Flowpath					NONE
06/22/2018 2:53:03 PM	Event	Pump P001 Run					NONE
06/22/2018 2:53:13 PM	Event	Pump P001 Control by Speed					NONE
06/22/2018 2:53:13 PM	Event	FLC001 Pump1 Ramp Complete					NONE
06/22/2018 2:53:13 PM	Event	FLC001 Pump1 Control Stable					NONE
06/22/2018 2:53:13 PM	Event	Pump P001 Speed Set Point	50.00	9.757			NONE
06/22/2018 2:53:21 PM	Alarm	YA03 Historical Data Collection Failure	0.00	1.00	Alarm		NONE
06/22/2018 2:53:31 PM	Alarm	YA02 CCP Runtime Comm Failure	0.00	1.00	Alarm		NONE
06/22/2018 2:53:31 PM	Alarm	YA01 PC to PLC Comm Failure	0.00	1.00	Alarm		NONE
06/22/2018 2:53:43 PM	Event	Pump P001 Speed Set Point	9.757	30.00			NONE
06/22/2018 2:53:53 PM	Event	XV021 Opened					NONE
06/22/2018 2:53:53 PM	Event	XV022 Closed					NONE
06/22/2018 2:53:53 PM	Event	XV023 Opened					NONE
06/22/2018 2:53:53 PM	Event	XV025 Opened					NONE
06/22/2018 2:53:53 PM	Event	XV026 Opened					NONE
06/22/2018 2:53:53 PM	Event	Column Reverse Flowpath					NONE
06/22/2018 2:54:03 PM	Event	FLC001 Pump1 Ramp Complete					NONE
06/22/2018 2:54:03 PM	Event	FLC001 Pump1 Control Stable					NONE

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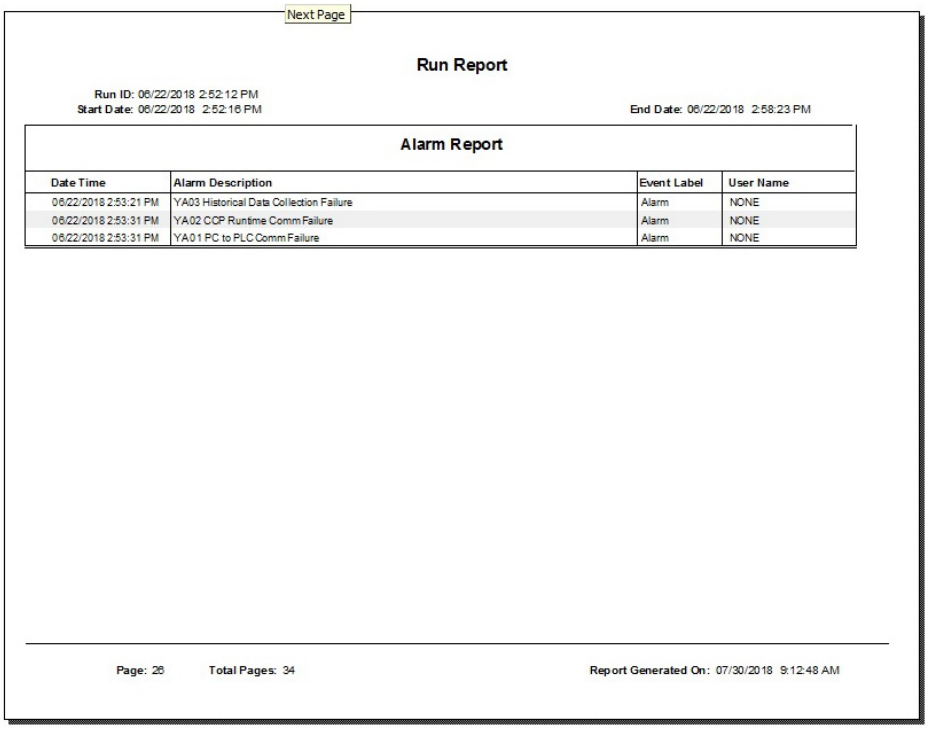
Alarm Report


Next Page

Run Report

Run ID: 06/22/2018 2:52:12 PM
Start Date: 06/22/2018 2:52:16 PM
End Date: 06/22/2018 2:58:23 PM

Alarm Report

Date Time	Alarm Description	Event Label	User Name
06/22/2018 2:53:21 PM	YA03 Historical Data Collection Failure	Alarm	NONE
06/22/2018 2:53:31 PM	YA02 CCP Runtime Comm Failure	Alarm	NONE
06/22/2018 2:53:31 PM	YA01 PC to PLC Comm Failure	Alarm	NONE

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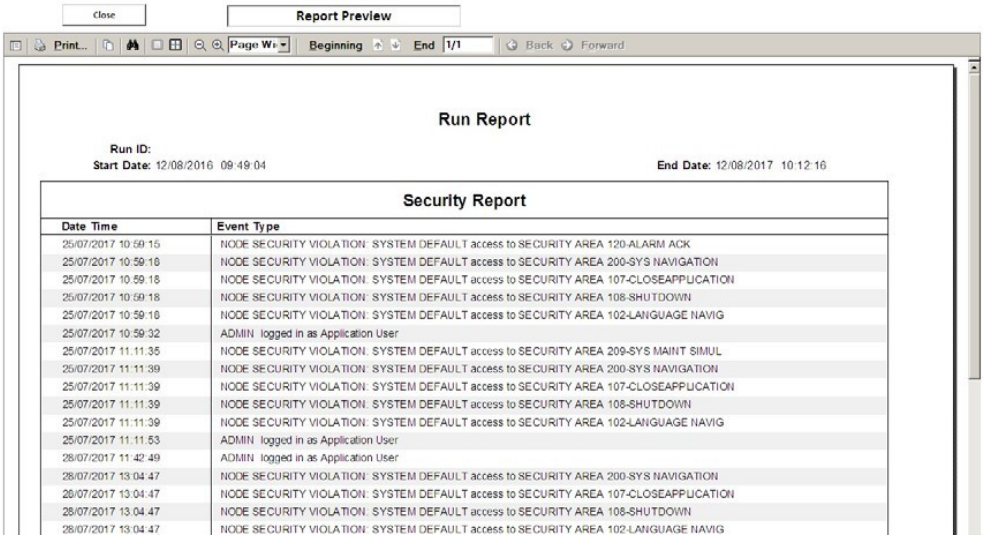
Security Report


Close

Report Preview

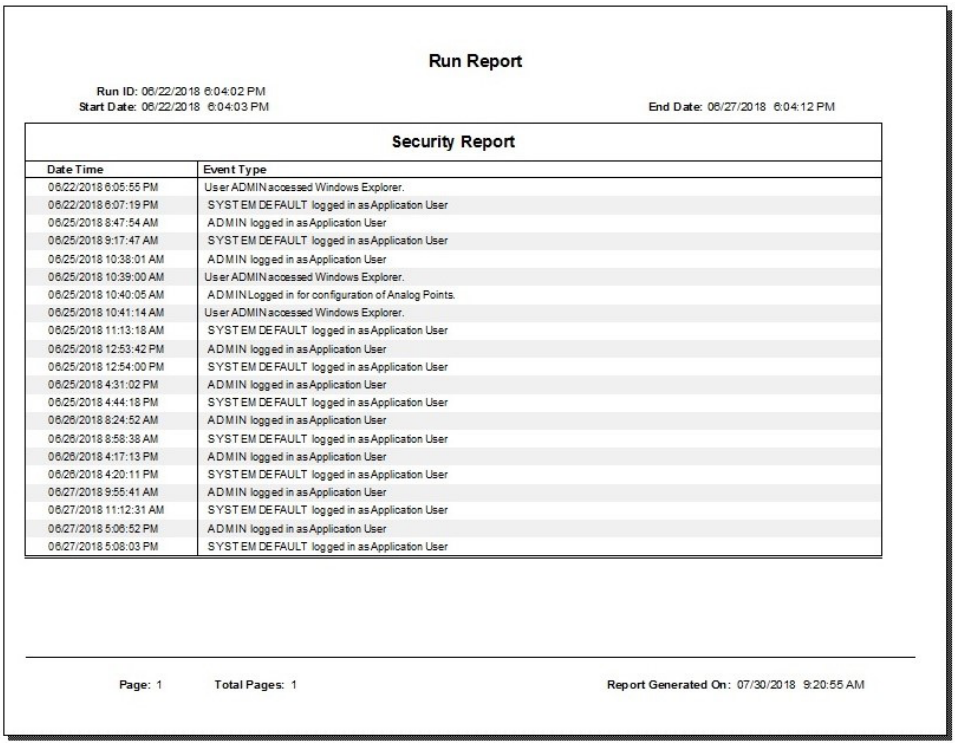
Print... Page W: Beginning End 1/1 Back Forward

Run Report

Run ID:
Start Date: 12/08/2016 09:49:04
End Date: 12/08/2017 10:12:16

Security Report

Date Time	Event Type
25/07/2017 10:59:15	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 120-ALARM ACK
25/07/2017 10:59:18	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 200-SYS NAVIGATION
25/07/2017 10:59:18	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 107-CLOSEAPPLICATION
25/07/2017 10:59:18	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 108-SHUTDOWN
25/07/2017 10:59:18	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 102-LANGUAGE NAVIG
25/07/2017 10:59:32	ADMIN logged in as Application User
25/07/2017 11:11:35	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 209-SYS MAINT SIMUL
25/07/2017 11:11:39	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 200-SYS NAVIGATION
25/07/2017 11:11:39	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 107-CLOSEAPPLICATION
25/07/2017 11:11:39	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 108-SHUTDOWN
25/07/2017 11:11:39	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 102-LANGUAGE NAVIG
25/07/2017 11:11:53	ADMIN logged in as Application User
28/07/2017 11:42:49	ADMIN logged in as Application User
28/07/2017 13:04:47	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 200-SYS NAVIGATION
28/07/2017 13:04:47	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 107-CLOSEAPPLICATION
28/07/2017 13:04:47	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 108-SHUTDOWN
28/07/2017 13:04:47	NODE SECURITY VIOLATION: SYSTEM DEFAULT access to SECURITY AREA 102-LANGUAGE NAVIG



Run Report

Run ID: 06/22/2018 6:04:02 PM
Start Date: 06/22/2018 6:04:03 PM
End Date: 06/27/2018 6:04:12 PM

Security Report

Date Time	Event Type
06/22/2018 6:05:55 PM	User ADMIN accessed Windows Explorer.
06/22/2018 6:07:19 PM	SYSTEM DEFAULT logged in as Application User
06/25/2018 8:47:54 AM	ADMIN logged in as Application User
06/25/2018 9:17:47 AM	SYSTEM DEFAULT logged in as Application User
06/25/2018 10:38:01 AM	ADMIN logged in as Application User
06/25/2018 10:39:00 AM	User ADMIN accessed Windows Explorer.
06/25/2018 10:40:05 AM	ADMIN Logged in for configuration of Analog Points.
06/25/2018 10:41:14 AM	User ADMIN accessed Windows Explorer.
06/25/2018 11:13:18 AM	SYSTEM DEFAULT logged in as Application User
06/25/2018 12:53:42 PM	ADMIN logged in as Application User
06/25/2018 12:54:00 PM	SYSTEM DEFAULT logged in as Application User
06/25/2018 4:31:02 PM	ADMIN logged in as Application User
06/25/2018 4:44:18 PM	SYSTEM DEFAULT logged in as Application User
06/26/2018 8:24:52 AM	ADMIN logged in as Application User
06/26/2018 8:58:38 AM	SYSTEM DEFAULT logged in as Application User
06/26/2018 4:17:13 PM	ADMIN logged in as Application User
06/26/2018 4:20:11 PM	SYSTEM DEFAULT logged in as Application User
06/27/2018 9:55:41 AM	ADMIN logged in as Application User
06/27/2018 11:12:31 AM	SYSTEM DEFAULT logged in as Application User
06/27/2018 5:06:52 PM	ADMIN logged in as Application User
06/27/2018 5:08:03 PM	SYSTEM DEFAULT logged in as Application User

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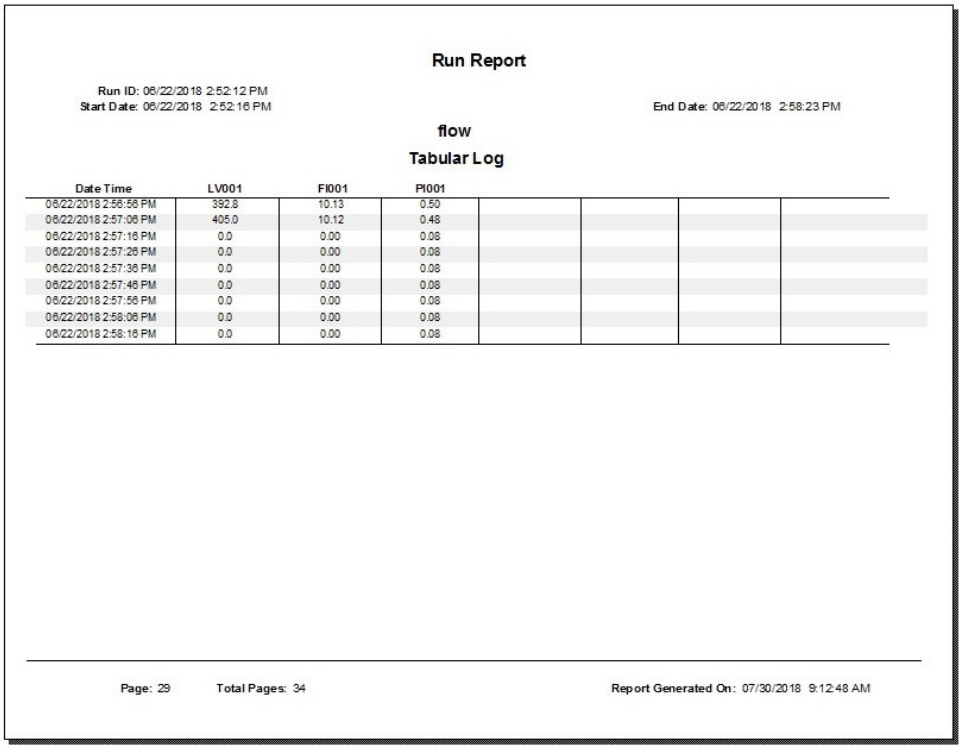
Tabular Data Report



Run Report

Run ID: 06/22/2018 2:52:12 PM
Start Date: 06/22/2018 2:52:16 PM
End Date: 06/22/2018 2:58:23 PM

flow

Tabular Log

Date Time	LV001	FI001	PI001				
06/22/2018 2:56:56 PM	392.8	10.13	0.50				
06/22/2018 2:57:06 PM	405.0	10.12	0.48				
06/22/2018 2:57:16 PM	0.0	0.00	0.08				
06/22/2018 2:57:26 PM	0.0	0.00	0.08				
06/22/2018 2:57:36 PM	0.0	0.00	0.08				
06/22/2018 2:57:46 PM	0.0	0.00	0.08				
06/22/2018 2:57:56 PM	0.0	0.00	0.08				
06/22/2018 2:58:06 PM	0.0	0.00	0.08				
06/22/2018 2:58:16 PM	0.0	0.00	0.08				

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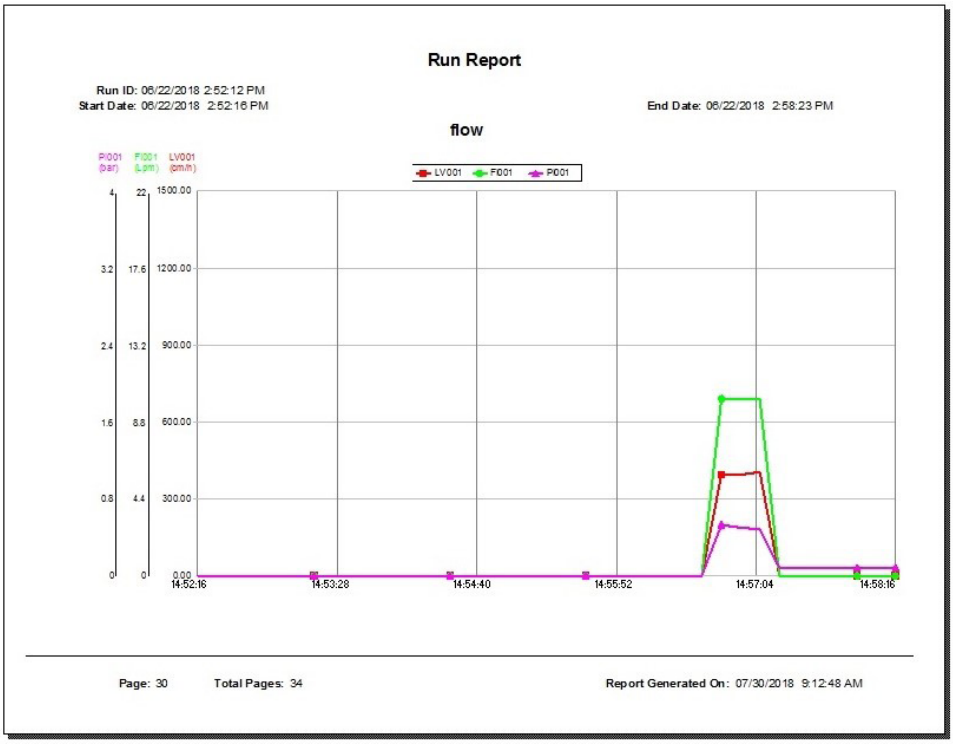
Analog Data Report



Printing Reports

To print the report to the default printer, click the Print Report button on the top left corner of the Report Generator form. Saving Reports

A report can be saved in different formats:

- RTF (*.rtf)
- Adobe® Acrobat® (*.pdf)
- Tab Separated (*.txt)

Select the desired format using the drop-down box in the upper left corner of the form and click the Save Report button.

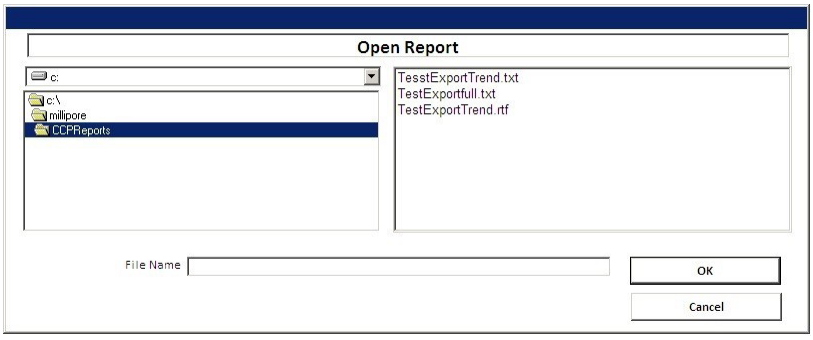
Note Tab Separated format contains only analog data and can be used to import data in an external application.

Exiting the Report Generator

To exit the report generator, click the Close button on the upper left corner of the form.

Opening an Existing Report

Existing reports can be opened within the CCP® Report Client by clicking the Open Report Icon or by clicking Reports menu and the Open Report menu item. The Open Report window opens.



To open a report, select the file from the list on the right side of the form and click OK. The File Name can be typed in the text box provided on the bottom of the form. The selected report is opened within the corresponding application.

Additional Features of Report Client Application

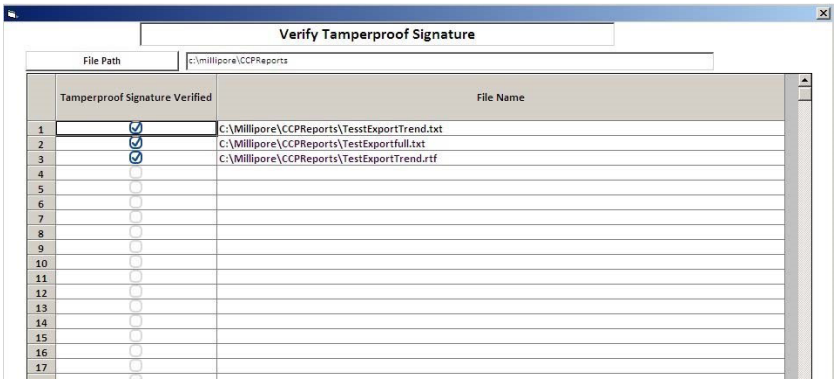
Enabling Keyboard or Touchscreen

The CCP® Report Client supports both a keyboard and a touch screen user interface. To switch between the two modes, click the keyboard/monitor icon or click the Tools menu and then the Toggle Popup Keyboard menu item. The monitor icon indicates that the touchscreen mode is active while the keyboard indicates that the keyboard mode is active.

Verifying Tamperproof Signatures

CCP® software keeps track of unauthorized modifications to archived report files. When report files are created within CCP® software, the system codes the file in a way that prevents unauthorized changes from going unnoticed.

To check which archived reports have been modified, click the Verify Signature icon or click the Tools menu and then the Verify Tamperproof Signature menu item. Either action will launch the Verify Tamperproof Signature form.

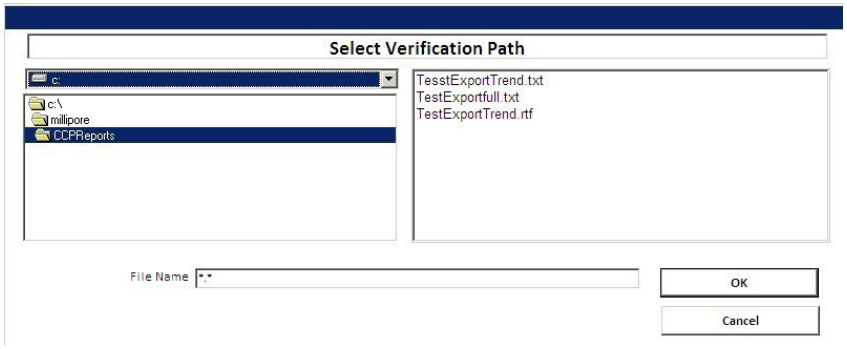


The files with the check marks are the original files created by CCP® software using the unalterable raw data archived during the run. The unchecked report files were altered in some way by software outside the CCP® system.

Note CCP® software considers ALL types of alterations to be tampering.

To check the integrity of the files residing in different locations within the available drives and folders, click the File Path button located on the top left corner of the Verify Tamperproof Signature form.

The Select Verification Path dialog box appears. Use the drive and folder list controls on the left side of the form to browse over the available drives and folders.

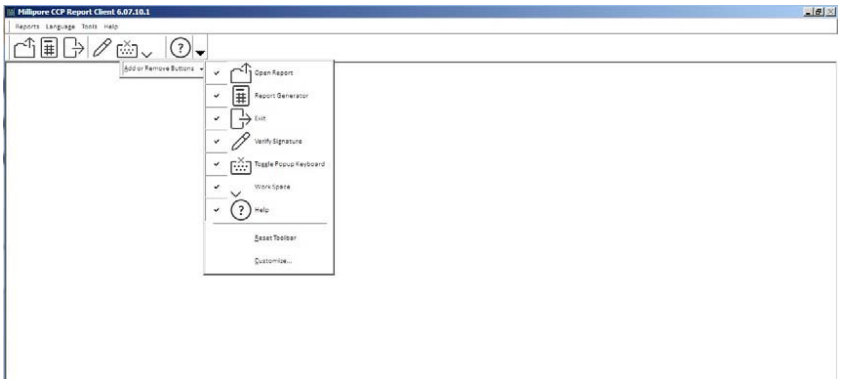


Once a path has been selected, click OK and the verification results will be displayed in the Verify Tamperproof Signature form. The selected file path is also updated on the gray text box located on the top part of the Verify Tamperproof Signature form.

To close the Verify Tamperproof Signature form, click the Close button.

Customizing the Report Client Menu Bar

The user interface may be customized by clicking on the black arrow located on the tool bar. The user can add or remove icons, menus or menu items, as shown below.



Historical Trend Display

Introduction

The Historical Trend Display helps the user monitor the performance of the process. The basis of the Historical Trend Display is the Chart Group File, which contains a list of tag names for which data is being collected. When a given Chart Group File is selected for display, the data specified by the tag names in that file will be displayed in the Historical Trend Display. The data for each tag name is represented by a distinctive individual trace, which is referred to as a Pen.

Chart Group Files which define the Historical Trend charts may be created.

At any time, a Chart Group File can be modified or a new one created to examine data in a different format or at a different time.

Through the Historical Trend program, create and modify display charts by assigning:

- Colors and optional markers for each tag name for enhanced readability
- High and low limits for display of each tag
- A time span for the display chart that can be shifted on demand
- Different line styles for the tags
- A display legend

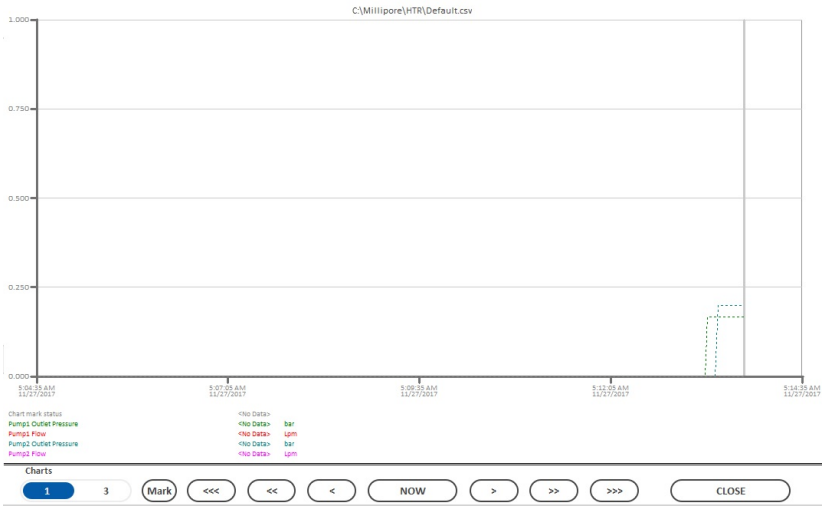
The Historical Trend chart groups are stored as *.csv files. The following is an example of the format using the default system path:

XMO4 by Chrom20

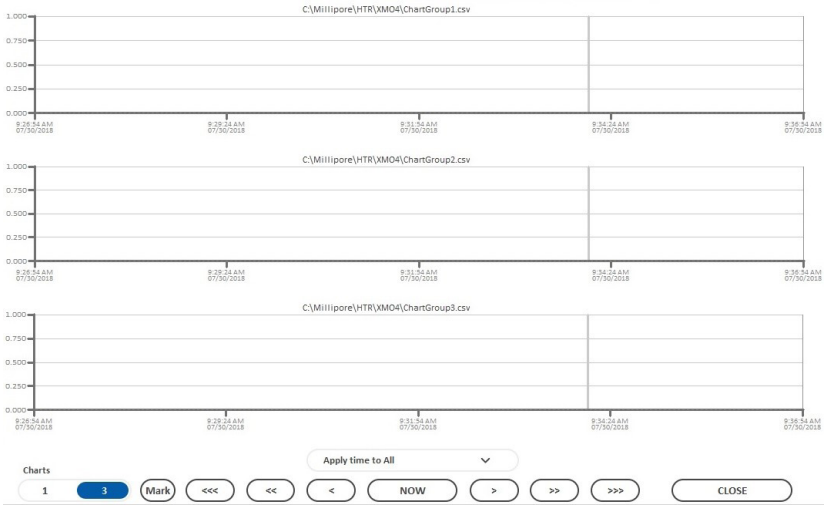
Opening the Historical Trend Display

To open the Historical Trend display, click on the related symbol of the Process Control Bar:

	When the Historical Trend Display is not visible, clicking on the « Trends » symbol allows to open it.
	Once opened, the Historical Trend Display can be maximized by clicking the « Maximize » symbol
	Once maximized, the Historical Trend Display can be minimized by clicking the « Minimize » symbol.



The maximized displayed can either show one single trend chart or three stacked charts.



Note A specific chart group can be selected for each trend.

Symbol	Description
1 3	Select either 1 single chart or three stacked charts
Apply time to All	Gives access to the following choices: • Apply time to All • Apply time to chart 1 • Apply time to chart 2 • Apply time to chart 3 The above arrow buttons allow time navigation within the selected charts.

The Historical Trend display displays, creates and modifies the Historical Trend charts. The Historical Trend display includes:

- A data description list with the specific color code.
- The X-axis has the date and time stamp.
- The Y-axis tick marks are configurable. Clicking on a particular data grouping the data description list causes the range and color of that data to be displayed on the Y-axis.
- Drag the marker bar across the chart to display the value of the various data at a given point in time.

Chart Group File

The basis of the Historical Trend is the Chart Group. The Chart Group File is a *.csv file containing a list of database tag names for which data is being collected. Chart Group files are located in the folder: XMO4 by Chrom20. When a chart group file is selected, the data in the selected chart group will be displayed in the Historical Trend display.

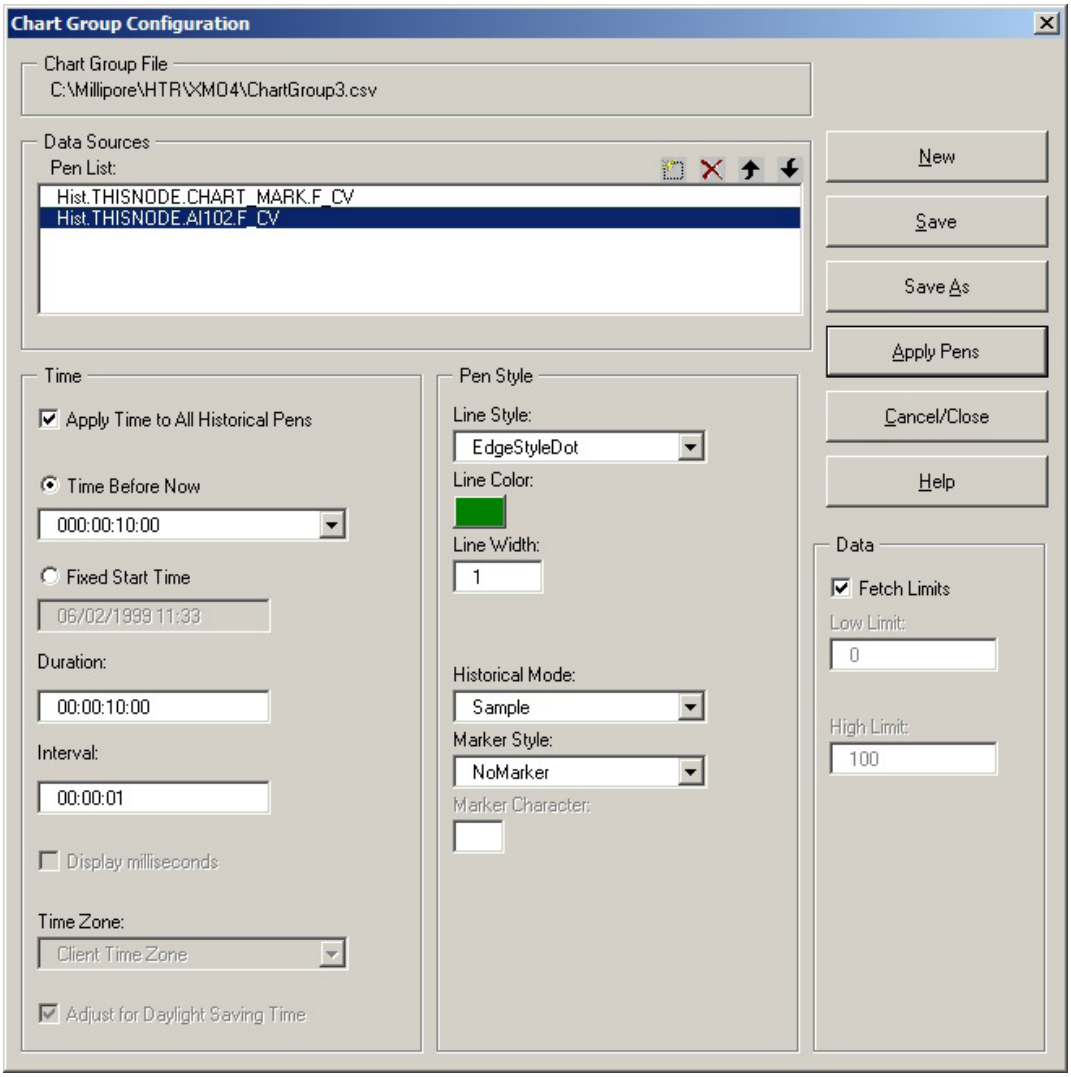
The system has a default chart group file: Default.csv. The table below lists the data included in this file.

Data Description	Pen	Color
Chart Mark	EdgeStyleDot	

Custom Group Files

A variety of custom Chart Group Files, defining a variety of Historical Trend charts, which can be examined to determine how the process was performing at any point in time can be created.

At any time, a Chart Group File can be modified or a new one created to examine data in a different format or at a different time.



To create a new chart group file, click the New button in the Chart Group File window. This launches the Chart Group Configuration window. Chart Group Configuration Window Structure.

Section	Functionality
Chart Group File	Lists the name of the chart group file that is being configured
Data Sources	Displays the pen list of the current chart group file. Allows the user to select additional data (pens) from the Historical Database
Time	Sets the time limits (X-axis range) for the data display
Pen Style	Defines the style of the Trend line for a particular pen
Data	Sets up high and low limits (Y-axis range) for the data value
Action Button	Controls for saving, canceling and managing the configured chart file

Chart Group File

When an existing Chart Group File is chosen, the name of the file and directory path will appear in the Chart Group File area.

If a new chart group file is being created, the string “no file” will appear in the Chart Group File area.

Data Sources: Pen Selection and Editing

The Data Sources section is for adding, removing and editing pens. There are four buttons to carry out these tasks.

Clicking the Add Pen button opens three additional buttons and a pen selection field.

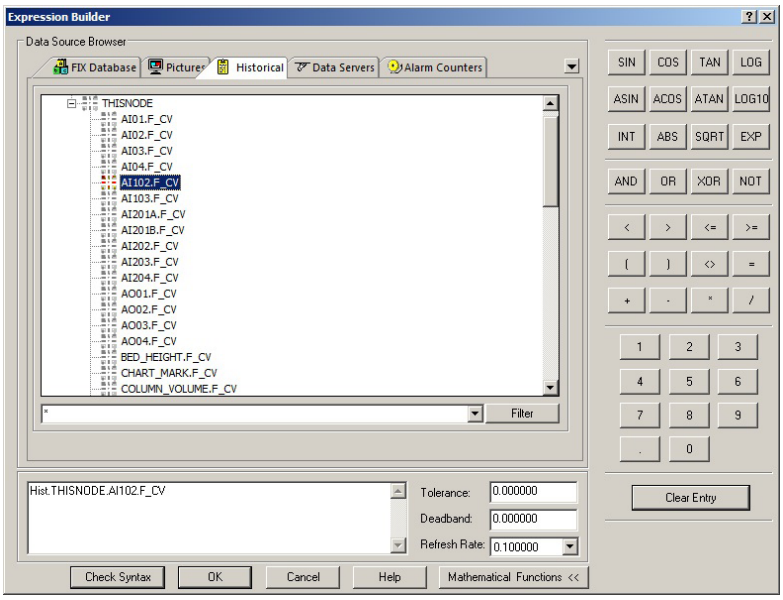
Pens can be added either from the existing pen list or from the historical database. The historical data pens have the format: Hist. Node.Tag.Field Note:

iFix® software pens default as Fix32.Node.Tag.Field. Look at the Historical database with pens that have the format as follows: Hist. Node. Tag.Field. See the next section for details.

1. Click on the drop-down sign to list the existing pens.

2. Click on the gray button to launch the Expression Builder window. Using the existing pen list, click the pen on the list, highlighting it. Then click on the white space in the Pen List and the software will add the selected pen to the list.

Using the Expression Builder Window



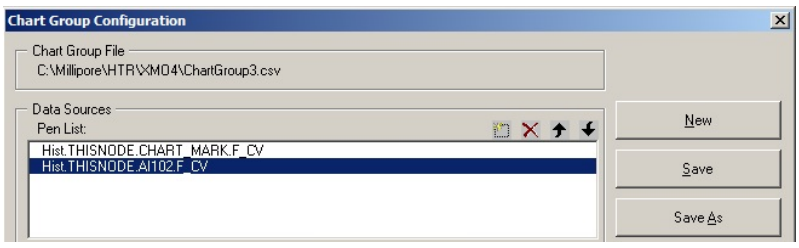
The Expression Builder window has five tabs. Only the Historical tab is needed. Clicking the Historical Tab button opens the historical database with the list of historical assigned and collected pens.

To add a pen using the Expression Building Window:

1. Click on the folder Hist and then click on the folder NODE. This will display a long list of the pens that can be chosen to display in the Historical Trend display in the process User Interface.

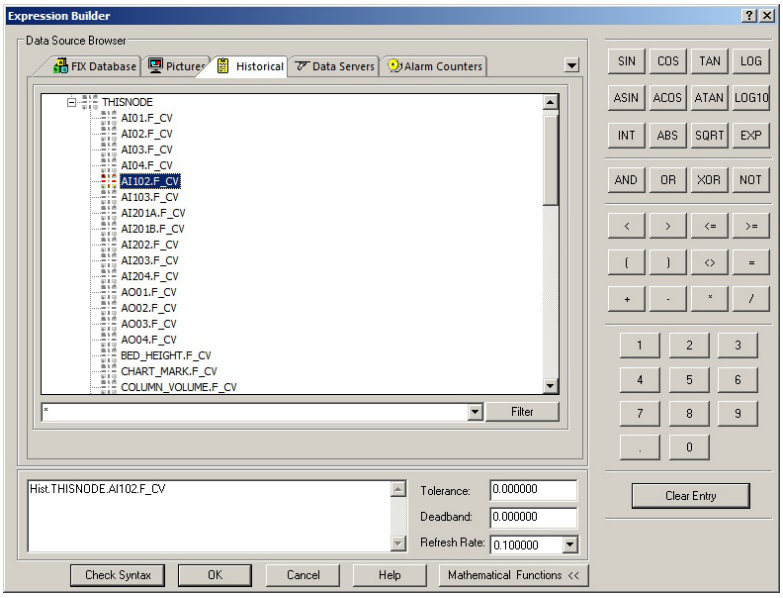
2. Click on a pen to select it. The selected pen will be highlighted and will be listed at the bottom of the window.

3. Click the OK button to return to the Chart Group Configuration window. Clicking in the white space of the Pen List will cause the selected pen to be added to the Pen List.



Filter	The Filter button is used to filter the data source by Node, Tag, etc.
Mathematical functions	Provides a keypad with basic and Boolean math functions.
Tolerance	Specifies the current connection's rounding factor.
Deadband	Specifies the maximum fluctuation you want for the current value before iFix® software updates it. This creates a +/- zone around the current value. As long as the value is within this range, iFix® software does not update the value.
Refresh	Specifies the rate at which iFix® software updates the current value.

Mathematical Function Keypad

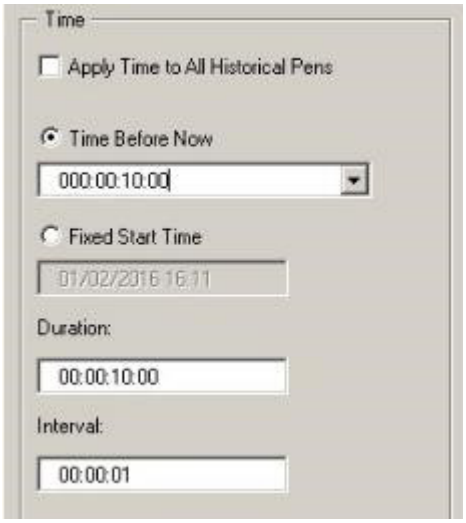


Editing the Pen List

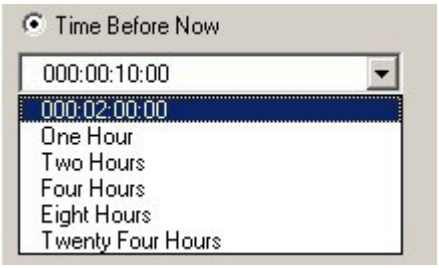
Use the Remove button to remove an existing pen from the pen list. Use the Move Pen Up or Move Pen Down button to change the position of a pen in the pen list.

Time: Setting Time Range for the Pens

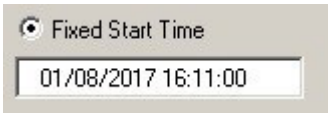
The Time section of the Chart Configuration window allows the user to set the time range for pens. If the Apply Time to All Historical Pens box is checked, the time setting will be applied to all the pens in the Group Chart File pen list. If this check box is left empty, the time setting will only apply to the pen that is configured.



Time Before Now has a drop-down menu that allows the user to choose the time period from current time. There are five choices: One hour, Two hours, Four hours, Eight hours and Twenty-Four hours.



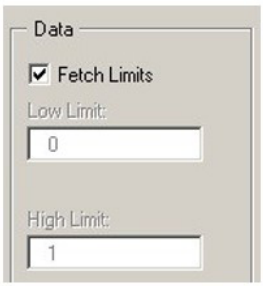
Fixed Start Time uses the fixed start time or sets a start time. Clicking the Time field opens the keyboard.

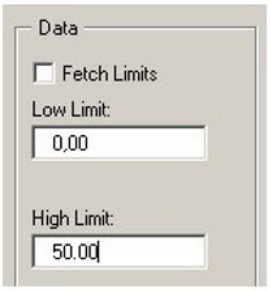


The Duration box chooses the duration time for the data display. Clicking the Duration data field opens the keyboard. The maximum duration time is 99:99:99:99.

Data: Setting Limits

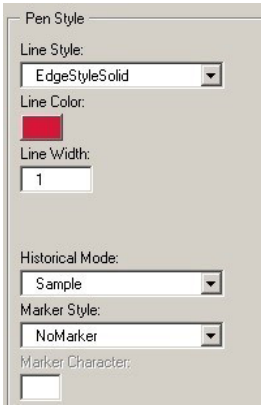
The Data section in the chart group configuration window is used to set the value (Y-axis) range for the selected pen. If the Fetch Limits box is checked, the data range will automatically be set as the default analog data range. If the Fetch Limits box is unchecked, the limits can be configured.





Pen Style: Selecting Appearance

The Pen Style section is used to choose the appearance of a pen in the Historical Trend display.

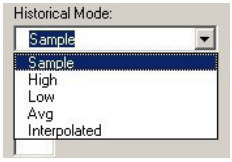


Line Style Drop Down Menu

When the Line Style drop down menu is highlighted, the selected style will be used to display the data profile line.

Historical Mode Drop Down Menu

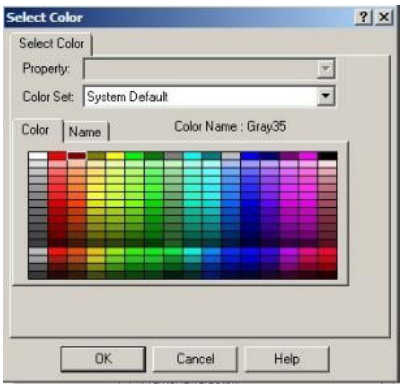
The Historical Mode drop down menu is used to choose the way the data is displayed. Typically, the Sample option is used. Sample will display the historical data according to user's data settings. High displays a straight line that has the highest value of the historical data over the selected time span. Low displays a straight line that has the lowest value of the data over the selected time span. Avg displays a straight line that has the average value of all the historical data points during that time period.



Marker Style Drop Down Menu

The Marker Style drop down menu is used to configure the marker shape of the individual data points.

The Line Color button defines the color of the data profile lines. Clicking the Line Color button opens a color palate that is used to select the desired pen color. Clicking the OK button applies the color to the pen.



The Line Width box defines the thickness of the line. The user can change the number in the Line Width box. A higher number denotes a thicker line.

Action Buttons: Completing the Configuration

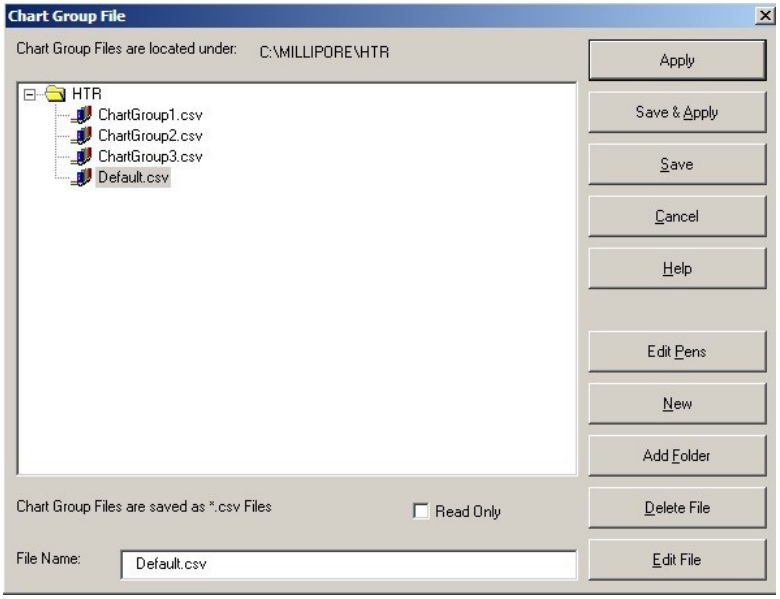
When finished with the configuration of the Chart Group File, use the action buttons to save the file or to directly apply the pen selected and configured.

Action Buttons in Chart Group Configuration window

Button	Action
New	Clicking the New button opens a confirmation Chart Group Wizard window.
Apply Pens	The configuration of the pen is applied to the Historical Trend display. The file will NOT be saved.
Cancel/Close	Cancels the pen configuration and closes the Chart Group Configuration window, without saving any selections.
Help	Provided by the iFIX® software package and is of limited utility for the user.
Save and Save As	Launch the Chart Group File window to save the file. Typing the name of the file at the bottom of the window and clicking the Save button will cause the file to appear in the file list.

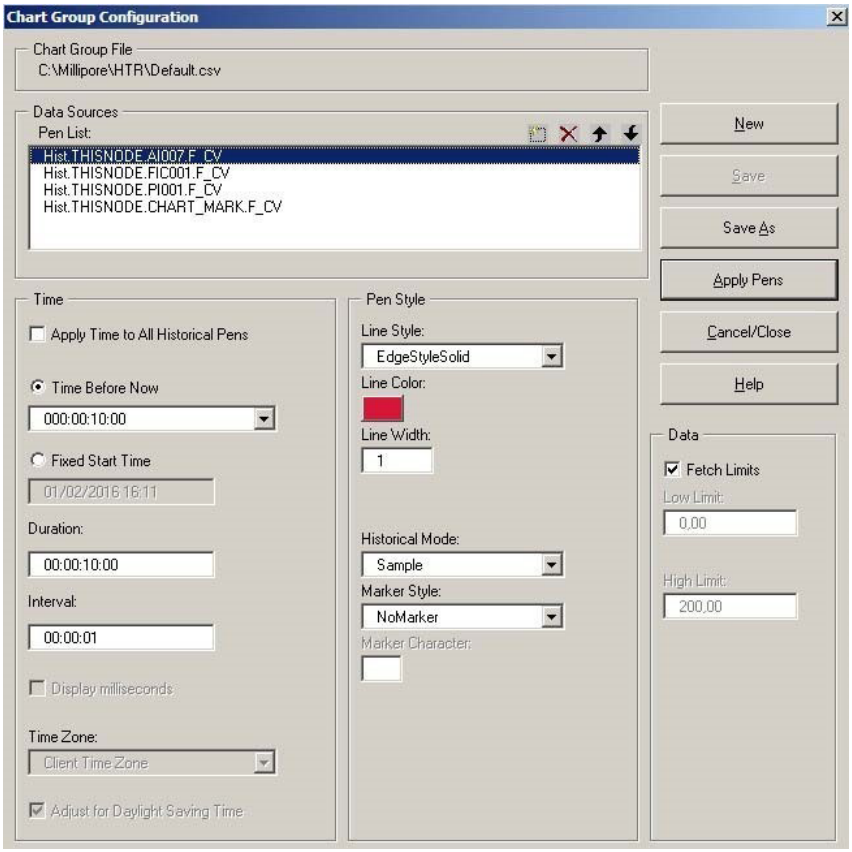
Editing a Chart Group File

To edit a chart group file, double click the Historical Trend display. This opens the Chart Group File window.



From the Chart Group File window, select the file to edit and then click the Edit File button.

This will launch the Chart Group Configuration window.



In the Chart Group Configuration window:

1. The name of the file that will be edited appears in the Chart Group File section, e.g., XMO4 by Chrom20.

2. All the pens included in the file are listed in the Data Sources section. Use the Pen Edit buttons to add or remove a pen or adjust its position up or down.

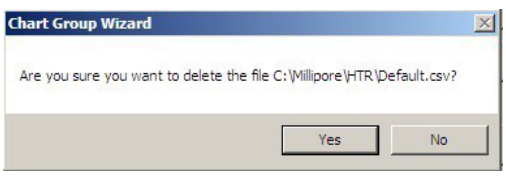
- Use the Time section to set up pen's time duration.
- Use the Data section to set limits for the data represented by the pen.
- Use the Pen Style section to adjust the pen's appearance.
- Use the Action buttons (Save or Save As) to save the modified files.

Deleting a Chart Group File

1. Select the file to be deleted from the file list at the Chart Group File window.

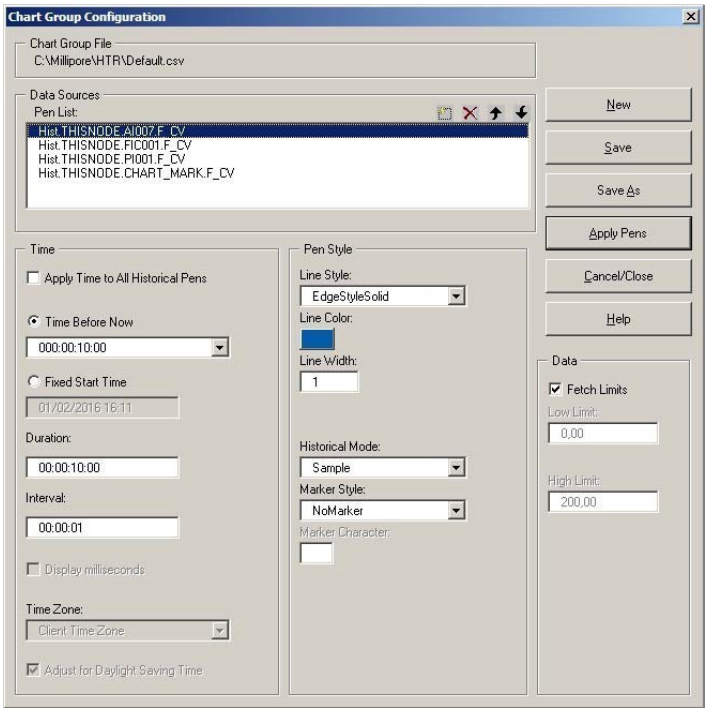
2. Click the Delete File button. A confirmation prompt will appear.

3. Clicking the Yes button will delete the selected file.



Editing Pens

1. Click the Edit Pens button in the Chart Group File window. This will launch the Chart Group Configuration window. If the required pen is not on the list, the user will have to open the list of all the pens.



2. Clicking the Add Pen icon opens the drop-down menu sign and displays the list of the existing pens.

3. Select the pen to edit from the list. Use the features of different sections of the Chart Group Configuration window to edit the pen's time duration, data limits, appearance, etc.

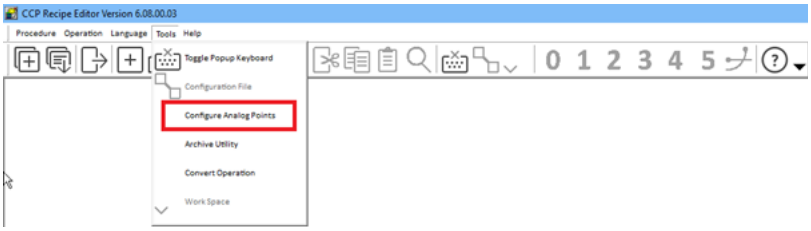
4. After editing the pen, the user can save the new configuration to a new file or directly apply the pen without saving the file by clicking the Apply Pens button.

Note The Help button in the Chart Group Configuration window is part of the iFIX® software package. Its menu includes topics that relate to configuring the design of the chart group using the iFIX® software package and is of limited utility to the user.

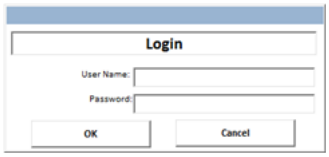
Analog Scaling

The EGU scaling and EGU units can be modified using Configure Analog Points tool from the CCP Recipe Editor application (see Recipe Editor chapter for further details).

Start the Configure Analog Points tool by clicking on the Tools\Configure Analog Points menu.



This feature is password protected and is synchronized with the Windows Security system. Any member of CCP Users and CCP Administrators can be logged in.

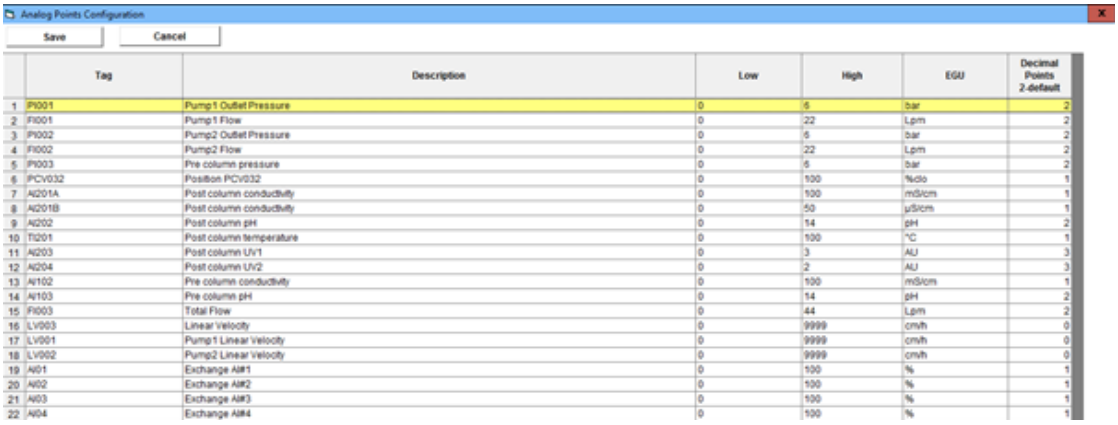


The following columns are displayed in the screen for configured Analog Inputs:

- Grid Row number (read-only)
- Tag – name used by the SCADA system for this input (read-only)
- Description - any text up to 40 characters (read-only)
- Range LO – lowest permissible value corresponding to the 4mA of the Input sensor (read-write)
- Range HI – highest permissible value corresponding to the 20mA of the Input sensor (read-write)
- EGU – any text to define an Engineering Unit up to 6 characters (read-write)
- Decimal Points – number of decimal places to be displayed in iFIX. The maximal size of the value is 5 characters, dot included (read-write)

Example 1: for a value in a scale of 0 to 100, the decimal points is 1 to obtain 0.0 to 100.0

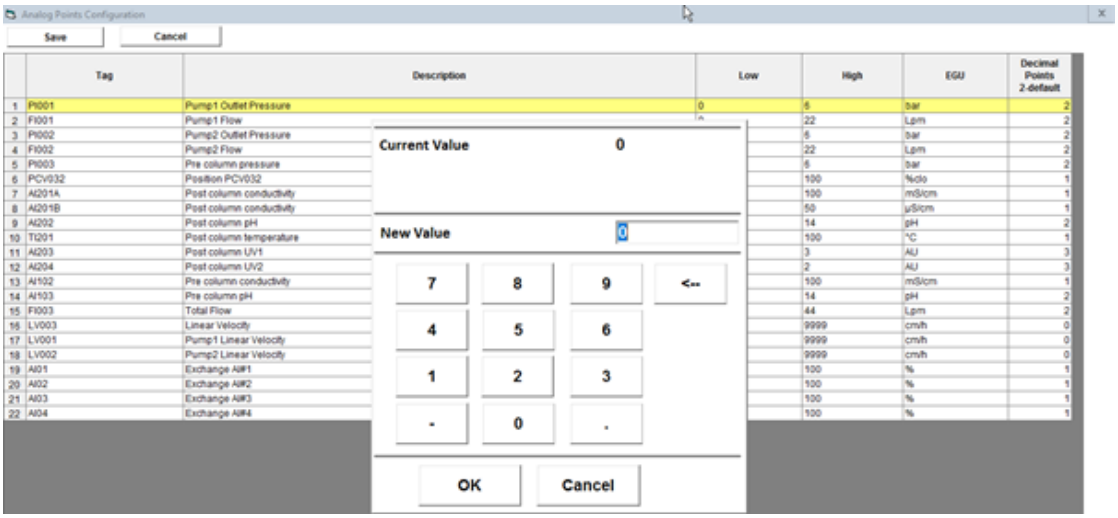
Example 2: for a value in a scale of 0 to 9999, the decimal points is 0 because “9999” contains 4 characters (5 characters with the dot, so no enough space to add a decimal).



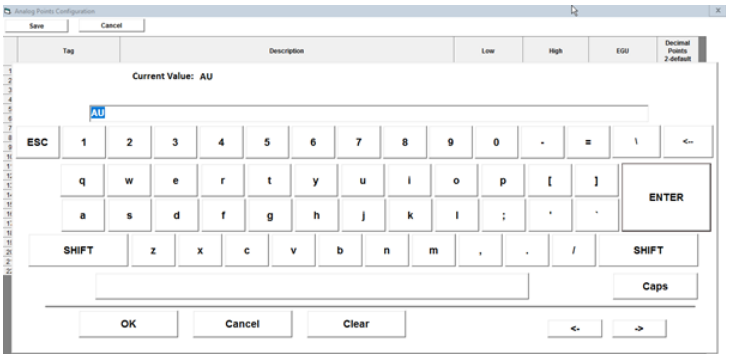
	Tag	Description	Low	High	EGU	Decimal Points 2-default
1	PI001	Pump1 Outlet Pressure	0	6	bar	2
2	FI001	Pump1 Flow	0	22	Lpm	2
3	PI002	Pump2 Outlet Pressure	0	6	bar	2
4	FI002	Pump2 Flow	0	22	Lpm	2
5	PI003	Pre column pressure	0	6	bar	2
6	PCV032	Position PCV032	0	100	%clo	1
7	AI201A	Post column conductivity	0	100	mS/cm	1
8	AI201B	Post column conductivity	0	50	µS/cm	1
9	AI202	Post column pH	0	14	pH	2
10	TI201	Post column temperature	0	100	°C	1
11	AI203	Post column UV1	0	3	AU	3
12	AI204	Post column UV2	0	2	AU	3
13	AI102	Pre column conductivity	0	100	mS/cm	1
14	AI103	Pre column pH	0	14	pH	2
15	FI003	Total Flow	0	44	Lpm	2
16	LV003	Linear Velocity	0	9999	cm/h	0
17	LV001	Pump1 Linear Velocity	0	9999	cm/h	0
18	LV002	Pump2 Linear Velocity	0	9999	cm/h	0
19	AI01	Exchange AI#1	0	100	%	1
20	AI02	Exchange AI#2	0	100	%	1
21	AI03	Exchange AI#3	0	100	%	1
22	AI04	Exchange AI#4	0	100	%	1

To change a value, click on the cell. A popup is displayed to fill a value.

For a number:



For a string:



Pressing the Save button will initiate a sequence of updating of the Configuration file (*.cfg), PLC configuration and SCADA configuration. A record will be logged into the SQL Database.

Pressing the Cancel button allows to close the tool without making any changes.

Installing the Mobius® Chrom 20 with Flexware® Assemblies

Introduction

Before installing any Mobius® Chrom 20 with Flexware® Bag Assembly, verify that the Base and the Pump Cart are located on a level surface, locked together, and wheel locks are engaged. Power to the system should be ON.

Install and connect required and optional Flexware® assemblies in the order presented in this guide.

Tighten all connections prior to each process run

Flexware® assemblies are packed in double polyethylene bags. To open the packages:

1. Place the carton boxe on a flat surface.
2. Cut the tape carefully to not damage any double polyethylene bags.
3. Place the packaged Flexware® assemblies on a flat surface away from any sharp edges
4. Cut the packaging on the edge. Do not cut through any of the Mobius® Chrom 20 with Flexware® Bag Assembly components.

Note End connections are covered with either a cap or a dust bag to prevent contamination of the flow path. Do not remove the covering until connecting the assemblies on the system.

After installation, ensure that there are no bends or kinks in the tubing.

Installing the Mobius® Chrom 20 System with Flexware® Assemblies

This section details the installation of the Mobius® Chrom 20 System with Flexware® Assemblies that must be installed onto the Base before any connections can be made. The next section details connecting all the Flexware® Assemblies used on the system.

Assembly numbers in this section are highlighted in **RED**.

Flexware® connection tags are highlighted **GREEN**.

Mobius® Chrom 20 System with Flexware® Assemblies

Install core and optional Flexware® assemblies in the order presented here:

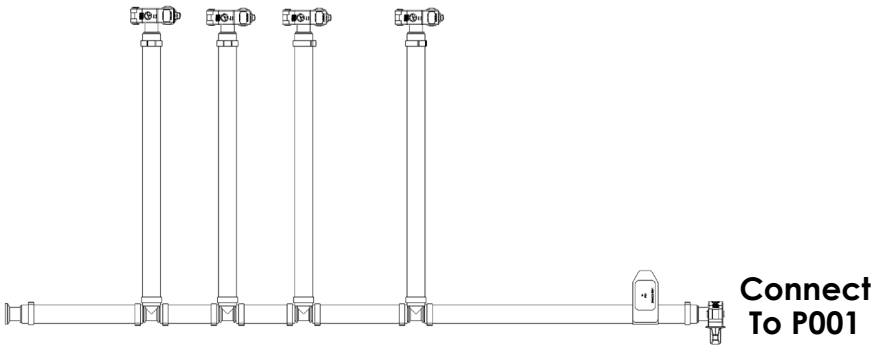
Order of Installation/ Connection	Description	Catalog Number	Connection Tag	Core or Option
1	Pump 1 Bottom Manifold Assembly	XM4P1MTC XM4P1MTC	TO P001	Core
2	Pump 2 Top Manifold Assembly	XM4P2MTC	TO P002	Core
3	Pump Assembly	DISPUMP2	none	Core
4	SU Flowmeter Assembly	XM4P1FLWSU XM4P2FLWSU	V, W	Core
5	Bubble Trap Assembly	XM4BUBBL	C, D, F	Core
6	Precolumn Filter Assembly	XM4FILT001	H, I	Option
6	Precolumn Filter Assembly Bypass	XM4PREFLT001BP	H, I	Option
7	Flexware® Clamshell Assembly	XM4SMART	V, W, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S	Core
8	Precolumn Instrument Assembly	XM4PRESU	J, K	Option
8	Precolumn Instrument Bypass Assembly	XM4PRESUBP	J, K	Option
9	Post Column Instrument Assembly	XM4PSTSU-1 XM4PSTSU-2	Q, R	Core
10	Chromatography Column Assembly	XM4CMASM	L, S, T	Option

Consult your local representative for additional Flexware® assemblies.

Installing Mobius® Chrom 20 System with Flexware® Assemblies for Chromatography Pump 1 Bottom Manifold Assembly onto the Manifold

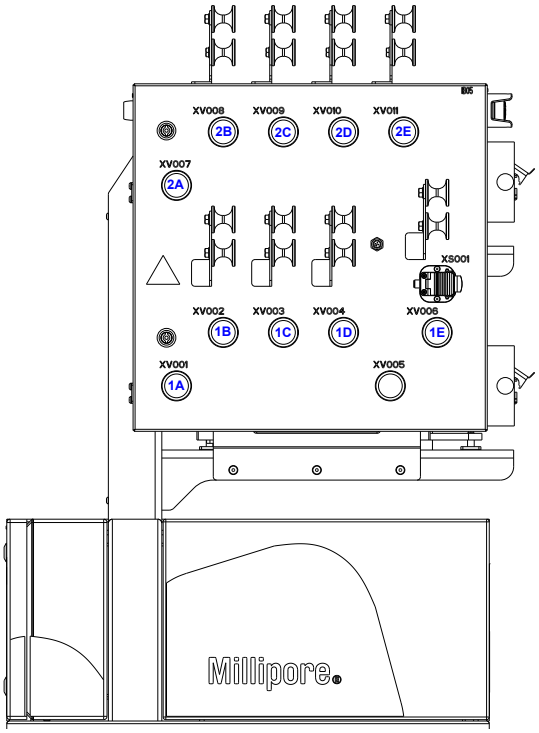
XM4P1MTC

The Pump Manifold Assemblies are available with TC fittings. All fittings are shipped with a cap installed. These caps must be removed when installing the assemblies onto the system.



Pump Manifold Assembly XM4P1MTC

1. Unpack the manifold assembly



Manifold

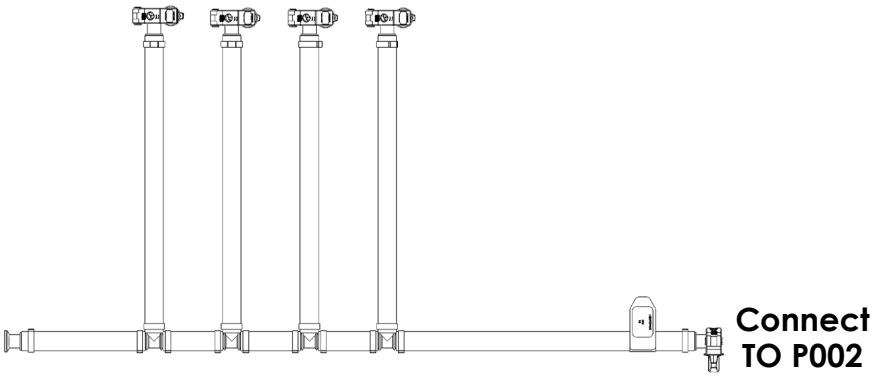
2. Using the touch screen, open valves XV001, XV002, XV003, XV004, XV005, XV006 or use the Open All Valves button.
3. Install the tubing into the opened pinch valves on the manifold from the right to the left
4. Using the touch screen close the pinch valves XV001, XV002, XV003, XV004, XV005, XV006 or use the Close All Valves button.
5. Once the assembly is installed, open the cover of the end product air sensor XS001 and push the Mobius® Chrom 20 with Flexware® Bag Assembly into the sensor. Close the cover.

Warning Ensure that the air sensor is operational before installing the flexware.

Installing Mobius® Chrom 20 with Flexware® Assemblies for Chromatography Pump 2 Top Manifold Assembly onto the Manifold

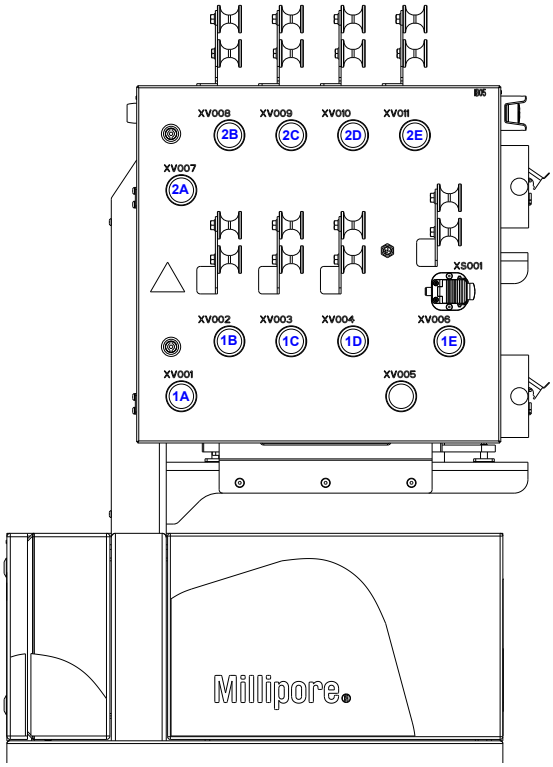
XM4P2MTC

The Pump Manifold Assemblies are available with TC fittings. All fittings are shipped with a cap installed. Remove the covering just before connecting the flow path to the system.



Pump Manifold Assembly XM4P2MTC

1. Unpack the manifold assembly



Manifold

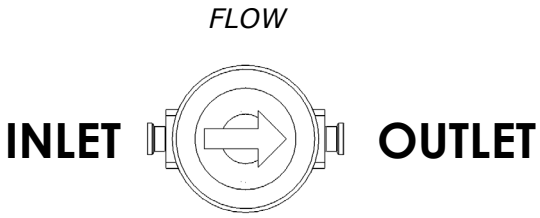
2. Using the touch screen, open valves XV007, XV008, XV009, XV0010, XV0011, or use the Open All Valves button.
3. Install the tubing into the opened pinch valves on the manifold from the right to the left.
4. Using the touch screen close the pinch valves XV007, XV008, XV009, XV0010, XV0011 or use the Close All Valves button.

Installing the Pump Heads onto the Pumps

DISPUMP2

1. Remove the stainless steel flange (if present) from the pumps.

2. Note the flow direction on the pump heads and install the pump heads on the pumps so that the inlet is on the left.



Installing the pump heads

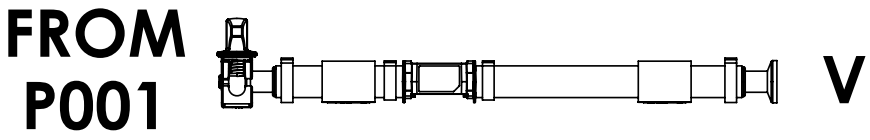
3. Place the stainless steel flange on the pump head and install both units onto the pump using the four longer screws that were supplied in a bag with the system.

4. Tighten the four screws with no. 5 Allen wrench (at 8Nm).

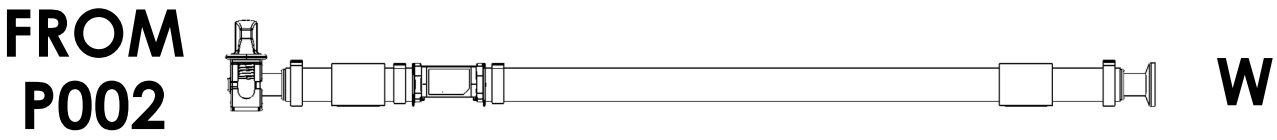
5. With the gasket in place, connect the manifold tubing labeled **TO P001** to the inlet of pump P001 Install the TC clamp over the fittings and tighten the clamp.

6. With the gasket in place, connect the manifold tubing labeled **TO P002** to the inlet of pump P002 Install the TC clamp over the fittings and tighten the clamp.

Installing the SU Flowmeter Tube



Flowmeter Assembly XM4P1FLWSU

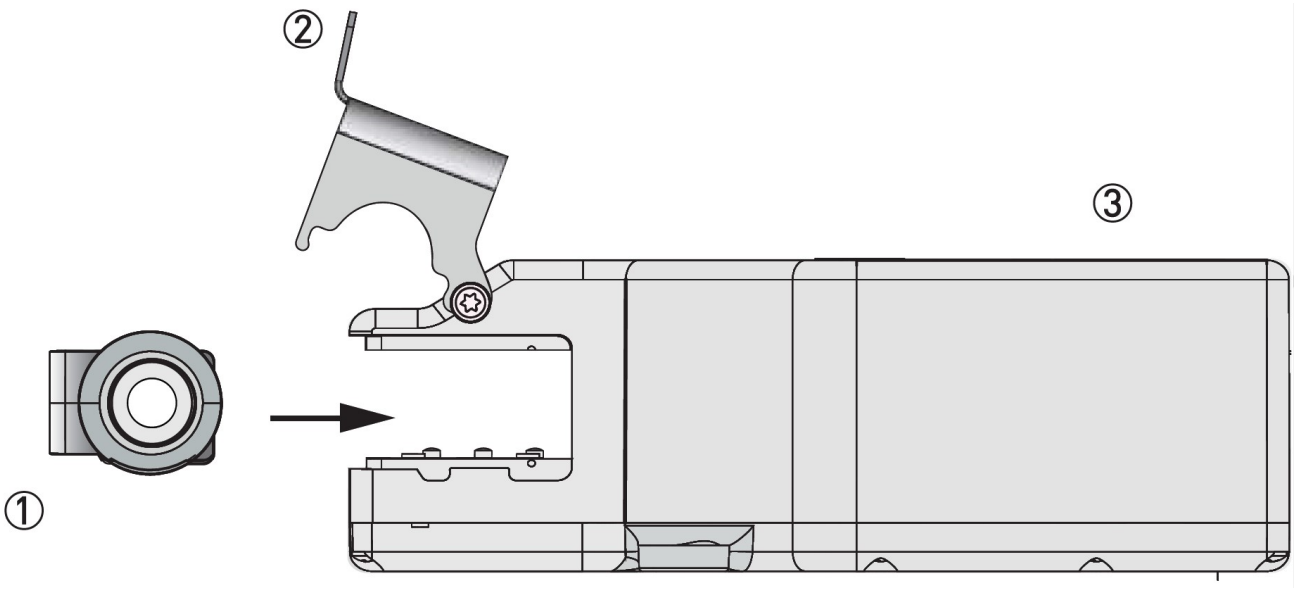


Flowmeter Assembly XM4P2FLWSU

The flowmeter supports (including the transmitter) must be installed onto the pump support. The SU flowmeter assemblies will be connected to the Flexware® Clamshell Assembly later.

XM4P1FLWSU must to be connected to P001 and XM4P2FLWSU to P002.

1. Open the clamp (2).
2. Move the tube (1) of the SU flowmeter Assembly XM4P1FLWSU in a horizontal direction into the transmitter (3) until the tube is flush with the front side of the transmitter.

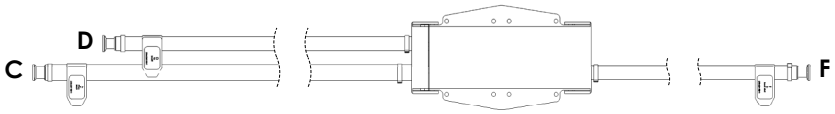


3. Turn the clamp (2) downward until the tube is locked by the clamp. This guides the tube to its proper position.
4. Remove the TC clamps from the SU flowmeter assembly inlet and outlet. With the gasket in place on the inlet of the flowmeter, connect the tube labeled From P001 to P001 SU pump head outlet.
5. Install the TC clamp over the fittings and tighten the clamp.
6. Repeat operations 1 to 5 for SU flowmeter on P002.
7. Enter both tubes K factor values into the HMI (refer to “Entering the K factor” section).

Installing the Bubble Trap Assembly

XM4BUBBL

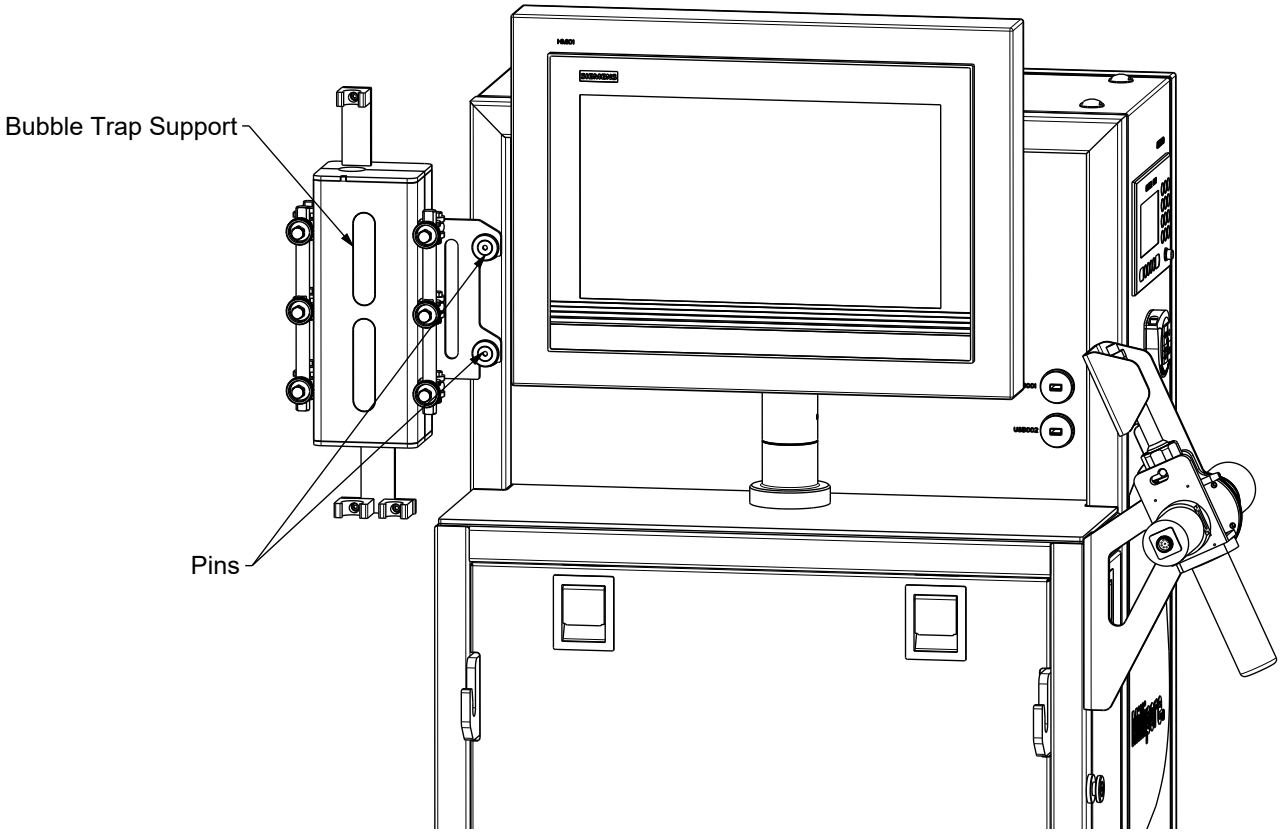
The Bubble Trap Support must be installed onto the Flexware® Base. The Bubble Trap Assembly will be connected to the Flexware® Clamshell Assembly later.



The Bubble Trap Assembly

1. Unpack the Bubble Trap assembly

2. Open the case by loosening the six screws. Install the bag in the holder on the base. The bottom of the bubble trap has an inlet port and an outlet port. The top of the bubble trap has one port, a vent port.

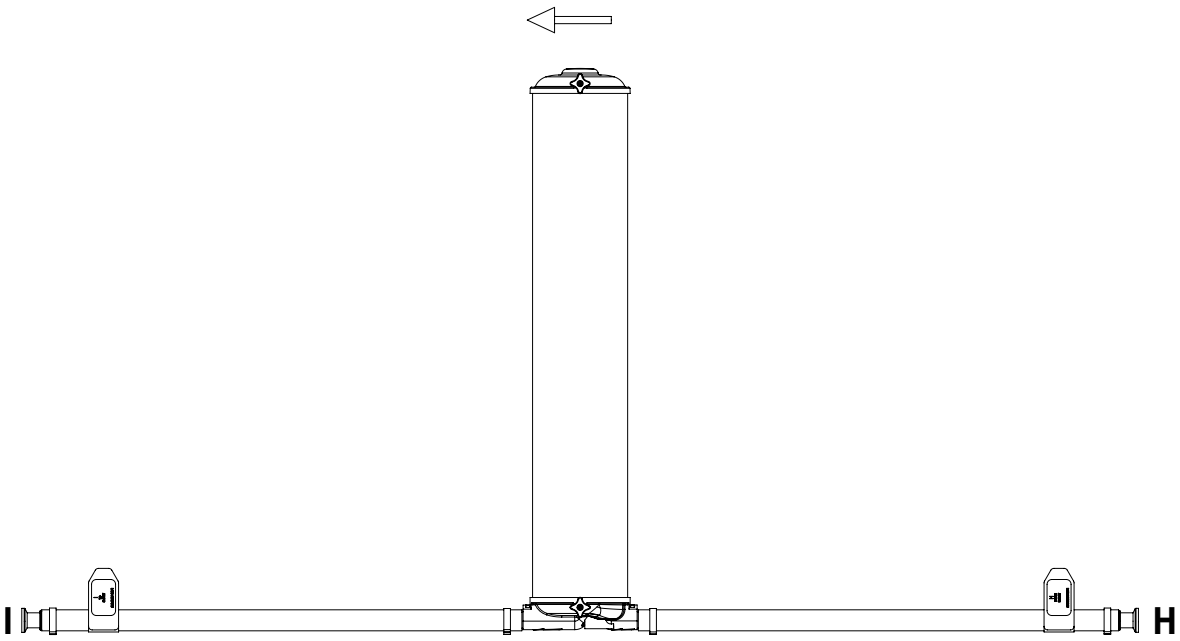


Bubble Trap Support

Installing the Precolumn Filter Assembly

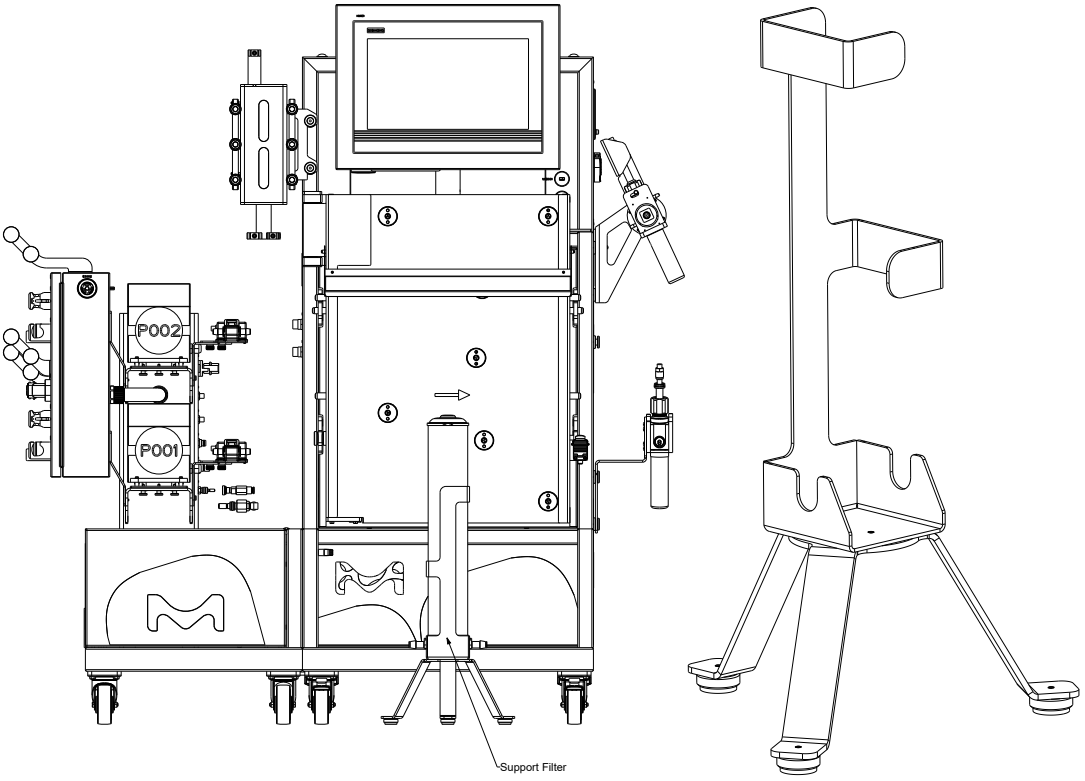
XM4FILT001

The Precolumn Filter Assembly must be installed onto the Flexware® Base. It will be connected to the Flexware® Clamshell Assembly later.



Filter Assembly XM4FILT001

1. Unpack the Precolumn Filter Assembly.
2. Note the flow direction indicated on the filter and install the filter on the support placed in front of the Flexware® Base.



Precolumn Filter Support

Installing the Flexware® Clamshell Assembly into the Clamshell

XM4SMART

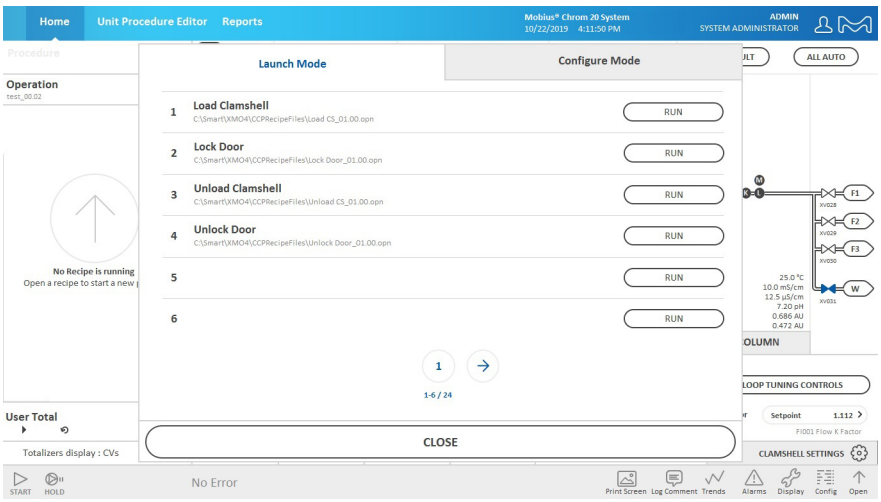
Note The Flexware® Clamshell Assembly can be used for 50 cycles (50 valve openings and 50 valve closings) per valve. The integrity of the installation may be compromised if used for more than 50 cycles.

The Flexware® Clamshell Assembly must be installed onto the Flexware® Base. It will be connected to the required assemblies later.

Refer to the Common Control Platform® Overview section of this manual for instructions on logging in to the system and navigating through the screens.

1. After logging on to the system, select the Recipe Pool Icon .

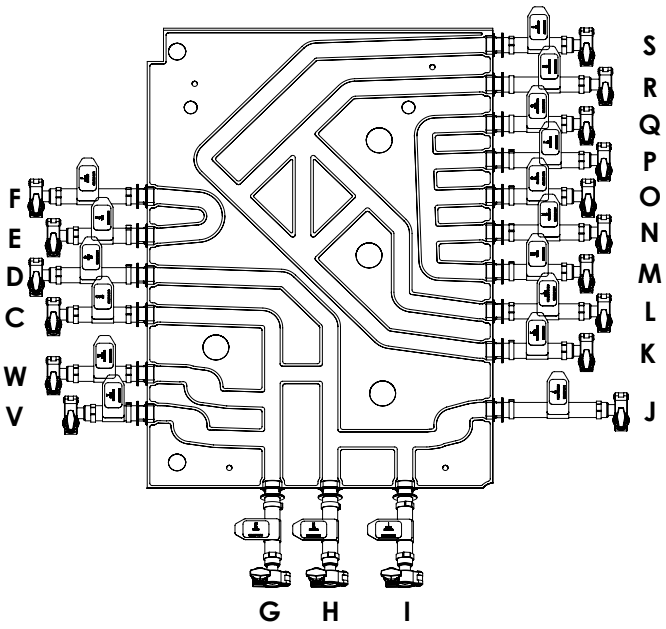
2. The Recipe Pool Launch Mode screen will appear. Select the Unlock Door recipe.



3. Click Run and the recipe will start.

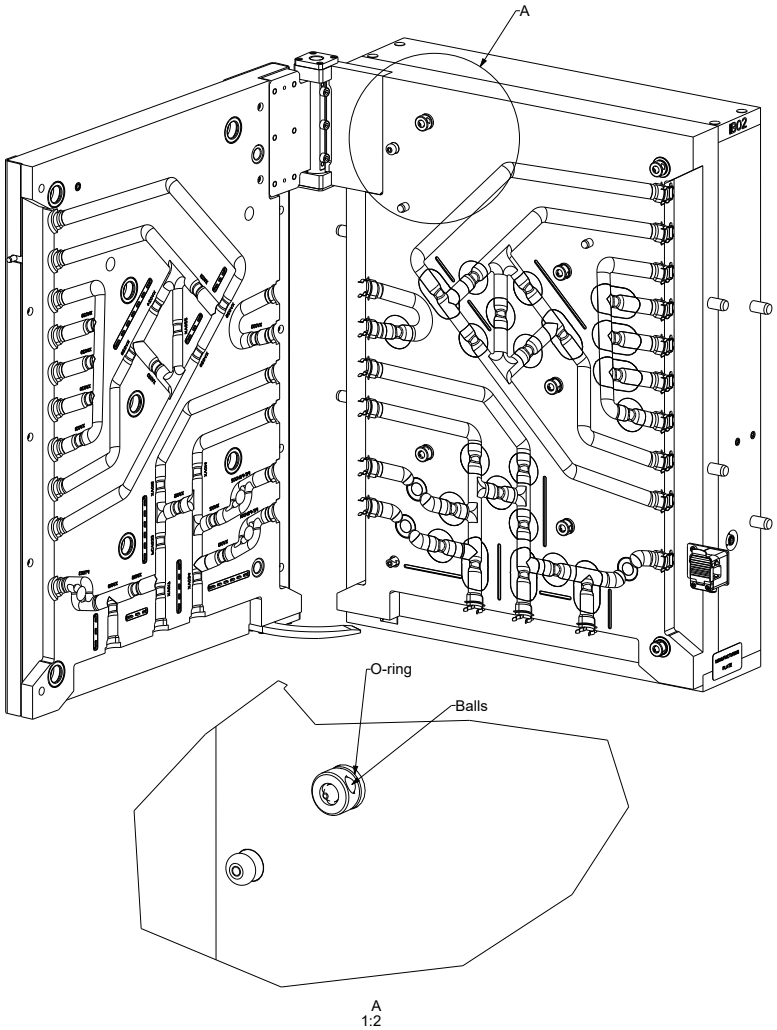
4. Once the door is open and recipe is complete, hang the container on the pins in the clamshell.

5. Install all fittings into the clips on the clamshell.

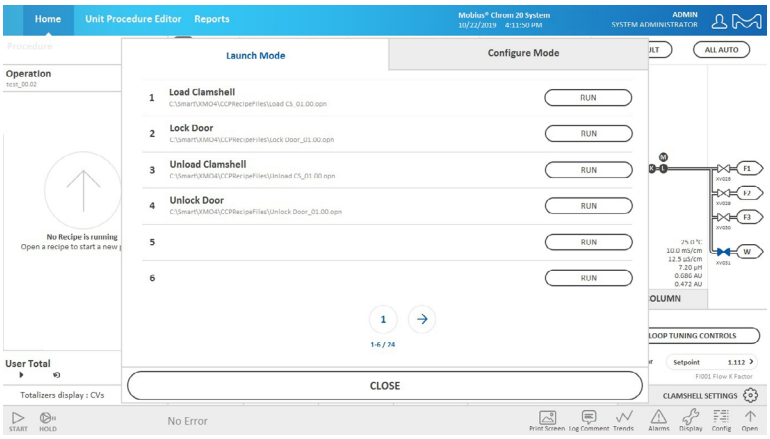


6. Open the cover of the Precolumn Bubble Sensor XS002 and push the Flexware® Clamshell Assembly tubing tagged J into the sensor. Close the cover.

7. Verify that the O-rings and stainless steel balls for door locks are in place.



8. Close the Flexware® Base door using the Lock Door recipe on the Recipe Pool screen.



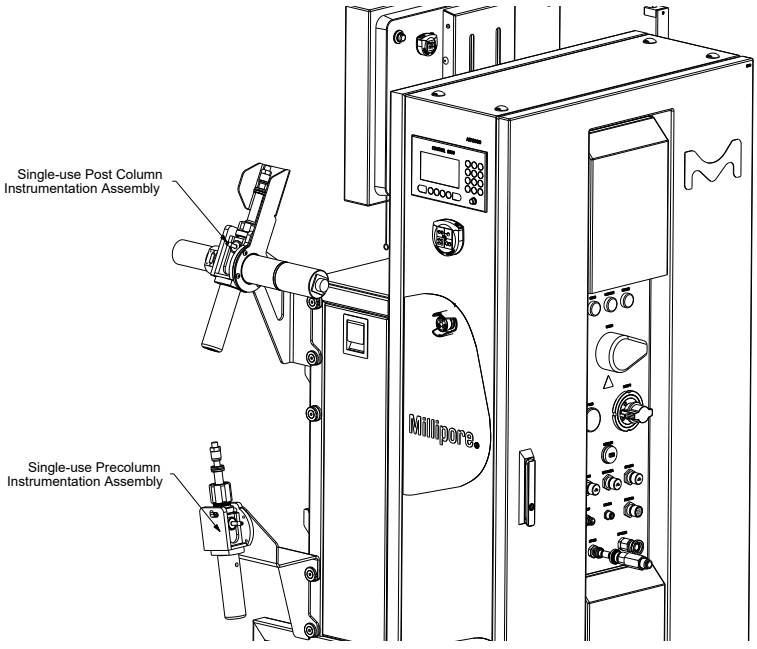
9. Hold the door closed on the top right corner of the Flexware® Clamshell Assembly until the recipe completes.

Installing the Single-use Precolumn and Post Column Instrumentation Assemblies

XM4PSTSU-1, XM4PSTSU-2, XM4PRESU

The Single-use Holder must be installed before installing the Mobius® Chrom 20 with Flexware® Bag Assembly. The Single-use Precolumn and Post Column Instrumentation Assemblies must be installed onto the Flexware® Base. They will be connected to the required assemblies later.

Refer to the assembly manufacturer's user guides for installation instructions.



Installing the Single-use Column Inlet and Outlet Assemblies

Warning pH probe must be calibrated (error in calibration manual entry will result in incorrect pH reading) and cleaned before inserting it into the assembly. Refer to the probe manufacturer's instructions for directions.

Connecting the Flexware®

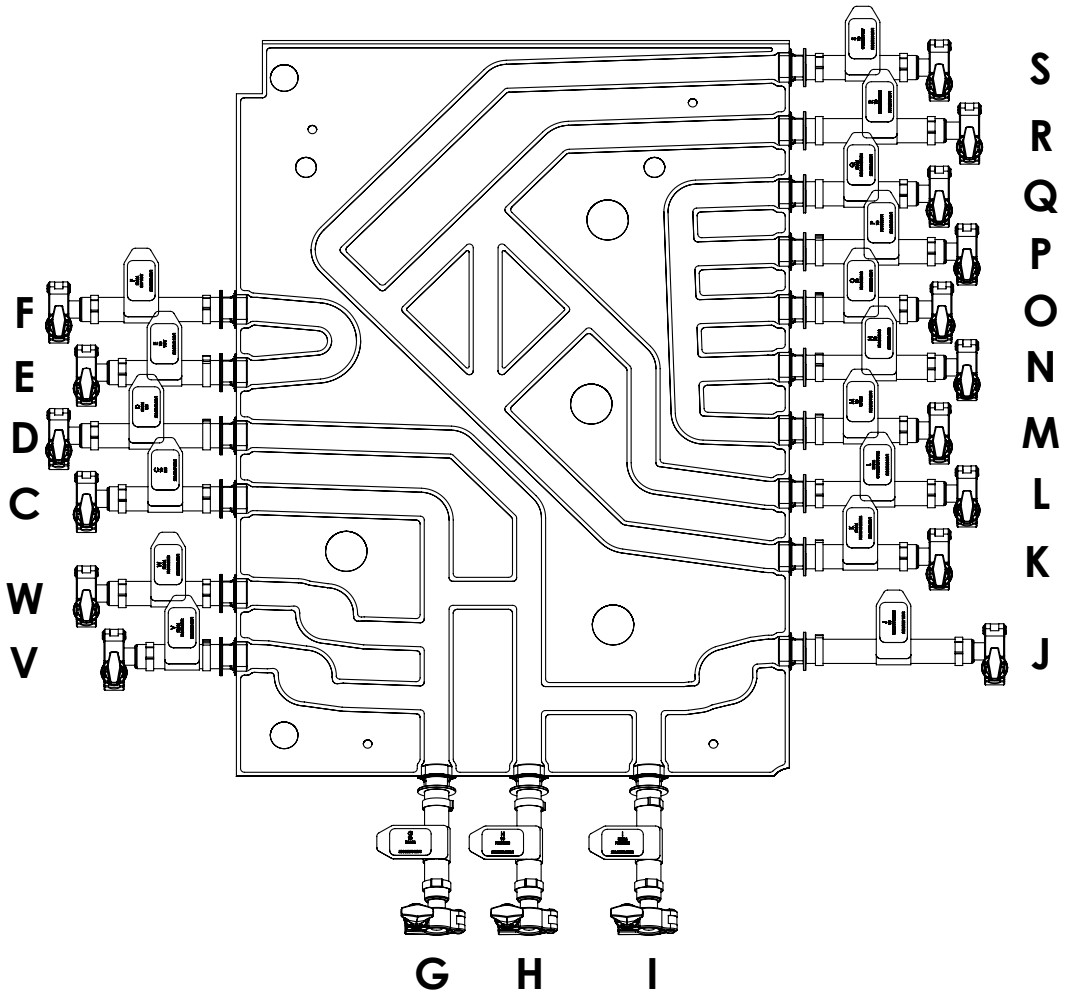
There are a number of Flexware® Assemblies that must be connected to the Flexware® Clamshell Assembly. The previous section details the installation of these assemblies. This section details connecting all the Flexware® Assemblies used on the system.

Assembly numbers in this section are highlighted in **RED**.

Flexware® connection tags are highlighted **GREEN**.

Connecting the Flexware® Assemblies

Install and connect the Flexware® Assemblies in the order presented in this section.



Connecting the Flowmeters

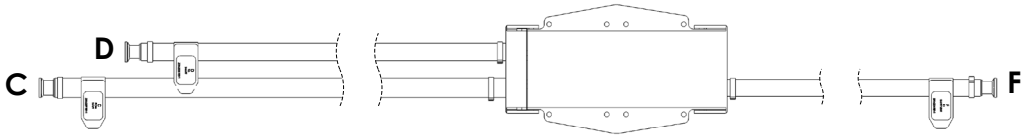
The Flowmeter outlets must be attached to the Flexware® Clamshell Assembly.

1. Remove the plugs/caps from the connector labeled **V** on the Flexware® Clamshell Assembly.
2. Connect **V** to the outlet of the flowmeter Assembly labeled **V**.
3. Remove the plugs/caps from the connector labeled **W** on the Flexware® Clamshell Assembly.
4. Connect **W** to the outlet of the flowmeter Assembly labeled **W**.

Connecting the Bubble Trap Assembly

XM4BUBBL

The Bubble Trap Assembly must be connected to the Flexware® Clamshell Assembly.



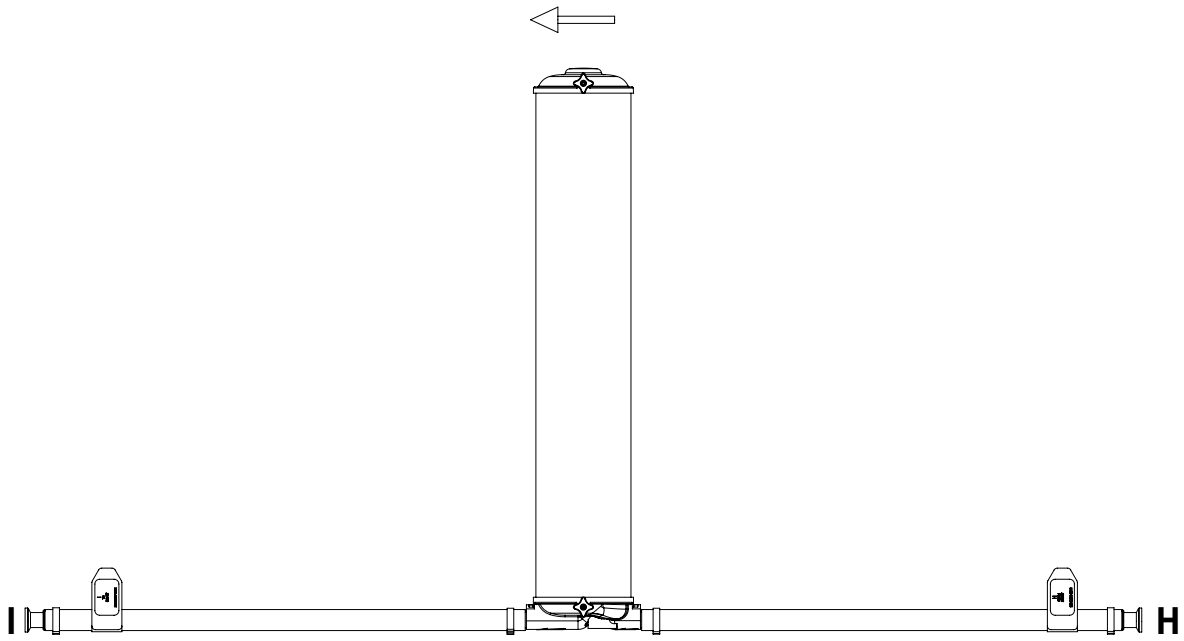
The Bubble Trap Assembly

1. Remove the plugs/caps from the connectors labeled **C** on the Flexware® Clamshell Assembly.
2. Connect **C** to **C**.
3. Remove the plugs/caps from the connectors labeled **D** on the Flexware® Clamshell Assembly.
4. Connect **D** to **D**.
5. Remove the plugs/caps from the connectors labeled **F** on the Flexware® Clamshell Assembly.
6. Connect **F** to **F**.

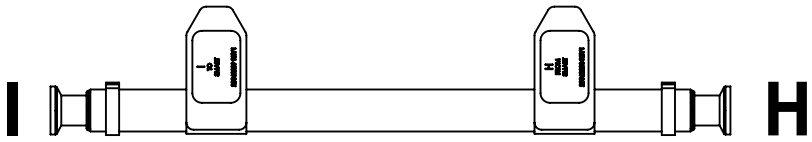
Connecting the Precolumn Filter Assembly

XM4FILT001

The Precolumn Filter Assembly must be connected to the Mobius® Chrom 20 with Flexware® Bag Assembly.



Precolumn Filter Assembly



Precolumn Filter Assembly By-pass (If no filter is used)

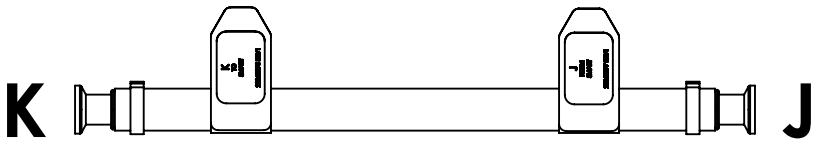
1. Remove the plugs/caps from the connector labeled **H** on the Flexware® Clamshell Assembly.
2. Connect **H** to **H**.
3. Remove the plugs/caps from the connector labeled **I** on the Flexware® Clamshell Assembly.
4. Connect **I** to **I**.

Connecting the Chromatography Precolumn Instrumentation Assembly

XM4PRESU, XM4PRESUBP

This will be connected to the Flexware® Clamshell Assembly.

Single-use Precolumn Instrumentation Assembly



Single-use Precolumn Instrumentation By-pass Assembly (If precolumn option is not selected)

1. Remove the plugs/caps from the tubing labeled **J** on the Flexware® Clamshell Assembly.
2. Connect **J** to **J**.
3. Remove the plugs/caps from the tubing labeled **K** on the Flexware® Clamshell Assembly.
4. Connect **K** to **K**.

Connecting the Post Column Instrumentation Assembly

XM4PSTSU-1, XM4PSTSU-2

This assembly will be connected to the Flexware® Clamshell Assembly.

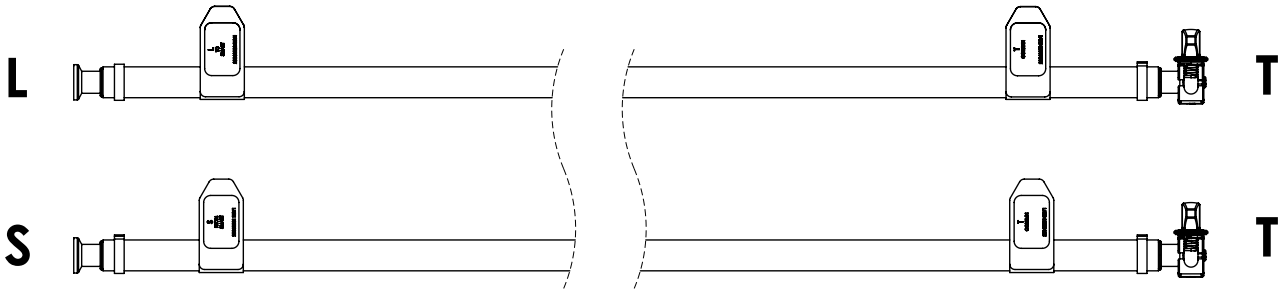
Single-use Post Column Instrumentation Assembly

1. Remove the plugs/caps from the tubing labeled **R** on the Flexware® Clamshell Assembly.
2. Connect **R** to **R**.
3. Remove the plugs/caps from the tubing labeled **Q** on the Flexware® Clamshell Assembly.
4. Connect **Q** to **Q**.

Connecting the Chromatography Column

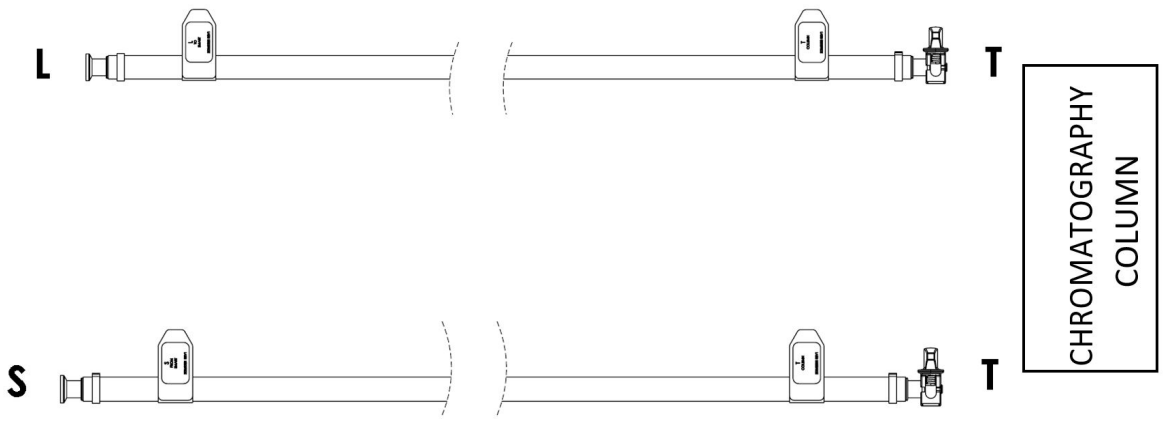
XM4CMASM

This assembly connects the chromatography column to the Flexware® Clamshell Assembly.



Column Assembly

1. Remove the plugs/caps from both connectors labeled T on the assemblies and connect as shown below. Tighten clamps.



Connecting the Column Assembly

2. Remove the dust bag from the connectors labeled **L** on the assembly and on the Flexware® Clamshell Assembly. Connect **L** to **L**.

3. Remove the dust bag from the connectors labeled **S** on the assembly and on the Flexware® Clamshell Assembly. Connect **S** to **S**.

Application Information

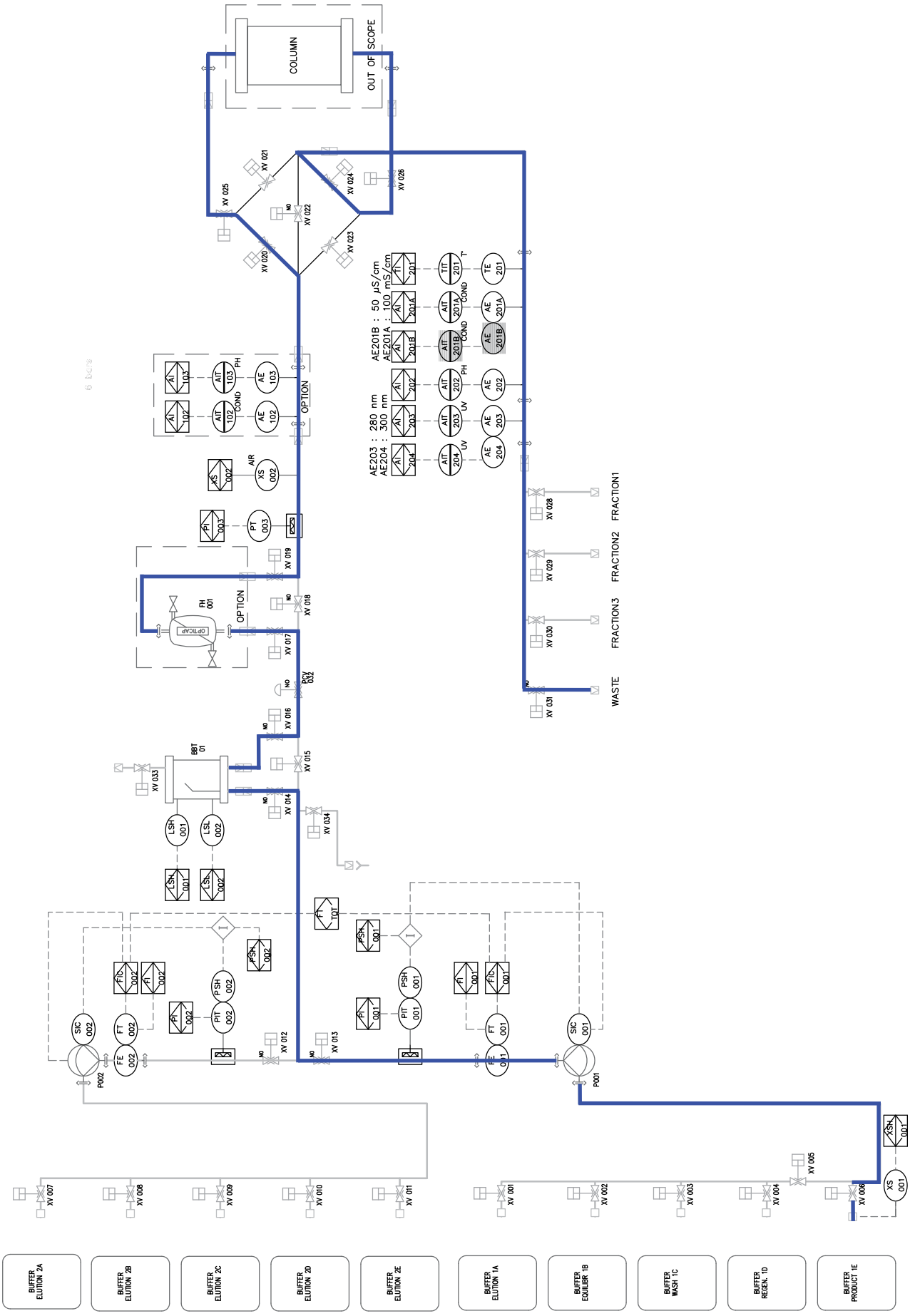
Introduction

This section of the user guide includes Specifications, P&ID drawings for some typical process steps and Flow Rate vs Pressure curves.

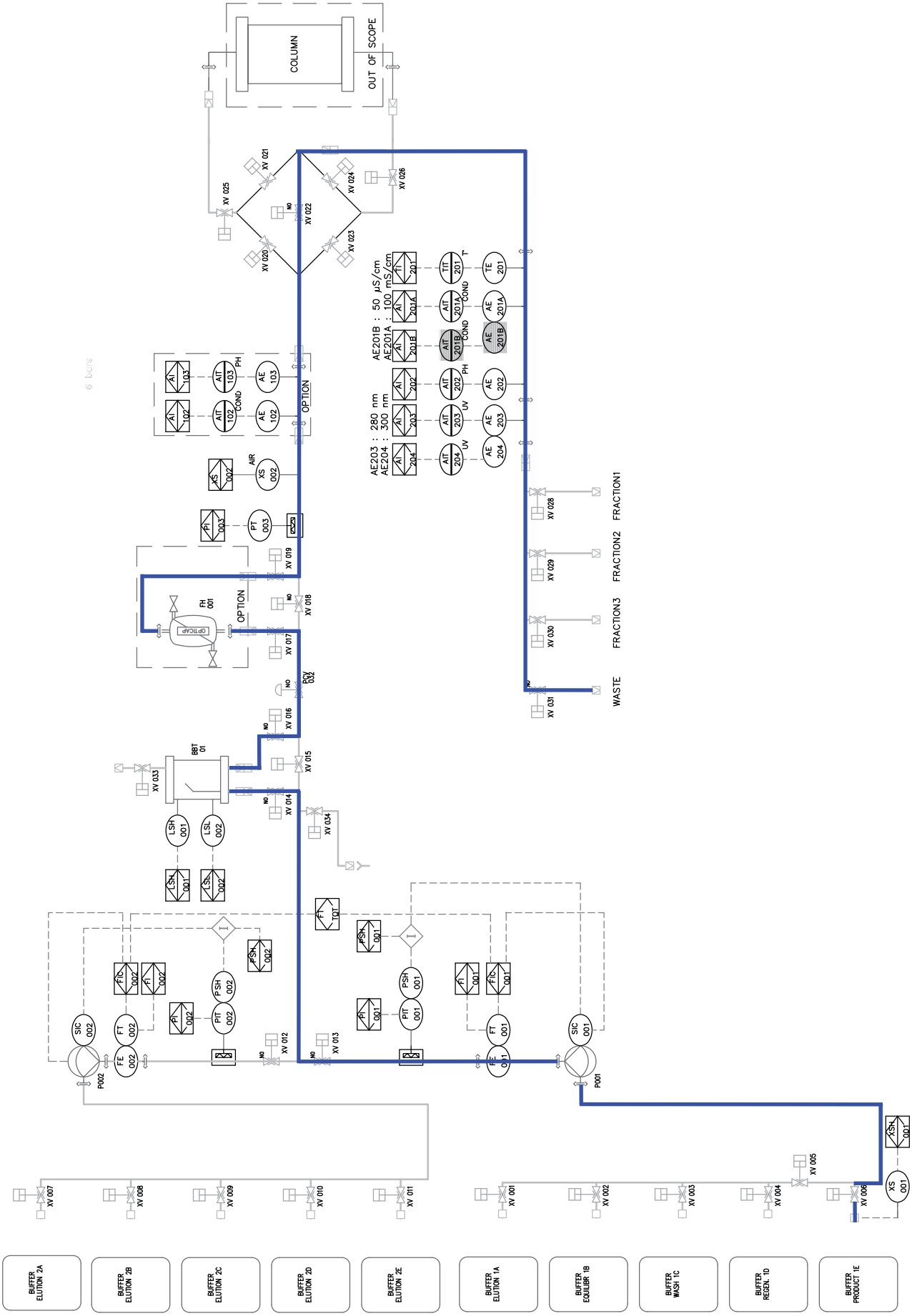
Flow Paths

The following pages contain P & ID for the sample flow paths listed here:

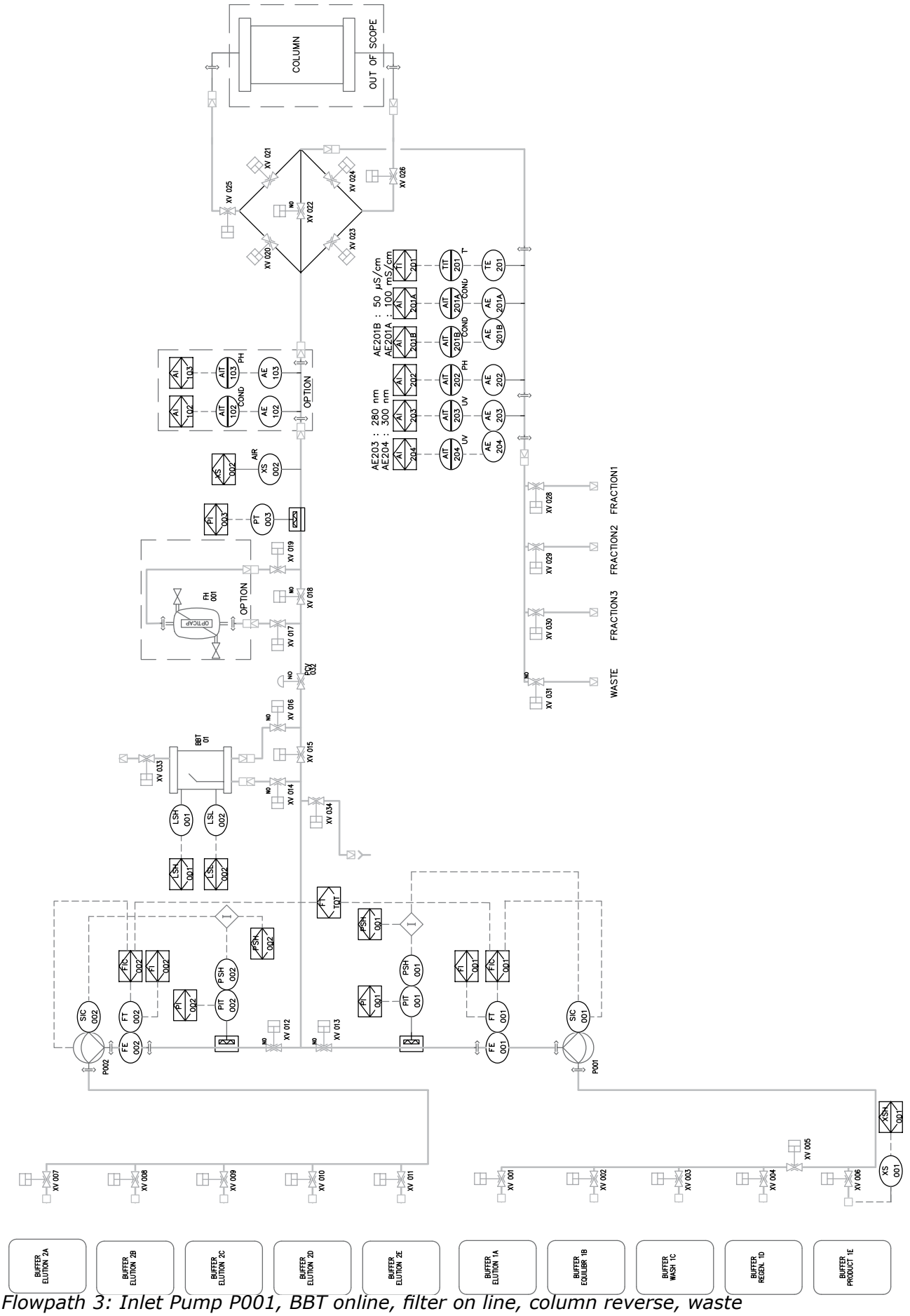
Flowpath 1	Inlet Pump P001, BBT online, filter on line, column forward, waste
Flowpath 2	Inlet Pump P001, BBT online, filter on line, column bypass, waste
Flowpath 3	Inlet Pump P001, BBT online, filter on line, column reverse, waste
Flowpath 4	Inlet Pump P002, BBT online, filter on line, column forward, waste
Flowpath 5	Inlet Pump P002, BBT bypass, filter bypass, column forward, waste
Flowpath 6	Inlet Pump P001, BBT online, filter online, column forward, fraction



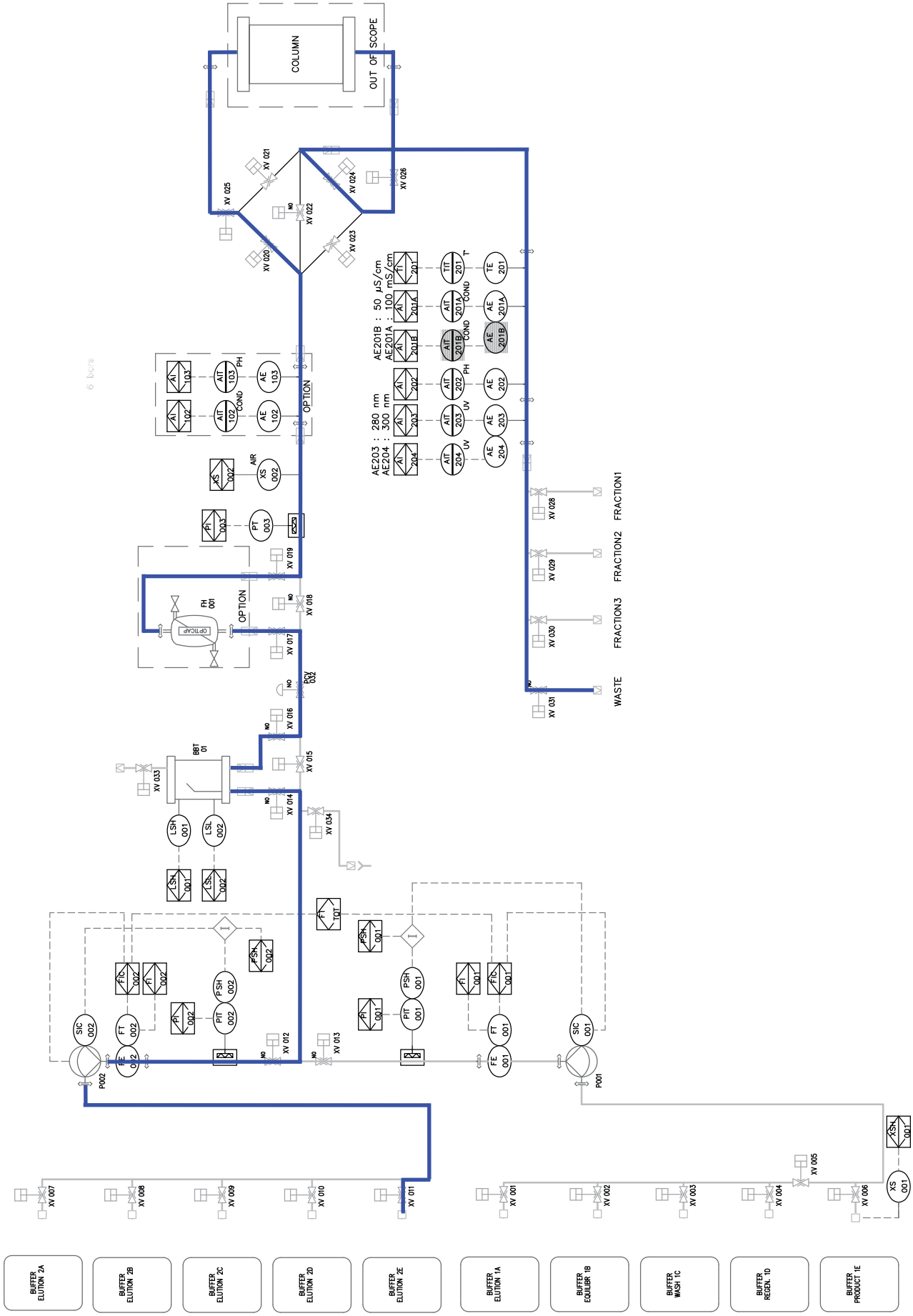
Flowpath 1: Inlet Pump P001, BBT online, filter on line, column forward, waste



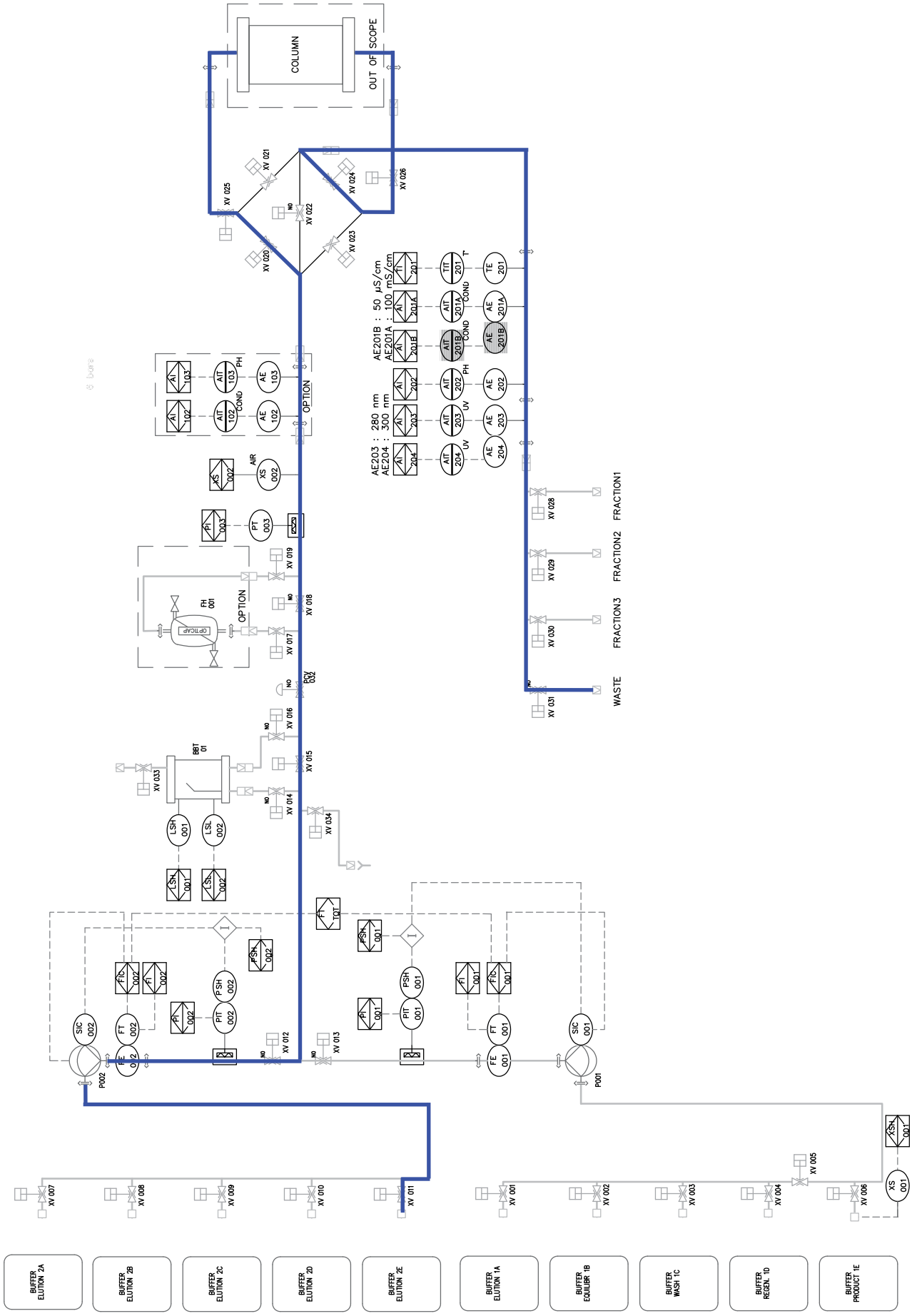
Flowpath 2: Inlet Pump P001, BBT online, filter on line, column bypass, waste



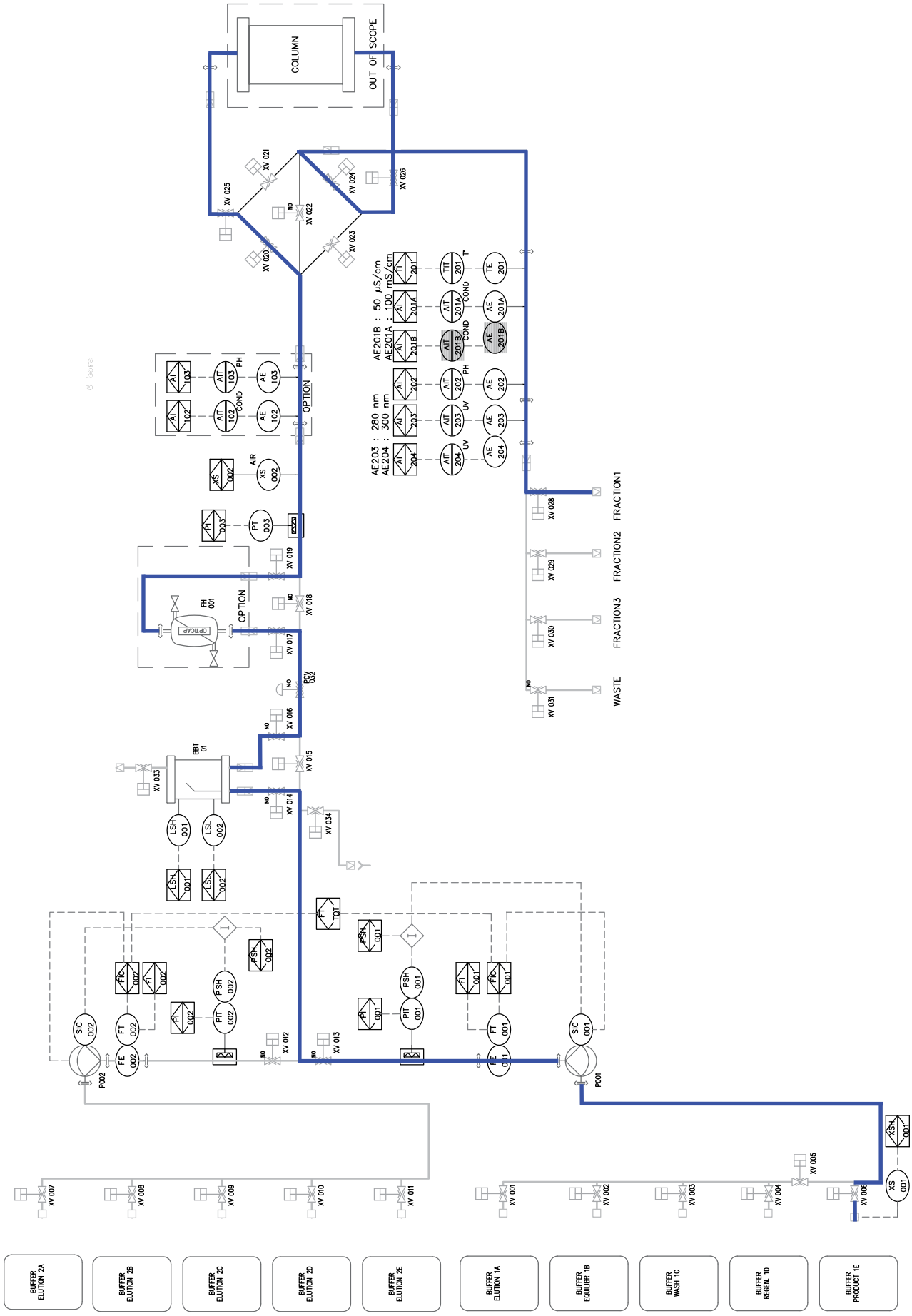
Flowpath 3: Inlet Pump P001, BBT online, filter on line, column reverse, waste



Flowpath 4: Inlet Pump P002, BBT online, filter on line, column forward, waste



Flowpath 5: Inlet Pump P002, BBT bypass, filter bypass, column forward, waste



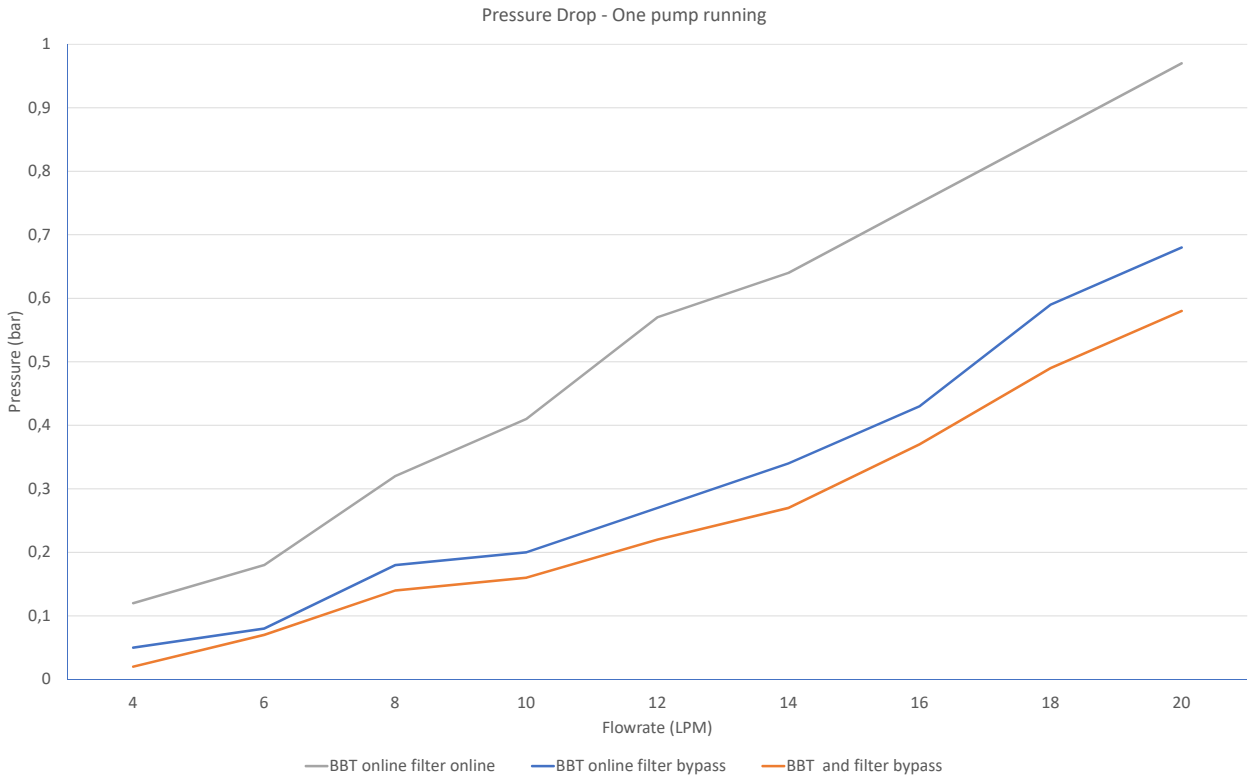
Flowpath 6: Inlet Pump P001, BBT online, filter online, column forward, fraction

System Pressure Drop

Test were performed with RO water at 20º C and the following parameters:

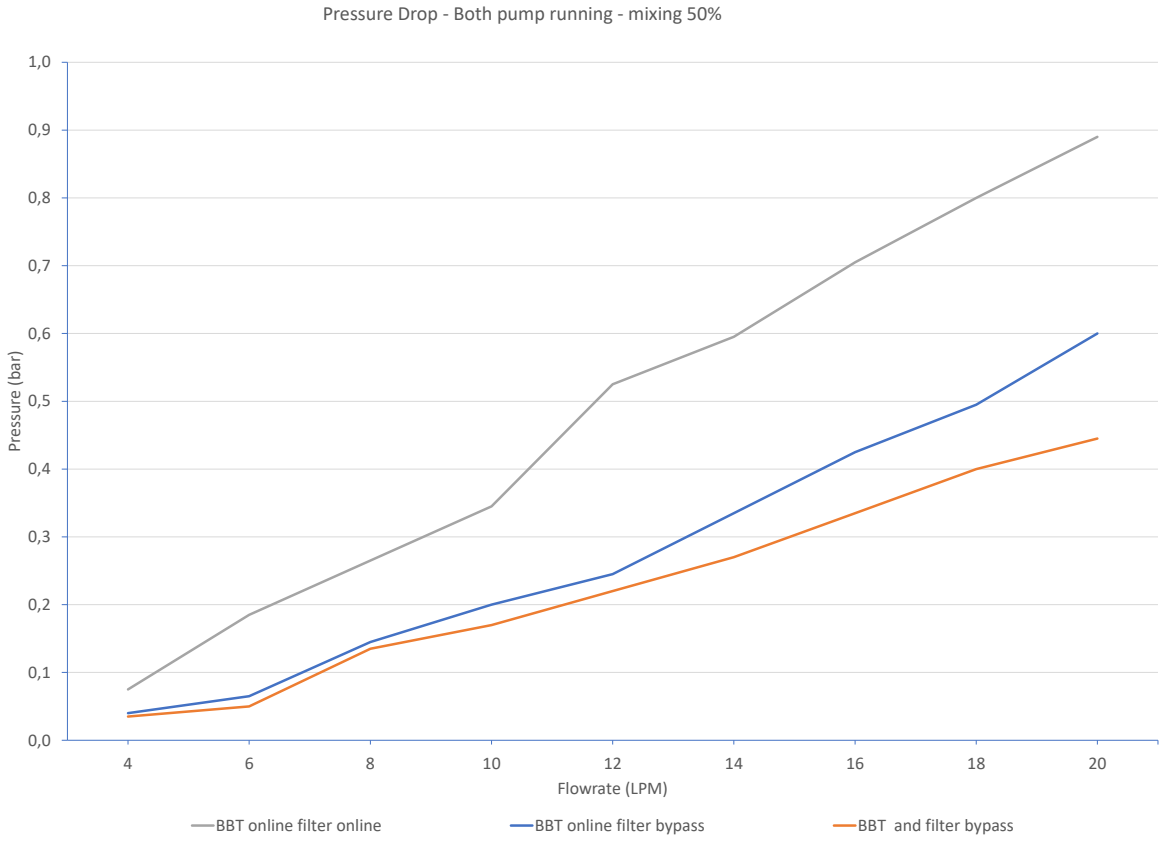
One Pump Running

Parameter	Value
Bubble Trap	XM4BUBBL.
Column	None installed. Replaced by 1 M of tubing.
Flow Rate	Read from system flowmeter.
Inlet	1A
Pump	P001
Fraction	Waste



Two Pumps Running

Parameter	Value
Bubble Trap	XM4BUBBL.
Column	None installed. Replaced by 1 M of tubing.
Flow Rate	Read from system flowmeter.
Inlet	1A and 2A
Pump	P001 and P002
Fraction	Waste



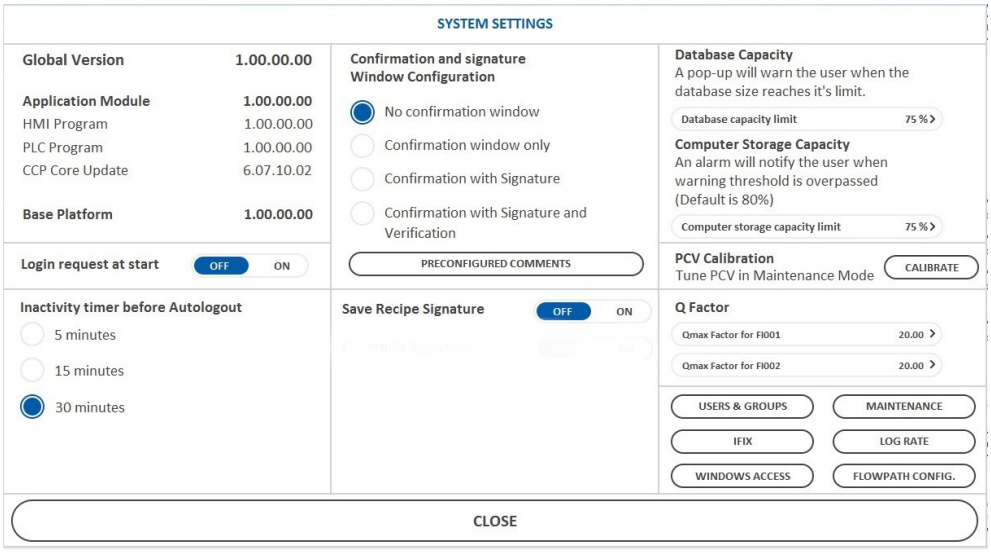
Using the System

Introduction

This section provides instructions on the use and functionality of the Mobius® Chrom 20 System with Flexware® Assemblies. Please review this section, in its entirety, before operating the system.

Preparing the System for Operation

The system settings display, available from the User menu with administrator rights, gives access to general system settings:



Login Request at Start

This setting allows to choose if user login is requested when starting the system.

When placed to OFF, after startup sequence completion, the Process display is opened.

When placed to ON, after startup sequence completion, the Startup login request prompt is opened, and Process display automatically opens once a valid user has logged in.

Inactivity Timer Before Autologout

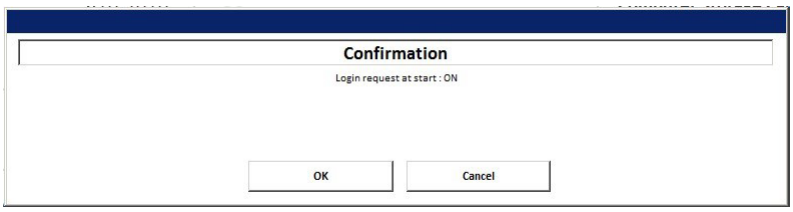
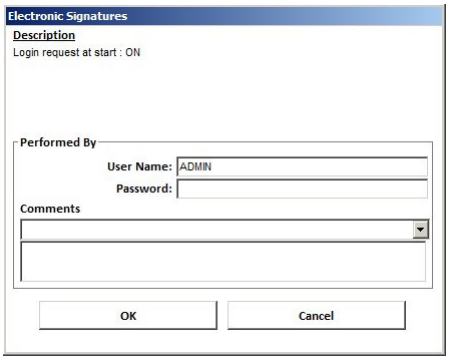
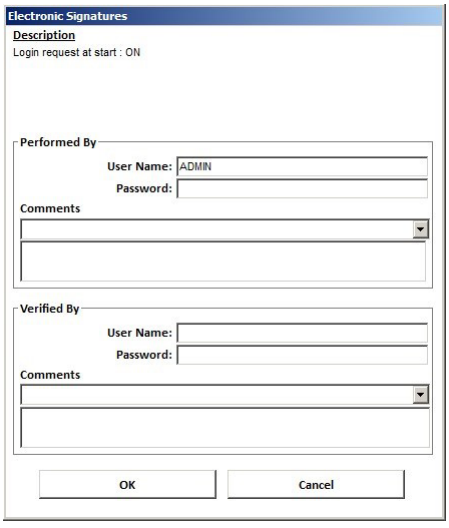
This setting allows to select the inactivity time after which the current user is automatically logged off.

If the screensaver is active, then the autologout occurs while the screensaver is displayed.

If the screensaver is not active, then a popup alerts the user 10 seconds before the autologout proceeds. If the user moves the pointer during this while, then the autologout is canceled.

Confirmation and Signature Window Configuration

This setting controls the confirmation box that appears before applying any user request (starting an equipment, changing a setpoint, …).

Setting	Description
No confirmation window	User request is directly applied. No confirmation box appear.
Confirmation window only	Example display: 
Confirmation with signature	Example display: 
Confirmation with signature and verification	Example display: 

Note Critical actions like switching from auto to manual mode or changing alarm priorities always require a user confirmation. If « No Confirmation Window » is selected, a simple confirmation will appear anyway for those critical actions.

Save Recipe Signature

This setting controls if user login is required for saving recipe files.

When ON, the user login prompt appears when clicking on the save button of the Recipe Editor:

Database Capacity

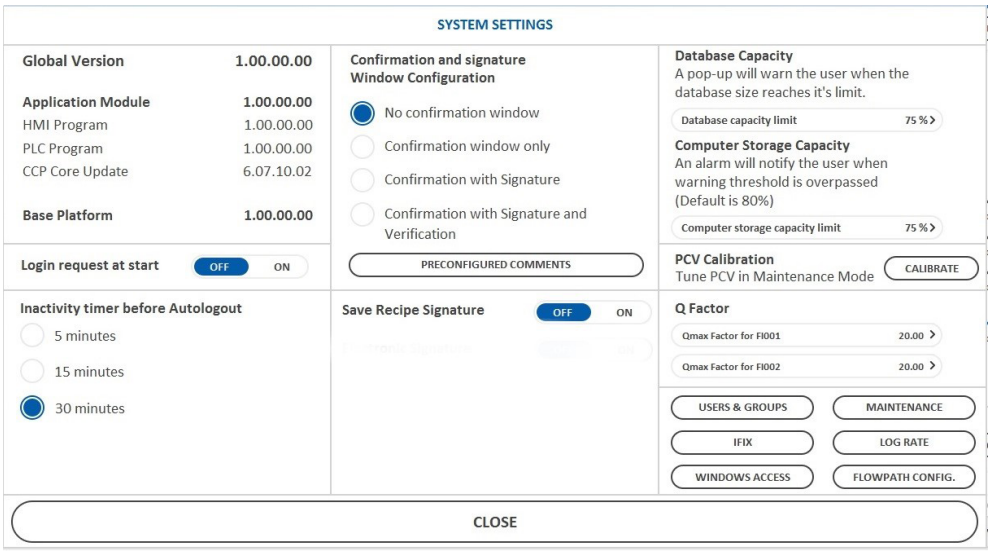
The control system is periodically monitoring the SQL database capacity and triggers a non-critical alarm when the current size overpass this setting. If the current size does not overpass the setting, the current value is logged in the application log file.

Computer Storage Capacity

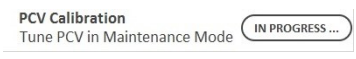
The control system is periodically monitoring the computer hard drive capacity and triggers a non-critical alarm when the current size overpass this setting. If the current size does not overpass the setting, the current value is logged in the application log file.

PCV Calibration

The CALIBRATE button can only be used in Maintenance mode (otherwise it is disabled). It is used to calibrate the valve when changing the valve pads.

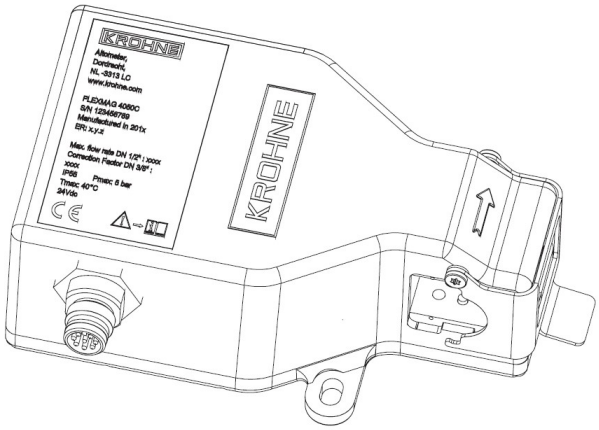


Click the CALIBRATE button to start the calibration (the label of the button changes to “In progress” and wait until the button returns to its initial label.



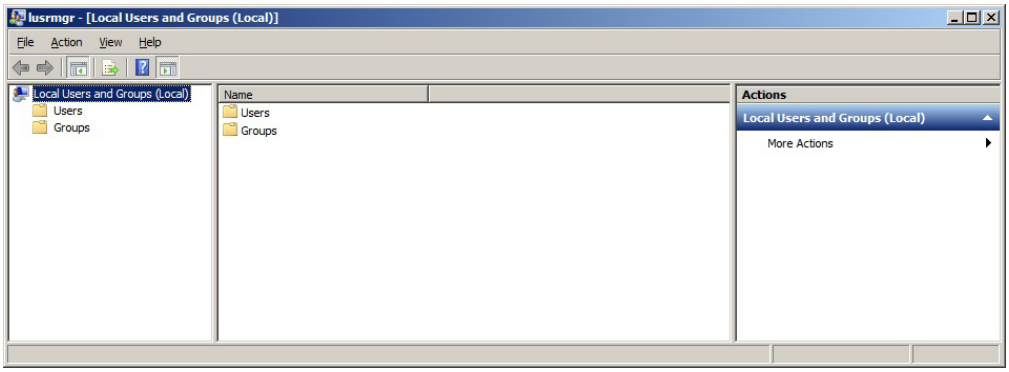
Q Factor

To achieve the best accuracy on the flow measurement, each flowmeter electronic is factory calibrated. It is important to enter the Qmax factor into the HMI each time a new SU flowmeter electronic is changed. The Qmax is on the label attached to each flowmeter (refer to Qmax ½" value).



Users and Groups

Allow to manage Windows users and groups.

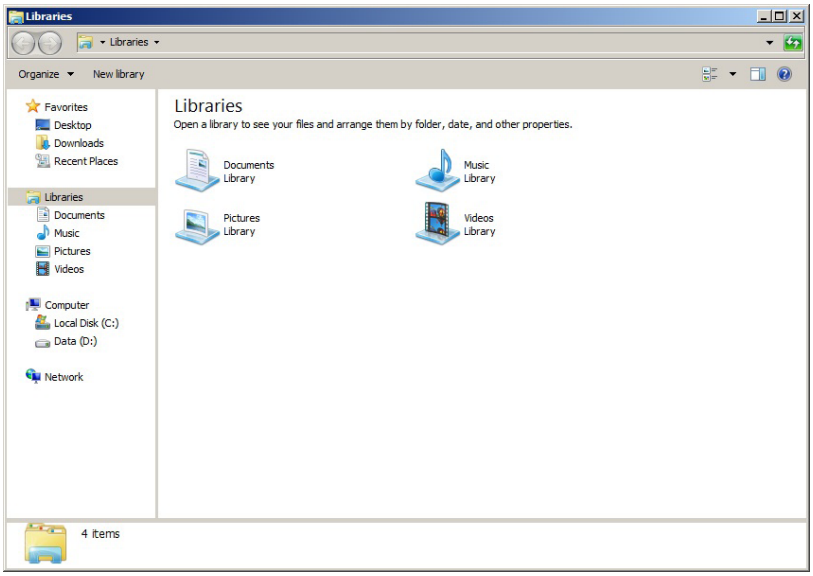


iFix®

Allow to manage iFix® security configuration.

Windows Access

Open a Windows Files Explorer popup.

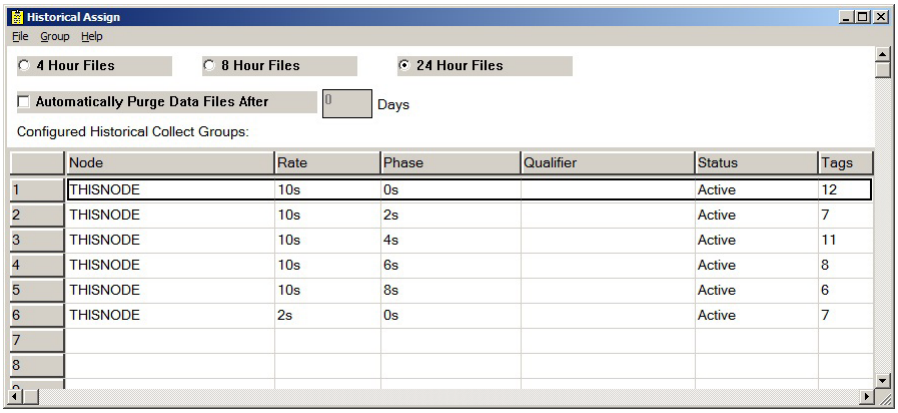


Maintenance

Switch to the maintenance mode (Access to this mode is restricted to those with maintenance privileges).

Log Rate

Log Rate button allows to access to the Historical Trend Assign utility. See section IV.2.2 “Starting Historical assign program” for more details.



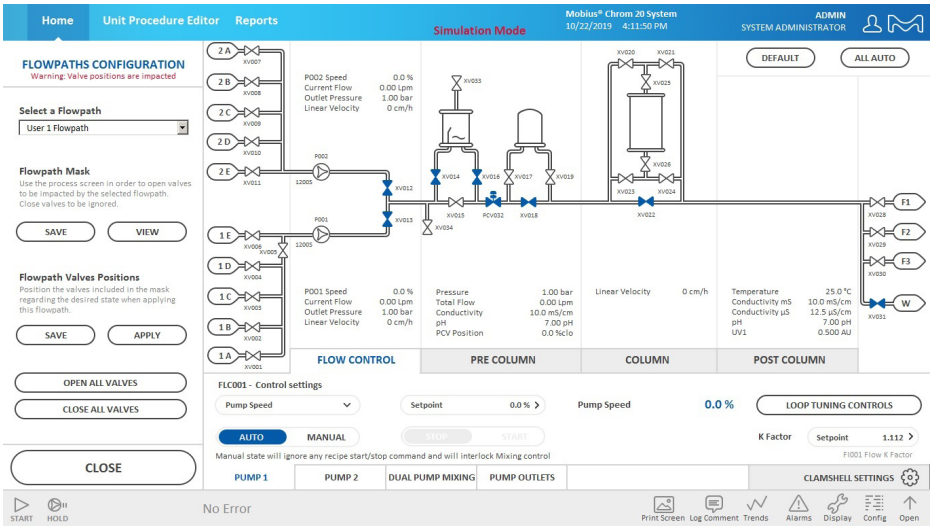
	Node	Rate	Phase	Qualifier	Status	Tags
1	THISNODE	10s	0s		Active	12
2	THISNODE	10s	2s		Active	7
3	THISNODE	10s	4s		Active	11
4	THISNODE	10s	6s		Active	8
5	THISNODE	10s	8s		Active	6
6	THISNODE	2s	0s		Active	7
7						
8						

Flowpath Configuration

Use the Flowpath Config. Button to open the flowpath configuration screen and allow the user to configure:

- The default flowpath
- The 5 user flowpaths

1. Select the Flowpath to be configured from the Select a Flowpath dropdown menu.
2. Click View to apply the Flowpath mask of the selected flowpath to the system valves. To modify, use the Process display to open and close valves. Click Save to store the current valves positions as the new Flowpath mask.
3. Click Apply to apply the selected flowpath to the system valves. To modify, use the Process display to open and close valves. Click Save to store the current valve positions as the new flowpath.



Manually Controlling the System

The process can be manually controlled using the User Interface. The process is automatically controlled when it is being run by a recipe. See the Using the Recipe Editor section of this document for details on configuring automatic runs.

Note The user should be comfortable with all aspects of manual operation of the system before attempting to write operations using the Recipe Editor.

For example, to manually control a pump, the user can click on the pump and change the settings.

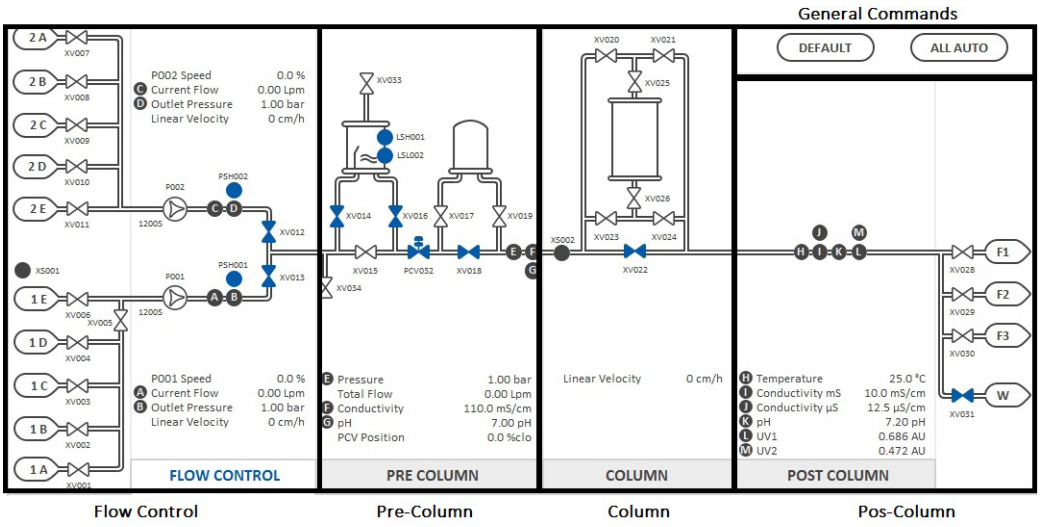
Critical Alarms

Before the system can be used, all of Critical Alarms must have disappeared. See the Alarm Control section for more details on the behavior of alarms in this system.

Process Control

Process Control is achieved through the Process Display and its detailed panels. The process display is split in 4 areas:

- Flow Control
- Pre-column
- Column
- Post-column



Each area has a detailed panel which can be accessed by clicking on the related button available at the bottom of the related process section of the process display.

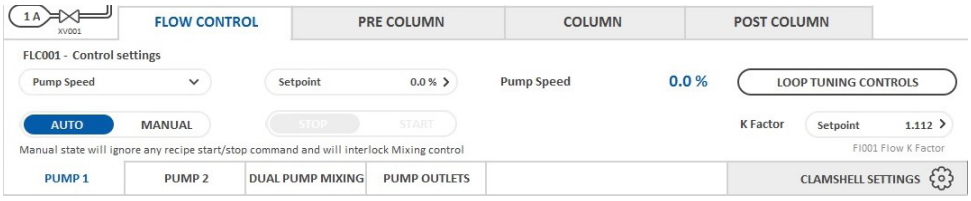
Note There are no detailed panels for inlets and outlets.

Flow Control

Pump 1 & Pump 2 Section

Each pump detailed panel allows the following:

- Select the pump control mode and its related setpoint
- Select auto or manual mode
- Start/Stop the pump
- Set a K factor for the flowmeter
- Access to the loop tuning controls



The flow can be controlled by a fixed speed value for the pump:

- Fixed Speed: This setpoint is expressed as a percentage of maximum allowable pump speed. The function will adjust the pump speed until the setpoint is reached. Range 0-100%

The flow can be controlled by controlled modes using PID calculation:

- Volumetric Flow rate: Pump speed is controlled by a PID Loop, which will set the pump speed from a given flow rate. Rang 0- 10 liters per min
- Linear Velocity. The software automatically converts the linear flow velocity set point to its corresponding volumetric flow rate set point. Range 0-1000 cm/hr

The Linear Flow Rate, at any time, depends upon the Volumetric Flow Rate, the Column Bed Height and the Column Volume according to the equation where:

$$L = \frac{FH}{V}$$

Where:

F = Volumetric Flow Rate (cm^3/hr)

L = Linear Flow Rate (cm/hr)

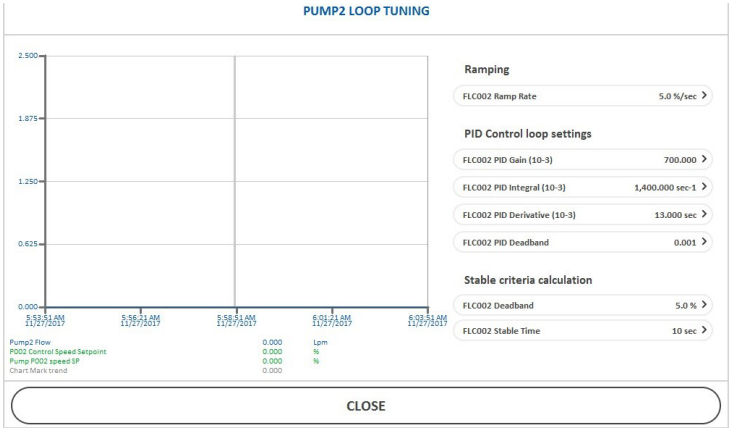
H = Column Bed Height (cm)

V = Column Volume (cm^3)

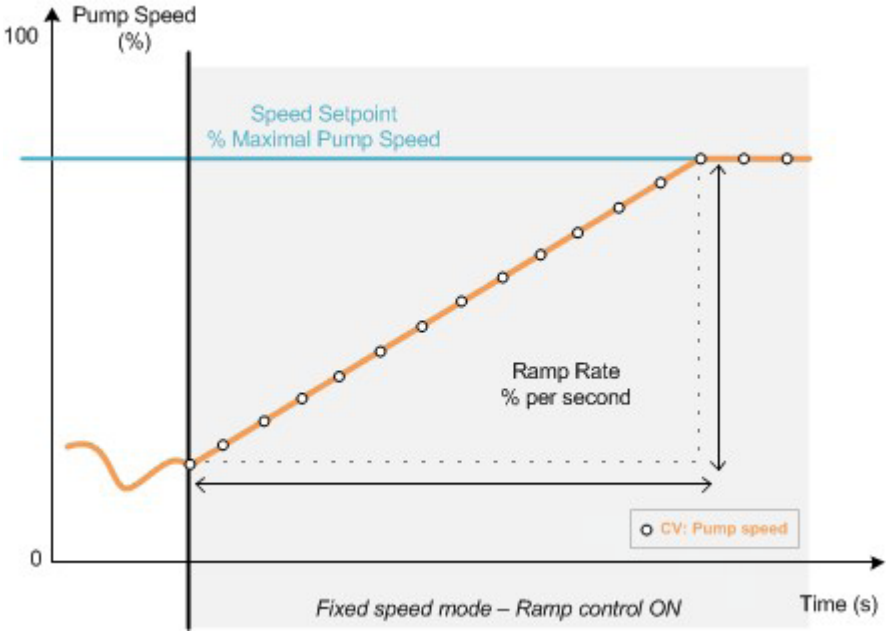
Under Linear Flow Rate Control, the software automatically converts the linear flow rate setpoint to its corresponding volumetric flow rate setpoint.

Note Depending on the Column Height and Volume, the Linear Velocity setpoint can be set at a value that will cause the Volumetric Flow Rate to be greater than the maximum allowed setpoint.

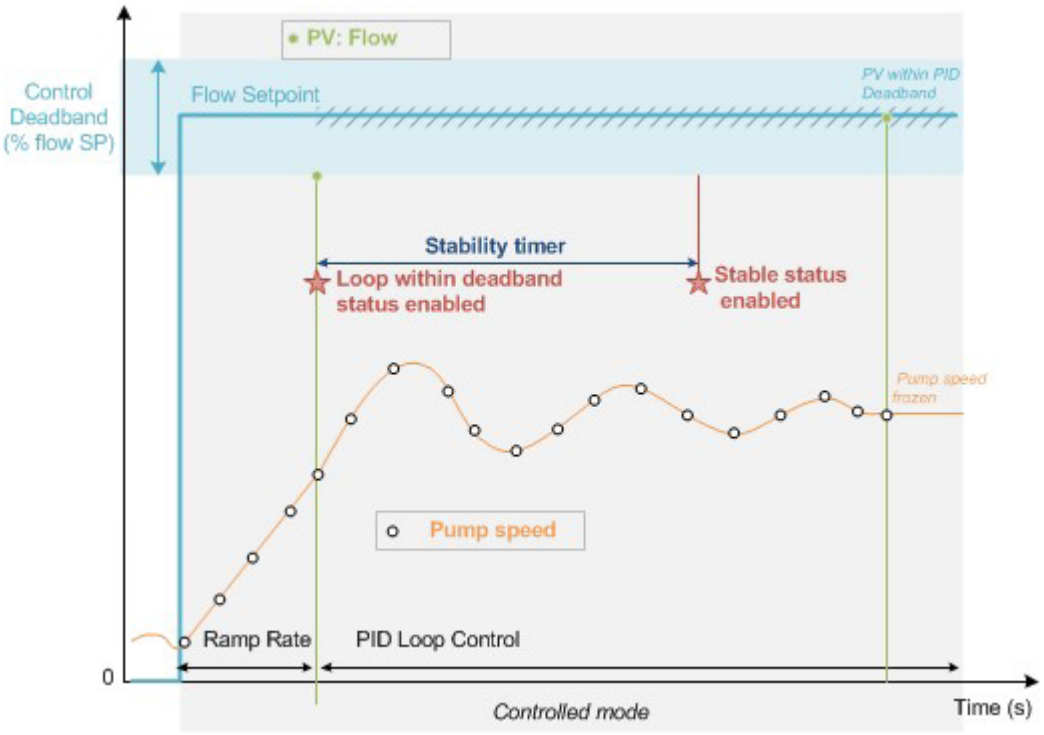
The Loop Tuning popup shows the control loop values on a chart and allow to tune the control parameters in order to reach the desired dynamic properties. Ramp rate is used outside the window covered by the PID control loop.



Fixed speed (Non PID controlled mode): the pump speed shall ramp until the speed setpoint is reached.



Flow and linear velocity (PID controlled mode): the control loop will compute a pump speed setpoint using PID parameters to reach the Flow setpoint entered by user. First, the pump speed shall ramp until the flow is within a configurable Control deadband (percentage of the setpoint). Once within the control deadband, the PID loop shall begin controlling the pump speed. "Loop within deadband" status is enabled and the stability timer is latched. When the stability timer reaches stability time, "Stable status" is enabled. The PID Loop controls pumps speed, proportionally to the error between the measured pump flow and the flow setpoint. When the flow reaches the setpoint within the PID deadband, the controller will freeze the speed setpoint, to avoid micro oscillations. It will unfreeze and be back to PID control as soon as the flow is out of the control deadband. If Flow Setpoint is modified, the pump speed will ramps up/down at ramp rate until Flow is within Control Deadband.



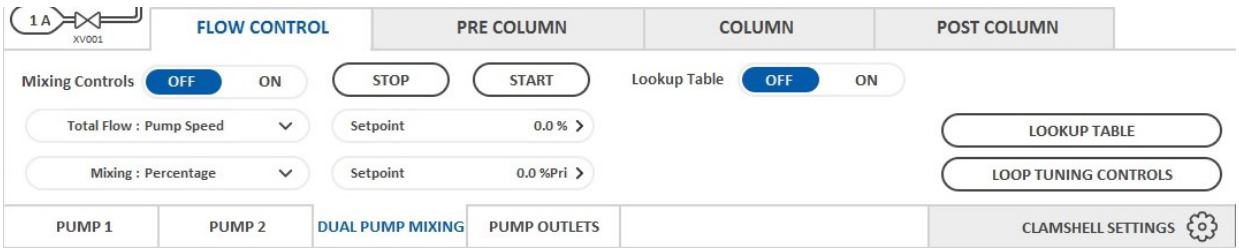
To achieve the best accuracy on the flow measurement, it's important to enter the K factor into the HMI for each SU flowmeter tube. The K factor is written on the label attached to each SU flowmeter tube. The operation needs to be performed each time a new SU flowmeter tube is installed into the transmitter.

Dual Pump Mixing Section

Use Dual Pump Mixing to control both pumps simultaneously. Both pumps must be in auto mode.

The Dual Pump Mixing panel allows the following:

- Enable/Disable the mixing control
- Start/Stop both pumps together
- Enable/Disable the lookup table
- Select the pump control mode and its related setpoint (see previous chapter: "Pump 1 & Pump 2")
- Select the mixing mode and its related setpoint
- Access to the lookup table controls
- Access to the loop tuning controls

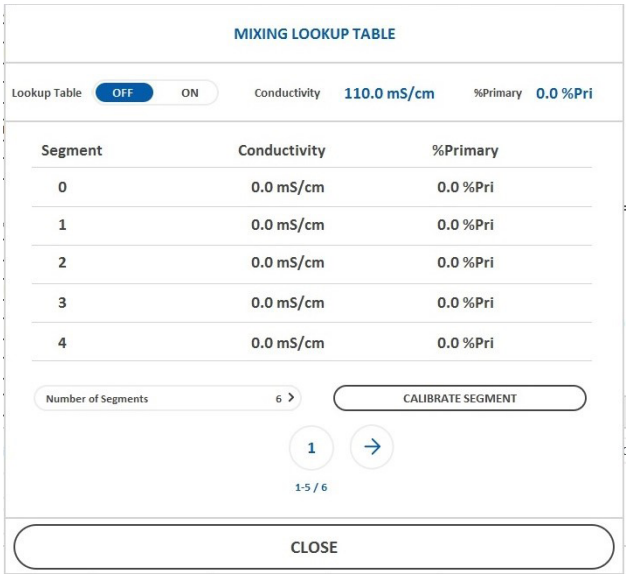


One of the capabilities of the system is the ability to form gradients based on conductivity. It allows a gradient to be defined in terms of the conductivity (in µS) of the fluid entering the column. The software employs a hybrid feed-forward-feedback algorithm to manipulate the gradient valve to achieve the desired conductivity.

In addition to gradients based on conductivity, users can program gradients the traditional way by specifying the primary pump (Pump 1) percentage (%pri).

- Gradient Control Fixed Speed Example: If the pump-based Loop Mode is set to Fixed Speed with a setpoint of 50% for the total pump speed and Gradient Control is enabled with a Percent Primary setpoint of 60%, Pump 1 would have an individual setpoint of 30% (60% of 50%) and pump 2 would have an individual setpoint of 20% (40% of 50%). The sum of the two pump speeds equaling 50%.
- Gradient Control Flow Example: If the pump based Loop Mode is set to Flow with a setpoint of 3.0 Lpm for the total system flow and Gradient Control is enabled with a Percent Primary setpoint of 60%, Pump 1 would have an individual setpoint of 1.8 Lpm (60% of 3.0 Lpm) and pump 2 would have an individual setpoint of 1.2 Lpm (40% of 3.0 Lpm). The sum of the two pump flows equaling 3.0 Lpm.
- Gradient Control Linear Flow Example: If the pump based Loop Mode is set to Linear Velocity with a setpoint of 300 cm/hr for the total system velocity and Gradient Control is enabled with a Percent Primary setpoint of 60%, Pump 1 would have an individual setpoint of 180 cm/hr (60% of 300 cm/hr) and pump 2 would have an individual setpoint of 120 cm/hr (40% of 300 cm/hr). The sum of the two pump velocities equaling 300 cm/hr.

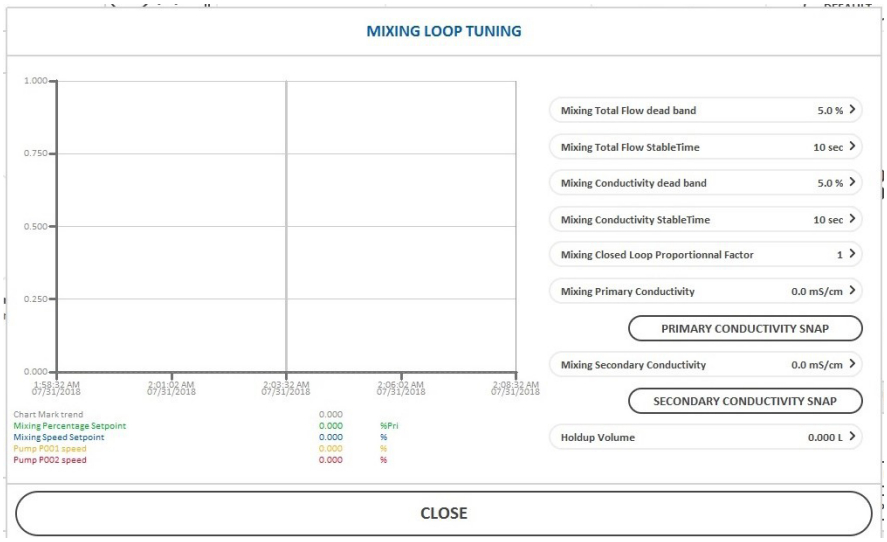
Linear gradients and/or combinations of step and linear gradients can be executed only through an operation.



The Mixing Lookup Table allows to minimize the conductivity control error when performing conductivity gradient (step or linear). The table compensates for the nonlinear relationship between mixing percentage and measured conductivity.

Fill in the lookup table based on experimental trials. When the system is stabilized, in the Calibrate segment, snap the current conductivity reading and current primary pump speed percentage. These readings are used as reference points on the table. Choose the number of points (maximum of 20 points) to include in the lookup table.

Note To use the Mixing Lookup Table, the holdup volume must be different from 0.



The Mixing Loop Tuning popup shows the control loop values. Tune the control parameters to reach the desired dynamic properties.

Use the Primary and Secondary conductivity snap buttons to store the current conductivity reading as primary or secondary conductivity value.

This popup also contains the Holdup volume used as reference to determine if the retention volume has passed through the system.

Gradient Calibration

Gradient calibration profiles stored in lookup tables shall be used to correct errors in the gradient mixing. Up to twenty lookup table segments can be defined for each profile. The resulting calibrated mixing value will be interpolated from the data within the lookup table. Different profiles shall be stored for conductivity based gradients and percentage based gradients.

- Percentage Calibration

  Manual percentage based gradients shall include a gradient calibration profile. This profile can be defined manually during OQ using UV readings to determine actual measured mixing percentages at various manual setpoints. The Gradient Percent Calibration display includes a table with a column for primary percentage values to be corrected and a column for the actual measured values. The number of segments is configurable with a maximum of 20. Calibration can be turned on or off. The profile can also be defined automatically using recipe actions.

- Conductivity Calibration

  Linear gradient control based on conductivity requires a lookup table to achieve accurate mixing. PID control cannot be used for linear gradients due to the volume of fluid between the inlet valves and the conductivity sensor. The correction shall be implemented by storing actual conductivity values for various mixing percentages in a lookup table. The stored values shall then be used to interpolate the mixing percentage required to achieve the desired conductivity value. The profile can also be defined automatically using recipe actions. The conductivity calibration profile shall also be used for isocratic gradients based on conductivity. This shall be active only until the system holdup volume has been processed. This prevents large errors in the PID control which would normally result in overshoot or undershoot. Once the holdup volume has been processed and the conductivity value has stabilized, the PID loop shall control the primary mixing percentage to achieve the desired conductivity value. This function is reset whenever there is a step change in the conductivity setpoint or the pump is started.

Procedure for Conductivity Calibration

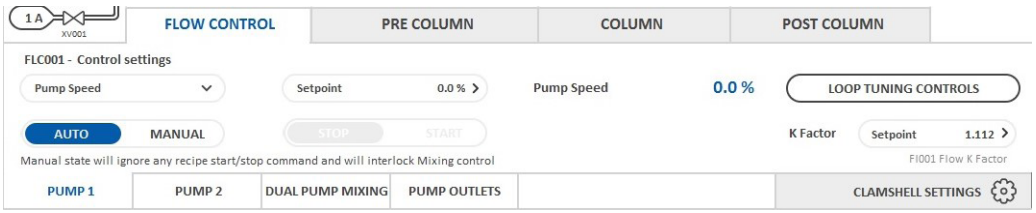
Conductivity calibration can be performed manually from the touch screen or automatically using an operation. Manual actions are performed using the Gradient Conductivity Calibration and Gradient Percentage Calibration windows.

1. Setup the desired flow path.
2. Enable the gradient control loop and select Speed control mode.
3. Run the pumps at 100% primary at a desired speed until the conductivity value stabilizes.
4. Select Save Primary Conductivity from Auto Cal or use the "Gradient Save Primary Inlet Conductivity" recipe action. This will store the conductivity value of the primary solution.
5. Run the system at 0% primary at a desired speed until the conductivity value stabilizes.
6. Select Save Secondary Conductivity from Auto Cal or use the "Gradient Save Secondary Inlet Conductivity" recipe action. This will store the conductivity value of the secondary solution.
7. Enter the total number of segments desired for the calibration profiles or use the "Gradient Percent Total Segments" and Gradient Conductivity Total Segments" recipe actions.
8. Run the system at the first segment percentage until the conductivity value stabilizes.
9. Select Calibrate Segment or use the "Gradient Conductivity Calibrate Segment" recipe action. The system will record the control value and the conductivity value and will automatically enter the values into the conductivity calibration table. The control value and actual percentage value will also be recorded into the percentage calibration table.
10. Repeat step 8 and 9 for each segment percentage.
11. When complete, select conductivity calibration On and percentage calibration On or use the "Gradient Conductivity Calibration On" and "Gradient Percent Calibration On" recipe actions

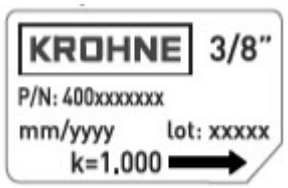
Single-use Flowmeters

To achieve the best accuracy on the flow measurement, it's important to enter the K factor into the HMI for each SU flowmeter tube. The K factor is written on the label attached to each SU flowmeter tube. The operation needs to be performed each time a new SU flowmeter tube is installed into the transmitter.

Click the flow control



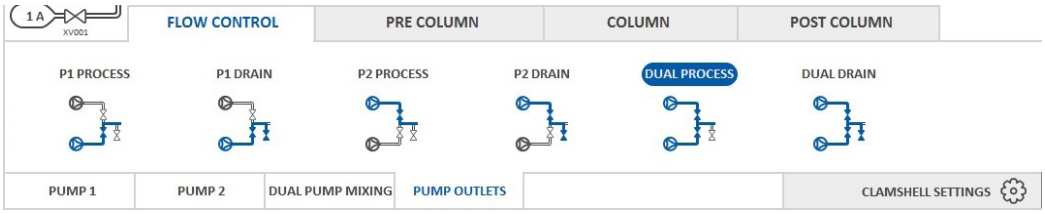
Click the K factor value and enter the value indicated on the SU flowmeter tube label.



Caution When entering K factor please check that it is the correct flowmeter faceplate.

Pump Outlets Section

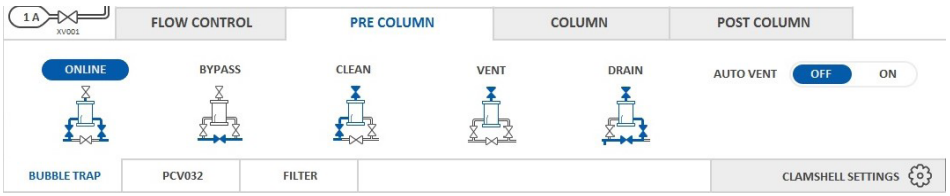
The pumps outlets flowpath can be selected through this display:



Pre-column

Bubble Trap Section

The Bubble trap panel allows to set the related flowpaths and to enable/disable the auto venting function.

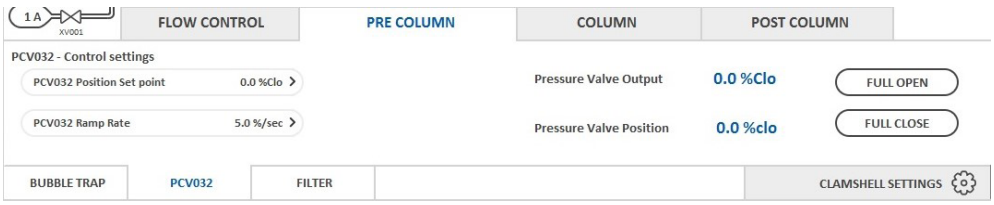


Online	The Online button changes the flow path to allow for the material to pass through the bubble trap.
Bypass	The Bypass button changes the flow path to prohibit material from passing through the bubble trap.
Clean	To clean the Bubble Trap, the Vent control must be in Auto Off mode. Clicking the Clean button changes the flow path to allow fluid to pass through the trap and out the vent. Be prepared for the fluid exiting the vent before initiating a cleaning.
Vent	Venting the Bubble Trap is necessary when there is excess air in the trap. Venting may occur when the Bubble Trap is online or bypassed. Venting can occur in conjunction with other flow paths, therefore the state of other valves may vary.
Drain	Clicking the Drain button changes the flow path to allow fluid to drain out of the trap and out the drain valve (XV034). Be prepared for the fluid exiting the drain before initiating a draining.
Auto On/Auto Off Button	The bubble trap will automatically vent itself if the Auto On/Auto Off button is in the Auto On state. It will not respond to the Vent button when in Auto mode. If manual vent control is desired, click the Auto On/Auto Off button so that it displays Auto Off. Then click the Vent button on the Bubble Trap Faceplate. Automatic venting is controlled by the two level sensors. If the low level sensor is activated, indicating that there is excessive air in the trap, venting is started. Venting continues until the high level sensor is activated. Automatic venting will not occur if the high level sensor is activated or if the low level sensor is not activated. Caution Leaving the vent in manual mode may cause undesired effects, including fluid venting from the top of the trap. If the bubble trap level sensors are improperly set, liquid may vent from the top of bubble trap. As a precaution, connect tubing and a container to the top of the bubble trap vent (XV033) to collect fluid and allow fluid to vent safely.

PCV Section

The Pressure Control Valve has a detailed panel which allows the following:

- Set its position setpoint
- Set the ramp rate
- Open/Close it fully through a single button



The ramp rate set the rate, in %/sec, at which the CV will increase or decrease to get the desired PV.

Filter Section

The Filter panel allows to set the related flowpaths.

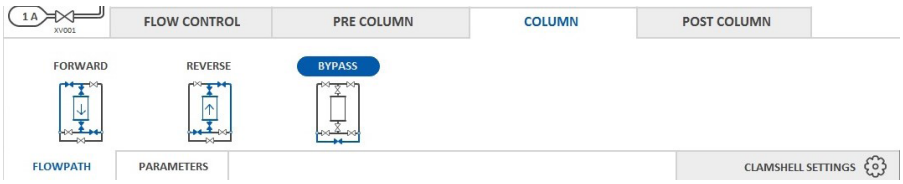
Flow Path	XV017	XV018	XV019
Online	Open		Open
Bypass		Open	

Button	Function
Online	The Online button changes the flow path to allow for the material to pass through the filter.
Bypass	The Bypass button changes the flow path to prohibit material from passing through the filter.
User	The User button sets the flow path according to the Filter 1 User Flow Path configured in the Flow Path Config section of the Maintenance Status Display Screen.

Column

Flowpath Section

The column flowpath panel allows to set the related flowpaths.



The table below indicates which valves are open in each selected flow path.

Flow Path	XV020	XV021	XV022	XV023	XV024	XV025	XV026
Forward	Open				Open	Open	Open
Reverse		Open		Open		Open	Open
Bypass			Open				

Button	Function
Forward	The Forward button changes the flow path to allow for the flow to pass through the column from top to bottom.
Reverse	The Reverse button changes the flow path to allow for the flow to pass through the column from bottom to top.
Bypass	The Bypass button changes the flow path to prohibit the flow from passing through the column.

Parameters Section

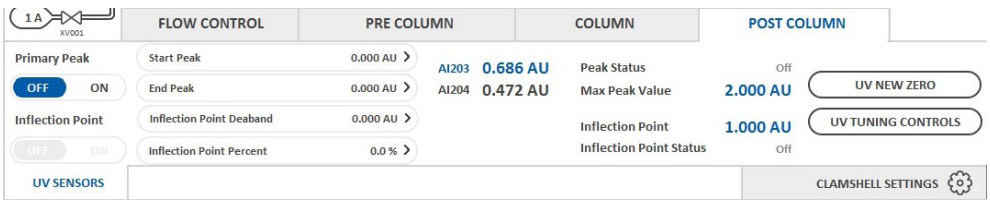
The Column Parameters panel allows to set the column mechanical characteristics used for CVs totalizers and HETP Calculations.

Post Column

UV Sensors

The UV Sensors allows the following:

- Enable / Disable Primary Peak and set its start and end setpoints
- Enable / Disable Inflection point and set its deadband and percent setpoint
- Set a new UV Zero baseline
- Access to UV Tuning controls

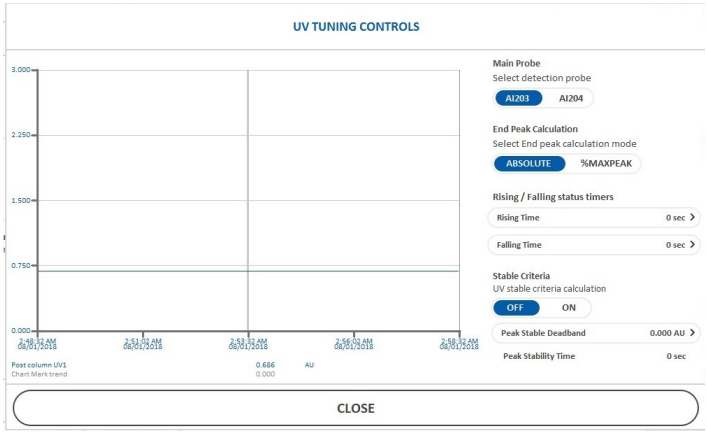


Peak detection status:

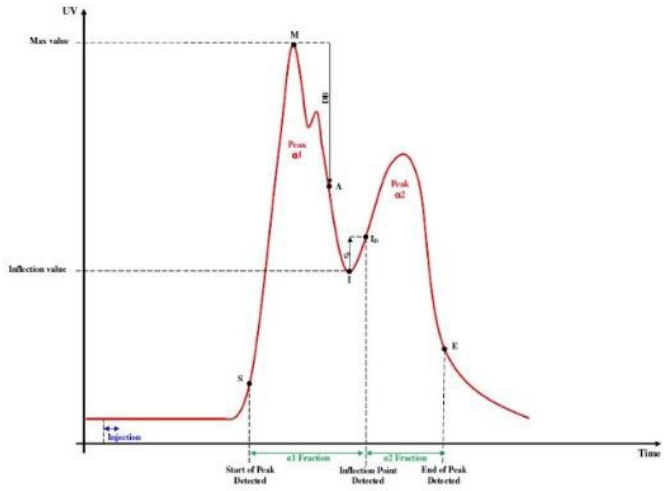
Status	Description
Off	Peak detection disabled
Wait	Wait the start of the peak detection (UV value below the start peak threshold)
Rising	Start of peak detected and UV value is rising
Falling	Start of peak detected and UV value is falling

The UV Tuning popup shows the UV Value on a chart and allow to tune the UV detection algorithm:

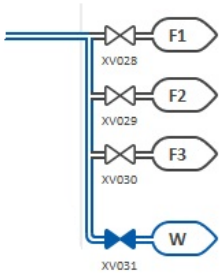
- The UV Probe to be used for detection can be chosen
- End peak calculation mode can be set to absolute or percentage of the peak height
- Rising and Falling timers can be adjusted
- UV Stable criteria parameters can be adjusted



Note Peak detection is used to automatically identify when the product is coming outside of a column in order to isolate it in specific containers (fraction outlet).



Outlets Section



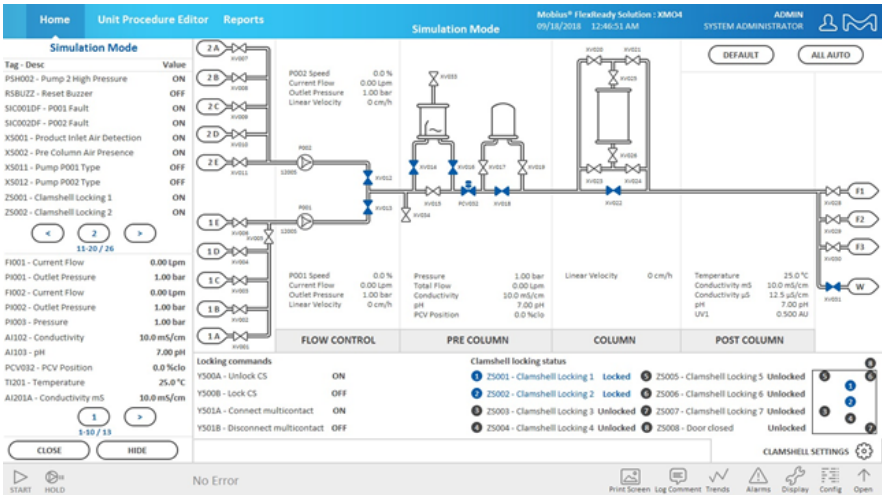
Process Display – Outlets

Controlling the Flow through the Outlets

To open a fraction valve, click on the desired fraction button. To close all fraction valves, click Drain.

Flexware® Clamshell Assembly Settings

The manual Door and Flexware® Clamshell Assembly Control window is open by clicking on the Clamshell Settings tab in the Navigation Toolbar.



Caution Improper setting of the valves may cause injury to the operator or damage to the Flexware® Clamshell Assembly. Manual control of the Flexware® Clamshell Assembly should only be performed by properly trained personnel.

Controls

Controlling the door and Flexware® Clamshell Assembly and installing the Flexware® Clamshell Assembly is done through the execution of a recipe or through manual control. See the chapter Using the Recipe Editor for the specific recipe actions related to door and Flexware® Clamshell Assembly control.

Manual Door and Flexware® Clamshell Assembly Control

There are separate controls for the Lock and Unlock processes. To turn a process ON/OFF, click on the valve status. Like the regular valves, a manual change status popup will appear.

To perform an action, the opposite action's valve must be in the OFF State. The user cannot Lock an object if the corresponding Unlock Valve is OPEN/ON. A user cannot Unlock an object if the corresponding Lock Valve is OPEN/ON. When a Lock (ZS001 to ZS007) is locked, its name is blue. When it is unlocked, its name is grey.

Sample Control Recipe

To Unlock the Flexware® Clamshell Assembly, assuming the Flexware® Clamshell Assembly is in a locked state.

1. Click the Unlock Flexware® Clamshell Assembly Valve (Y500A).
2. Select ON then click CLOSE. The Valve indicates the ON State.
3. Click the Lock Flexware® Clamshell Assembly Valve (Y500B).
4. Select OFF then click CLOSE. The Valve indicates the OFF State and the Flexware® Clamshell Assembly is unlocked.

To Lock the Flexware® Clamshell Assembly, assuming the Flexware® Clamshell Assembly is in a unlocked state.

1. Click the Lock Flexware® Clamshell Assembly Valve (Y500B).
2. Select ON then click CLOSE. The Valve indicates the ON State.
3. Click the Unlock Flexware® Clamshell Assembly Valve (Y500A).
4. Select OFF then click CLOSE. The Valve indicates the OFF State and the Flexware® Clamshell Assembly is locked.

Safety

Before starting operations in manual control, the following actions will make sure that the system is in a safe state:

1. Disable the alarms ZS008, YA08 and YA09 and ZSDF.
2. Open all valves in the Flexware® Clamshell Assembly.
3. In the Flexware® Clamshell Assembly Settings, open/On Y500B and close/Off Y500A.
4. Verify the status of the sensors and that they correspond to the current system state.

Before leaving the manual control window, the following actions will make sure that the system is in a safe state:

1. In the Flexware® Clamshell Assembly Settings, verify the status of the sensors and that they correspond to the current system state.
2. Open/On Y500B and close/Off Y500A.
3. Enable the alarms ZS008, YA08 and YA09 and ZSDF.

If the system is on hold, select “Resume with current flowpath”.

Sample Control Recipe

Unlock Door

1. Before getting started, check that the system is in a safe state as described above.
2. Open/On Y500A and close/Off Y500B to unlock the Flexware® Clamshell Assembly
3. Open the door.

Lock Door

1. Before getting started, check that the system is in a safe state as described above.
2. Close the door and maintain it closed.
3. Open/On Y500B and close/Off Y500A to lock the Flexware® Clamshell Assembly.
4. Verify the status of the lock sensors ZS001 to ZS008.

Unload Flexware® Clamshell Assembly for Storage

1. Before getting started, check that the system is in a safe state as described above.
2. Open/On Y500A and close/Off Y500B to unlock the Flexware® Clamshell Assembly
3. Open/On Y501B and close/Off Y501A to disconnect the Flexware® Clamshell Assembly
4. Unload the Flexware® Clamshell Assembly.

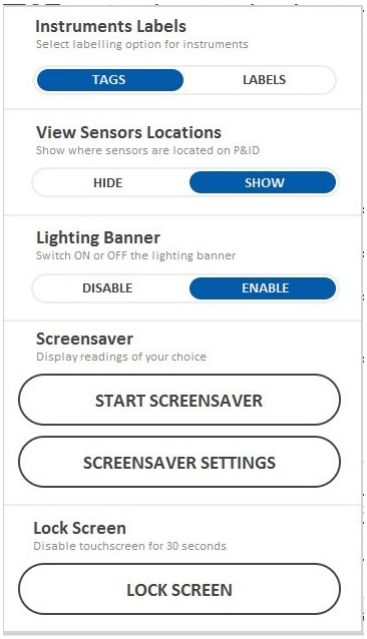
Load Flexware® Clamshell Assembly after Storage

1. Before getting started, check that the system is in a safe state as described above.
2. Load the Flexware® Clamshell Assembly.
3. Close the door and keep it closed.
4. Open/On Y501A and close/Off Y501B to connect the Flexware® Clamshell Assembly
5. Wait for communication with the Flexware® Clamshell Assembly.
6. Open/On Y500B and close/Off Y500A to lock the Flexware® Clamshell Assembly
7. Once all I/O network are green, system is on “hold”, select “Resume with current flowpath”.

Display Setup

Display Setup can be accessed from the Process Controls Bar. It allows the User to:

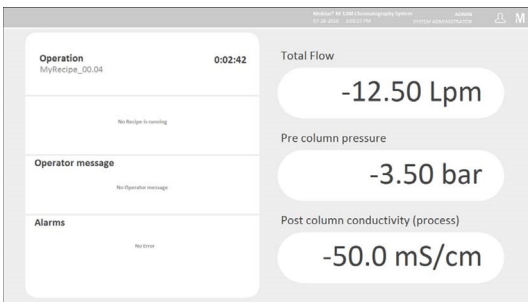
- Choose its display preferences for the Process display (Instruments labels or tags; View or hide sensors locations)
- Enable or disable the lighting banner
- Configure and launch the screensaver
- Lock the touchscreen for cleaning purpose



Screensaver

The screensaver shows system most relevant information:

- Recipe Status
- Operator message
- Alarms
- Three process values selected by the user



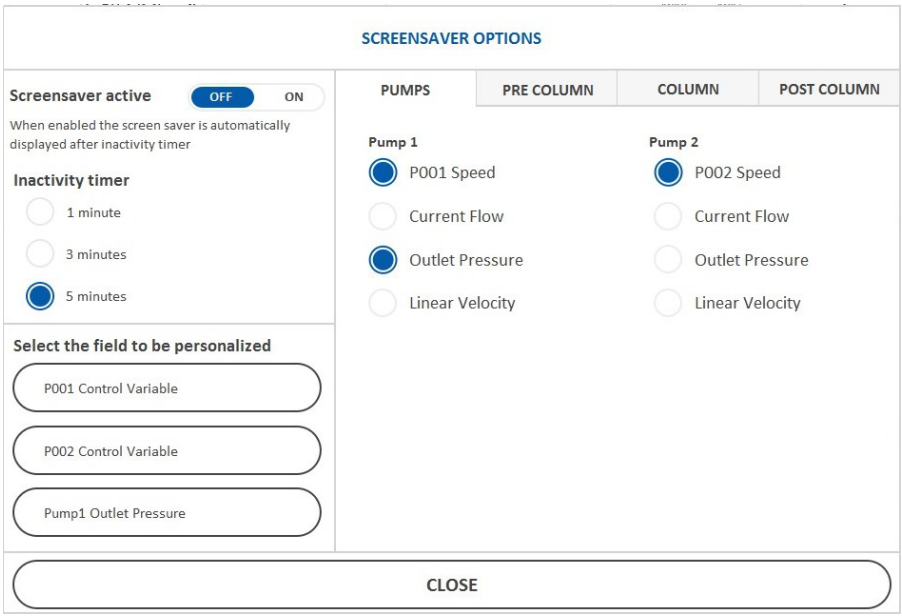
The Screensaver background color and blinking status is used to inform about system's state.

Color	Meaning
Steady grey	OK
Blinking grey	Waiting for operator answer
Steady orange	Non-critical acknowledged alarm is present
Blinking orange	Non-critical unacknowledged alarm is present
Steady red	Critical acknowledged alarm is present
Blinking red	Critical unacknowledged alarm is present

Screensaver Settings

The Screensaver settings popup allows the following

- Activate or deactivate the screensaver
- Set the inactivity time used to trigger the screensaver
- Choose each of the three -user configurable analog fields



Lock Screen

The Lock screen display allows to clean the touchscreen. It automatically closes once its 30 seconds timer has elapsed.

Alarm Control

The system includes alarm logic which provides safety to personnel and equipment, and ensures proper operating parameters are maintained.

General Alarm Behavior

Alarms are classified as non-critical (medium priority) or critical (high priority).

Non-critical alarms provide warnings. Critical alarms activate a lock, which sets the system to a safe state.

When a non-critical alarm is triggered, information is displayed in orange in the alarm banner and the Alarm panel. The actuators continue to run.

When a critical alarm is triggered, information is displayed in red in the alarm banner and the Alarm panel. All actuators are stopped and critical flowpath is activated.

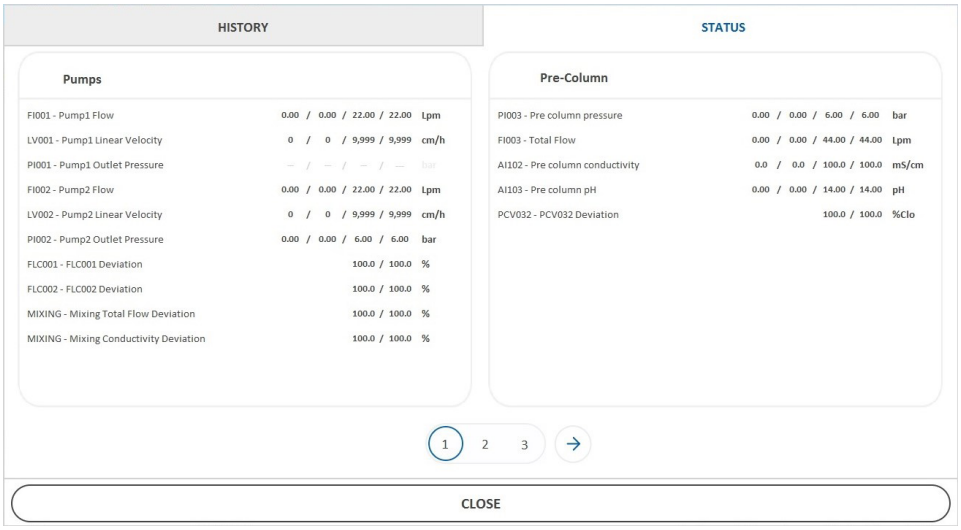
Non-Critical Alarms Actions	Critical Alarms Actions
Sound alarm horn	Sound alarm horn
Records alarm condition and value in alarm / event log	Records alarm condition and value in alarm / event log
Lists alarm in the Alarm Summary display with an orange background	Lists alarm in the Alarm Summary display with a red background
The specific sensor is in orange on the HMI	The specific sensor is in red on the HMI
	Set system to Hold state

The Alarm panel refers to all alarms information and settings. It has two main tabs: Status and History.

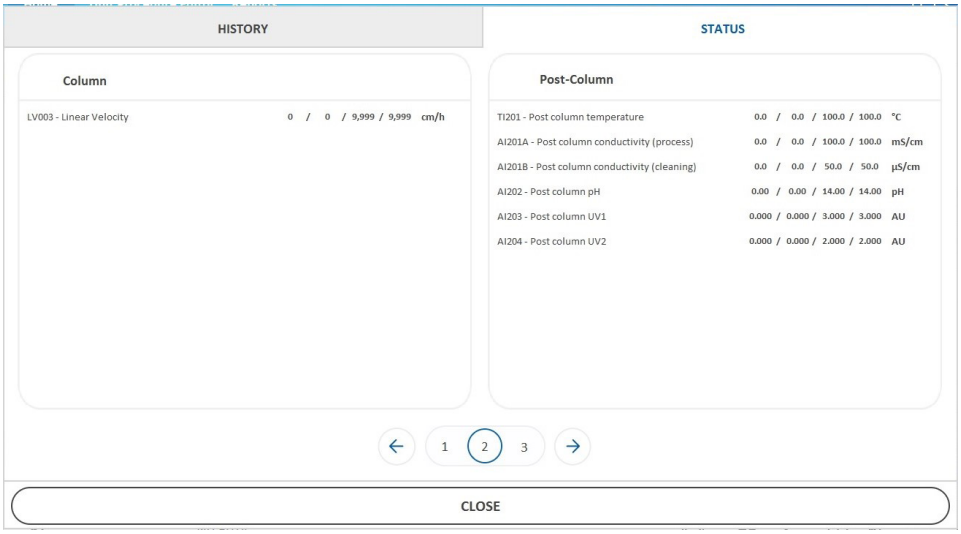
The Status tab regroups all alarms settings into categories:

- Pumps
- Pre-column
- Column
- Post-column
- Digital
- Network
- Signal
- Exchange

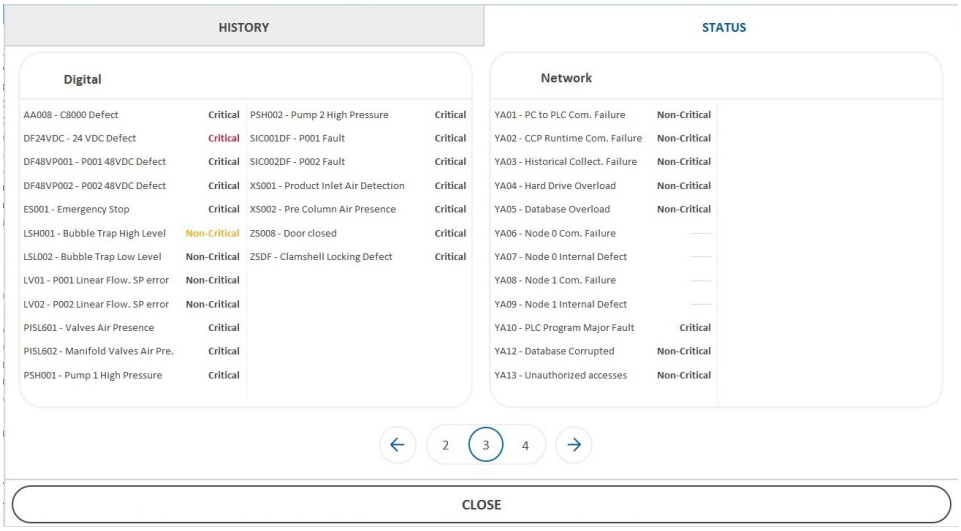
Alarm Status – Pumps & Pre-column



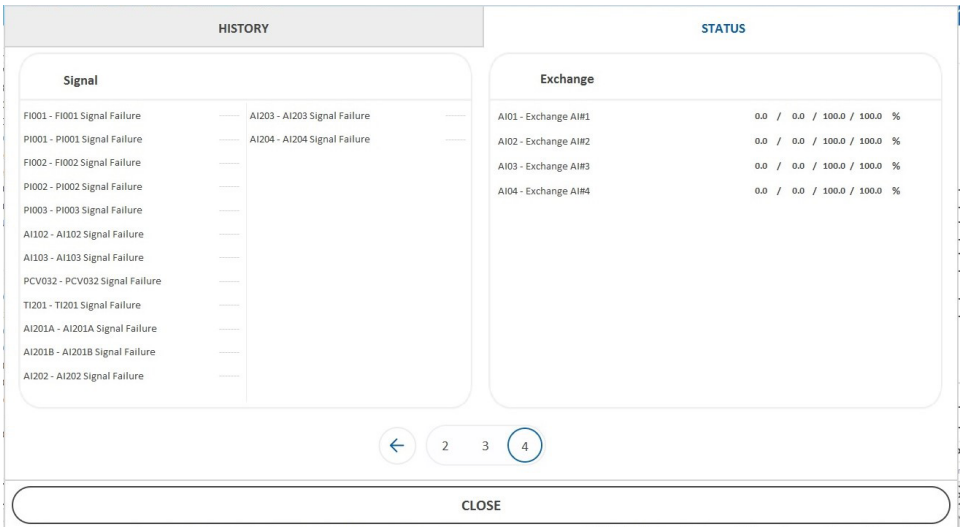
Alarm Status – Column & Post-column



Alarm Status – Digital & Network



Alarm Signal – Exchange



Click on one of these categories to open the Alarm settings panel.

The History tab groups all current alarms on one list.

Current alarms are also displayed on the Alarm banner.

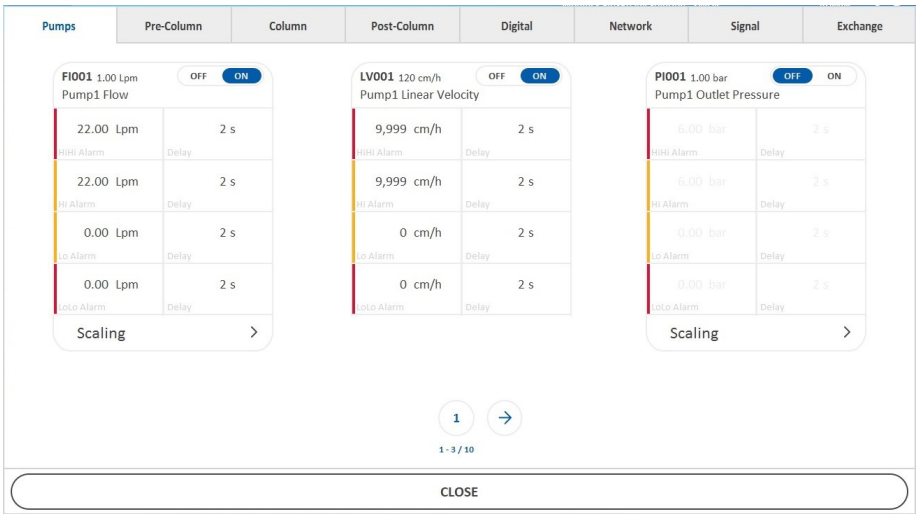
Alarms are acknowledged by selecting the Alarm Acknowledge icon on the bottom of the screen. Alarms remain current until cleared or disabled. System operation cannot be continued until a critical alarm is cleared.

Alarm History

Process (Analog Instrument) Alarms

The analog process alarms have LOLO, LO, HI and HIHI setpoints. If the HI or LO setpoint is violated, a non-critical alarm is triggered; if the HIHI or LOLO setpoint is violated, a critical alarm is triggered.

All the process (analog instrument) alarm settings are made on the Alarm settings panel which lists the analog measurement name and their alarm limit settings. This panel sets up the critical alarm (LOLO and HIHI) and non-critical alarm (LO and HI). When the process data reaches the alarm set point, the alarm will be turned on after a configurable period of time called delay.



The following categories contain analog alarms:

- Pumps
- Pre-column
- Column
- Post-column
- Exchange

To set up an alarm value, click on the appropriate cell (LOLO, LO, HI or HIHI). A data entry box will appear. There is a range for each process alarm.

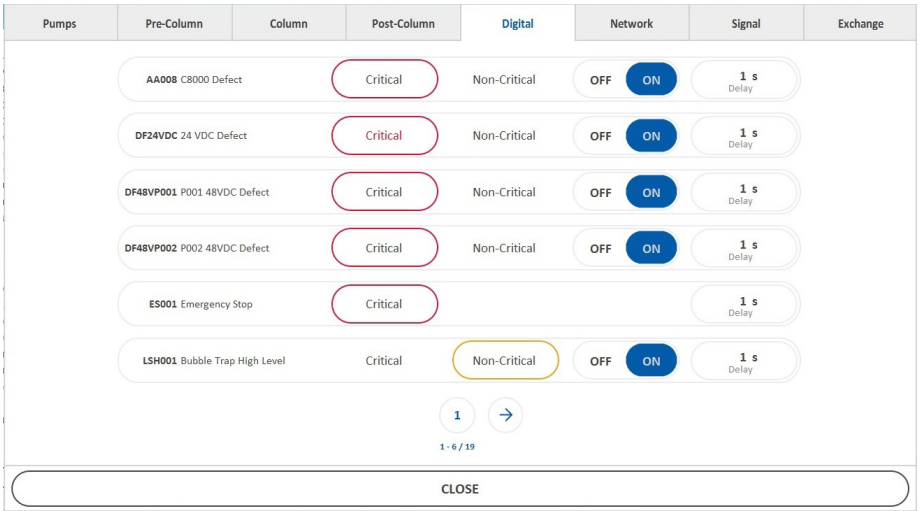
Minimum Range Value ≤LOLO ≤LO ≤ HI ≤HIHI ≤Maximum Range Value

The range is different with different process data. The input data should be in the range; otherwise, the error message, Value Out of Range, appears.

To enable or disable the alarms, click on the On/Off button near the Analog Tag.

Discrete Device (Digital) Alarms

The digital alarm display show alarm status for each discrete device.



Enable or disable an alarm by clicking the ON/OFF button.

The Alarm priority can be set by clicking on the Critical or Non-Critical button. This always require a confirmation from the user, regardless the System Setting that has been set.

Safety alarm priorities can be set. Safety alarms are always Critical and cannot be disabled. Safety alarms are the following:

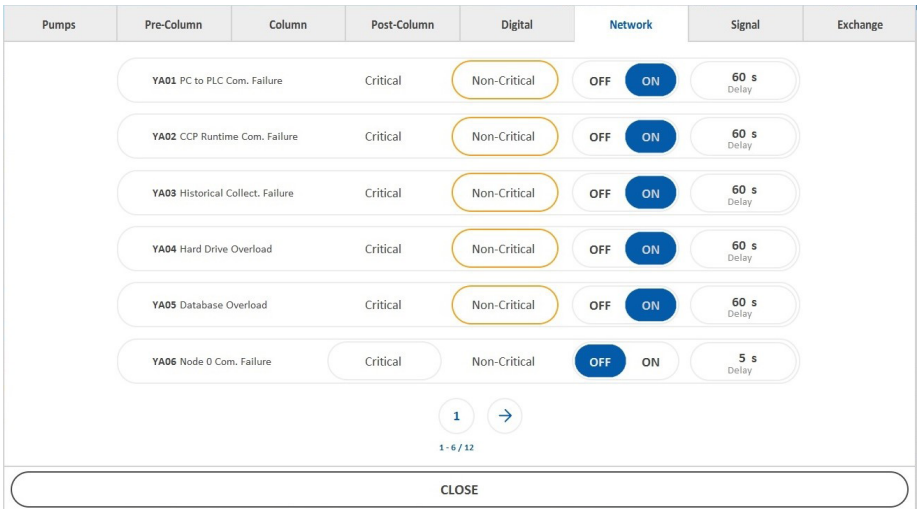
- Emergency Stop (ES001)
- Door closed (ZS008)
- Door closed (ZS008)
- Flexware® Clamshell Assembly Locking Defect (ZSDF)

High Pressure alarms are always Critical but can be disabled (during the Flexware® Clamshell Assembly switch for example):

- High Pressure Switch for Pump 1 (PSH001)
- High Pressure Switch for Pump 2 (PSH002)

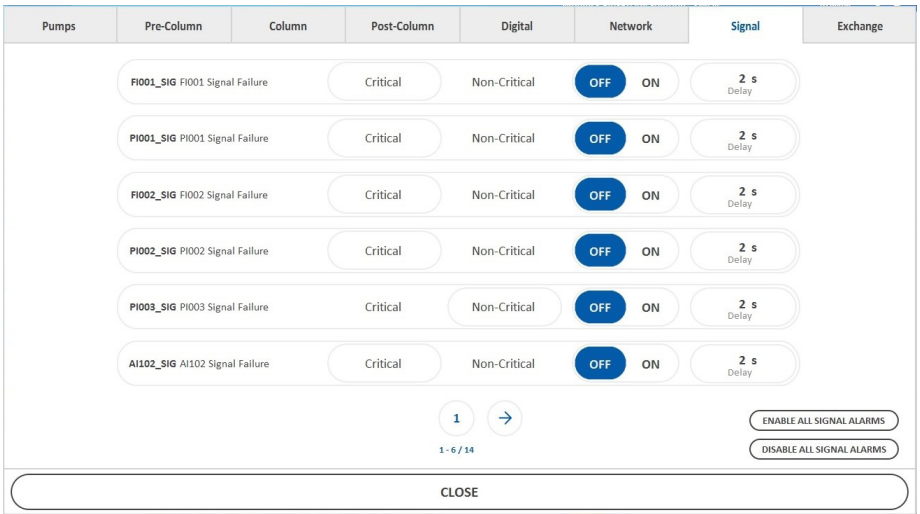
Network Alarms

The network alarms tab displays all network alarms and their status.



Signal Alarms

The signal alarms tab displays all signal alarms and their status.



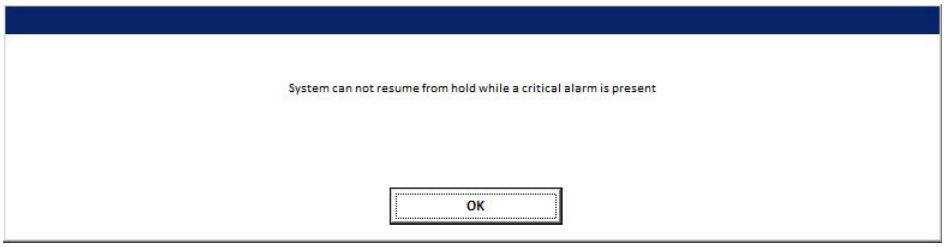
The Signal alarms tab displays all network alarms and their status.

The tab allows to enable or disable all signal alarms.

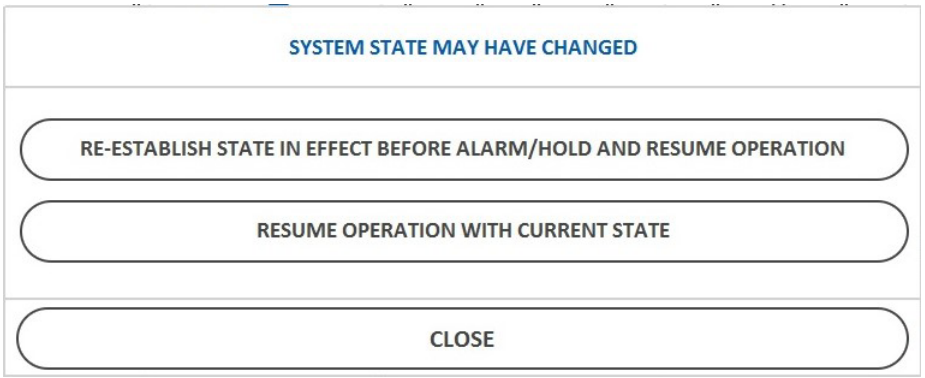
Resuming from Hold

Once all Critical alarm conditions have been cleared, the user can resume the system from hold state using the Process Controls bar button:

If a Critical alarm is still present, resuming from hold is not possible and the following message will appear:



If no Critical alarm is present, resuming from hold triggers this popup:



The first option « Re-establish state in effect before alarm/hold and resume operation » allows to restore the flowpath, pump status, in place before the alarm so that the process can restart at its previous state.

The second option « Resume operation with current state » do not restore the previous state. This allows for example to end a process manually instead of with the current recipe.

The « Close » button allows the user to cancel the Resume from Hold action.

Security Overview

The security system consists of group accounts, user accounts and security areas. A typical system uses four group accounts: Operator, Supervisor, System Administrator and QA Users. Each user of the system belongs to a group account corresponding to the user's permitted access level.

The login name and password identify each user account. A user account assigns security privileges to a single user. Group accounts, application features and security areas are assigned to each user account. Login timeouts can also be assigned for each user. Different passwords restrict access to the system and only users belonging to group accounts with appropriate security privileges are permitted access to the security areas of the software. In ascending order of security level, the group accounts are: Operator, Supervisor, and System Administrator. QA User is reserved for specific Quality Assurance actions.

The program acknowledges each user as having certain privileges, defined as application features and security areas. Security areas are sections of the software or process that are accessible only if a user account or the user's group account authorizes access to that security area. Application features are also defined for each group or user account. If an attempt is made to gain access to an unauthorized area, an "Unauthorized Access Attempt" message will flash on the screen.

Further detail on the security system is provided for the Security chapter of Computer Administrator manual.

Priming the System

Introduction

Once the Flexware® Assemblies are installed and before operating the column, the tubing must be free of air and filled with liquid. The user should review Using the System to be familiar with the Common Control Platform® (CCP®) Software.

Required Supplies

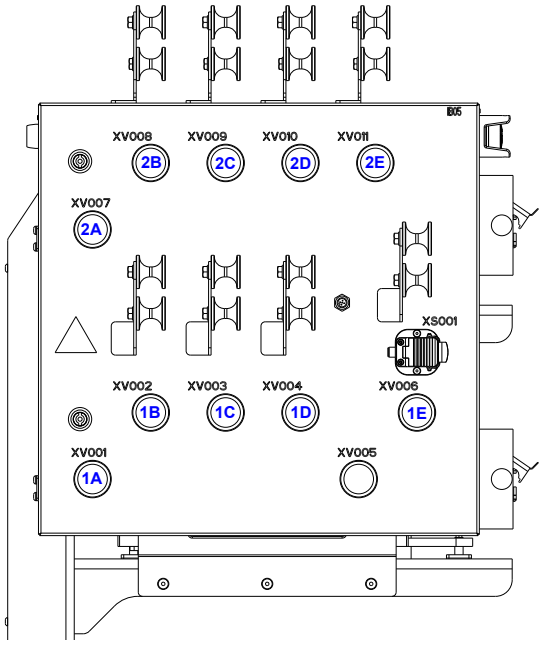
- Vessel to collect the fluid from the drain and the waste
- Tubing to connect drain to the disposal vessel or site
- Tubing to connect filter vent to the disposal vessel or site
- Vessel to collect the fluid from the top of the column

Set-up

1. Connect the tubing from the source bags to the manifold.
2. If P001 is used, close XV012. If P002 is used, close XV0013.
3. Open valve XV034 (drain valve) and close valves XV014 and XV015. This will allow the fluid drain out of the system while closing off the rest of the system.
4. Place the bubble trap and filter off line and set the column to bypass.
5. Open the waste.

Prime the Inlet Paths

The inlet lines should be primed one at a time, starting with valve 2E in the figure below. If only one pump is being used, go to step 7.



Closed the valves from right to left

Manifold

1. Set Pump P002 control to manual control. Set the speed setpoint to 20%. The speed should be set at the lowest level that will allow sufficient flow to purge the lines of air.
2. Open the appropriate valves to get a clear flow path from the SINGLE inlet to the drain.
3. Confirm that a collection vessel is properly installed at drain valve XV034.
4. Start pump P002.
5. Purge the air out of the tubing in the flowpath from the solution bags to the inlet white rollers by manually manipulating (raising or lowering) it as required. Do not allow air to get trapped in the tubing over the white rollers. If necessary, remove the tubing from the white roller and lower it to purge the air from the tubing.
6. Repeat steps 1 through 5 above for all inlets, ending with inlet 2A.
7. Set Pump P001 control to manual control. Set the speed setpoint to 20%. The speed should be set at a the lowest level that will allow sufficient flow to purge the lines of air.
8. Open the appropriate valves to get a clear flow path from the SINGLE inlet to the drain.
9. Confirm that a collection vessel is properly installed at drain valve XV034.
10. Start pump P001.
11. Purge the air out of the tubing in the flowpath from the solution bags to the inlet white rollers by manually manipulating (raising or lowering) it as required. Do not allow air to get trapped in the tubing over the white rollers. If necessary, remove the tubing from the white roller and lower it to purge the air from the tubing.
12. Repeat steps 7 through 11 above for all inlets, ending with inlet 1A.

At this point, the flowpaths from all of the inlets to the drain should be purged of air.

1. Confirm that a collection vessel is properly installed at the waste outlet and at the filter vent.
2. With the pump still running and one inlet open, the bubble trap will be set in auto mode.
3. Bring filter online.
4. The column should be bypassed.
5. With collection vessel in place, manually open the filter vent and tap the filter to remove the air. Once a steady stream of fluid is coming out of the vent, close the vent.
6. The flowpath through the precolumn instrumentation to the waste outlet should be filling up.
7. Tap the pre-column instrumentation cell until no bubbles exit and a clear stream of fluid flows out of it.
8. Stop the pump.
9. Attach the column tubing to the bottom of the column and open the isolation valve, if applicable. Do not connect the top of the column.
10. The column should be in the Forward Flowpath. Collect the fluid coming out of the tubing that will be connected to the top of the column.
11. Set the pump speed setpoint to 10% and start the pump.
12. When a steady flow of liquid exits the tubing, attach the tubing to the top of the column and open the valve (if applicable).
13. Bring the pump up to an appropriate speed for the column.
14. Manipulate the post column instrumentation cell tubing to remove any air that may have accumulated while connecting the column to the system.
15. Once all the air has been purged out of the post column instrumentation and a steady stream exits the waste outlet, turn the pump off. The system is now primed with the equilibration solution.

Removing the Mobius® Chrom 20 System with Flexware® Assemblies

System Preparation

Prior to removing the Mobius® Chrom 20 System with Flexware® Assemblies from the system, verify the following:

- The product has been recovered into the collecting container
- The complete flowpath is properly drained and emptied
- All the TC connectors are free from liquid
- Pressure is released from the complete flowpath
- If decontamination is required, the decontamination operation was performed
- All the caps, gaskets and clamps are available to cap and plug the TC connectors

Note The Mobius® Chrom 20 System with Flexware® Assemblies must be removed and replaced after each batch

Removing the Mobius® Chrom 20 System with Flexware® Assemblies

1. Disconnect the column inlet and outlet.
2. Disconnect the pre column instrumentation cell.
3. Disconnect the post column instrumentation cell.
4. Remove the two instrumentation cells from their supports.
5. Open the cover of the liquid sensor XS002 and remove the Flexware® Clamshell Assembly. Close the cover.
6. Disconnect the inlet and outlet of the bubble trap.
7. Disconnect the vent of the bubble trap.
8. Remove the bubble trap with Flexware® Clamshell Assembly from the BBT01 support.
9. Disconnect the outlet of pump P001 from the flowmeter.
10. Disconnect the outlet of pump P002 from the flowmeter
11. Disconnect the inlet of Pump P001
12. Disconnect the inlet of Pump P002
13. Disconnect the outlet of FT001.
14. Disconnect the outlet of FT002.
15. Open the cover of the liquid sensor XS001 and remove the Flexware® Clamshell Assembly. Close the cover.
16. Open the Valves XV001, XV002, XV003, XV004, XV005, XV006, XV007, XV008, XV009, XV0010, XV011.
17. Remove the manifold line from the manifold.
18. Close the valves XV001, XV002, XV003, XV004, XV005, XV006, XV007, XV008, XV009, XV0010, XV011.
19. Disconnect the precolumn filter FH001 and remove the filter assembly from the filter holder.
20. On the touch screen, navigate to the recipe screen and run the Unlock door recipe.
21. Open the door and remove the Flexware® Clamshell Assembly from the clamshell.
22. Complete the recipe following the prompts on the screen.
23. Run the Lock door recipe.
24. Close the door.
25. Remove the flowmeter cell of FT001 and FT002 as described in the flowmeter manufacturer’s instructions.
26. Remove the pump head of P001 and P002 as described in the pump manufacturer’s instructions.

Maintenance, System Conversion, and Troubleshooting

Introduction

The Unload Flexware® Clamshell Assembly for Maintenance recipe should be used when performing any maintenance procedures. The Load Flexware® Clamshell Assembly After Maintenance recipe should be used to reinstall the back Flexware® Clamshell Assembly after performing any maintenance procedures.

Refer to manufacturer’s instructions included with the system for maintenance, calibration and troubleshooting guidelines of OEM parts.

General Maintenance

Before doing any work, read and understand Operator and Equipment Safety.

The following schedule is only a guideline. Depending on use, components may need more frequent maintenance.

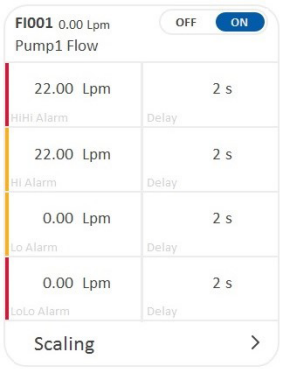
Maintenance Schedule

Schedule	Maintenance Procedures
Every Three Months	System Cleaning
	General Inspection
	Mechanical Preventive Maintenance
	Electrical Preventive Maintenance
	Sensor Maintenance

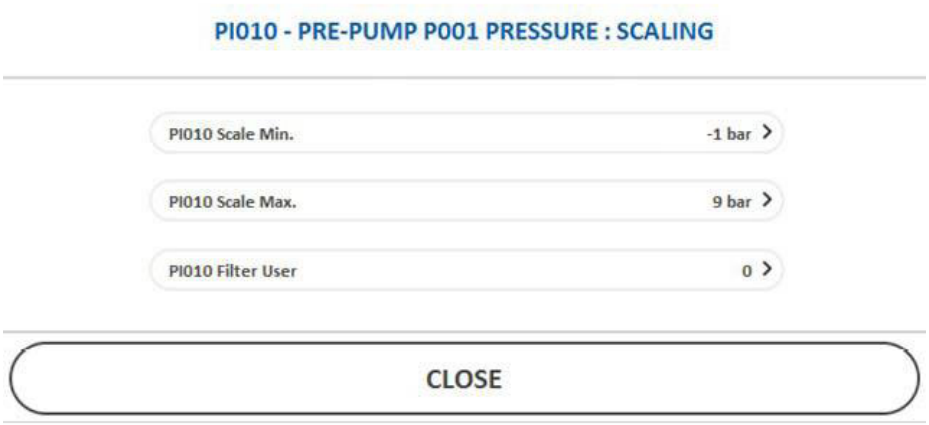
Calibrating the Analog Instruments

Note Calibration events are not automatically recorded as electronic records by CCP software. For information on compliance with 21CFR211.68, refer to installation SOPs.

Adjust the calibration of analog instruments using the Scaling popup on the user interface display. The popup is accessible for each analog value that can be calibrated.



Press **Scaling** to open the Scaling popup:



Scale Min. / Scale Max.

Analog inputs are scaled to engineering units in the PLC. Zero and full-scale values for each analog input are configurable from the associated scaling popup. Raw data is not modifiable.

To modify the Scale Min. or Scale Max. values, click the value and enter a new value in the Data Entry Prompt that appears.

Input Filtering

Analog inputs can be configured to include filtering of the raw data signal. A value of 0 disables filtering; a value of 99 enables maximum filtering.

The PLC computes an actual filter value from (100–User Filter Value) / 100 which converts the 0–99 user filter value to 1.00–0.01 to be used in the filtering equation.

The filtered raw value is computed once per second using the equation:

(Raw Value x Actual Filter Value) + (Previous Filtered Raw Value x (1 – Actual Filter Value))

To modify the Filter Value, click the value in the scaling popup and enter a new value in the Data Entry Prompt that appears.

Cleaning the Hardware

Note Read Operator and Equipment Safety in this user guide before performing any maintenance or troubleshooting.

All parts of the system should be wiped down with a cloth dampened with one of the following agents:

- Quaternary ammonium
- Isopropyl alcohol (70%)
- Ethanol (70%)
- Solution of peracetic acid (<1%), Hydrogen peroxide (1%) and acetic acid (<10%)
- Bleach (250ppm)

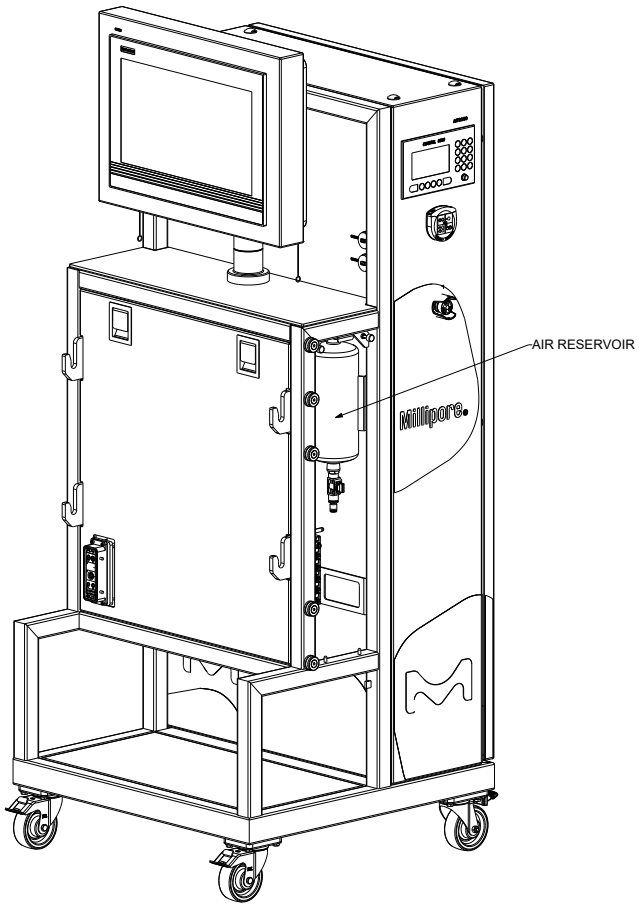
Do not use a water hose or spray gun on the system.

Do not expose the system to hydrogen peroxide (>1%) as this may damage the system.

Do not expose the system to decontamination vapours as this may damage the system.

Moving the System

Before moving the system, the air reservoir must be emptied. The reservoir acts as an air buffer when the emergency stop is engaged. The air tank is located behind the Flexware® Clamshell Assembly. Ensure that the HMI screen is placed in a safety position before moving the system.



1. Turn valve Y102 OFF. Y102 is located just below the air reservoir behind the side Access Door.
2. Once air is released, turn valve Y102 ON.

Moving the System on Site

1. Disengage the bases from each other. The bases must be moved individually. Do not move the connected bases.
2. Push each base to the desired location.
3. Reconnect the bases once they are in the new location.

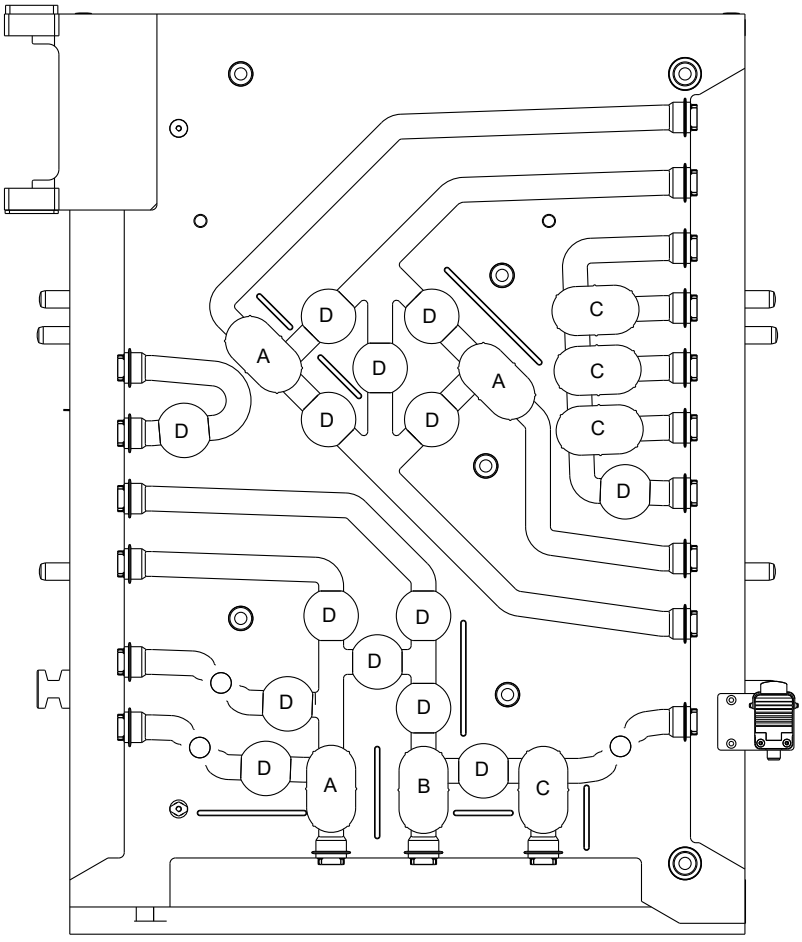
Moving the System to a New Site

1. Disengage the bases from each other. The bases must be moved individually. Do not move the connected bases.
2. To lift the bases you could use a forklift. Ensure the fork hold front and rear of the frame. Be carefull to not dammage the wheel with fork.
3. Move the base to the desired location
4. REconnect the bases once they are in the new location.

Changing the Valve Pads

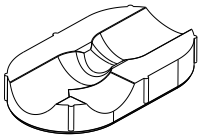
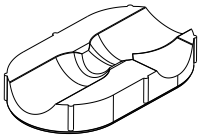
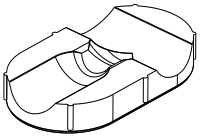
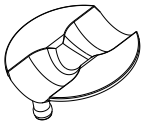
The valve pads in the Flexware® Clamshell Assembly should be changed after 2500 cycles or after six months of use.

1. Run the Unlock Door recipe to open the door and access the valve pads.
2. For Valve Pads A, B and C, insert the blade of a flat head screwdriver between the valve pads and the Flexware® Clamshell Assembly and pry the valve pads off of the Flexware® Clamshell Assembly.
3. For Valve Pad D, pull the valve pad out using the stems.
4. Discard the used pads.
5. Install the new pads by aligning the pins on the pads with the holes in the Flexware® Clamshell Assembly. Push the pins into the holes to secure the pads.
6. Run the Lock Door recipe to close secure the door.



Valve Pad Locations

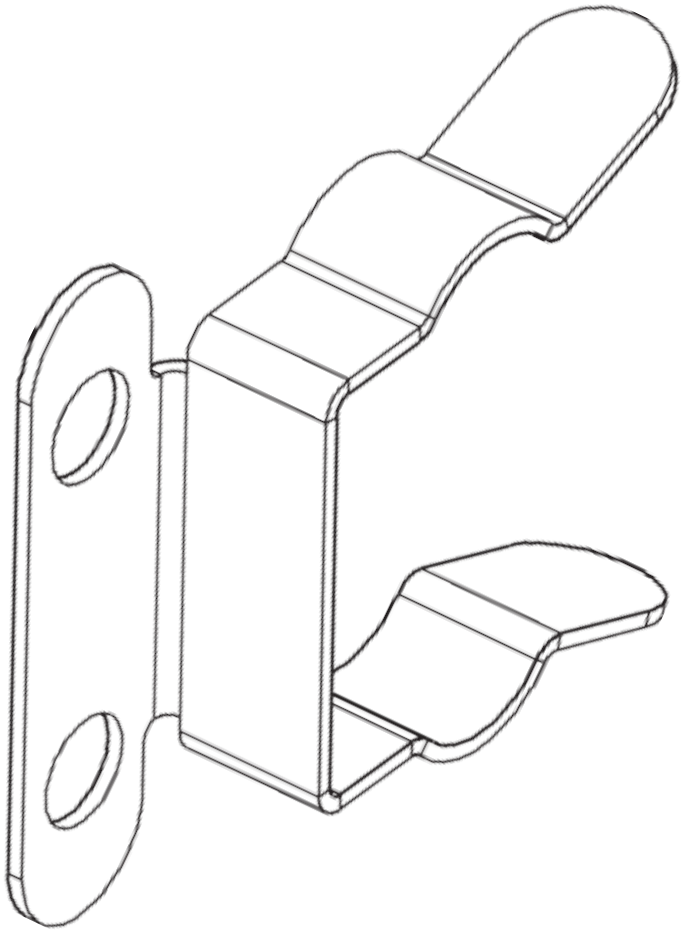
Valve Pads

Valve Pad		
Key	**Description**	**Size**
A		⅝ inch
B		
C		
D		

Replacing the Fitting Clips

Flexware® Clamshell Assembly	Fitting Clip Size
Mobius® Chrom 20 with Flexware® Assembly	⅝ inch

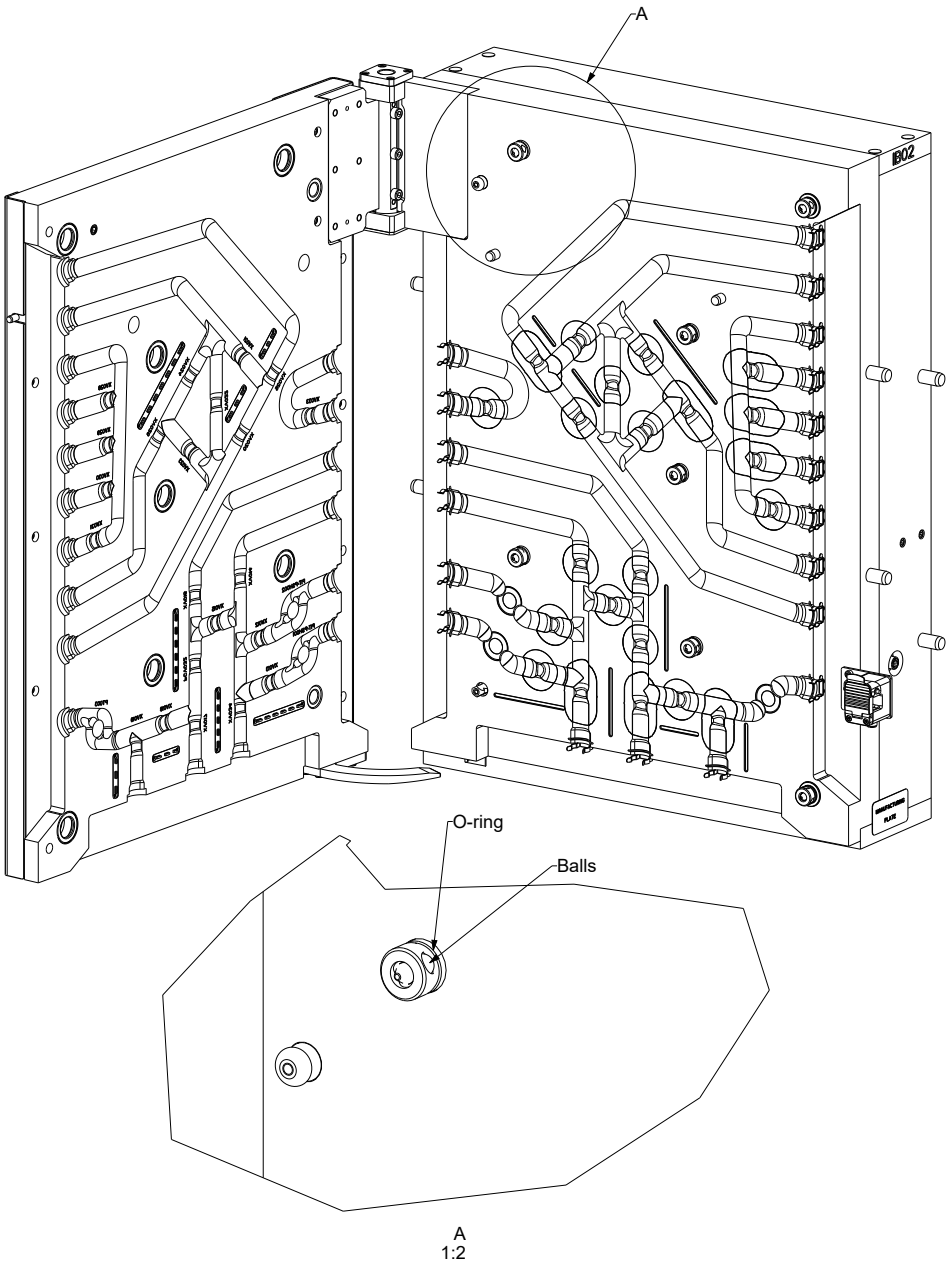
1. Run the Unload Flexware® Clamshell Assembly for Maintenance recipe.
2. Remove the clip from the Flexware® Clamshell Assembly by removing the two screws that hold the clip onto the Flexware® Clamshell Assembly.
3. Place the new clip in position and fasten it to the Flexware® Clamshell Assembly with the screws.



4. Run the Load Flexware® Clamshell Assembly after Maintenance recipe.

Replacing the Flexware® Clamshell Assembly Door O-rings or Balls

The lock on the Flexware® Clamshell Assembly has O-rings and stainless-steel balls that may need periodic replacement.



1. Run the Unlock Door recipe to open the door.
2. Remove the O-ring from the lock.
3. Remove the three balls from inside the lock cylinder.
4. Insert the replacement balls into the cylinder.
5. Insert the O-ring in the groove so that it seats completely.
6. Run the Lock Door recipe to close secure the door.

Setting the Level Sensors

The level sensors situating on the bubble trap support need to be set.

A tip (a pen for example), a bubble trap filled half way with water and the level sensors are required.

1. The system should be powered ON and all emergency stops should be acknowledged.
2. Place the sensors on the support and locate them approximately one-third of they way from the top and bottom of the bubble trap. The stainless steel washers and identification tags must be installed with the sensors.
3. Connect the sensors on the clamshell side and ensure that the sensors are in contact with the bubble trap windows.
4. Unscrew the sensor **LSH001** screw and move it so that it is located in the empty area of the bubble trap.
5. Using the tip, push on the OUT OFF button for approximately two seconds until the LED blinks once.
6. Move the sensor so that it is located in the filled area of the bubble trap.
7. Using the tip, push on the OUT ON button for approximately six seconds until the LED blinks twice.
8. Unscrew the sensor **LSL002** screw and move it so that it is located in the empty area of the bubble trap.
9. Using the tip, push on the OUT ON button for approximately two seconds until the LED blinks once.
10. Move the sensor so that it is located in the filled area of the bubble trap.
11. Using the tip, push on the OUT OFF button for approximately six seconds until the LED blinks twice.

LSL002 is active when the sensor is detecting fluid. LSH001 is inactive when the sensor is detecting fluid.

In normal operation, the fluid level must be situated between the two sensors.

On the HMI display the bubble trap shows two waves.

Note When assembling the level sensors take attention to not damage the plastic thread.

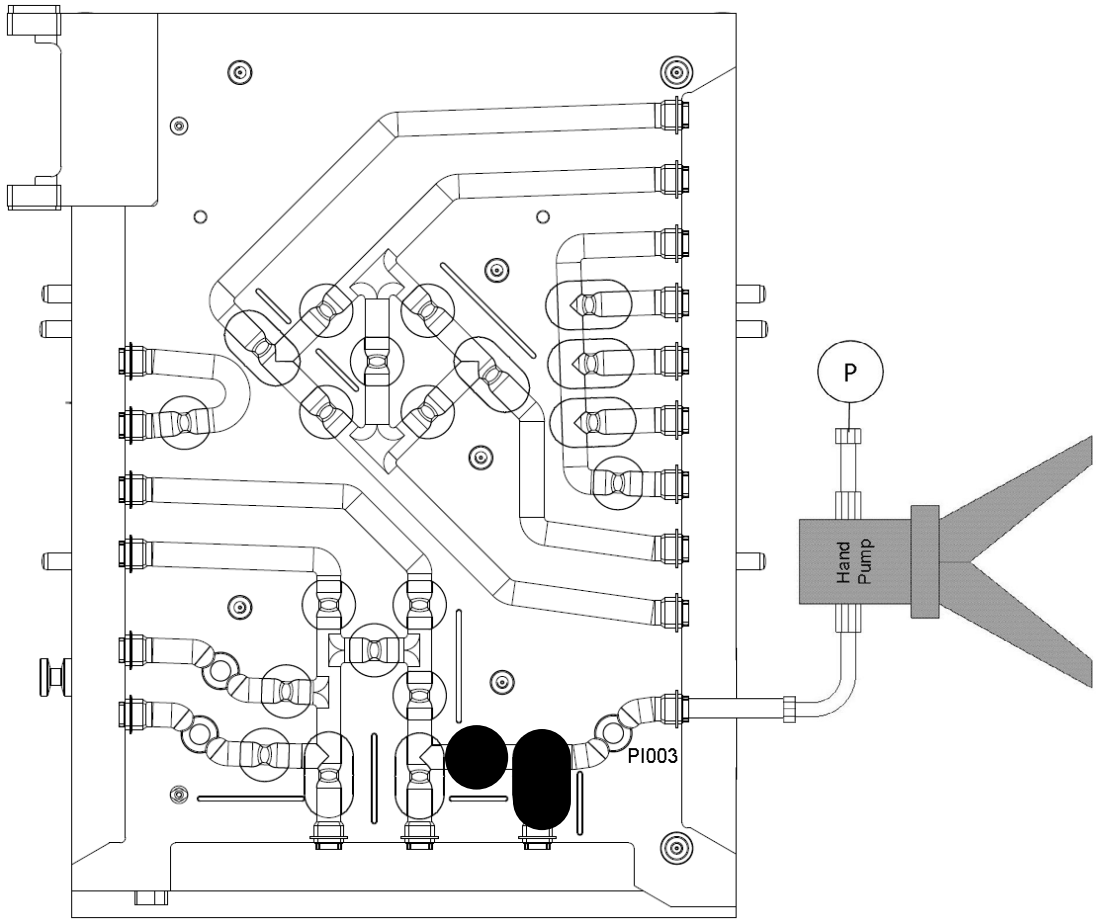
Calibration Verification for the Pressure Sensors in the Flexware® Clamshell Assembly

Material Required

- An air source (a hand pump or compressed air)
- A calibrated pressure sensor
- A Flexware® Clamshell Assembly for Chromatography
- The Flexware® Clamshell Assembly must be connected to the base

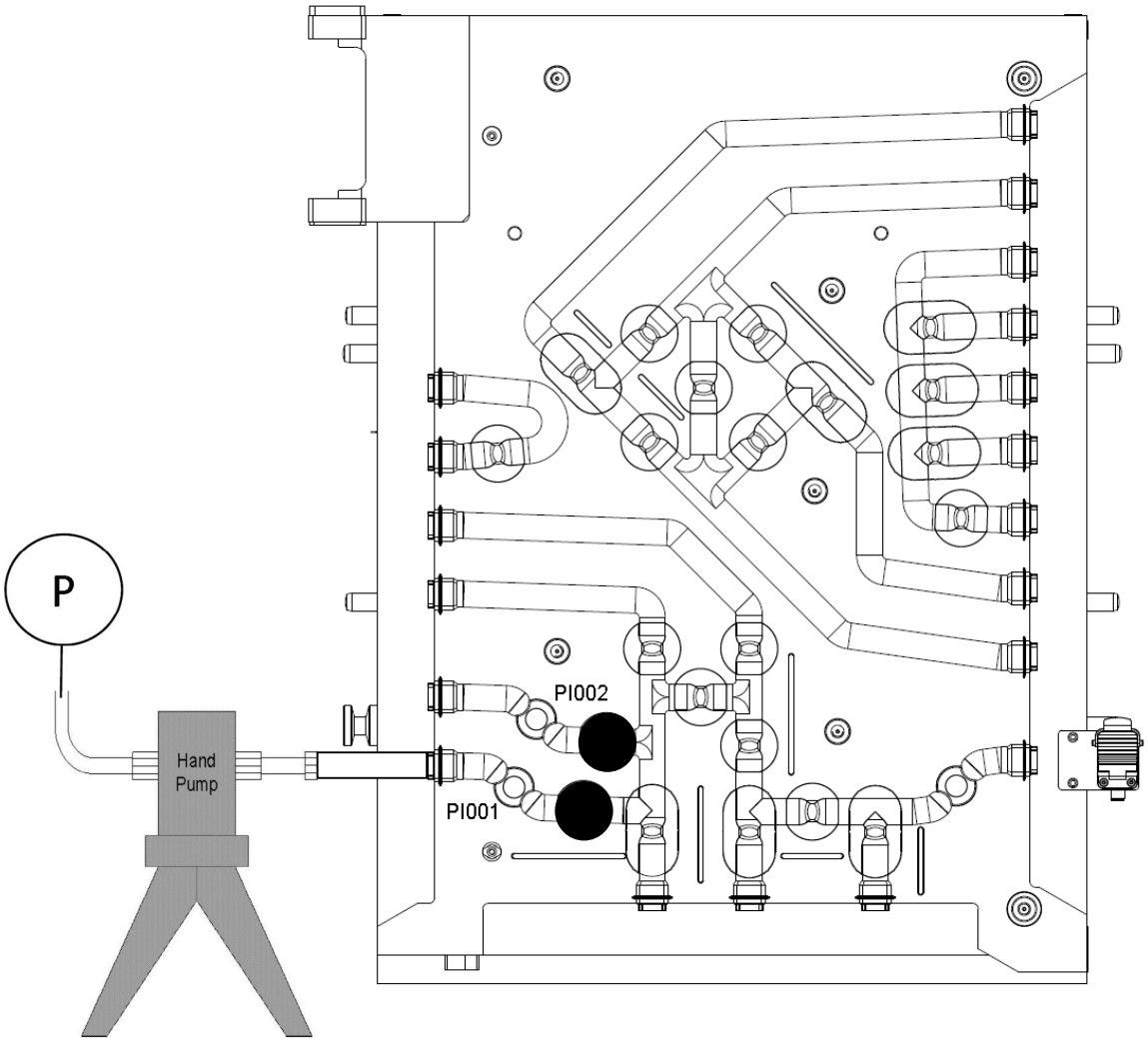
Pressure Sensor PI003

1. Connect the air source to the calibrated pressure sensor and to the Flexware® Clamshell Assembly as shown.
2. Close the valves as shown.
3. Apply pressure to reach the setpoints 0.00, 2.00 and 4.00 bar.
4. Record the different pressures on the reference pressure sensor and the respective pressures displayed on the system for PI003.
5. Release the pressure.



Pressure Sensors PI001 and PI002

1. Connect the air source to the calibrated pressure sensor and to the Flexware® Clamshell Assembly as shown.
2. Close the valves as shown.
3. Apply pressure to reach the setpoints 0.00, 2.00 and 4.00 bar.
4. Record the different pressures on the reference pressure sensor and the respective pressures displayed on the system for PI001 and PI002.
5. Release the pressure.


P
Hand
Pump
PI002
PI001

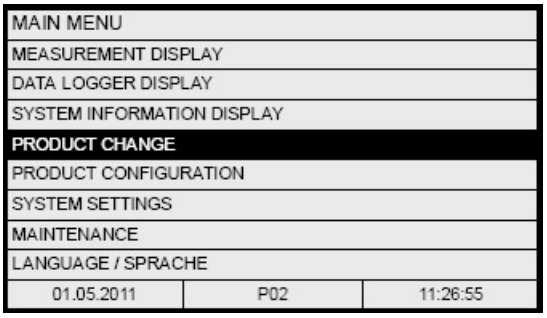
Adding or Removing Column Instrumentation

Adding Precolumn Instrumentation to a System with Post Column Instrumentation Only

1. Install the precolumn instrumentation hardware. See the Assembling and Setting Up the Hardware chapter in this manual for installation details.

2. Connect the conductivity, pH and UV cables.

3. Change the transmitter configuration from CHROM20PST to CHROM20PSTPRE, by selecting, PRODUCT CHANGE from the MAIN MENU.



Product Change Screen

4. Enter password (222), if prompted.

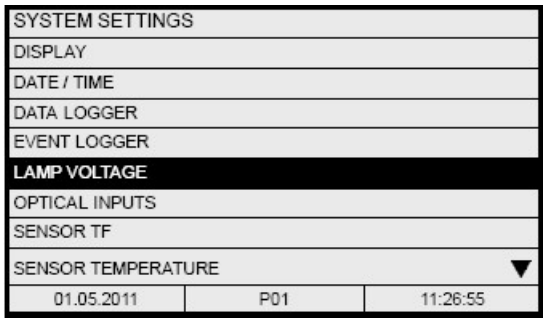
5. Select the desired product configuration and save it. The selected configuration will be displayed in the center of the bottom of the screen.

Configuration Name	Description	Lamp Voltage
CHROM20PSTPRE	Chrom 20 LPM system with post and pre column instrumentation	ON
CHROM20PST	Chrom 20 LPM system with only post column instrumentation	ON

6. From MAIN MENU select SYSTEM SETTINGS.

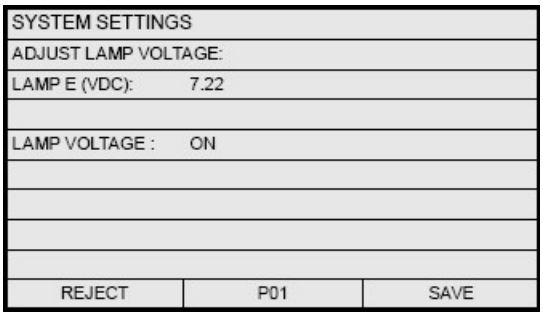
7. Enter password if required.

8. Select LAMP VOLTAGE.



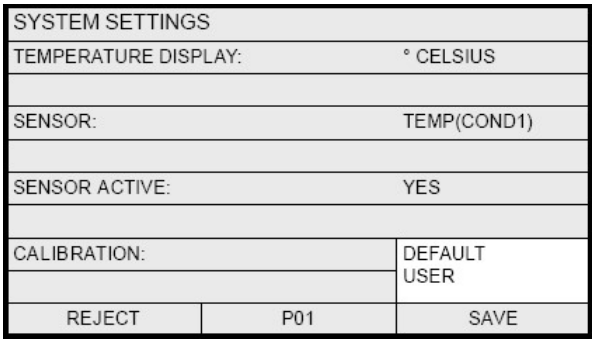
System Settings Menu with LAMP VOLTAGE Selected

9. Set the LAMP VOLTAGE to ON and save it.



Entering LAMP VOLTAGE

10. Select SYSTEM SETTINGS > SENSOR TEMPERATURE. The SENSOR TEMPERATURE menu appears.



Sensor Temperature Menu

11. Set the parameters as follows:

Parameters	Settings			
Temperature Display	°Celcius			
Sensor	TEMP (COND1)	TEMP (COND2)	TEMP (pH1)	TEMP (pH2)
Sensor Active	Yes	Yes	Yes	Yes
Calibration	Default			

12. Click SAVE.

13. Select SYSTEM SETTINGS > SENSOR CONDUCTIVITY. The SENSOR CONDUCTIVITY menu appears.

SYSTEM SETTINGS		
SENSOR:		COND1
SENSOR ACTIVE:		YES
CALIBRATION:		DEFAULT
TEMP. COMPENSATION:		YES
REFERENCE TEMP. [°C]:		25.0000
TEMP. COEFFICIENT [%]:		2.0000
REJECT	P01	SAVE

Sensor Conductivity Menu

14. Set parameters as follows:

Parameter	Settings	
Sensor	COND1	COND2
Sensor Active	Yes	Yes
Calibration	User	
Temperature Compensation	Yes	
Reference Temperature	25.0000	
Temperature Coefficient	2.0000	

15. Click SAVE.

16. Select SYSTEM SETTINGS > SENSOR pH. The SENSOR pH menu appears.

SYSTEM SETTINGS		
pH-ELECTRODE:		pH1
SENSOR ACTIVE:		YES
CALIBRATION:		DEFAULT
CALIBRATION DATA:		
MAX SL ADJUSTMENT [%]:		50.00
MAX OFFSET [mV]:		50.00
TEMP. COMPENSATION:		YES NO
REJECT	P01	SAVE

Sensor pH Menu

17. Set parameters as follows:

Parameter	Settings	
pH-Electrode	pH1	pH2
Sensor Active	Yes	Yes
Calibration	Default	
MAX SL Adjustment [%]	50.0000	
MAX Offset [mV]	50.0000	
Temperature Compensation	Yes	
Temperature Coefficient	2.0000	

18. Click SAVE.

19. Reboot the transmitter. After reboot, the transmitter should be in the CHROM20PSTPRE configuration.

Date Time Format

Choosing any format other than the ones listed below could cause errors when using CCP® software:

- MM-DD-YYYY
- DD-MM-YYYY
- YYYY-MM-DD

Once the date format chosen, changing it afterwards may cause damage to the historical data. Before any change, it is recommended to create data backup and to purge the database.

By default, the daylight-saving time shift is disabled. Enabling this function may cause damage to the historical data.

Troubleshooting

Component	Symptom	Corrective Action
System	No system components are operating and there is no power.	Ensure that system is plugged in to an electrical source and switched on.
		Ensure that the main disconnect is not turned off.
		Ensure that energy supply specifications are met.
		Ensure that the Emergency Stop is not engaged and the reset emergency/ HP blue light is illuminated.
		Ensure that all circuit breakers are on.
		Ensure that all circuit breakers are not stripped.
		Ensure that correct tapings are selected on the transformer.
	No system components are operating, but system has power.	Ensure that Ethernet cables are connected and plugged in properly and there is power to the internal hub.
		Ensure that the software is correctly installed.
		Ensure that all 24 VDC fuses are intact.
		Ensure that air supply is connected and turned on.
		Ensure that the system is not in critical alarm status.
		Press the Reset emergency/HP button if the light is not blue.
	No power to the system.	Ensure that the circuit breaker is ON.
		Ensure that the system power is connected to the PLC.
Pneumatics	No pressure or low pressure	Purge the filter to ensure that the regulator filter is not blocked.
		Operate the purge valve to ensure there is no air leak in the pressure regulator.
		Verify that the pressure setting is correct (for the correct value, see the P&ID).
	High pressure alarm is activated at incorrect level	Ensure that high pressure alarm is set correctly.
PLC	Touchscreen shows ?, &, and @ symbols for analog data.	Verify that the network connections are connected and plugged in properly and not damaged.
		Verify that the LED is GREEN.
		Ping the PLC to verify it is communicating (PLC IP: 10.20.60.110)
	Error numbers starting with '-214702XXXX'	Verify that the network connections are connected and plugged in properly and not damaged.
		Verify that the LED is GREEN.
		Ping the PLC to verify it is communicating (PLC IP: 10.20.60.110)
	System not responding when clicking on anything	Verify that PLC is in Run mode
	PLC is not in Run mode and/or the LINK LED is not flashing	Ensure that the software is correctly installed.

Component	Symptom	Corrective Action
Alarms	YA06 alarm is trigged	Verify that there are no other critical alarms on the Touchscreen.
		Verify that the PC and PLC connections and cables are not faulty.
		Verify that the power LCD on the switch is green. If it is orange, the problem is with the switch.
		Verify that diagnostic lights NS or MS are green on Station NOD (500NOD0).
	YA08 alarm is trigged	Verify that there are no other critical alarms on the Touchscreen.
		Verify that diagnostic lights NS or MS are green on Station NOD (500NOD1).
		Verify that Ethernet and electrical cables are connected and plugged in properly and not damaged.
		Verify that the Flexware® Clamshell Assembly is connected to the Base. If not, connect Flexware® Clamshell Assembly via Y501A.
		When the system is started without Flexware® Clamshell Assembly, and to start the Load Flexware® Clamshell Assembly recipe, disable the YA08 alarm. YA08 alarm will be enabled by the recipe.
	YA07 alarm is trigged	Check the I/O modules of the Base. One of the devices could be defective or there could be an issue with one of the 4 - 20 mA loops.
	YA09 alarm is trigged	Check the I/O modules of the Flexware® Clamshell Assembly. One of the devices could be defective or there could e an issue with one of the 4 - 20 mA loops.
	YA01 alarm is trigged	The IP addresses on the system are not configured properly. Call IT support.
		The system just powered up and PLC and PC have not been powered up together, in case of HMI restarted
	YA05 alarm is trigged	SQL server failed to start. Restart the application.
		SQL server failed to start. Restart the application. If it still fails, the data base is full. Purge the SQL data and restart the application/system.
	YA12 alarm is trigged	An unauthorized write has been done in the SQL database. Only a backup and purge of the SQL database (see Archive and Restore Utilities) will close the alarm.
Base Door	Door could not be opened	Verify that the system is not in critical alarm status
		Recipe Open door is not started, or in hold, or not in the correct step. Start the recipe or wait for the end of the recipes if already started.
		Verify that ZS008 is not defective before opening door. Verify that ZS008 is operational, using a metallic tool before starting the recipe.
		Check valves are all opened.
		System is not in critical alarm status
		Recipe Close door is not started, or in hold, or not in the correct step. Start the recipe or wait for the end of the recipes if already started.

Component	Symptom	Corrective Action
Base Door	Door could not be opened	Verify that ZS008 is not defective before opening door. Verify that ZS008 is operational, using a metallic tool before starting the recipe.
Base Door	Door could not be opened	Check valves are all opened and all fittings are mounted correctly.
		Verify that a ball is not missing in one of the locks. Each lock should contain three balls.
		Verify that an O-ring is not broken in one of the locks. Replace O-ring if needed.
	Flexware® Clamshell Assembly could not be removed	Verify that the system is not in critical alarm status.
		The "Unload Flexware® Clamshell Assembly" recipe has not started, or is on hold, or not at the correct step. Start the recipe or wait for the end of the recipes if already started.
		Verify that YA08 is still active. Disconnect the Flexware® Clamshell Assembly from the Base by closing Y501A and opening Y501B.
	Flexware® Clamshell Assembly could not be installed	Verify that the system is not in critical alarm status.
		The "Load Flexware® Clamshell Assembly "recipe has not started, or is on hold, or not at the correct step. Start the recipe or wait for the end of the recipe if already started.
		Verify that the Flexware® Clamshell Assembly seat is clean, especially on the bottom.
		Verify that the window behind the Flexware® Clamshell Assembly is correctly installed & closed.
		Connector XC009 is defective. Remove the Flexware® Clamshell Assembly and verify the functionality of the connector XC009 in Manual mode. Close Y501A & open Y501B
Pump	Pump does not operate	Verify that the system is not in critical alarm status.
		Verify that the pump is connected correctly to JB01.
		Verify that the main circuit breaker in the electrical cabinet is ON.
		Pump is not locked because there is no open flowpath. Open the flowpath.
		Verify that there is no alarm on the pump, directly on the drive. Verify that the temperature is within the operating temperature range.
		Verify that pump signal alarm. If not, connect to communication port.
	Pump flow rate is erratic, or pulsing	Flowmeter is full of liquid, without any air. Prime the flowmeter before starting a batch at the highest flow rate. Do not prime in flow control mode, use the speed setpoint for the pump.
		Pump Head is full of liquid, without any air. Prime the pump head before starting a batch at the highest flow rate. Do not prime in flow control mode, use speed setpoint for the pump.
		If a magnetic flowmeter is used, verify that there is enough salt in the buffer to enable a stable reading.

Component	Symptom	Corrective Action
Pump	Pump flow rate is erratic, or pulsing	Verify that the four screws on the flange on the pump cover are correctly tighten.
		Verify that all connections located before pump are tight.
		Verify that there are no kinks in the tubing.
		Verify that the pump air sensor tubing is the correct diameter.
		Verify that the Flowmeter Converter parameters are correct
		Verify that the Regulation/ Control parameters are correct
Single-use Flowmeter	Flow measurement is not accurate	Verify that the right K factor for the SU flowmeter tube is entered into the HMI
		Verify that the right Qmax for the SU flowmeter transmitter is entered into the HMI
		Verify there is no sign of oxidation on the SU flowmeter tube electrodes
		Verify that the correct cable for flowmeter connection is used (black cable with tag WFT002-SU or WFT004-SU).
		Verify that the Single Use cell is well maintained into the flowmeter electronic.
		FI001 and FI002 signal alarms are only trigged if cable break is between the Flowmeter converter and the communication port (no alarm if the break is between the flowmeter and the converter).
Valves	Valve does not operate	Verify that YA06, YA07, YA08 and YA09 are not trigged
		Verify that the system is not in critical alarm status.
		Verify that the Buffer Air Container valve is open.
	Valve flow rate is erratic	Verify that PCV032 is set at 100%, real position will be closed to 100%.
Pressure Transmitter	Pressure transmitter has no power	Verify that the power indication lamp on signal converter is lit.
Pressure Switch	High pressure alarm is activated at incorrect level	Verify that the high-pressure alarm is set correctly.
Bubble Trap Level Sensor	Liquid level sensor does not indicate high or low level	Verify that the power to sensor is on.
		Tighten capacitive sensor against bubble trap. Calibrate sensor sensitivity.
		Verify that LSL & LSH are correctly connected.
		Verify that the Bubble Trap is not in AUTO ON.
pH, UV, Conductivity Sensor	See probe manufacturers documentation	Operating in condensating atmosphere is prohibited and may lead to erroneous sensors reading.
Manifold	Valve on manifold could not be operated	Verify that the pneumatic connection is done correctly.
USB on HMI01	USB ports are not powered	Connect a keyboard and check if power is supplied to keyboard. If no power is supplied, open HMI01 and verify that the connections are connected and plugged in properly.

Component	Symptom	Corrective Action
C8000 Defect	XC102-3DF is RED	All alarms from the instruments connected to the C8000 transmitter are regrouped is this alarm.
		Check the C8000 transmitter for which alarm in triggered. See probe manufacturers documentation for more information.
	XC010-4DF is RED	All alarms from the instruments connected to the C8000 transmitter are regrouped is this alarm.
		Check the C8000 transmitter for which alarm in triggered. See probe manufacturers documentation for more information.

System Administrator Information for the Common Control Platform® Software

Security

Introduction

The Common Control Platform® (CCP® Software) system security is configured using Windows® 10 Security and the iFIX® Security Configuration programs. This means that there are two security programs working in unison and both must be configured correctly for users to access and operate the system.

For more information please refer to the following document:

20321584 - Security Matrix

20408403 - Computer Administration procedure

Security Report

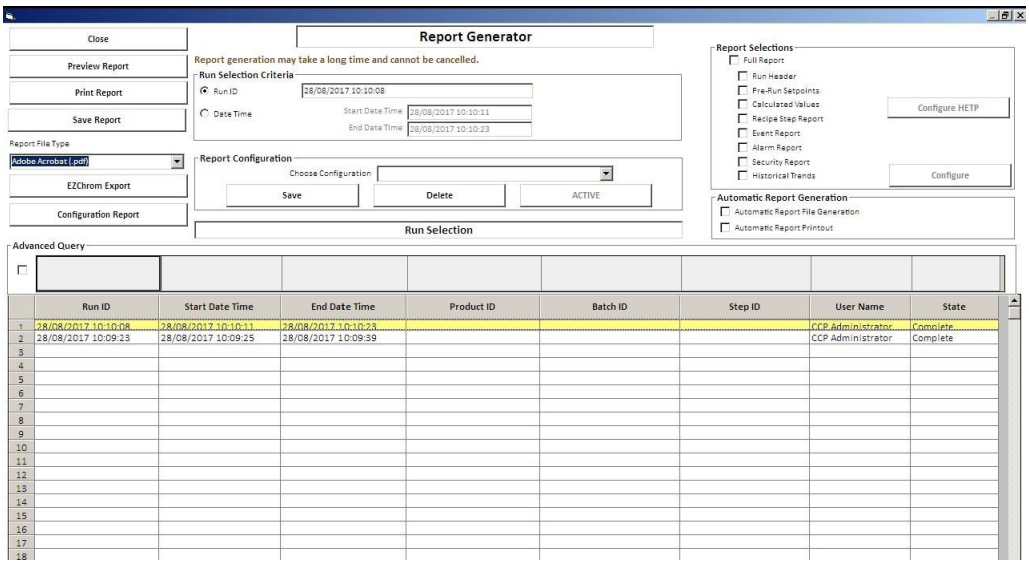
The Login utility records all system security data and login attempt in an audit trail file called the Security Report. This report includes the user name and login/logout times of everyone who logs in. All successful and unsuccessful login attempts are recorded. Changes to security configuration are also documented in this report.

To obtain a Security Report:

1. Access the Report Client from the User Interface by clicking on the Reports icon in the toolbar.

2. Open the Report Generator by clicking on the Report Generator icon in the toolbar of the Report Client

3. In the Report Selections box, select the Security Report option, then click either the Preview Report, Print Report or Save Report button.

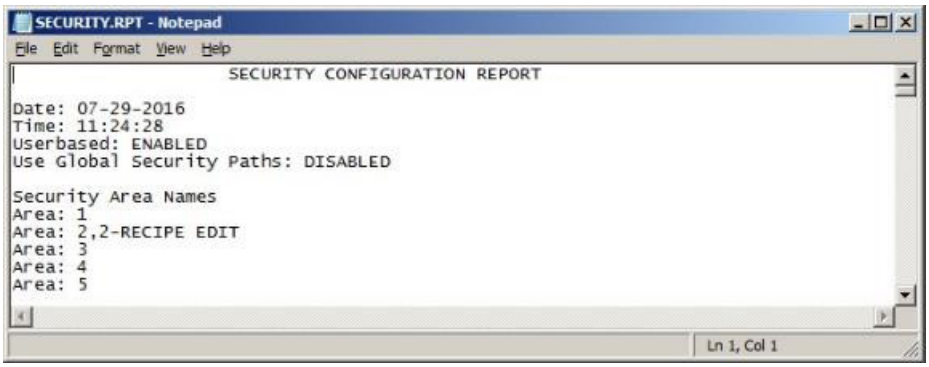


Security Configuration Report

The export feature of the iFIX® Security Configuration program can be used to obtain a Security Configuration Report. The export feature creates an ASCII file that lists configuration information for groups, users, etc.

To obtain a Security Configuration Report:

1. Open the iFIX® Security Configuration program.
2. Select File > Export from the main menu. The export file name defaults to SECURITY.RPT.
3. Select the export location and click the Save button.
4. Use any text editor to open and view the exported report file.



Security Recommendations

Before using the system:

- It is recommended to perform qualification of Inputs/Outputs and their settings.
- Persons who will use or manage the system have to be trained and qualified.

Procedure and training recommendations:

- Only duly qualified and duly trained personal should be granted permissions for system configuration.

Establish formal and appropriate procedures for:

- Controlling changes of the system configuration
- Controlling changes on security settings and user access
- Data logging settings
- Computer performance administration
- Controlling change of alarm settings
- Controlling change to remote connectivity settings
- Backup and restore operations and computer performance administration
- Maintaining controller hardware
- Client internal procedures should provide instruction for identifying change on monitored values in Controller (e.g. identify sudden value change in data records, identify HMI shutdown).

Security recommendations:

- Password policy configuration should be changed to maximal security by final user administrator to ensure compliance to 11.300(b) and that default password policy do not ensure compliance to 21CFR11.300(b).
- Limit the count of people in charge of security settings management to a limited number.
- Limit the access to alarm settings and remote connectivity settings to properly trained and qualified personal.
- Systematically apply the good practice to logout.
- Do not share passwords or user accounts.
- Implement network security policies and management policies for the system configuration to users.
- Inform users about meaning of local console authentication screen.
- Default generic accounts have to be disabled as soon as the individual accounts have been setup.

Save, backup and performance recommendations:

- Before each backup, it is recommended to ensure that no data base corruption alarm is active.
- Make backup before and after any change.
- Use automatic daily hot backup and secure your data and backup. For more information, refer to the Computer Administration document in the digital set of documents supplied with the system.

- Note that the backup function does not save the recipes. For this backup make a copy from the directory XMO4 by Chrom20. Use frequently recipe backup operation. For more information, refer to the Computer Administration document in the digital set of documents supplied with the system.
- Storage capacity must be managed by qualified personnel.
- Make periodic control of system performance (e.g. database capacity; hard drives capacity; communication links status).
- Make periodic Security Reports in order to ensure the system is properly used. For more information, see chapter Security Reports of this manual.
- It is recommended to implement communication control features when integrating the Control System with other assets.

By using the system:

- Do not perform any action on the system before it has been properly validated.
- Note that if a mixing must be started at 0%-100% (outside the claimed range of 10%-90%), the pump control must be started before setting the pump speed at zero.
- Use only validated spare parts.
- Client internal procedures should:
  - inform users about actions to be taken in case of communication error,
  - inform users to take care of saving recipe changes before leaving the recipe editor,
  - warn users and provide instruction about proper acknowledgement of manifold alarm (i.e. do not acknowledge before completion of the manifold replacement and restore flowpath manually).

Shutting Down the Control System

Caution Close all programs and shutdown Windows® before switching off power to the computer. Failure to do so may damage any Historical Data files that are open when the computer loses power.

Only users with sufficient access privileges can close the application and shutdown Windows®.

Accessing to the User Menu thanks to the top right symbol gives access to both those buttons:

Button	Description
	Closes the iFIX Workspace (iFIX service is still running) and gives access to the Windows desktop. It is then possible to shutdown Windows® through its Start menu.
	Closes the iFIX Workspace and shutdown Windows®

Note If the Close application and Shutdown Windows® buttons are not accessible, the user must log into the system with a user ID that has sufficient privileges to shut down the system (see the Security Overview section of this chapter for more information).

Archive and Restore Utilities

Overview

The CCP® software provides an Archive Utility to back up and restore the numerical and event data acquired during operation of the unit.

Data backed up by the archive utility include all the data that are stored in the Historian database (trending information) and SQL database (events). This chapter explains how to back up and restore data stored in these two databases.

These two databases are located in the Current Active Data Location. When a backup is run, data from the Current Active Data Location is copied to the Backup File Location. The Backup File Location is where the backup files will be located when the backup process is complete.

Each backup consists of several files which are organized in one directory. That directory will automatically be named to indicate the date and time at which it was generated. These individual backup directories will be located in the Backup File Location.

When you run a Restore operation, files are copied from the Backup File Location and will be copied into the Current Active Data Location. The incoming restored files will replace the files that are in the active data location.

Archiving Intervals

The databases store the data logging files. These files grow in size as new data is collected and logged into the archives. Even if the archives are backed up, their size will not shrink. Since the databases are forever growing, the backup files will grow as time progresses. Monitor the backup files size over a period of routine use and examine the growth rate of these files. From this growth rate and the total size of the hard disk, users should decide at what intervals to back up their archives.

Backup files include data only up to the time of the backing up.

The system is equipped with an alarm (YA05) to alert users when the data has exceeded 7.5 Gb of the 10 Gb capacity.

Starting the Archive Utility

The Archive Utility is launched in the Recipe Editor, with the iFIX® off. An attempt to launch the Archive Utility while iFIX® is still running, results in an error message.

There are two ways to open the Archive Utility:

- Start the Recipe Editor from Windows® Explorer. Find the file named CCPRecipeEditor.exe. Its default location is: C:\ Millipore\CCPSystem\.
- Start the Recipe Editor from the User Interface and then close the UI and shutdown iFIX.

Access to Windows® system Internet Explorer® browser, as well as closing down the touchscreen, requires Administrator privileges. Once a specific task has been selected in the Archive Utility, the user name and password prompt for a member of the CCP® Administrators group will appear.

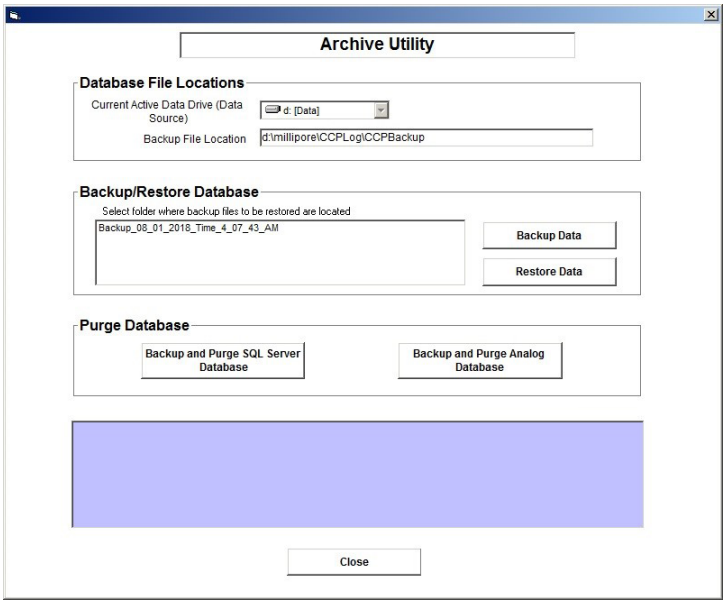
To start the archiving utility, select Archive Utility from the Tools menu on the Recipe Editor tool bar.

Archive Utility Screen

There are three main parts of the Archive Utility screen:

- Database File Locations
- Backup/Restore Database
- Purge Database.

At the bottom of the screen is a report box for progress and messages.

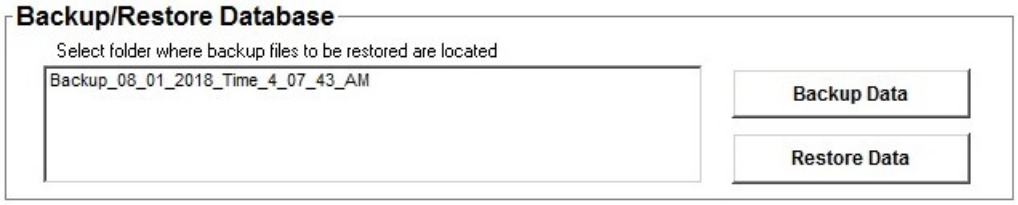


Database File Locations

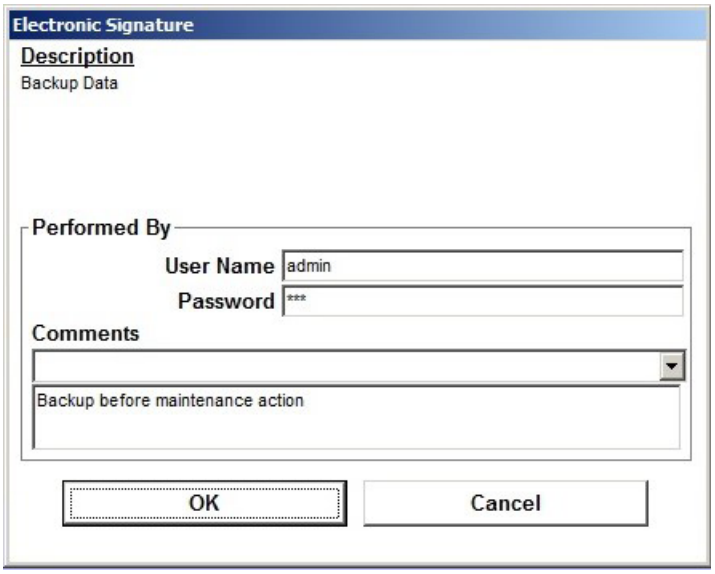
Display the Current Active Data Drive and the Backup File Location.

Backing Up or Restoring a Database

When the database file locations are appropriately set, execute either a backup or a restore operation. Start either activity by pressing the buttons on the screen as shown below.



An electronic signature will be mandatory to execute a backup or restore operation.

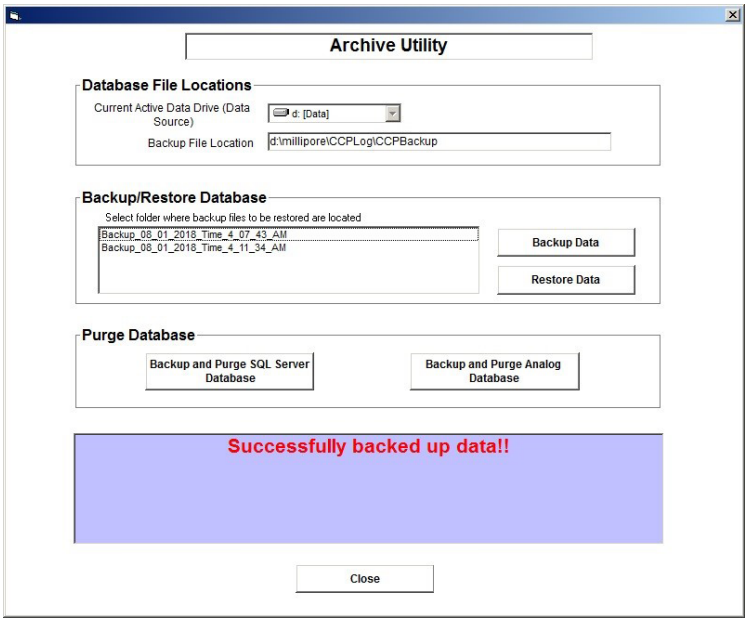


Backing Up a Database

Each backup action generates one backup directory with a unique name. That directory name records the exact time of the backup.

Depending on the size of the archive files and the backup location, the backup process may take considerable time. During the backup the archive utility will display progress messages and message box at the bottom of its interface.

When the backup process is completed, the message "Successfully backed up data!!" will be displayed.



Restoring a Database

Backed up data may be restored by selecting the appropriate data set from the selection box. An error message will be displayed if you do not select any data set at all. After you have selected the appropriate data set, click on the button labeled "Restore Data" to commence the restoration process.

Caution The data from the backup data set will replace any existing database files in the current active data location. Data that are logged in the active data location that are not backed up will be lost and are not recoverable.

Before starting the restoration operation, users will be prompted to confirm the overwrite of their current active databases. Click OK to proceed with the restore, click Cancel to abort the process and keep the currently active databases. At the end of the successful restore operation the message “Successfully. Restored Selected to Backup” will appear.

Purging Databases

The Event Archive and the Historical Archive are ever-growing files. Depending on the size of the hard disk and the growth rate of the equipment, it may be necessary to permanently export data from the archives and reduce their size on the disk. The Purge Database feature of the Archiving Utility performs this task.

The login prompt will appear. Comments can also be added at this time.

The Purge Database function copies the currently active archives to the specified archiving location, and then replaces the currently active archives by empty shells. After the purge, all active archive files are at minimum size and ready to log new data.

To restore the previous contents, go through the restore procedure explained in the previous section, and restore the backup set created during the backup and purge process.

Note The backup set created during the purge database operation will not show up in the list of available backup sets until you leave and reenter the Archive Utility.

Managing iFIX Software Data Collection

Historical Assign Program

The data collection software in CCP® software has been configured for customer use. The Historical Assign program is to assign database blocks to be collected for use with the historical trending software. It should be used only by properly trained and authorized users.

This Chapter describes how to:

- Start the Historical Assign program
- Select database blocks for a collection group
- Use Historical Assign to set up the group to collect process data and store it in historical data files.

Caution The data collection settings on the system have been configured at the factory. Only authorized users familiar with iFIX® HTA software with training on this subject should alter these settings.

The CCP® Historical Assign program requires two separate operations to save changes to the configuration, as described in the section Saving Changes to Historical Assign Configuration.

Data collection and batch reporting will not function as desired unless both operations to save the configuration have been performed.

Default Historical Assign Configuration

The CCP® software data collection will initially be configured as follows.

Note The following tables shows configuration for a full options system. The actual configuration may vary regarding the active options of the system.

Group Number	Node	Rate	Phase
1	"THISNODE"	"10s"	"0s"
2	"THISNODE"	"10s"	"2s"
3	"THISNODE"	"10s"	"4s"
4	"THISNODE"	"10s"	"6s"
5	"THISNODE"	"10s"	"8s"
6	"THISNODE"	"2s"	"0s"

The phase field is used to offset the collection intervals of groups to prevent collection overruns in the event that too much data is being collected in a single scan.

The data collections groups are listed below.

Group	Data	Deadband
1	PI001	0.01
1	PI002	0.01
1	PI003	0.01
1	FI001	0.01
1	FI002	0.01
1	AI201B	0.1
1	PCV032	0.1
1	TI201	0.5
1	AI01	0.1
1	AI02	0.1
1	AI03	0.1
1	AI04	0.1
2	SIC001_AO	0.1
2	SIC002_AO	0.1
2	PCV032_AO	0.1
2	AO01	0.1
2	AO02	0.1
2	AO03	0.1
2	AO04	0.1
3	FLC001_Speed SP	0.1
3	FLC001_Flow SP	0.1
3	FLC001_LV SP	0.1
3	FLC002_Speed SP	0.1
3	FLC002_Flow SP	0.1
3	FLC002_LV SP	0.1
3	MIX_TotalFlow_Speed SP	0.1
3	MIX_TotalFlow_Flow SP	0.1
3	MIX_TotalFlow_LV SP	0.1
3	MIX_PercentageSP	0.1
3	MIX_ConductivitySP	0.1
4	PHASE0 Totalizer (L)	0.1
4	PHASE0 Totalizer (CV)	0.1
4	PROCEDURE Totalizer (L)	0.1
4	PROCEDURE Totalizer (CV)	0.1
4	USER Totalizer (L)	0.1
4	USER Totalizer (CV)	0.1
4	FQ-1PR (L)	0.1
4	FQ-2PR (CV)	0.1
5	LV001	0.1
5	LV002	0.1

Group	Data	Deadband
5	BED_HEIGHT	0.1
5	COLUMN_VOLUME	0.1
5	FI003	0.1
5	LV003	0.1
6	Chart Mark	0.5
6	AI102	0.1
6	AI103	0.01
6	AI201A	0.1
6	AI202	0.01
6	AI203	0.001
6	AI204	0.001

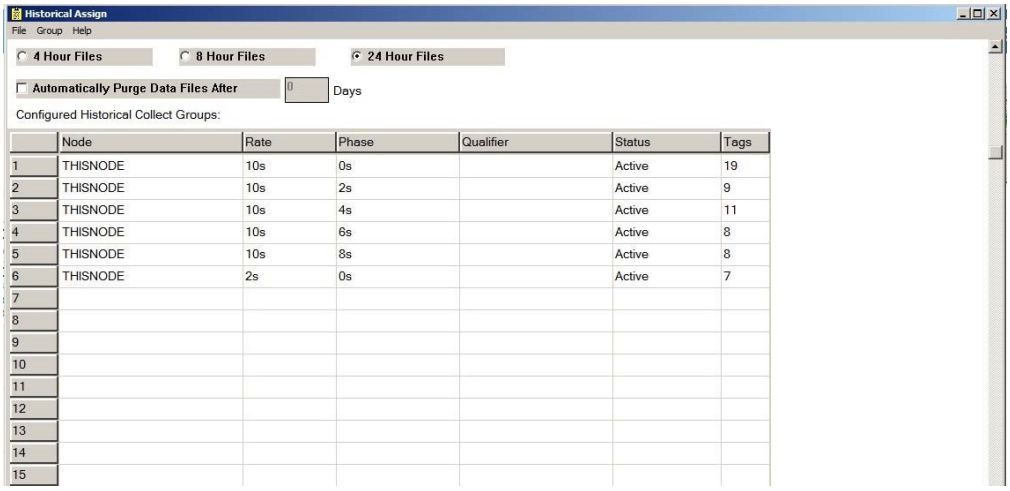
The limit field provides a deadband limit to eliminate recording data within the specified range of the last recorded value. This prevents the database from filling up with data from signal noise and changes smaller than the limit.

Starting Historical Assign Program

Historical assign is started when iFIX® is started at power up.

To edit Historical Assign, administrator access is required and a keyboard must be plugged into system.

To start the Historical Assign program, Use the Log Rate button available in the System Settings Window.



Creating a New Collection Group Assign Program

To create a historical collection group from the Historical Assign window, select Add from the Group menu. The Group Configuration dialog box opens and lists the tag names and the collection parameters for the group being created.

Group Configuration Parameters

Parameter	Description
Node	The name of the node that contains the database blocks that this collection group uses during collection.
Qualifier	Optional database block that determines whether data collection for the group is on or off.
Rate	Determines how often you want data collected for the block tag names in the collection group.
Phase	Determines how the system distributes the data collection load
Tag Name List	Displays the database block from where the data is collected.
Tag Name Field	Used to find tags to add to the Tag name List.
Limit	Provides a deadband limit to eliminate recording data within a specified range of the last recorded value.
Add, Modify, Delete Buttons	Apply to the tag names listed in the tag name area. First select a tag name and then select the button to perform the action.
Save	Saves the changes you made in the Group Configuration dialog box and closes the window.

1. Select a Node

In the Node field in the Group Configuration dialog box, enter the name of the SCADA software node that contains the block tag names for the collection group.

Or

To display a list of the SCADA software nodes being communicated with, click the "…" button next to the Node field to display the standard Node Select dialog box.

To search the node list for a particular node, enter a character in the Filter field. For example, to search the list for all nodes that begin with N, type "N*" and then select the Filter button to display a list of nodes beginning with N.

Select a node from the list in the Node Select dialog box click the OK button. The node is entered in the Node field in the Group Configuration dialog box.

Note All tag names in a collection group must be located on the same node.

2. Enter a Qualifier Block for ON/OFF Collection State (Optional).

Specify an optional Qualifier block to collect data for a specific interval when process data has changed. In the Qualifier field, enter the block name that determines when the data collection state for the group is on or off. The Qualifier block is usually a Digital Input or Digital Output block. A Digital Register block cannot be used as a qualifier block. When the digital block goes from Open to Closed, data collection starts for the group. When the digital block goes from Closed to Open, data collection stops.

If the qualifier block is a block other than a digital block, a value of 0 stops collection. Any value other than 0 starts collection.

If a non-digital block is assigned as a qualifier, the following message appears: The qualifier is not a digital point. Use anyway?

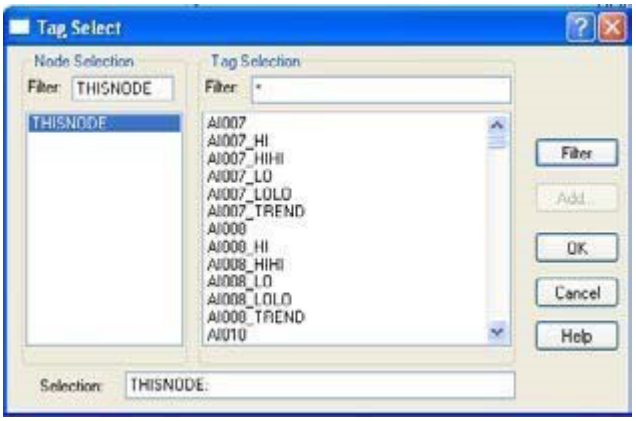
If a non-existent block is assigned as a qualifier, the following message appears: This qualifier not found in database. Use anyway?

When starting Historical Collect, an operator message is generated warning that the qualifier is not found.

To choose the qualifier block from a list of tag names for the node entered in the Node field select the "…" button to the right of the Qualifier field.

The tag names for the node displayed in the Node field are shown in the standard Tag Select dialog box.

To quickly search through a tag list for the node, enter the initial letters of a tag name in the Filter field. For example, type C*, and then select the Filter button to display a list of tags beginning with C.



Select a Qualifier tag from the list in the Tag Select dialog box by tapping on the touchscreen. It will appear in the Selection field next to the collection node.

Select the OK button. The qualifier tag is entered in the Qualifier field in the Group Configuration dialog box.

3. Enter a Data Collection Rate

In the Rate field in the Group Configuration dialog box, enter how often values should be collected for the tag names in the collection group.

Select the "…" button to display a list of available rate values. The Rate field defaults to 30 seconds.

Select a collection rate from the list and then select the OK button. The selected rate is entered in the Rate field in the Group Configuration dialog box.

Note For remote nodes, the minimum recommended collection rate is 10 seconds. The 1 and 2 second collection rates are recommended for use only on local nodes.

The collection rate operates off of the system clock time rather than when Historical Collection is started. Time increments (hours, minutes, and seconds) for clock time are maintained from midnight (00:00:00) to the present, so no matter when the Historical Collection Program starts, the rate function runs off the system clock and begins its collection process in relation to the clock setting.

4. Enter Phase Value

Phasing offsets the collection process for a group by the amount of time entered in the field. When collection starts, it waits for the phase period to elapse once. Thereafter, data is collected according to the rate defined for the group.

The main benefit of phasing collection rates is to prevent overruns. A historical collection overrun occurs when the Historical Collect program cannot collect all the data at the rate specified. When an overrun occurs, the collection program does not collect values for some tag names.

If a Phase time of 2 seconds and a Rate time of 10 seconds are assigned, then once collection starts, data will be collected at 2 seconds, 12 seconds, 22 seconds, 32 seconds and every 10 seconds thereafter.

Note A total of 80 tag names can be assigned to a collection group. The Historical Collect program uses less CPU time to process one group containing 80 tag names than it does to process eight different groups with ten tag names per group.

In the Phase field, enter the number of seconds by which the collection will be staggered.

Select the "…" to display a list of available phase values.

The Phase value choices are in two second increments from 0 to 58 seconds. The Phase field defaults to 0 seconds for the first group added in Historical Assign, and then increments by two seconds for each additional group added.

Note The Phase value entered must always be smaller than the Rate value.

Select a Phase value from the list and then select OK. The selected phase value is entered in the Phase field in the Group Configuration dialog box.

5. Select Tag Names

In the Tag name field in the Group Configuration dialog box, enter the tag name you want to add to the collection group.

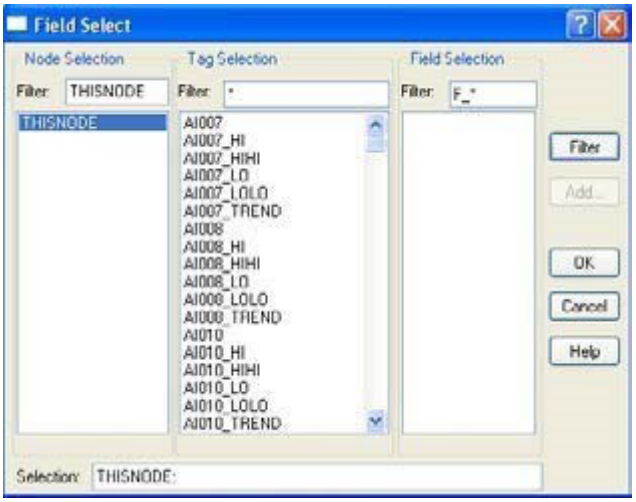
To choose from a list of tag names for the selected node click the ".." button. The standard Field Select dialog box displays with a list of tag names and fields for the node.

To quickly search through the tag list for a specific tag, enter the beginning letters for a tag in the Filter field. For example, if "A*" is entered, then the Filter button is selected, a list of tags beginning with "A" is displayed.

To quickly search through the fields for a tag, select the tag, and then follow the same procedure as in Step 2. For Historical Assign, all the tags have the same field: F_CV

When the tag and field have been selected select the OK button in the Field Select dialog box. The tag you chose to trend is shown in the Tag name field in the Group Configuration dialog box.

Click the Add button to add the tag to the list of Tag names.



Note Only floating point fields (F_) can be trended.

6. Enter a Deadband Limit for Data Collection

Using a deadband limit is a convenient and powerful way to compress data. During times when process values change by insignificant amounts, the deadband limit can improve system performance and decrease the amount of disk space used by historical data files. The deadband limit accomplishes this by controlling how much the current value can deviate from the last recorded value before Historical Collect records the value in the historical data file. See the next section Limit Example for an example of data collected using a deadband limit.

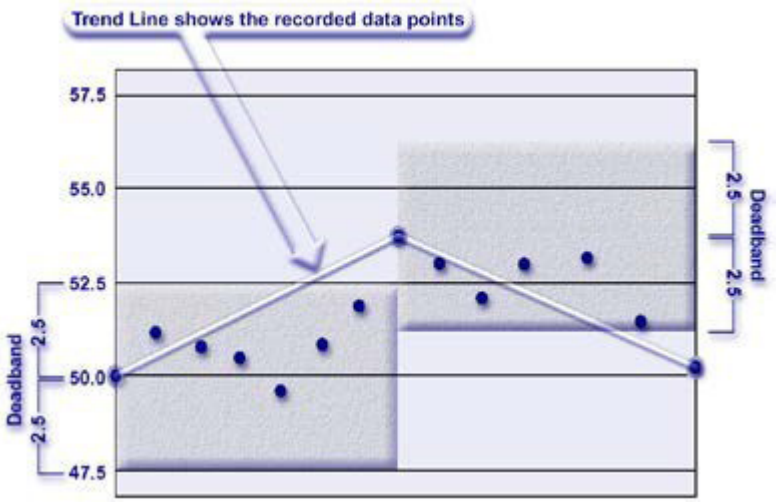
Note If the limit value is 0, the system saves every sample. Tag names with a limit value of 0 use the maximum amount of disk space available.

7. Save Changes

When completed with defining a collection group in the Group Configuration dialog box, select the Save Changes button to save the group. The dialog box closes and the user is returned to the Historical Assign window.

Limit Example

The following diagram illustrates how setting the Limit field reduces the amount of data collected by Historical Collect. In this example the Limit field is set to 2.5. Of the 16 data points shown, Historical Collect records only three. Data points within the shaded areas are not recorded because they fall within the 2.5 deadband limit.



The first recorded value shown is 50. The next value that Historical Collect records must be greater than or equal to 52.5 or less than or equal to 47.5.

The second value recorded is 54. The deadband limit now applies to the current value of 54. Therefore, the third value that Historical Collect records must be greater than or equal to 56.5 or less than or equal to 51.5.

The third value recorded is 51. The deadband limit now applies to the current recorded value of 51.

Suspending a Collection Group

A collection group can be suspended temporarily if the current data does not need to be viewed, or if the data is taking up too much disk space on the system.

To suspend a group, select the group in the Historical Assign window. Then select Deactivate from the Group menu. The Status field for the group changes to Inactive.

To reactivate a group, select the group and then select Activate from the Group menu.

Modifying a Collection Group

To change the collection parameters for a group at a later date, select the group in the Historical Assign window and double-click or select Modify from the Group menu. The Group Configuration dialog box opens. Changes can be made to the group by following the instructions in the Creating a New Collection Group section of this chapter.

Note If changes are made to a collection group in the Historical Assign program (such as adding new tags to a group) after the Historical Collection program has started, stop and restart Historical Collect so the system can read the new configuration.

Deleting a Tag

To delete a tag name in the Tag name list:

1. Select the tag in the Tag name list.
2. Select the Delete button.

Modifying a Tag

To modify a tag name in the Tag name list:

1. Select the tag to be modified. The tag is shown in the Tag name field below.
2. Modify the tag in the Tag name box. To select a new tag for trending from a list, select the "?" button.
3. After the tag has been changed, select the Modify button. The new tag is shown in the Tag name field and list.

Deleting a Collection Group

To delete a group, select the group in the Historical Assign window and then select Delete from the Group menu. The following message appears: Are you sure you want to delete this group?

Select the Yes button to delete the collection group, or the No button to cancel the deletion.

Saving Changes to Historical Assign Configuration

To save changes to the Historical Assign program, two separate operations are required.

1. Select Save from the File menu. This operation saves the changes made, to support data collection.

2. Select Save As from the File menu. In the File name field in the Save As window, enter the following path and filename: “C:\millipore\ccpsystem\{SystemID}\ini\hta-cfg.csv” where {SystemID} depends to the clamshell family used by the system (e.g. XMO4 by Chrom20).

This operation saves the changes made, to support batch reporting.

Data collection and batch reporting will not function as desired unless both operations to save the configuration have been performed.

Exiting the Historical Assign Program

To exit the Historical Assign program, select Exit from the File menu and the window will close. If changes have not been saved, the system prompts the user to do so before exiting.

Note Do NOT exit the Historical Assign Program until BOTH operations described under Saving Changes to Historical Assign Configuration, above, have been performed.

Data collection and batch reporting will not function as desired unless both operations to save the configuration have been performed.

Historical Collect Program

Starting the Historical Collect Program

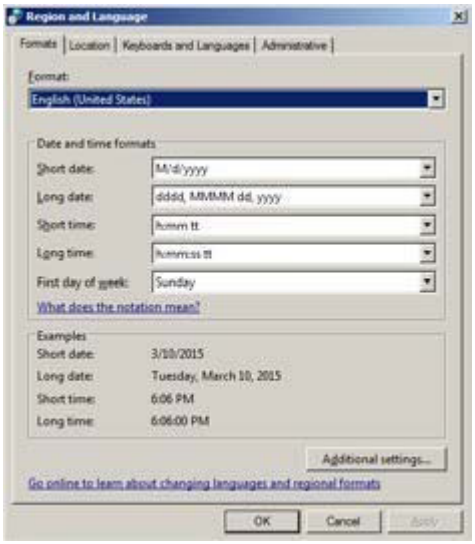
Starting the Historical Collect application enables data collection. Historical Collect starts automatically when the system starts up and collects data, as configured in the Historical Assign program. If any changes are made in Historical Assign, the system should be rebooted.

Data File Storage and Backup

Historical Data is collected using the iFIX® Historian software. The iFIX® Historian is a component that is embedded into iFIX® software. The Historian Server logs the assigned data into databases. An Archiving Utility that performs Backup and Restore Operations on both the Event Log and the Historical data are included in the CCP® Software. Please see the chapter on Backup and Restore for more details.

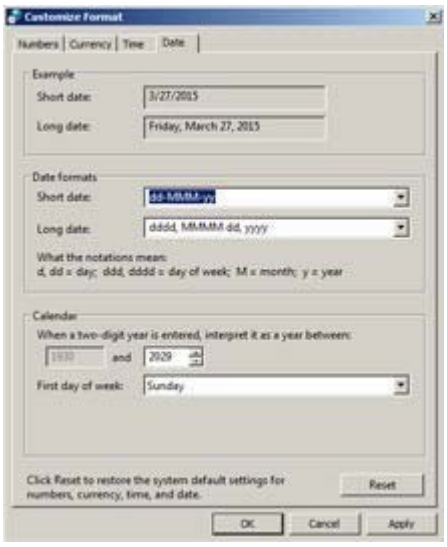
To select a different date and time format:

1. Access the Windows® task bar and click the Start button.
2. Select Control Panel>Region and Language Options.



3. On the tab, click on the button Additional settings.

4. In the Customize Regional Options window, click on the Date tab.



5. In the Short date format field, select or manually enter one of the following supported formats from the drop-down menu or type it into the field:

- MM-DD-YYYY
- DD-MM-YYYY
- YYYY-MM-DD

For Korean do not use default time format with tt (AM/PM) in front of time. Place tt after time or use 24 hour time: hh:mm:ss tt or hh:mm:ss.

Note Choosing any format other than the ones listed above could cause errors when using CCP® software.

Once the date format chosen, changing it afterwards may cause damage on the historical data. Before any change it is recommended to create data backup and to purge the database.

By default, the daylight-saving time shift is disabled. In case this function is enabled, we cannot ensure proper sequencing of registered events to demonstrate that they occurred in the proper chronological order, which could lead to non-compliance to 21CFR11 and other electronic records/ electronic signature regulatory requirements. Ensure that any personal in position to modify this function setting has a proper GMP training and a clear understanding of consequences of such non-compliance.

We provide information and advice to our customers on application technologies and regulatory matters to the best of our knowledge and ability, but without obligation or liability. Existing laws and regulations are to be observed in all cases by our customers. This also applies in respect to any rights of third parties. Our information and advice do not relieve our customers of their own responsibility for checking the suitability of our products for the envisaged purpose.

For technical assistance please visit:

www.emdmillipore.com/techservice.
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