



# Orion-M

iSeries Interface

## Multi-loop Control System Configuration Manual



## Safety Information in this Manual

Notes, cautions and warnings appear throughout this book to draw your attention to important operational and safety information.

A “**NOTE**” marks a short message to alert you to an important detail.

A “**CAUTION**” safety alert appears with information that is important for protecting your equipment and performance.

A “**WARNING**” safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.



This symbol (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.



This symbol (a lightning bolt in a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

## Technical Assistance

If you encounter a problem with your Orion-M controller, review all of your configuration information to verify that your selections are consistent with your application: inputs; outputs; alarms; limits; etc. If the problem persists after checking the above, you can get technical assistance by dialing +1 (866) 342-5332 or by faxing your request to +1 (866) 332-8014, Monday thru Friday, 8:00 a.m. to 5:00 p.m. Eastern Standard Time. You can also email your request to [support@futuredesigncontrols.com](mailto:support@futuredesigncontrols.com).

An applications engineer will discuss your application with you.

### Please have the following information available:

- Complete Model #'s and/or Serial #'s for Component(s) in Question
- Complete Software Version #'s
- All Configuration Information
- All User Manuals

**Warranty and return information is on the back cover of this manual.**

## Your Comments

Your comments or suggestions on this manual are welcome. Please send them to:  
Future Design Controls, P.O. Box 1196, Bridgeview, Illinois, 60455  
Telephone: +1 (888) 751-5444; fax: +1 (888) 307-8014  
[csr@futuredesigncontrols.com](mailto:csr@futuredesigncontrols.com)

The Orion-M iSeries Multi-loop Control System Configuration Manual is copyrighted by Future Design Controls, Inc., © 2009, all rights reserved (<http://www.futuredesigncontrols.com/Orion-M.htm>).

<b>1</b>	<b>What is the Orion-M?</b>	<b>1.1</b>
1.1	Features	1.1
<b>2</b>	<b>Configurator Overview</b>	<b>2.1</b>
2.1	Configurator Menus	2.2
<b>3</b>	<b>Configuring the Orion-M</b>	<b>3.1</b>
3.1	Orion System Setup	3.1
3.1.1	Setting the Number of Control Loops	3.1
3.1.2	Setting the Number of Analog Inputs	3.2
3.1.2.1	Protected Analog Input Example	3.2
3.1.3	Setting the Number of Analog Outputs	3.2
3.1.3.1	Protected Analog Output Example	3.3
3.1.4	Setting the Number of Digital Inputs	3.3
3.1.4.1	Protected Digital Input Example	3.3
3.1.5	Setting the Number of Digital Outputs	3.4
3.1.5.1	Protected Digital Output Example	3.4
3.1.6	Setting the Number of System Events	3.4
3.1.7	Setting the Number of Loop/Monitor Alarms	3.5
3.1.7.1	Protected Loop/Monitor Alarms Example	3.5
3.1.8	Auto-Online Enable/Disable	3.5
3.2	Loop Configuration	3.6
3.2.1	Loop Setup	3.6
3.2.1.1	Loop Permissions	3.8
3.2.1.2	Cascade Loop Operation	3.9
3.3	Monitor Points Setup	3.11
3.3.1	Setting the Monitor Point Input Source	3.13
3.3.1.1	Important Settings for Using Loop Input 2 as Monitor Points	3.14
3.4	Defrost Setup	3.15
3.4.1	Setting the Defrost Enable Outputs	3.16
3.4.2	Setting Defrost/PreCool Output Defeats	3.16
3.5	Redundancy Setup	3.18
3.5.1	Setting the System A/B Alarm Inputs	3.18
3.5.2	Setting the Redundancy Enable Outputs	3.19
3.6	Profiler Setup	3.20
3.7	Customize Name\Address	3.21
3.8	Orion Functions/Startup View	3.22
3.9	Event/Digital IO Tagnames	3.27
3.9.1	System Event Names	3.27
3.9.2	Digital Input Names	3.27
3.9.3	Digital Output Names	3.28
3.10	System Event Configuration	3.29

## Appendix

- Order Matrix and Replacement Parts
- Software License
- Software Usage Note
- Warranty
- Returns



## 1 What is the Orion-M?

The Orion-M is a multi-loop process control system combined with an embedded SCADA color touch interface. The Orion-M provides a configurable control platform for a variety of OEM applications requiring up to 15 separate loops of control. In addition to 15 loops of control, the Orion-M can also provide up to an additional 15 inputs for process monitoring, for a total of 30 process inputs.

The system is provided with eight 24Vdc digital inputs, two 24Vdc outputs and 6 relay outputs standard. The Orion-M can be expanded to a total of 16 digital inputs and 32 digital outputs. The Orion-M also provides the capability of accepting analog inputs for remote set point control and analog outputs capable of retransmitting system variables (PV, SP or %Out) to other devices such as a chart recorder. The 0-10Vdc or 4-20mA user selectable signals are provided through the addition of optional analog expander cards.

The Orion-M complements its versatile hardware platform by providing a host of standard features and configuration capabilities, all through its visual, touch interface. The touch screen interface is an embedded, industrial PC with all software included. No external PC software is required for setup or configuration of the Orion-M. All of the setup and configuration data is saved to the Orion-M's internal memory.

Individual process controllers, one for each loop in the system, provide reliable, consistent and accurate control by distributing the process control requirements of the system among multiple processors. Each loop controller provides full auto tune functionality with high resolution, universal process inputs. When coupled with the built in ramping profiler of the Orion-M, it allows for automatic, timed control of all processes and outputs of the system. No other control system on the market provides the flexibility, functionality and configurability of the Orion-M.

### 1.1 Features

The digital inputs of the Orion-M can be configured as alarm inputs with adjustable delay timers, as control inputs for controlling profile operation or for direct control of the system's digital outputs.

The digital outputs of the Orion-M can be used as direct outputs for controlling external equipment related to the application through software switches, called events, or be programmed to act as system alarm or status outputs. All outputs have adjustable delay times for on, off and cycle times.

The Orion-M can be operated in single set point or automatic profile control mode. Profile entry is made easy through the use of copy, paste and delete menu selections. Profiles can be copied to the external 'USB' memory stick and then imported to another Orion-M controller which eliminates the need to enter duplicate profiles into multiple Orion-M systems. When running in automatic profile mode, the operator can place the system into hold and change any control parameter without modifying the saved profile. This gives the operator maximum flexibility over the controlled process.

Data file analysis tools (auto-trend) make looking at historical data a simple task. Any control variable saved to the Orion-M flash memory can be plotted on the historical data trend, for any time frame within the data file's total time range. Full 'USB' print capabilities from the Orion-M interface to a standard HP inkjet printer Model 6540, 6940, 6980 (or compatible printer), eliminates the need for a PC, strip or circular chart-recording device. Graphics trends, historical and report print functions are standard.

The built in Ethernet functionality includes a 'Web Server' to provides access to all Orion-M data (view only), a VNC interface for remote control and monitoring and an NTS clock, all available via a local Intranet connection (wired or wireless), or the World Wide Web using standard software like Microsoft's Internet Explorer.

The Orion-M provides a rich set of tools for control interaction and data analysis. Views include system overviews, trends, alarms, profiles as well as historical data, alarm history and audit trail views. The menu driven interface eliminates screen 'clutter' by providing an easy to use 'Windows' interface for interaction between the user and the Orion-M system.

The Orion-M can store more than one year of data on its internal compact flash card. Data logging can be enabled manually or automatically during automatic profile run. Data backup is provided with the 'USB I-Stick' for plug and play transfer of files to any PC running Microsoft Windows XP operating systems.

The Orion-M security module provides full system security with three levels of access. Each of the three access levels allow for independent user rights. Up to 30 users can be entered into the system while the audit trail tracks all operator actions and records them.

*The Orion-M control system includes the following interface features:*

- Overview screen that displays all "runtime" information.
- Profile run and monitor views.
- Profile entry, open, save and download interface screens.
- Current alarm and alarm history views (alarm history for up to 1 year).
- Real time trends (with adjustable X,Y limits) for all inputs.
- System and application setup (control loops, monitors, inputs/outputs, alarms, etc.).
- Data logging interface screens include log point selection and historical viewing.
- 'Plug and Play' memory stick functionality for data transfer/backup.
- Full USB print capabilities and on-line help screens
- Web server for intranet/internet access (view only).
- VNC server for intranet/internet access (control/view).
- FTP data back-up for automatic data file transfer over intranet/internet.
- Integrated email server for alarm notification and file transfer.
- NTS clock with daylight savings time insures that the system is up to date.
- Full security with audit trail for tracking user actions.
- Maintenance counters for output cycles and on times.
- Helps screens are available for most screen views; configurable in English, Spanish and French
- Voice assisted help in English, Spanish and French (external speakers required – not included).

## 2 Configurator Overview

The Orion-M configurator is a program that allows the OEM or user to set up control system options for the Orion-M runtime application. The configurator program will not run at the same time as the main runtime software, therefore, no control functions are active while the OEM or operator is editing the configuration of the Orion-M through the configurator program.

The configurator program is a powerful tool that allows full customization of the Orion-M. Text editing for all inputs, outputs and event names can be customized via the configurator. All control loop functionality can also be edited via the configurator.

The Orion-M configurator program will run the first time power is applied to the FDC-2010-Orion-M controller. The configurator can also be run when the runtime software is exited and the “Exit and run configurator on next power-up” option is selected. The next time the unit is re-powered the configurator will run.

**NOTE:** *Each Time the Orion-M configurator software is exited; the controller runtime software will run after the unit is re-powered.*

The Orion-M configurator provides the following functionality:

- Set the number of control loops that the Orion-M will use.
- Provides control loop configuration settings for decimal point, set point range, control function, etc.
- Set the number of analog inputs and outputs accessible on the system.
- Set the number of digital inputs and outputs accessible on the system.
- Set the number of system events accessible on the system with configurable digital output selection.
- Set the number of alarms accessible on the system.
- Set the number of monitor points and input type that the Orion-M will use.
- Profile selection for step operation of ramp in time or ramp in rate.
- ‘Splash Screen’ name editing for custom OEM or user requirements.
- Enable/disable options for runtime menu and screen availability.
- Text editing for all system event, digital input and digital output names.

**To assist in setup and documentation of the Orion-Mi, see the “Orion-M Configuration and Setup Worksheets” Excel file provided on the Future Design Controls website. This document provides setup and configuration forms and templates for all of the Orion-Mi configuration parameters (<http://www.futuredesigncontrols.com/Orion-M.htm>).**

## 2.1 Configurator Menus

File	Setup	Event/Alarm Tags
Exit	Orion System Setup	System Event Names
	Loop Configuration	Digital Input Names
	Monitor Points Setup	Digital Output Names
	Defrost Setup	System Events Configure
	Redundancy Setup	
	Profiler Setup	
	Customize Name\Address	
	Orion Functions/Startup View	

### File Menu

The 'File' menu provides the exit function for the configurator. After selecting this menu item and exiting the configurator, the controller runtime software will run after the unit is re-powered.

### Setup Menu

The 'Setup' menu provides access to system and controller setup options. These options include the number of loops and monitors used, the number of digital and analog inputs and outputs available, the number of alarms and events available, defrost setup, redundancy setup, profiler setup, splash screen setup and functions/startup view settings.

### Event/AlarmTags Menu

The 'Event/Alarm Tags' menu provides access to the text editing functions of the configurator which allow the event and digital input and output names to be changed to match their use in the system. The menu also provides access to the configuration options for the output assignments to various system events.

### 3 Configuring the Orion-M

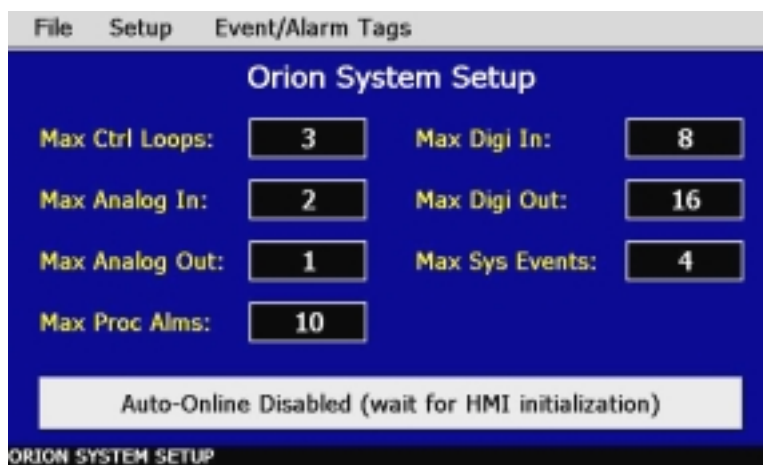
Different setup screens are provided in the configurator for the various functions and settings of the Orion-M. It is important to note; however, that the loop controllers must be set up independently of the configurator, via the loop controller itself. Since the Orion-M is capable of interfacing to more than one type of controller, refer to the operating manual for the brand and model loop control being used for information on how to access the various input and output settings in order to properly set up the controller to match the application.

**IMPORTANT:** *Once all configuration settings are made, you must select 'Exit' from the File menu to exit the configurator prior to cycling power to the Orion-M. All configuration files are written upon exiting the configurator. Do not cycle power prior to exiting the configurator or settings will be lost and the Orion-M will not operate properly when entering the runtime application.*



#### 3.1 Orion System Setup

The 'Orion System Setup' screen is accessed from the Setup menu. It is the primary configuration screen for the Orion-M providing entries for setting the number of control loops, number of analog and digital inputs and outputs, number of process alarms and number of system events available in the system. It also provides the ability to set the auto-online feature for systems that do not use a local operator interface (HMI).



Field	Value
Max Ctrl Loops	3
Max Analog In	2
Max Analog Out	1
Max Proc Alms	10
Max Digi In	8
Max Digi Out	16
Max Sys Events	4

Auto-Online Disabled (wait for HMI initialization)

##### 3.1.1 Setting the Number of Control Loops

The **Max Ctrl Loops** field sets the number of loop controls that will be attached to the Orion-M. The maximum number of control loops available is 15 single loop controllers. If no control loops are used in the application, the number of control loops can be set to zero. Once the number of loop controls is set, the loop configuration of the Orion-M must be set so that the proper units, decimal point and set point ranges are used for each control loop. See Section 3.2, Loop Configuration for information on configuring each control loop.

When the Orion-M runtime application is started, the Orion-M will automatically configure all loop view displays, trends and available log point selections based on the configurator settings for each control loop.

**NOTE:** *Some loop controllers such as the Honeywell UDC3500 provide two loops of control. In such cases, the maximum number of loop controllers that can be attached to the system is 7, for a total of 14 control loops. Refer to the Orion-M part number matrix for the operating system provided, and reference the operating manual for the brand and model loop control being used to verify the number of control loops provided by the controller.*

### 3.1.2 Setting the Number of Analog Inputs

The **Max Analog In** field sets the number of analog inputs that will be accessible in the Orion-M runtime application's 'Offline\Setup\IO' menu. The analog inputs provide a means for generating a remote set point for any of the configured control loops from a 2-10Vdc or 4-20mA source. The maximum number of analog inputs available is 14, based on the number of optional analog I/O cards attached to the Orion-M CPU (two inputs per analog I/O card).

If the maximum number of analog inputs is set to zero, the 'Analog Inputs' selection under the 'Offline\Setup\IO' menu in the runtime application will be hidden, regardless of the number of analog inputs physically attached to the system. This provides the OEM with a means of protecting the inputs from accidental changes that may occur if the end user accesses them. It also provides a means for offering the end user analog inputs that they can set up for their own use, while hiding inputs specifically configured for proper system operation that the user is not to have access to.

#### 3.1.2.1 Protected Analog Input Example

Three analog I/O cards are attached to the system in order to provide a total of six analog inputs. Three inputs are to be provided to the end user. The other three are set up at the factory and are used specifically by the OEM so they are not to be altered.

In order to set up the OEM analog inputs, the 'Max Analog In' field must first be set to six. This allows all six inputs to be accessed from the Offline\Setup\IO menu in the runtime application. The OEM can then set up analog inputs 3, 4 and 5 while leaving 0, 1 and 2 available for the end user. Once the system has been configured and tested, prior to shipment, the OEM can then access the configurator once more and change the 'Max Analog In' field to a value of three.

Since the field is now set to three, only the first three analog inputs will be accessible from the Offline\Setup\IO menu, i.e., inputs 0, 1 and 2, the analog inputs for the end user. Analog inputs 3, 4 and 5, the OEM inputs, are now hidden and cannot be accessed by the end user. The analog input configuration is then protected and the analog inputs will operate in the background as set by the OEM.

**NOTE:** See the Orion-M Multi-Loop Control System Manual, Section 9.9 Analog Inputs, for information on configuring the analog inputs for operation.

### 3.1.3 Setting the Number of Analog Outputs

The **Max Analog Out** field sets the number of analog outputs that will be accessible in the Orion-M runtime application's 'Offline\Setup\IO' menu. The analog outputs provide the ability to transmit loop input, set point or percentage of output values to a remote device such as a chart recorder via a 0-10Vdc or 4-20mA signal. The maximum number of analog outputs available is seven, based on the number of optional analog I/O cards attached to the Orion-M CPU (one output per analog I/O card).

If the maximum number of analog outputs is set to zero, the 'Analog Outputs' selection under the 'Offline\Setup\IO' menu in the runtime application will be hidden, regardless of the number of analog outputs physically attached to the system. This provides the OEM with a means of protecting the outputs from accidental changes that may occur if the end user accesses them. It also provides a means for offering the end user analog outputs that they can set up for their own use, while hiding outputs specifically configured for proper system operation that the user is not to have access to.

### 3.1.3.1 Protected Analog Output Example

Three analog I/O cards are attached to the system in order to provide a total of three analog outputs. Two outputs are to be provided to the end user. One output is set up at the factory and is used specifically by the OEM so it is not to be altered.

In order to set up the OEM analog output, the 'Max Analog Out' field must first be set to three. This allows all three outputs to be accessed from the Offline\Setup\IO menu in the runtime application. The OEM can then set up analog output 2 while leaving 0 and 1 available for the end user. Once the system has been configured and tested, prior to shipment, the OEM can then access the configurator once more and change the 'Max Analog In' field to a value of two.

Since the field is now set to two, only the first two analog outputs will be accessible from the Offline\Setup\IO menu, i.e., outputs 0 and 1, the analog outputs for the end user. Analog output 2, the OEM output, is now hidden and can not be accessed by the end user. The analog output configuration is then protected and the analog output will operate in the background as set by the OEM.

**NOTE:** See the Orion-M Multi-Loop Control System Manual, Section 9.10 Analog Outputs, for information on configuring the analog outputs for operation.

### 3.1.4 Setting the Number of Digital Inputs

The **Max Digi In** field sets the number of digital inputs that will be accessible in the Orion-M runtime application's 'Offline\Setup\IO' menu. The digital inputs provide various control functions such as alarming, remote profile start/stop, digital output control, etc. The base Orion-M system provides 8 digital inputs on the CPU, and can be expanded up to a maximum of 16 digital inputs with the addition of the optional digital input card.

If the maximum number of digital inputs is set to zero, the 'Digital Inputs' selection under the 'Offline\Setup\IO' menu in the runtime application will be hidden, regardless of the number of digital inputs physically attached to the system. This provides the OEM with a means of protecting the inputs from accidental changes that may occur if the end user accesses them. It also provides a means for offering the end user digital inputs that they can set up for their own use, while hiding inputs specifically configured for proper system operation that the user is not to have access to.

#### 3.1.4.1 Protected Digital Input Example

Four digital inputs are to be provided to the end user while 12 inputs are set up at the factory and are used specifically by the OEM so they are not to be altered. In order to get a total of 16 inputs, the optional 8 point digital input card is attached to the system.

In order to set up the OEM digital inputs, the 'Max Digi In' field must first be set to 16. This allows all 16 inputs to be accessed from the Offline\Setup\IO menu in the runtime application. The OEM can then set up digital inputs 4 - 15 while leaving 0 - 3 available for the end user. Once the system has been configured and tested, prior to shipment, the OEM can then access the configurator once more and change the 'Max Digi In' field to a value of four.

Since the field is now set to four, only the first four digital inputs will be accessible from the Offline\Setup\IO menu, i.e., inputs 0 - 3, the digital inputs for the end user. Digital inputs 4 - 5, the OEM inputs, are now hidden and can not be accessed by the end user. The digital input configuration is then protected and the digital inputs will operate in the background as set by the OEM.

**NOTE:** See the Orion-M Multi-Loop Control System Manual, Section 9.11 Digital Inputs, for information on configuring the digital inputs for operation.

### 3.1.5 Setting the Number of Digital Outputs

The **Max Digi Out** field sets the number of digital outputs that will be accessible in the Orion-M runtime application's 'Offline\Setup\IO' menu. The digital outputs provide various control functions such as system events, audible alarm, remote fault contact, profile status indication, etc. The base Orion-M system provides 8 digital outputs on the CPU (2 TTL and 6 relay), and can be expanded up to a maximum of 32 digital outputs with the addition of optional digital output cards.

If the maximum number of digital outputs is set to zero, the 'Digital Outputs' selection under the 'Offline\Setup\IO' menu in the runtime application will be hidden, regardless of the number of digital outputs physically attached to the system. This provides the OEM with a means of protecting the outputs from accidental changes that may occur if the end user accesses them. It also provides a means for offering the end user digital outputs that they can set up for their own use, while hiding outputs specifically configured for proper system operation that the user is not to have access to.

#### 3.1.5.1 Protected Digital Output Example

Eight digital outputs are to be provided to the end user while 16 outputs are set up at the factory and are used specifically by the OEM so they are not to be altered. In order to get a total of 24 outputs, the optional 16 point digital output card is attached to the system.

In order to set up the OEM digital outputs, the 'Max Digi Out' field must first be set to 24. This allows all 24 outputs to be accessed from the Offline\Setup\IO menu in the runtime application. The OEM can then set up digital outputs 8 - 23 while leaving 0 - 7 available for the end user. Once the system has been configured and tested, prior to shipment, the OEM can then access the configurator once more and change the 'Max Digi Out' field to a value of eight.

Since the field is now set to eight, only the first eight digital outputs will be accessible from the Offline\Setup\IO menu, i.e., outputs 0 - 7, the digital outputs for the end user. Digital outputs 8 - 23, the OEM outputs, are now hidden and cannot be accessed by the end user. The digital output configuration is then protected and the digital outputs will operate in the background as set by the OEM.

**NOTE:** See the Orion-M Multi-Loop Control System Manual, Section 9.12 Digital Outputs, for information on configuring the digital outputs for operation.

### 3.1.6 Setting the Number of System Events

The **Max Sys Events** field sets the number of system events that will be provided in the Orion-M runtime application under the "System Event Control" screen. The system events are 'soft' switches which can be assigned to the different digital outputs configured in the system. When the event is turned on, any digital outputs assigned to the event will be activated. This allows equipment to be turned on and off directly through the Orion-m which also allows for the automatic and timed starting and stopping of equipment with the use of the Orion-M profiler.

The maximum number of system events available is 32, one for each digital output available. Outputs can be assigned to events specifically by the OEM in the configurator or outputs can be assigned to events in the runtime application under the Offline\Setup\IO menu. However, in the runtime application, if a digital output is assigned as a system event on the digital output screen, it will be assigned to the corresponding system event only. For example, digital output 4 will be assigned to system event 4; digital output 14 to system event 14, etc. Various outputs cannot be assigned to specific events, this can only be done in the configurator.

**NOTE:** See Section 3.8, System Events Configuration for information on how to assign digital outputs to different system events.

### 3.1.7 Setting the Number of Loop/Monitor Alarms

The **Max Proc Alms** field sets the number of loop/monitor alarms that will be accessible under the Orion-M runtime application's Setup menu. The alarms provide various alarming and output control functions for indicating 'out-of-tolerance' conditions for the various loop and monitors configured in the system. The Orion-M provides up to 30 loop/monitor alarms.

If the maximum number of alarms is set to zero, the 'Alarm Settings' selection under the Setup menu in the runtime application will not be accessible. This provides the OEM with a means of protecting the alarm settings from accidental changes that may occur if the end user accesses them. It also provides a means for offering the end user alarms that they can set up for their own use, while hiding alarms specifically configured for proper system operation that the user is not to have access to.

#### 3.1.7.1 Protected Loop/Monitor Alarms Example

Two alarms are to be provided for the end user while 10 alarms are required for use specifically by the OEM so they are not to be altered. In order to set up the OEM alarms, the 'Max Proc Alms' field must first be set to 12. This allows all 12 alarms to be accessed from the Setup menu in the runtime application. The OEM can then set up alarms 2 - 11 while leaving 0 and 1 available for the end user. Once the system has been configured and tested, prior to shipment, the OEM can then access the configurator once more and change the 'Max Proc Alms' field to a value of two.

Since the field is now set to two, only the first two alarms will be accessible from the Setup menu, i.e., alarms 0 and 1, the alarms for the end user. Alarms 2 - 11, the OEM alarms, are now hidden and cannot be accessed by the end user. The alarm configurations are then protected and the alarms will operate in the background as set by the OEM.

**NOTE:** See the Orion-M Multi-Loop Control System Manual, Section 8.4 Alarm Settings, for information on configuring the alarms for operation.

### 3.1.8 Auto-Online Enable/Disable

The default setting for the auto-online function is 'disabled'. This prevents the Orion-M control module from operating until the HMI initializes and begins the Orion-M application. This insures that the system will not run until the HMI is active, so that the operator has a means for viewing and controlling system operations. Once the HMI starts the Orion-M application, it instructs the control module to begin operation.

By enabling the auto-online function, the Orion-M control module will begin operation upon application of power, as it no longer requires the run instruction from the Orion-M display. It is intended for use on equipment that does not use a local Orion-M display, or that contains multiple Orion-M systems linked together and operated from a single computer and software interface such as Future Design Control's EnVision software package.

**IMPORTANT:** It is highly recommended that 'auto-online' be disabled whenever the Orion-M display is used on the system. This prevents system operation until the Orion-M application is initialized and ready for operator input to control the system.

*When using the auto-online function, insure that the automatic start of the Orion-M system upon application of power will not cause a hazardous condition. Operator control/monitoring of the system will not be available until a software connection is made via the Orion-M's optional, user communications port, or the Orion-M's local display is attached and the Orion-M application has initialized.*

### 3.2 Loop Configuration

In order for the Orion-M to properly interface with each of the loop controls attached to the system, the Orion-M must be given the proper configuration settings for each loop. These settings are accessed from the 'Loop Configuration' screen under the Setup menu.

**IMPORTANT:** *The loop input number corresponds to the communications address that must be set in the loop controller from the Orion-M to access it properly. If the communications address is not set properly in the loop control, the Orion-M will not be able to communicate with it, or may communicate to the wrong loop control and assign the incorrect set points and control parameters to it.*

*For loop controllers that provide more than one loop of control, the loops will be assigned in sequential order, i.e., loop controller 1 (communications address of 1) is assigned to loop inputs 1 and 2; loop controller 2 (a communications address of 2) is assigned to loop inputs 3 and 4, etc.*



The loop input number in the upper right of the display, shows the current loop selected for configuration. The left and right scroll buttons adjacent to the loop input number, allow the user access each loop in the system, by pressing left or right to go to the previous or next loop.

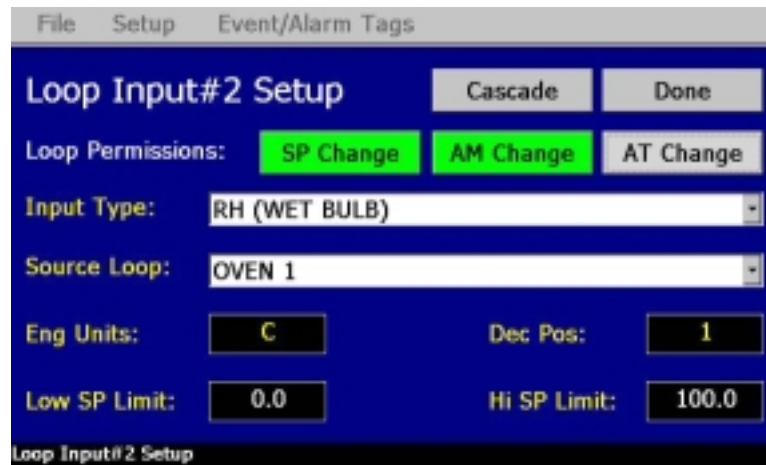
The **Input Type** is a display only field that allows the user to view the current input type setting of the loop. In order to change the input type and access other settings for the loop input, press the 'Loop Setup' button. This provides access to the loop setup screen.

The **Tagname** field is used to enter a specific name for the loop, up to 16 characters in length. This name will be used throughout the Orion-M runtime application and can be used to provide a more detailed description as to the function of the loop in the application. Default tagnames are Loop 1, Loop 2, Loop 3 and so on.

#### 3.2.1 Loop Setup

The 'Loop Setup' screen is accessed by pressing the Loop Setup button on the Loop Configuration screen. The Loop Setup screen provides all settings related to the loop input configuration for the Orion-M. When all settings have been made, press the 'Done' button to return to the Loop Configuration screen.

**NOTE:** *The settings entered on the Loop Setup screen must correspond to the settings entered into the corresponding loop controller for proper operation of the Orion-M.*



The **Input Type** selection is used to set the input type of the loop. There are three selections available for the type of input that can be used with the Orion-M:

**Temperature:** This input type should be used when the loop controller is configured with a temperature input such as a thermocouple or RTD. When supported by the loop controller, the Orion-M will automatically switch the temperature units of the controller between degrees C and degrees F as selected in the Orion-M runtime application on the Offline\Setup\Degrees C/F screen.

**NOTE:** *Not all loop controllers support read/write access of their temperature units over the serial communications connection to the Orion-M. Consult the FDC Loop Controller Notes for the specific brand and model loop controller used to see if the function is supported.*

**RH (Wet Bulb):** This input type is a special feature of the Orion-M and is used to provide an input with units in %RH (relative humidity) from a wet bulb input on the loop controller. When this input type is selected, the **Source Loop** selection is enabled so that a dry bulb loop can be selected from one of the other available control loops which is used as the dry bulb control loop.

The Orion-M then calculates the relative humidity from the dry bulb and wet bulb loops and displays the value on the loop view screens in the runtime application. This allows the operator to enter in a set point and read the value in %RH rather than a wet bulb temperature.

**NOTE:** *The input type of the controller must be a temperature type, i.e., thermocouple or RTD. Not all loop controllers support read/write access of their temperature units over the serial communications connection to the Orion-M. Consult the FDC Loop Controller Notes for the specific brand and model loop controller used to see if the function is supported.*

*If the loop controller does not support read/write access of temperature units, the Orion-M temperature units on the Offline\Setup\Degrees C/F screen must be set to match that of the loop controls or the %RH calculation will not be done correctly.*

*The low and high set point limits for the wet bulb loop are limits in %RH, not temperature. The wet bulb loop controller will automatically be assigned the dry bulb source loop low and high set point limits for temperature.*

**Process:** This input type should be used when the loop controller is configured with a linear input type such as voltage or current such as a carbon potential input from loop controllers like the Honeywell UDC3200.

**NOTE:** *If the linear input to the controller is from a temperature transmitter, the process input type selection will not allow for the selection of temperature units in the Orion-M on the Offline\Setup\Degrees C/F screen. The units will remain as set in the loop control and the engineering units will remain stay at the value set in the configurator. Only temperature input types allow for degrees C/F selection in the Orion-M.*

The **Eng Units** field is used to enter the engineering units for the loop up to three characters maximum. This value is shown on the single and dual view loop screens in the Orion-M runtime application. When the loop input type selection is temperature, the Orion-M will change the units between 'C' and 'F' based on the units selection on the Offline\Setup\Degrees C/F screen. If the loop type is a process input type, the engineering units entered here will remain as entered regardless of the temperature unit configuration.

The **Dec Pos** field is used to select the decimal point resolution for the loop input. All set point and process value readings in the Orion-M will be displayed using the selected resolution. Temperature and %RH (Wet Bulb) input types have a maximum resolution of 1 decimal point. Process input types can be displayed with a resolution of up to 3 decimal points.

The **Low SP Limit** and **Hi SP Limit** fields are used to set the minimum and maximum allowable set points for the control loop. These settings allow the OEM to enter an absolute minimum and maximum range for the operation of the control loop regardless of the end user's desired range. The 'Setpoint Limits' screen in the runtime application (see Section 8.2 Setpoint Limits in the Orion-M Multi-Loop Controller Manual) will be limited to the loop input low and high set point limits as set in the configurator. The end user will be able to decrease the set point range if given access in the runtime application, but not increase the range beyond these limits.

**NOTE:** *If the low and/or high set point limit fields exceed the range of the loop controller, a communications error will result when the Orion-M runtime application is started. This error will not be able to be cleared and the loop will not operate properly until these low and high set point limit fields are set to a value within the input range of the controller. Make sure that these set point limits do not exceed the loop controller range.*

### 3.2.1.1 Loop Permissions

By default, the Orion-M is the master control for the system. All loop set points, auto/manual and auto tune functions are controlled by the Orion-M. If a user tries to modify any of these settings through the front panel of the loop control, their selections will be overridden by the Orion-M. If there is a desire to allow a user to adjust these settings from the front panel of the loop control as well as the Orion-M interface, the loop permissions can be set to allow the user to adjust each of the individual settings at the loop control.

**NOTE:** *The security suite of the Orion-M runtime application provides audit trail capabilities in which all user changes to the system are tracked and logged. This includes user set point, auto/manual and auto tune changes to each individual loop control attached to the system. If loop permission is granted for one or all of these settings, the user will be able to make adjustments at the loop controller.*

*These changes can not be tracked or controlled by the Orion-M security settings as they were made at the loop control, not the Orion-M interface. If the application requires the user to have proper security rights to make any control system changes, the loop permissions should not be enabled unless other means are used to prevent adjustments at the loop controller without proper security access to the loop controller.*

The **SP Change** permission is used to allow the user to change the set point at the loop controller. However, if the loop is currently under profile operation through the Orion-M, any set point change made at the loop control by an operator will be overridden by the profile generated set point in the Orion-M. The profile would have to be placed in hold or stopped to allow local set point changes.

**NOTE:** *If the loop is a wet bulb or cascade type, the set point for the loop is generated by calculations performed in the Orion-M, thus, even with the set point change permission enabled, any set point entered by an operator at the control will be overridden by the Orion-M unless the “set point communications disable” digital input function of the Orion-m is activated to disable set point communications from the Orion-M.*

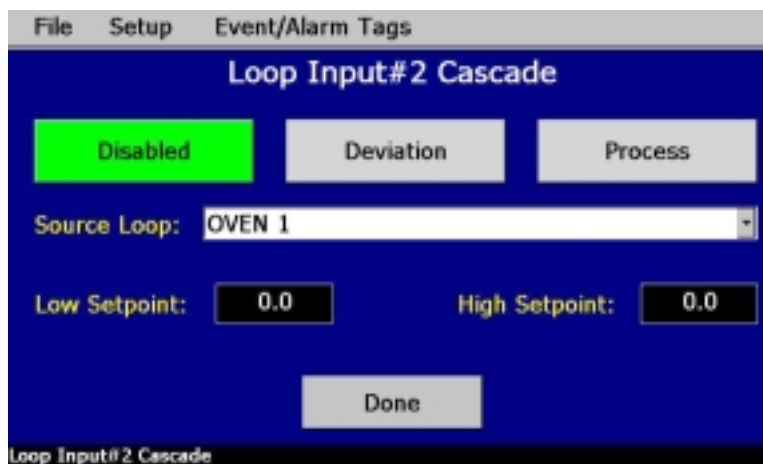
The **AM Change** permission is used to allow the user to switch the control loop between auto and manual mode at the at the loop controller. This permission may be required depending on the functionality and model of loop control used. Honeywell UDC controllers for example, provide a failure transfer mode in which a digital input on the controller can be used to force it into manual mode. If this function is used, but the permission at the Orion-M is not enabled, a communication error will result when the Orion-M tries to force the controller back into auto mode. To prevent this from happening, this permission must be enabled.

The **AT Change** permission is used to allow the user to initiate an auto tune of the control loop at the loop controller. Note that not all controllers allow set point changes once auto tune has been initiated. The FDC 9300 for example, will terminate auto tune if the set point is changed. If the loop is under profile control, or is a wet bulb or cascade type, in which the set point for the loop is constantly changing based on other control loop conditions, auto tune will not be able to initiate at the controller even with this permission enabled.

Loops that are programmed as wet bulb or cascade types should have auto tune initiated at the Orion-M. When initiated from the Orion-M, the set point will be held at its current value, regardless of the source loop condition, in order to allow the auto tune to be performed and complete properly.

### 3.2.1.2 Cascade Loop Operation

Cascade loop operation is a control strategy in which one control loop provides the set point for another loop. If cascade operation is enabled for a loop, its set point will be calculated by the Orion-M based on the output of the selected source loop. The Orion-M will then apply the set point automatically and override any other set point entered for the loop. Cascade settings for a loop can be accessed by pressing the ‘Cascade’ button on the Loop Setup screen.



The **Source Loop** is often referred to as the 'outer loop' for cascade control. The source loop selection tells the Orion-M which control loop to use in calculating the set point for the cascade loop. The Orion-M will monitor the output percentage of the source loop and generate a set point using the **Low SP** and **High SP** entries as the upper and lower ranges for calculating the set point. There are two modes of operation for the cascade control feature, deviation and process. These modes define how the loop set point is calculated using the low and high set points.

**Deviation:** This mode uses the low and high set points to generate a set point that is defined relative to the source loop set point. The upper and lower range of the cascade loop set point is calculated by adding the high and low set point values as offsets from the source loop's set point. As the set point of the source loop changes, the window defined by the high and low set points automatically changes with it.

*Example: If the source loop set point is 50, the cascade Low SP is -10 and the High SP is 20, the cascade loop set point will be in the range of 40 (-10 + 50) to 70 (50 + 20). The actual value is then calculated by using the percentage of output of the source loop and creating a linear set point range from 40 to 70.*

*Thus, if the source loop output range is 0 to 100%, at 0% output, the cascade loop set point will be 40, at 50% output the cascade set point will be 55 and at 100% output the cascade loop set point will be 70.*

**Process:** This mode uses the low and high set points as the upper and lower range of the cascade loop set point. The output of the source loop is then used to calculate the cascade loop's set point by generating a linear value between the low and high set points.

*Example: If the cascade Low SP is 10 and the High SP is 150, the cascade loop set point will be in the range of 10 to 150. The actual value is then calculated by using the percentage of output of the source loop and creating a linear set point range from 10 to 150.*

*Thus, if the source loop output range is 0 to 100%, at 0% output, the cascade loop set point will be 10, at 50% output the cascade set point will be 80 and at 100% output the cascade loop set point will be 150.*

The deviation mode has the benefit of limiting the maximum and minimum temperature that the cascade loop can achieve relative to the source loop set point. This allows the system to be fine tuned to the minimum amount of overshoot required to obtain the desired control response.

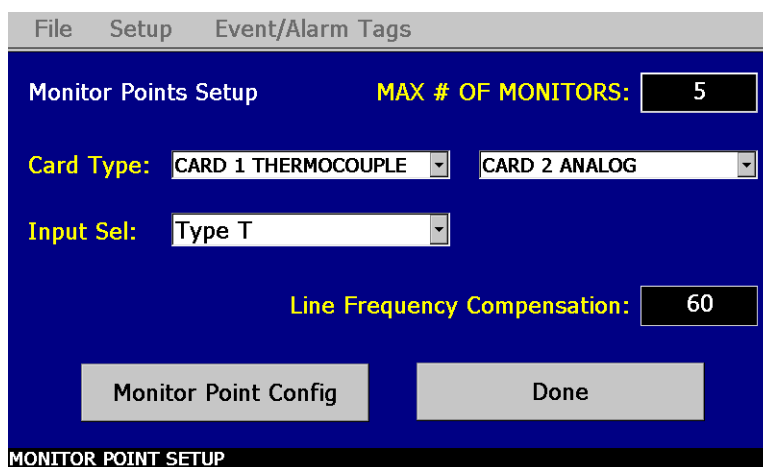
The process mode has the benefit of maximum change rates by allowing the cascade loop to go to absolute limits. This allows the process to achieve set point temperature as quickly as possible, but does so at the cost of stability. If the process has a considerable amount of lag, the cascade loop control may oscillate uncontrollably once the source loop reaches set point because of the large overshoot that can be created.

### 3.3 Monitor Points Setup

In order for the Orion-M to properly interface with the optional monitor input modules, the Orion-M must be given the proper configuration settings for the type of monitor input modules used. These settings are accessed from the 'Monitor Points Setup' screen under the Setup menu.

**IMPORTANT:** *The monitor input modules must be assigned the proper communications address or the Orion-M will not be able to communicate with them. In addition, if an address of a monitor module is improperly assigned an address that corresponds to one of the loop controllers or the other monitor module, it will cause a failure in the communications to the loop controller or monitor module of the same address.*

*The first monitor input module (card 1) must be assigned to address 16. If the second monitor module is used (card 2), it must be assigned an address of 17. This is done via the DIP switches located on the front of the monitor module. See Section 3.5, Connecting to the Orion-M Process Monitor Module, of the Orion-M Multi-Loop Control System Manual for more information on the proper DIP switch settings pertaining to the type of monitor card used.*



The **Max # of Monitors** located in the upper right of the display, is used to set the number of monitor points that will be shown in the Orion-M runtime application. Up to 15 monitor points can be configured. Note that the thermocouple and analog input monitor modules provide up to 8 inputs each, while the RTD type provides up to 6 inputs. If the CM version used supports using the second input of the loop controls as monitor points, up to 15 inputs can be provided (one for each loop control).

**NOTE:** *It is not necessary to wire or use all inputs of the monitor input modules (or second input of control loops) if they are not required for the application. Unused inputs will be ignored by the Orion-M. The Orion-M will only utilize the inputs individually configured as monitor points.*

The **Line Frequency Compensation** field is shown if one or both monitor input cards are configured for use. It is used to set the filtering circuit in the monitor input modules. The field has an adjustable range from 50 to 60 corresponding to typical 50Hz and 60Hz power sources.

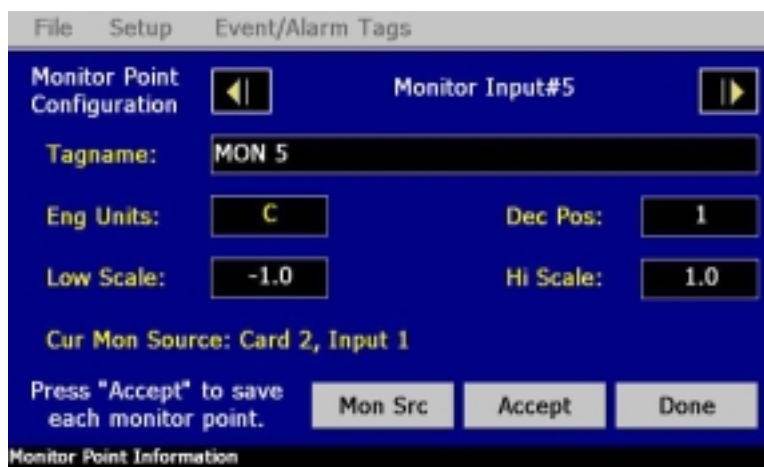
The **Card Type** is used to select the type of monitor module connected to the Orion-M. Available selections are Not Used, Analog, RTD and Thermocouple.

The **Input Sel** field is shown only for RTD and Thermocouple type monitor input modules. This field is used to select from one of the available sensor types that are supported by the input module. The analog input modules have fixed voltage or current input ranges. The available RTD and Thermocouple input ranges are provided in the following tables.

RTD Selections	
<i>Sensor Type</i>	<i>Input range</i>
PT100	-200 to 850°C ± 0.3°C
Ni120	-80 to 320°C ± 0.3°C
PT1000	-200 to 850°C ± 0.3°C
Ni1000-DIN	-200 to 850°C ± 0.3°C
Ni1000-Landys&Gyr	-200 to 850°C ± 0.3°C
10-400ohms	10 to 400
10-4000ohms	10 to 4000

Thermocouple Selections	
<i>Sensor Type</i>	<i>Input Range</i>
Type J	-150 to 760°C ± 0.2°C
Type K	-200 to 1370°C ± 0.3°C
Type E	-0 to 600°C ± 0.1°C
Type T	-200 to 400°C ± 0.3°C
Type N	0 to 1300°C ± 0.3°C
Type B	400 to 18200°C ± 0.5°C
Type S	-50 to 1767°C ± 0.6°C
Type R	-50 to 1767°C ± 0.7°C
0 – 50mV	0 to 50 ± 0.1%
Type C	0 to 2315.5°C ± 0.7°C
Type D	0 to 2315.5°C ± 0.7°C
Type G	0 to 2315.5°C ± 0.9°C
-100 – 100mV	-100 to 100 ± 0.1%

The **Monitor Point Config** button provides access to the 'Monitor Point Configuration' screen. This screen allows each monitor point to be individually customized per system requirements.



The monitor input number in the upper right of the display, shows the input selected for configuration. The left and right scroll buttons adjacent to the monitor input number, allow the user to access each monitor point in the system by pressing left or right to go to the previous or next input.

The **Tagname** field is used to enter a specific name for the monitor point, up to 16 characters in length. This name will be used throughout the Orion-M runtime application and can be used to provide a more detailed description as to what the value of the monitor point represents. Default tagnames are Mon 1, Mon 2, Mon 3 and so on.

The **Eng Units** field is used to enter the engineering units for the input up to three characters maximum. This value is shown on the single and dual view loop screens in the Orion-M runtime application. When the monitor input module is an RTD or Thermocouple type, the Orion-m will change the units between 'C' and 'F' based on the units selection on the Offline\Setup\Degrees C/F screen. If the monitor input module is an analog input type, the engineering units entered here will remain as entered regardless of the temperature unit configuration.

The **Dec Pos** field is used to select the decimal point resolution for the monitor point. All readings in the Orion-M will be displayed using the selected resolution. Temperature input types have a maximum resolution of 1 decimal point. The analog input types can be displayed with a resolution of up to 3 decimal points.

The **Low Scale** and **Hi Scale** fields are shown for analog input types only. They are used to set the display range for the input in order to scale the 0(2)-10Vdc or 0(4)-20mA signal. The display value is then a linear representation of the input signal from the low to high scale value.

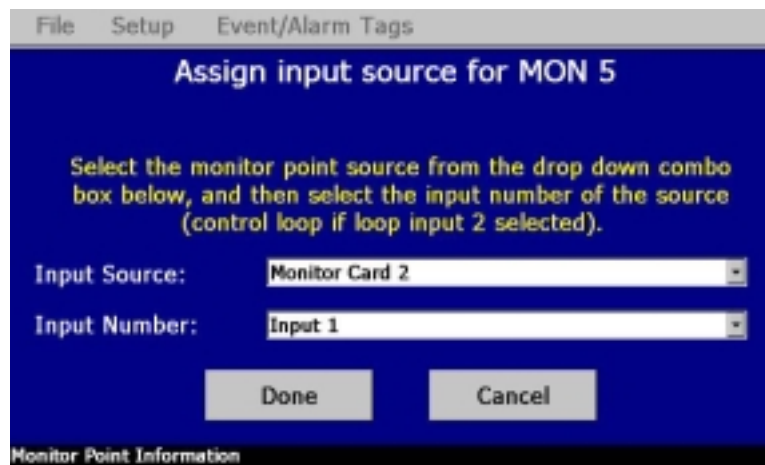
The **Cur Mon Source** field displays the current source selection for the monitor point being configured. The monitor card and input number, or loop name, will be shown. To change the source input for the monitor point, press the 'Mon Src' button. This provides access to the *Monitor Point Source* screen.

**NOTE:** You must press the 'Accept' button on the Monitor Point Configuration screen to save edits to the current monitor point. If you advance to the next monitor point or press the 'Done' button prior to pressing the 'Accept' button, all edits to the current monitor point will be ignored.

Once all of the settings have been made for the monitor points, press the 'Done' button on the Monitor Point Detail screen to return to the Monitor Points Setup screen. To exit the Monitor Points Setup screen, press the 'Done' button to return to the Number of Loops/Monitors screen.

### 3.3.1 Setting the Monitor Point Input Source

The *Monitor Point Source* screen provides drop down menu selections that allow the user to set the source for the input (monitor card 1 or card 2) and which input to use from the selected card. In addition, certain CM software versions such as the FD30 or HWSL, also allow the second input of the loop controls to be configured as monitor points. These versions will allow the selection of 'Loop Input 2' from the input source drop-down menu.



Once the input source selection is made, the **Input Number** drop down menu will provide the corresponding input selections for the source selected. These will be inputs 1-6 for RTD cards, inputs 1-8 for analog and thermocouple cards or the individual loop names for all loops configured in the system. If the selected monitor card is not used, or loop input 2 is selected but is not available on the current CM version, the selection will be cleared and the user will be alerted to make another selection.

Once the desired monitor source selections have been made, press the 'Done' button to exit the screen and return to the Monitor Detail screen. The new source selection will be shown as the current monitor point source. To exit the screen without making changes to the monitor input source, press the 'Cancel' button.

**NOTE:** It is possible to assign the same monitor card input or loop to more than one monitor point.

### 3.3.1.1 Important Settings for Using Loop Input 2 as Monitor Points

#### **Decimal Point**

When using the second input of control loops for monitor points, it is important to note that the controller itself, provides range, calibration and input bias settings for the input. In order for the Orion-M to properly read and display the value, the decimal point setting for the monitor input must match that of the loop control for input 2. If the decimal point settings do not match between the Orion-M and the loop controller, the Orion-M will not properly read or display the value of the second input for the monitor point.

#### **Engineering Units**

When degrees C or degrees F is selected from the Degrees C/F screen in the Orion-M runtime application, engineering units for temperature of 'C' or 'F' are automatically updated for all loop and monitor points. If input 2 of the loop controller is a temperature reading in degrees F for example (from a temperature transmitter), and degrees C is selected on the Orion-M, the monitor point reading will be a value in degrees F, but the units shown will be in degrees C.

To prevent the units from being changed, the Degrees C/F settings screen in the runtime application can be hidden to prevent changes (see Section 3.6 Orion Functions/Startup View) or even password protected in the runtime application. The engineering units could also be entered as 'dgC' or 'dgF' for example. The Orion-M will then ignore them for a degrees C or degrees F units change.

It is important to insure that the engineering units match the loop control for input 2 to avoid operator confusion and prevent the misinterpretation of the value.

#### **Input Offsets**

When using the second input of control loops for monitor points, it is important to note that the controller itself, provides range, calibration and input bias settings for the input. The Orion-M does provide an input offset capability which can be used to correct errors in readings from the analog, RTD or thermocouple monitor modules in order to correct for lead resistance or sensor tolerance.

The 'Monitor Input Offset' screen in the Orion-M runtime application also allows an offset to be applied to the monitor points when input 2 of the loop controls are used. However, the input offset of the Orion-M only corrects the value shown on the Orion-M and does not offset the reading in the loop control.

If the loop control is visible to the operator, it is recommended that the 'Monitor Input Offset' screen be hidden (see Section 3.6 Orion Functions/Startup View) or even password protected in the runtime application to prevent an offset from being applied to the monitor point in the Orion-M. Rather, use the input bias setting of the loop control so that both the reading on the loop control and the Orion-m will match to avoid operator confusion.

### 3.4 Defrost Setup

The 'Defrost Setup' screen allows the OEM to configure the type of defrost mode to use (if any) and what outputs are to be associated with defrost operation. While the Orion-M's defrost function is primarily intended for refrigeration system use, it can also be used as a general timer function to perform repetitive actions based on an interval time or in conjunction with a specific loop value. It does not have to be used with refrigeration systems specifically.



The **Defrost Type** selection is used to choose the defrost mode. Available selections are Disabled, Timed Defrost and Timed Process. When Timed Defrost is selected, defrost occurs on regular intervals based on the interval time entered on the defrost screen in the Orion-M runtime application. When Timed Process is selected, defrost also occurs on regular intervals based on the interval time entered on the defrost screen in the Orion-M runtime application; however, the selected enable loop/monitor must also be below the enable setpoint.

The interval timer will begin counting down to the next defrost as long as the selected enable loop/monitor remains below the enable setpoint. If at any time the selected loop/monitor rises above the setpoint, the defrost interval timer will be reset. This provides a means for enabling defrost only when the control loop or monitor point associated with the function is below a certain temperature in which defrost may be required on regular intervals.

The **Enable Loop/Mon** selection is shown only when defrost is set to timed process. This field is used to select any of the available loop or monitor points configured in the system to be used as the enable point for defrost.

When a loop is selected as the enable source:

The setpoint of the selected loop is used as the source value and is compared to the defrost enable setpoint. When the loop setpoint is equal to or less than the defrost enable setpoint, the defrost logic will be activated. This insures that defrost will operate as required, since temperatures can rise if the cooling coil begins to ice over and cooling capacity is lost. If the air temperature was used, the coil could ice over causing air temperature to rise, deactivating defrost prior to it beginning its cycle.

When a monitor point is selected as the enable source:

The process value of the selected monitor point is used as the source value and is compared to the defrost enable setpoint. When the monitor point is equal to or less than the defrost enable setpoint, the defrost logic will be activated. This offers the ability to provide a type of "adaptive" defrost by placing the sensor on the cooling coil or cold plate and monitoring surface temperature. It could then be used to activate defrost only when the surface temperature is operating at or below freezing in which ice can accumulate.

The **Enable SP** field is shown only when defrost is set to timed process. It is used to enter the setpoint for the selected enable loop/monitor below which the defrost interval timer will be started.

### 3.4.1 Setting the Defrost Enable Outputs

In order for defrost to operate, timed or timed process, an output must be selected as an enable for the defrost logic. When the output is on, the defrost interval timer will begin operation. Note that if timed process is selected, the enable loop/monitor point must also be below the enable setpoint. As long as the output remains on, defrost will continue operation.

The output(s) is used as the switch to activate defrost. This allows defrost to be turned on and off in conjunction with the system it is associated with. If at any time the enable output(s) is off, defrost operation will be terminated. There must be at least one output selected in order for defrost to operate regardless of the selected type. To select which output(s) is to be used, press the 'Enable Output' button.



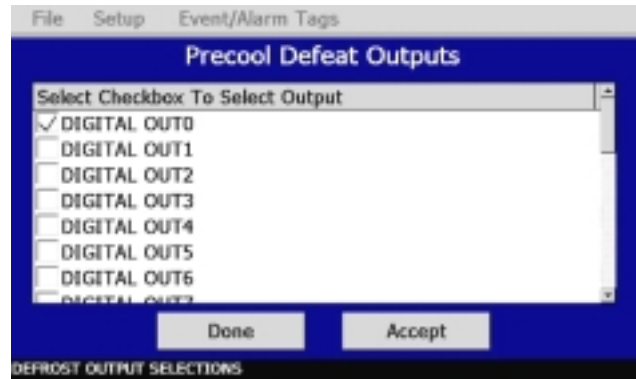
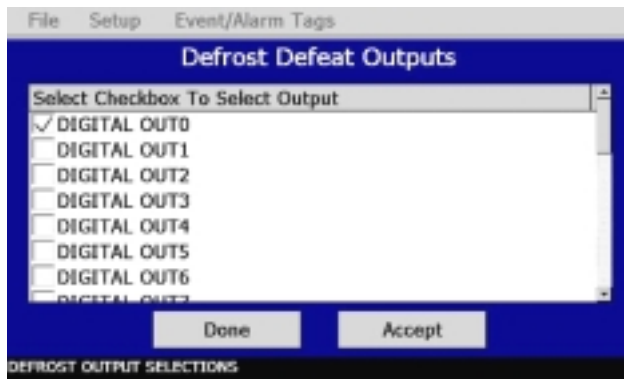
Select each output to be used as the enable by placing a check in the checkbox next to the output name. Once all selections have been made, press the "Accept" button to save the changes and press the 'Done' button to return to the main defrost setup screen. If changes are not saved prior to leaving the screen, the changes will be lost and the original selections will be used.

**NOTE:** Control outputs for defrost and precool (that activate when defrost or precool are active) are configured under Digital Output Setup in the Orion-M runtime application.

### 3.4.2 Setting Defrost/PreCool Output Defeats

The defrost and precool output defeat selections allow the OEM to select which outputs should be disabled during defrost and precool. This allows specific equipment to be disabled during defrost operation such as a fan or cooling valve for example.

The 'Defrost Output Defeat' allows the OEM to select which outputs should be disabled during defrost. The 'PreCool Output Defeat' button allows the OEM to select which outputs should be defeated during precool. Precool, otherwise known as fan delay, occurs immediately after the defrost duration has completed. In typical refrigeration applications, this allows the OEM to defeat cooling systems and fans during defrost, but then allow the cooling systems to operate during the precool period while keeping the fan off. This allows the cooling coil temperature to be lowered prior to turning on the system fans.

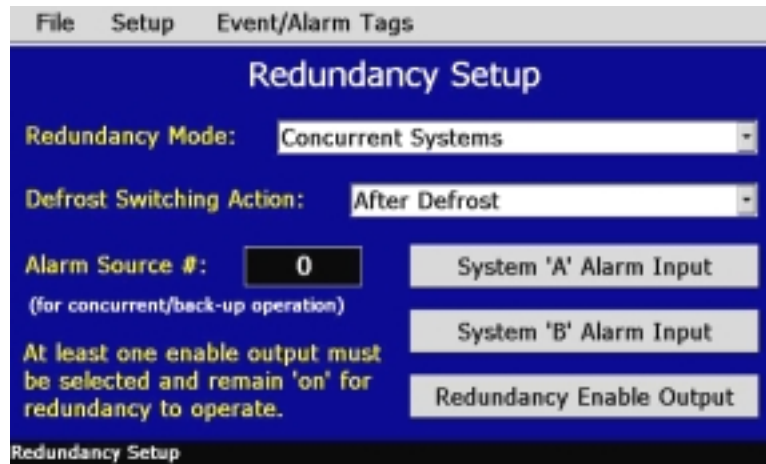


Select which outputs are to be disabled by placing a check in the checkbox next to the output name. Once all selections have been made, press the "Accept" button to save the changes and press the 'Done' button to return to the main defrost setup screen. If changes are not saved prior to leaving the screen, the changes will be lost and the original selections will be used.

### 3.5 Redundancy Setup

The Orion-M redundancy function is enabled and configured from the Redundancy Setup screen. It provides the OEM with a means for configuring the Orion-M to control two separate systems, usually identical, where one is a primary system and the other is a back-up system in case of primary system failure. The redundancy settings provide selections for the type of back-up system operation as well as selections for alarm inputs and redundancy enable settings.

**NOTE:** See the Orion-M iSeries User's Manual for a more detailed explanation of redundancy operation.



The **Redundancy Mode** selection is used to choose the redundancy type. Available selections are Redundancy Disabled, Concurrent Systems and Alternating Redundancy. The concurrent and alternating redundancy modes select the back-up system mode of operation. When concurrent systems is selected, both system A and system B will operate at the same time when the selected alarm source in is alarm. When alternating redundancy is selected, the Orion-M will switch to the back-up system on alarm.

The **Defrost Switching Action** is used to select how the redundant systems will switch if defrost is also enabled. Available selections are Before Defrost and After Defrost. When before defrost is selected, the systems will alternate based on the defrost interval setting without actually running a defrost cycle. When after defrost is selected, the currently system will perform an actual defrost prior to switching to the other system.

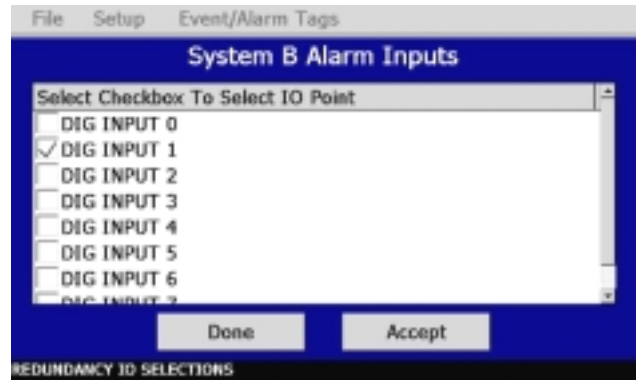
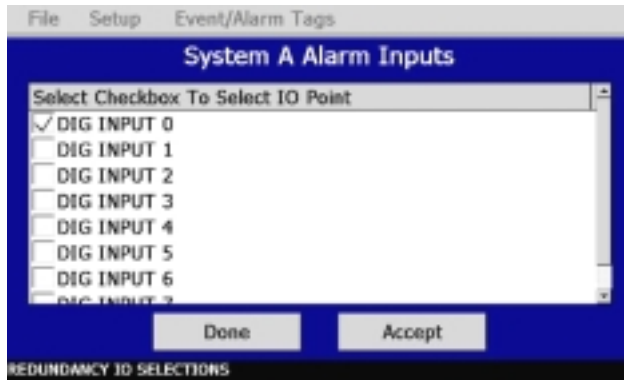
**NOTE:** If defrost is disabled in the Orion-M configuration and redundancy is enabled, you must select 'After Defrost' in order to activate equal run time switching. Alternating time settings will not be activated in the Orion-M runtime application unless 'after defrost' is selected.

The **Alarm Source #** field is used to enter the system alarm number that is to be used to activate the redundancy back-up system. This allows the OEM to select any of the 30 process alarms available in the Orion-M (configurable in the Orion-M runtime application). This allows any loop or monitor point to activate the back-up system on a high, low, high/low, deviation or rate of change condition.

#### 3.5.1 Setting the System A/B Alarm Inputs

The system A and system B alarm input selections allow the OEM to select which inputs should be used (if any) for the system A and system B failure inputs. When the input alarm is activated, the respective system would be disabled and the other system would remain operating indefinitely until the alarm condition was correct on the other system. Alarm inputs do not have to be configured; however, when configured, the selected input(s) must be configured as an alarm input under the Digital Input Setup of the Orion-M runtime application.

To select alarm inputs for system A and/or system B, press the System 'A' Alarm input or System 'B' Alarm input button. Select which outputs are to be disabled by placing a check in the checkbox next to the output name.

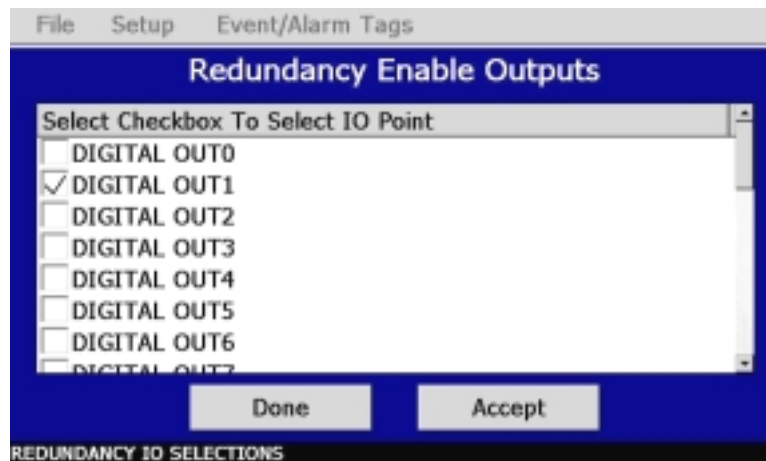


Once all selections have been made, press the "Accept" button to save the changes and press the 'Done' button to return to the main defrost setup screen. If changes are not saved prior to leaving the screen, the changes will be lost and the original selections will be used.

### 3.5.2 Setting the Redundancy Enable Outputs

In order for redundancy to operate, concurrent or alternating, an output must be selected as an enable for the redundancy logic. When the output is on, the redundancy logic is activated and any digital outputs configured in the Orion-M runtime application under Digital Output Setup as 'Redundant System A' or 'Redundant System B' will activate based on the redundancy mode of operation.

The selected output(s) is used as the switch to activate redundancy. This allows the system A and B outputs to be turned on and off in conjunction with a common system they are associated with. There must be at least one output selected in order for redundancy to operate regardless of the selected type. To select which output(s) is to be used, press the 'Redundancy Enable Output' button.



Select each output to be used as the enable by placing a check in the checkbox next to the output name. Once all selections have been made, press the "Accept" button to save the changes and press the 'Done' button to return to the main defrost setup screen. If changes are not saved prior to leaving the screen, the changes will be lost and the original selections will be used.

### 3.6 Profiler Setup

The Orion-M profiler can be set to operate in one of two modes; ramp in time or ramp in rate. The default mode of operation is 'Ramp In Time'. To make a selection, press the desired profile mode button. The button for the selected mode, ramp in time or ramp in rate, will be illuminated green once selected.



When **Ramp In Time** is selected, the steps of the profile are entered as units of time in hours, minutes and seconds with individual set points for each control loop in the system. When the steps of the profile are executed, the profiler will ramp the set points of each loop individually to the set point of the step, linearly over the time duration of the step.

When **Ramp In Rate (Deg/Hrs)** is selected, the steps of the profile are entered as a rate of change in degrees per hour with a single set point that is used for all control loops in the system. When the steps of the profile are executed, the profiler will ramp to the set point of the step at the ramp rate specified. The length of the step is then based on the ramp rate and the difference in the current set point versus the step's set point.

**NOTE:** *The 'Ramp In Rate (Deg/Hrs)' selection turns the profiler into a set point generator. It is provided primarily for the heat treat industry. Since all control loops profiled will use the same set point, it is important to properly configure all loop inputs for the same settings in order to properly apply the ramp in rate profile mode.*

## 3.7 Customize Name\Address

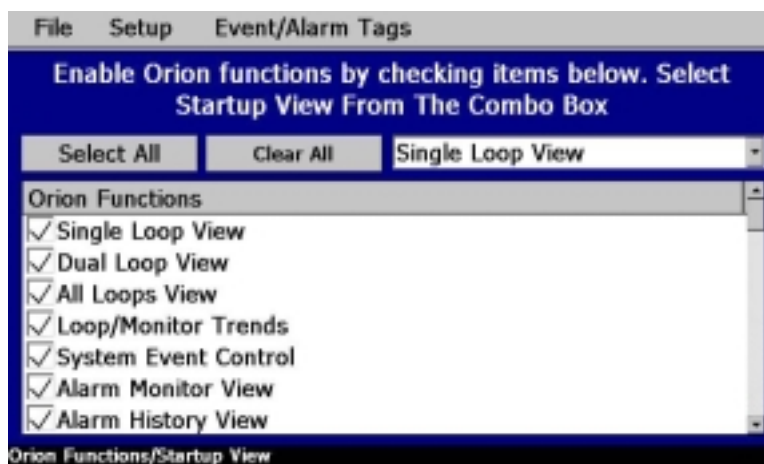
The 'Customize Name\Address' screen allows the OEM to configure the main splash screen when the Orion-M runtime application starts. This is used so the OEM name and contact information is shown each time the FDC-2010-Orion-M controller is powered up.



To edit the company, address and phone number, press the desired field and enter the desired text. Each field can be entered with a maximum of 26 characters that will be displayed on the splash screen when the Orion-M starts.

### 3.8 Orion Functions/Startup View

The 'Orion Functions/Startup View' screen allows the OEM to select the Start Up/MainView as well as enable or disable Orion-M menu items and corresponding screens in the runtime software. These functions can be used to customize the system to meet specific requirements. The ability to enable/disable specific menu items and functions not required or desired for the application are configured in this screen.



The **Select Orion Screen To View on Startup** selection allows the OEM to define which of the main view screens the runtime application will show when it first starts and when 'Main View' is selected from various system menu drop downs. The selections are Single Loop View, Dual Loop View, All Loops View, Loop/Monitor Trends, System Event Control, Alarm Monitor View, Alarm History View, Digital Input Monitor and Digital Output Monitor.

**NOTE:** *If the selected screen to view on startup is disabled in the Orion functions list, the screen will only be available when the Orion-M first starts up. Once the user navigates to a different screen, they will be unable to return the selected start screen (Main View) because it has been disabled.*

When functions are disabled at the configurator level from the **Orion Functions** list, it will be disabled in the runtime software by removing the menu item so the operator can not select the function or edit any corresponding settings related to the function. Clicking the checkbox on will enable the function while clicking the checkbox off will disable the function. Shown below is a list of the available Orion-M functions, where to find the menu item(s) applicable to the function and a description of what it applies to.

Orion Function	Runtime Menu Location	Description
Single Loop View	View\Single Loop View	View loop PV, %Out, set loop auto tune, auto/manual output mode and loop set point  <b>NOTE:</b> Without access to the single loop view screen, the user will be unable to initiate auto tune or set loop in manual mode and adjust its output.
Dual Loop View	View\Dual loop View	view loop PV, %Out, set loop set point  <b>NOTE:</b> Without access to at least one loop view screen, the user will be unable to manually adjust loop set points.
All Loops View	View\All loop Views	view loop PV, %Out, set loop set point  <b>NOTE:</b> Without access to at least one loop view screen, the user will be unable to manually adjust loop set points.

Orion Function	Runtime Menu Location	Description
Loop/Monitor Trends	View\Loop/Monitor Trends	view and set up real time trends for loops and monitors
System Event Control	View\System Event Control	view and enable or disable manual events  <b>NOTE:</b> Without access to system event screen, user will be unable to manually turn events on/off which could prevent them from operating equipment if events are required to do so.
Alarm Monitor View	View\Alarm Monitor View	view and silence current alarms  <b>NOTE:</b> Without access to alarm monitor screen, user will be unable to silence and acknowledge alarms.
Alarm History View	View\Alarm History View	view and email alarm history files
Digital Input/output Monitor	View\Digital Input/Output Monitor	view current digital input and output status
Redundancy Settings	Setup\Redundancy Settings	view redundancy status and set primary system, operating mode and cycle times
Profile Control	Profiles	view, create, edit and run profiles  <b>NOTE:</b> When disabled, all profile items and menus will be removed from the runtime application. The user will be unable to access or run profiles via the interface. A preconfigured profile could be started via a digital input.
System Security	Security	view/set security rights, view audit trails, user log on  <b>NOTE:</b> If security is enabled, but system security is then disabled through this item, the user will be unable to log on. Default security (operator level) access will be used. This allows audit trails to be active while hiding all user security features.  With security menu disabled, audit trail files are accessible via Log/USB File Utilities or temporarily re-enable security menu to gain access to the audit files.
Data Logging	Log\Data Logger	enable/disable data logging, select points for logging, access to historical viewer, FTP and USB File utilities  <b>NOTE:</b> If data logging is set to log on profile run or when the Orion-M starts or through the use of a digital input, and this menu is then disabled, data logging will be disabled. This menu item must remain visible in order for the built in data logging of the Orion-M to function.  The USB File utilities will not be accessible to copy or delete data, alarm, audit or profiles files. If alarm, audit and/or profile files are accessible via their respective menus these files may be emailed individually if unit is so configured
Data Log Viewer	Log\DataLogging	access to view historical data log files
USB File Utilities	Log>Edit\File Utilities	access to copy/delete alarm, audit, profile and data log files  <b>Note:</b> If these files are accessible via their respective menus these files may be emailed individually if unit is so configured. Data files may be transferred via FTP if unit is so configured.

Orion Function	Runtime Menu Location	Description
FTP File Transfer	Log/Edit\FTP/WAN Setup	access to view/configure FTP file transfer settings  <b>NOTE:</b> Once the FTP is configured for Auto Backup in the runtime application, this menu item can be disabled and hidden from the operator so that OEM configuration is preserved and can not be accessed or altered. The Auto Backup to the FTP Server would occur as configured.
Loop Alarm Settings	Setup\Alarm Settings	access loop/monitor alarm settings  <b>NOTE:</b> Alarms can be configured in the runtime and then the menu removed by disabling this function. The alarms will operate as configured in the background removing all access by the operator.
Email/SMTP	Setup\Email	access to view/configure email settings
System Event Names	Setup\Event Tagnames	access to view/edit system event names  <b>NOTE:</b> Event names can be assigned in the runtime and then this item disabled to prevent changes to event names.
Web Server/VNC	Setup\Web Server/Modbus/VNC	access to web server, Modbus and VNC settings  <b>NOTE:</b> Without access, the user will be unable to view the Orion-M IP address if required for VNC or web server access.
Degrees C/F	Offline\Setup\Degrees C/F	access to set temperature units  <b>NOTE:</b> For systems with loop controls that do not support read/write access for temperature units, it is recommended that this screen be hidden once the proper selection is made so that the units match the control loop temperature units if applicable.
Maintenance Items	Offline\Setup\Maintenance Items	view, set and clear maintenance counters  <b>NOTE:</b> If maintenance service alerts are enabled and this function is then disabled, the operator will be unable to clear service alerts from the alarm monitor since access to clear service counters is not available.
Monitor Input Offset	Offline\I/O\Monitor Input Offset	adjust offsets of monitor inputs
Analog Input Setup	Offline\I/O\Analog Input Setup	access analog input settings  <b>NOTE:</b> Once analog inputs are set in the runtime application, this menu item can be disabled and hidden from the operator so that OEM configuration is preserved and can not be accessed or altered.
Analog Output Setup	Offline\I/O\Analog Output Setup	access analog output settings  <b>NOTE:</b> Once analog outputs are set in the runtime application, this menu item can be disabled and hidden from the operator so that OEM configuration is preserved and can not be accessed or altered.

Orion Function	Runtime Menu Location	Description
Digital Input Setup	Offline\I/O\Digital Input Setup	access digital input settings  <b>NOTE:</b> Once digital inputs are set in the runtime application, this menu item can be disabled and hidden from the operator so that OEM configuration is preserved and can not be accessed or altered.
Digital Output Setup	Offline\I/O\Digital Output Setup	access digital output settings  <b>NOTE:</b> Once digital outputs are set in the runtime application, this menu item can be disabled and hidden from the operator so that OEM configuration is preserved and can not be accessed or altered.
Operator Events	Log>Edit\Add Operator Events	access to add and view operator events to active data log file  <b>Note:</b> If Barcode Setup has been set Operator Events can be entered with Barcode Reader.
Digital Signatures	Log>Edit\Add Digital Signatures	access to add digital signature to data log file
Offline DI\DO Monitor-Force	Offline\I/O\Digital output Force	access to view digital input and output status as well as force digital outputs on in offline mode
Not used	-	-
Barcode Setup	Setup\Barcode Setup	access to view/edit barcode setup  <b>NOTE:</b> Once Barcode Setup is configured in the runtime application, this menu item can be disabled and hidden from the operator so that OEM configuration is preserved and can not be accessed or altered
Not used	-	-
Profile GS Events	Profiles\Profile Entry	ability to view/program soak events in a profile  <b>NOTE:</b> If a profile is loaded that has GS events programmed, the operator will be unable to view or change the GS event status.
Profile Wait For	Profiles\Profile Entry	ability to view/program wait for conditions in a profile  <b>NOTE:</b> If a profile is loaded that has wait for conditions programmed, the operator will be unable to view or change them.
Profile GS Soak Limits	Profiles\Screens\GS Soak Limits	ability to view/program soak limits in a profile  <b>NOTE:</b> If a profile is loaded that has GS events programmed, the operator will be unable to view or change the soak limits that correspond to the GS events.
Profile Auto Start	Profiles\Screens\Auto Start Profile	ability to view/program profile auto start settings  <b>NOTE:</b> If a profile is loaded that has auto start programmed, the operator will be unable to view or change the auto start settings.
Loops Not Used In Profile	Profiles\Screens\Loops Not Used In Profile	ability to view and enable or disable control loops that are used in a profile

Orion Function	Runtime Menu Location	Description
		<b>NOTE:</b> If a profile is loaded that has loops not used in the profile, the operator will be unable to view or change the selections.
Profile Jump Step	Profiles\Profile Entry	ability to view/program jump steps in a profile  <b>NOTE:</b> If a profile is loaded that has jump steps programmed, the operator will be unable to view or change the settings.
Profile Jump Count	Profiles\Profile Entry	ability to view/program jump counts in a profile  <b>NOTE:</b> If a profile is loaded that has jump counts programmed, the operator will be unable to view or change the settings.
Import/Export Setup	Offline\Setup\Import/Export Setup	Access import/export utility to back up current Orion-M configuration or restore configuration from back-up file
Defrost Settings	Setup\Defrost Settings	view defrost status, activate demand defrost and set interval and duration times
Exit Application	Offline\Setup\Exit Application	Access to exit the Orion-M runtime application and/or start configurator on next power up.

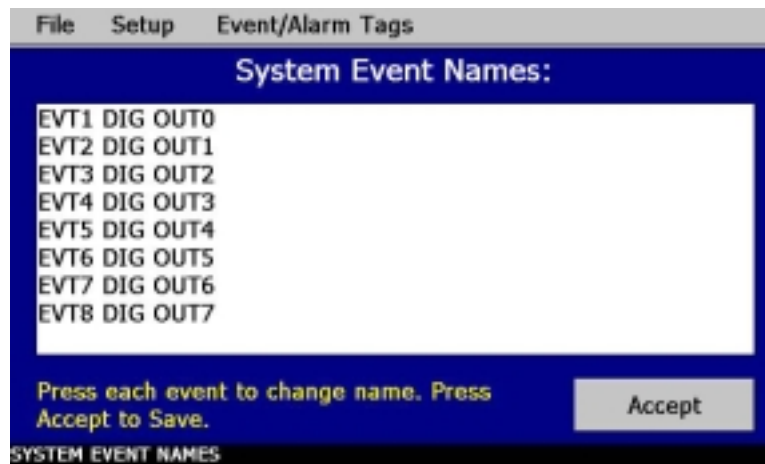
**IMPORTANT:** *Disabling Orion-M functions that are not required for the application results in a system that is clean and easy to use for the operator; however, be careful when disabling certain items. Without access to them, there will be no way of determining if the system is operating as required, i.e., wait for conditions programmed into a profile loaded on the Orion-M, but no way of accessing them because the Profile Wait For access has been revoked. The profile may then enter a wait for condition that the operator did not know about and think the system is malfunctioning.*

### 3.9 Event/Digital IO Tagnames

**NOTE:** In order to gain access to the 'names' screens, there must be at least one system event, digital input or digital output enabled in the system on the Number of Loops/Monitors screen or the corresponding names screen will not be accessible.

#### 3.9.1 System Event Names

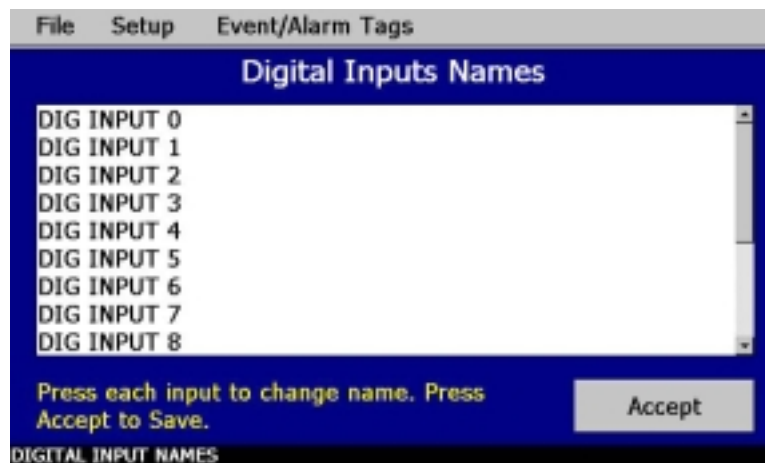
The 'System Event Names' screen allows the OEM to configure the system event names. These names will be displayed in the runtime application under the System Event Control and profile Step Events screens. This allows each event to be identified by the function it performs for the end user.



To edit an event name, press the desired field and enter the desired text up to 20 characters. Once all names have been edited, press the 'Accept' button in order to save the entries to the configuration file. If you change screens or exit the configurator without pressing the 'Accept' button, all edits will be lost.

#### 3.9.2 Digital Input Names

The 'Digital Input Names' screen allows the OEM to configure the names of the digital inputs. These names will be displayed in the runtime application under the Digital Input Monitor screens and used as the alarm description on the Alarm monitor screen if the input is configured as an alarm input.



To edit a digital input name, press the desired field and enter the desired text up to 20 characters. Once all names have been edited, press the 'Accept' button in order to save the entries to the configuration file. If you change screens or exit the configurator without pressing the 'Accept' button, all edits will be lost.

### 3.9.3 Digital Output Names

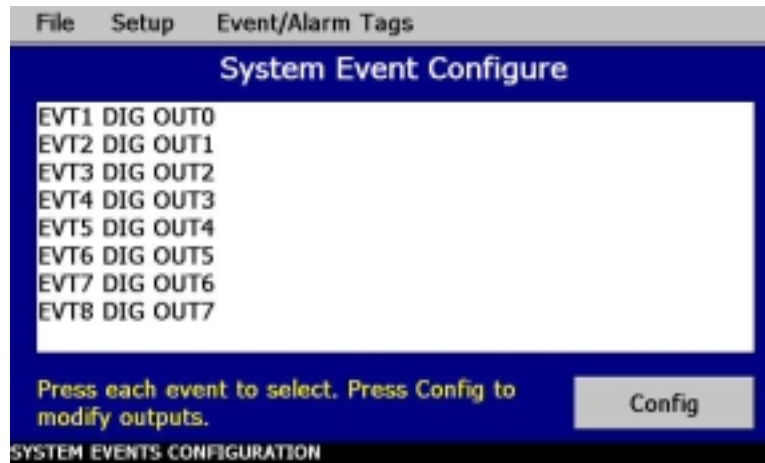
The 'Digital Output Names' screen allows the OEM to configure the names of the digital inputs. These names will be displayed in the runtime application under the Digital Output Monitor screens. This allows each output to be identified by the function it performs for the end user.



To edit a digital output name, press the desired field and enter the desired text up to 20 characters. Once all names have been edited, press the 'Accept' button in order to save the entries to the configuration file. If you change screens or exit the configurator without pressing the 'Accept' button, all edits will be lost.

### 3.10 System Event Configuration

The 'System Event Configure' screen allows the OEM to assign specific digital outputs to each system event. Events can be assigned to one or more outputs as required based on application.



To assign outputs to an event, touch the desired event from the list box. The selection will be highlighted blue. Next, press the 'Config' button to access the 'System Event Output Configuration' screen (shown below).



For each output that is to be assigned to the event, place a check in the checkbox next to the digital output. Once all selections have been made, press the 'Accept' button to assign the outputs to the event, and then press 'Done' button to return to the System Event Configure screen. If you do not press 'Accept' prior to leaving the event output configuration screen, any changes will be ignored.

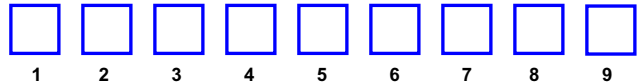
**NOTE:** Each digital output can be assigned to more than one event. This allows different events to control the same outputs or combination of outputs in order to perform various tasks as required by the application.



## Appendix

## Order Matrix:

### FDC Orion-M -



#### 1. Graphic User Interface (GUI) & Control Module (CM)

- 2: FDC-2107i Windows CE 7" iSeries Color Touch Screen
- 3: FDC-2110i Windows CE 10" iSeries Color Touch Screen

**Control Module (CM) includes the following components:**

- FC5A-D16RS1: Control Module CPU with on-board 8-digital input (24Vdc) and 8-digital outputs (6-relay/2TTL)
- FC4A-PM64: 64KB Memory Card
- FC4A-PT1: Real Time Clock
- FC4A-HPC3: Modbus port (connect loop controls and monitor point cards to CM)
- CA2011-8A: Cable from FC5A CPU to display (8ft)
- GE1A-C10MA110 / SR2P-06: Reset Timer and socket (DIN Rail)
- 2GB SD Memory Card (holds Orion-Mi application software)
- 2GB High Capacity USB Memory Stick (3VDC)
- PS5R-SD24: Power Supply (Input 85-264Vsc/Output 24Vdc 60 Watt (2.5 amp))

#### 2. Graphic User Interface (GUI) Application Software

- 2: FDCi: standard iSeries software for 7" and 10" displays
- 3: FDSR: SR iSeries software for 7" and 10" displays

#### 3. Control Module (CM) Application Software (loop control type)

- 1: **FD10:** CM software for FDC 100 Series
- 2: **FD30:** CM software for FDC 300 Series (note 2)
- 3: **HWSL:** CM software for Honeywell 2500/3200 (note 2)
- 4: **HWDL:** CM software for Honeywell 3500 (note 3)
- 5: **WTSD:** CM software for Watlow SD
- 6: **WTPM:** CM software for Watlow PM
- 7: **DHPL:** CM software for Danaher West/Partlow Plus
- 8: **YKGS:** CM software for Yokogawa UT Green Series
- 9: **FDSR:** CM software for FDC 300 Series Orion-M SR (note 2)

**Software - Future Release**

- YKXX:** CM software for Yokogawa UT Advanced
- ER20:** CM software for Eurotherm 2000 Series
- ER30:** CM software for Eurotherm 3000 Series
- ERM8:** CM software for Eurotherm Mini 8 Series

#### 4. Monitor Inputs (Note 2) (DIN Rail Mount – serial connection to CM)

- 0: None
- 1: **IO-8TCS:** (8-thermocouple input module - isolated)
- 2: **IO-6RTD:** (6-RTD input module)
- 3: **IO-8AIIS:** (8- input module 0-20 / 4-20mA - isolated)
- 4: **IO-8AIVS:** (8-analog input 0-10 / 2-10Vdc—isolated)
- 9: **Special**

**Combination Monitor Input Modules** (maximum of 2 & 15 points)

- |                   |                |
|-------------------|----------------|
| A: Item 1 / qty 2 | F: Items 1 & 3 |
| B: Item 2 / qty 2 | G: Items 1 & 4 |
| C: Item 3 / qty 2 | H: Items 2 & 3 |
| D: Item 4 / qty 2 | I: Items 2 & 4 |
| E: Items 1 & 2    | J: Items 3 & 4 |

**Note 1:** CM will support up to 7 expansion modules (the monitor point input module is not a CM expansion module).

**Note 2:** Maximum of 2 monitor input cards monitoring a maximum of 15 monitor card inputs. With specific CM software, the loop control's input #2 may be configured as monitor points. System maximum of 15 monitor points made up of loop control input #2, inputs of monitor cards or combination of both.

**Note 3:** Dual loop HW3500 is limited to 7 controls maximum (14 loops).

#### 6. Digital Inputs (Note 1) (DIN Rail Mount – plug into CM)

- 0: None
- 1: **FC4A-N08B1:** (8-digital input card (24Vdc))
- 2: **FC4A-N08A11:** (8-digital input card (120Vac))

Note: The above optional digital inputs (DI) are in addition to the eight 24Vdc digital inputs that are standard on the CM; system maximum of 16 digital inputs.

#### 4. Digital Outputs (Note 1) (DIN Rail Mount – plug into CM)

- 0: None
- 1: **FC4A-T08S1** (8-digital output– TTL 24Vdc (source))\*
- 2: **FC4A-R081** (8-digital output - Relay (240Vac 2-amps))
- 3: **FC4A-T16S3** (16-digital output– TTL 24Vdc (source))\*
- 4: **FC4A-R161** (16-digital output - Relay (240Vac 2-amps))

**Combination DO modules** (maximum of 24 optional DO)

- |                                |                |
|--------------------------------|----------------|
| A: Item 1 / qty 2              | G: Items 1 & 3 |
| B: Item 1 / qty 3              | H: Items 1 & 4 |
| C: Item 2 / qty 2              | J: Items 2 & 3 |
| D: Item 2 / qty 3              | K: Items 2 & 4 |
| E: Item 1 qty 2 & Item 2 qty 1 |                |
| F: Item 1 qty 1 & Item 2 qty 2 |                |

\*The terminal blocks for all of the above are inclusive except for the FC4A-T16S3, 24Vdc output card, whose terminal block is a separate component, part number FC4A-PMPC20P. This terminal block is included as a separate component when specifying this output card.

Note: The above optional digital outputs (DO) are in addition to the 8 DO that are standard on the CPU (6 relay & 2 TTL 24Vdc); maximum of 32 DO.

#### 7. Analog I/O (Note 1) (DIN Rail Mount – plug into CPU)

- 0: None
- 1: **1 A-IO card** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)
- 2: **2 A-IO cards** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)
- 3: **3 A-IO cards** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)
- 4: **4 A-IO cards** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)
- 5: **5 A-IO cards** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)
- 6: **6 A-IO cards** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)
- 7: **7 A-IO cards** **FC4A-L03A1** (4-20mA or 0-10Vdc IO)

Note: Each I/O card has qty 2 Remote Setpoint input and quantity 1 Retransmission output configurable for PV,SP or %Out

#### 8. Serial Communication (Note 1) (DIN Rail Mount – plug into CM)

- 0: None
- 1: **FC5A-SIF4** (RS485 Modbus RTU port (slave))\* (port 3)
- 2: **FC5A-SIF2** (RS232 port for Barcode Reader) \*\* (port 4)

**Note: If Item 2 is specified, Item 1 is included and must be counted in the total number of modules.**

\*RS485 Modbus RTU port allows R/W access by FDC EnVision & 3rd party software.  
 \*\*Bar Code Reader input is compatible for serial based barcode readers. System will accept up to 16 characters of data from the bar code scanner. Data from the bar code reader will be inserted as operator events in the Historical Data File; there is no limit to the number of events that may be entered manually or with a bar code scanner.

#### 9. Special

- 0: None
- 1: **CM Assembled & wired on DIN Rail**

## NOTES: SCADA (Supervisory Control & Data Acquisition)

FDC-Orion-M iSeries Graphic User Interface (GUI) is available in 7" and 10" color touch screens. The GUI provides a full SCADA feature set providing ease of use, data acquisition, alarm manager, operator audit trail, multi-level Security with user rights, LAN connections and more.

### The GUI provides ease of configuration, use & support.

- System Configuration for loop, monitor point, alarm, digital input & outputs assignment / logic, Help language selection and more, all without an external device or PC.
- Loop Views: multiple view Loop and/or Monitor Points in single or All View; Trend, Bar Graph and Digital views also available
- Profile: Virtually unlimited number of profiles with each profile having up to 99 steps with up to 32 events.
- File Management: View, print, copy/move Profile, Alarm, Historical Data (data log files) and operator audit trial files. File transfer via LAN features or USB flash memory.
- Support: View loop & digital IO status, force loop & digital outputs and more.
- Print: Print directly from GUI via USB port
- LAN: Remote Access & touch screen operation (VNC), email/SMS on alarm, email historical, alarm & audit trail files on-demand, Web Page (view only) and FTP of historical data files automatically or on-demand.

### Data Acquisition:

- Data log up to 15 control loops (PV, SP & % out) & 8 Monitor Points (specific dual input loop controls may allow up to 30 PV inputs)
- Log interval: configurable 6 seconds to 31 minutes with configurable number of days to auto start & name next file (1 to 31 days).
- File Start/Stop: Configurable; operator on-demand, on system boot, profile ramp-soak start/end or digital inputs
- File Interval: Once started a data log file is configurable to auto end and start new file with the same name as previous file with an appended time/date name. Configurable time interval is from 1 to 31 days.
- File name: Operator entered file name, batch & lot number or if running a profile, file name same as profile name. (all file names appended with date-time to file name)
- Operator Comments/Events: Unlimited operator comments/events linked to each file entered manually or via Bar Code Scanner.
- Digital Signatures: full support for user based digital signatures for each data file (data encryption).
- Historical Data File: View & print the data directly from the display (auto scale on X & Y axis with each channel selectable for right or left axis values), from a PC after data is copied/moved via LAN (FTP or email) or USB Flash Memory card provided.

## NOTES: Monitor Inputs – Optional

### Monitor Inputs:

The FDC-IO modules are DIN rail mount 8-channel isolated thermocouple, RTD (6-channel) or 8-channel linear mA or Vdc input modules. Each monitor point is configurable for Alarm setpoints and segment advance "wait for" logic (SP logic & loop Delta function).

2 Monitor input cards may be specified. Orion system configuration allows up to 15 monitor points including input #2 of specific loop controls.

Information on the FDC-IO modules may be found at the following link: [http://www.futuredesigncontrols.com/FDC-IO\\_Modules.html](http://www.futuredesigncontrols.com/FDC-IO_Modules.html)

## NOTES: Power Supply – Standard (DIN Rail Mount)

### Power Supply:

DIN Rail mount 24VDC 60 watt power supply (2.5-amps) to power the FDC-2107i or 2110i GUI, control module CPU, optional IO and FDC-IO monitor input modules.

## NOTES: Configurable Control Logic

**Ramp/Soak Profiles (Global Profile configurable as Time or Ramp Rate based):** The FDC-Orion-M provides for a virtually unlimited number of profiles each with up to 99 steps and up to 32 configurable events per step. Step Advance, Hold, Stop, and other "Wait For" logic per step is standard. The "Wait For" step advance logic includes digital inputs, loop / monitor points achieving a "wait for SP" and Delta SP logic.

### Configurable Loop Control:

Each of the DIN control loops may be configured via the operator interface as single loop controls or as components in Cascade or %RH values. Each control loop is configurable to run Ramp/Soak profiles or as steady state controls (non-profile) per profile.

### Alarm Configuration:

#### System Alarms

System Alarms include loss of communication with loop & monitor points, configurable call back, audible and more; may be mapped to one of the standard or optional digital outputs

#### DIN Control Loop Alarms (a maximum of 30 alarms for loop & monitor)

The loop controls (up to 15) may have up to 30 alarms configured per loop. The alarms may be configured as soft/audible, latching or not, inhibit logic and to defeat any digital output. Alarms may be mapped to one or more of the standard or optional digital outputs (maximum of 32 digital outputs). Alarm types include:

- Process, Deviation, Percent Output and Rate of Change (ROC) low, high or both

#### Monitor Input (a maximum of 30 alarms for Loop & monitor)

Each channel may be configured with Process or Rate of Change (ROC), soft/audible, latching or not, inhibit and/or to defeat any digital output. Alarms may be mapped to one or more of the standard or optional digital outputs (max of 32 digital outputs)

### Digital IO Configuration

Digital Outputs (DO): CPU includes 8-digital output (6-relay & 2-TTL) with optional 8 & 16 output cards (24VDC or relay); max of 32 DO.

DO are configurable as:

- Loop, monitor point or digital input alarms
- Event outputs used in ramp soak profiles
- Event output for profile status: run, hold & step change
- Event outputs as a result of Digital Inputs
- Configurable cycle times to pulse an output or no cycle - on 100%
- Configurable time delay to automatically turn DO off
- Configure DO with counter & alarm message

Digital Inputs (DI): CPU includes 8-digital inputs with optional 8- digital input card for maximum of 16 digital inputs.

DI may be configured:

- Configurable time delay (timers)
- System Run
- Alarm Input
- Data Acquisition start and stop
- Profile functions; start, stop (all off), hold, advance previous/next step
- Defeat Logic; disable specific or groups of DO
- Disable Communication to loop controls SP or All components
  - SP communication disabled: SP values may be changed at loop controls while still monitor & data log all values.
  - All communication disabled: SP values may be changed at loop controls but no loop, monitor alarms or data log occurs.

## NOTES: Analog I/O – Optional (DIN Rail Mount to CM)

### Analog I/O (Input/Output):

Remote Setpoint: Cards accept two 4-20mA or 2-10Vdc inputs to be transmitted as SP values via the serial link to specific DIN controllers.

Retransmission: Cards have one 4-20mA or 0-10VDC signals configurable as PV, Setpoint or % Out values from specific DIN controls

Maximum number of cards is 7: 14 remote setpoint inputs and 7 retransmitted PV, Setpoint or %Output values.

**NOTES: System Configuration**

Orion-M has an embedded configuration program and normal runtime allowing full customization & configuration directly from the GUI. Simple Import/Export function allows complete configurations to quickly & easily imported to other Orion-M iSeries control systems.

**Configuration Program allows:**

- Number of Loop Controls, Monitor Points, Digital Inputs, Digital Outputs and Analog I/O.
- Assign Tag Names to Loop, Monitor, Alarms, System Events, Digital Input & Outputs
- Profile Setup: Time or Ramp Rate based Ramp configuration.
- Main View: Select Start up/Main View (home page)
- Menu System: Enable/disable specific Menu items & functions not required or desired for the application
- System Event Configuration to allow multiple DO from one Event

**Runtime Configuration allows:**

Profile Power Recovery logic, Setpoint Limits, Alarm Settings, LAN settings (VNC, Modbus, web server, email, FTP, alarm email / text), Barcode Reader, degrees C/F, DO counter, Date/Time, Help/Voice language selection, I/O mapping & logic, Monitor Point offset, Analog I/O configuration, export/import configuration & more.

**NOTES: Loop Controls (Serial connection to CM)**
**Control Module (CM) Software for Loop Controls:**

The software allows connection up to 15 loop controls and one FDC-IO monitor input module (8-T/C, 6-RTD or 8-mA or VDC inputs). (specific dual input loop controls may allow up to 30 PV inputs)

The software and appropriate loop control model is identified by the character description on the part number matrix. Note that the appropriate software must be specified for the Control Module memory.

The FD30 & FD10 CM software allows connection to Future Design Controls 300 & 100 Series DIN controllers. Both Series are available in 1/32, 1/16, 1/8 and 1/4 DIN sizes with DIN rail mounting available for both the 1/32 and 1/16 DIN sizes. Information on these Series controllers may be found at the following links:  
<http://www.futuredesigncontrols.com/300.HTM>  
<http://www.futuredesigncontrols.com/100.HTM>

CM software supporting Honeywell, Watlow, Danaher , Eurotherm, Yokagawa and other controller products are, or will be available. Refer to the specific FDC brochure available for each control brand as there may be limitations depending upon control brand.

**OPTIONS: Manual, Screen Covers and USB/Ethernet Cables**
**Printed Operators Manual**

<u>Part Number</u> ( <a href="#">FDC-Orion-M_iSeries_Operators_Manual.pdf</a> )	<u>Price</u>
FDC-Orion-M Operators Manual	\$30.00

**Printed Configuration Manual**

<u>Part Number</u> ( <a href="#">FDC-Orion-M_iSeries_Config_Manual.pdf</a> )	<u>Price</u>
FDC-Orion-M Configuration Manual	\$30.00

**Color Touch Screen Protective Screen Covers (FDC-210\_Series\_Protective\_Sheet.pdf)**

	<u>Price</u>
PS2107 FDC-2107 7" Display / 5 per pack	\$30.00
PS2110 FDC-2110 10" Display / 5 per pack	\$30.00

**USB Cables & Accessories**

	<u>Price</u>
IStick-Panel USB Panel Mount Adapter	\$40.00
IStick-4X-CVR USB Panel Mount Adapter-Nema4x	\$75.00

**Ethernet Cables**

<u>Part Number</u>	<u>Price</u>	<u>Part Number</u>	<u>Price</u>
CA-CAT5E-Patch-7ft	\$10.00	CA-CAT5E-Crossover-7ft	\$10.00
CA-CAT5E-Patch-25ft	\$15.00	CA-CAT5E-Crossover-25ft	\$15.00
CA-CAT5E-Patch-50ft	\$25.00	CA-CAT5E-Patch-100ft	\$45.00

**NOTES: Serial Communications (Serial connection to CM)**
**RS485 Modbus RTU (slave) and RS232 (barcode input) modules**
**RS485 Modbus RTU input module:**

The RS485 module allows 3rd party software / hardware R/W access to specific registers within the Control Module. Contact Future Design Controls technical support for the register/address listing for specific software versions.

**RS232 Serial input for barcode readers:**

The RS232 serial input option allows the Orion to receive up to 16 characters from a standard compatible serial Barcode reader. Data from the bar code reader will insert operator events into the historical data file; there is no limit to the number of events that may be entered manually or with a bar code scanner.

Note: If Serial Communication is used the RS485 module must be included; i.e. if bar code reader is used both the RS485 and the RS232 (used for bar code reader) modules must be specified.

**NOTES: Control Module (CM) components, I/O & other options**
**USB Memory Stick:**

A high capacity USB Memory Card is provided to facilitate file transfer to and from the FDC-2107/2110 display. The USB memory card power requirement is 3VDC matching the display's USB port 3VDC power supply (note: many USB memory sticks require 5VDC and will not work with the FDC-2107/2110 display)

**CM: CM components includes the following hardware:**

- FC5A-D16RS1: CPU (IO includes 8-digital output & 8 input (DO 6-relay & 2-TTL 24VDC) & (DI 8 24VDC)
- CA2011-8A: Cable (8ft) to connect CPU to GUI
- FC4A-PM64: CPU memory card (CM application software pre-installed)
- FC4A-PT1: CPU Real Time Clock (RTC)
- FC4A-HPC3: Modbus port to connect control module to loop and monitor input devices
- PS5R-SD24: 24VDC power supply for Display & CPU
- USB Memory: high capacity USB memory stick (3VDC)
- GE1A-C10MA110/SR2P-06: Reset Timer with mounting Socket

**Optional Digital I/O (plugs into CPU) (\*note 1)**

- FC4A-T16S3: 16-digital output card (24Vdc source)
- FC4A-R161: 16-digital output card (relay 240Vac 2A)
- FC4A-T08S1: 8-digital output card (24Vdc source)
- FC4A-R081: 8-digital output card (relay 240Vac 2A)
- FC4A-N08B1: 8-digital Input card (24Vdc)
- FDC4-N08A11: 8-digital input card (120Vac )

**Maximum Digital IO Summary for CPU & optional IO modules**

- Digital Output: 32 Digital Outputs  
 CPU 8-digital out (6-relay and 2-transistor)  
 Optional 24-digital out (relay or 24Vdc)
- Digital Inputs: 16 Digital Inputs  
 CPU 8-digital in (24Vdc)  
 Optional 8-digital in (120Vac or 24Vdc)

**Optional Analog I/O (Remote SP & Retransmission) (\*note 1)**

- FC4A-L03A1 Two mA or Vdc inputs & one mA or Vdc out

**Optional Serial Communication Modules (\*note 1)**

- FC5A-SIF2: RS232 port for Barcode Reader
- FC5A-SIF3: RS485 Modbus RTU (slave)

**Optional Monitor Point 8-channel (6-channel RTD) input module**

System supports one Monitor Input Module (serial connection to CM):

- IO-8TCS: 8-thermocouple input module (isolated)
- IO-6RTD: 6-RTD input module
- IO-8AIIS: 8- input module 0-20 / 4-20mA (isolated)
- IO-8AIVS: 8-analog input 0-10 / 2-10VDC (isolated)

**\*Note 1:** CM will support up to 7 expansion modules.  
 (The Monitor Point input modules are not a CM expansion module)

## **FUTURE DESIGN SOFTWARE LICENSE FOR FDC Orion-M Control System**

Future Design Controls Windows CE based Orion display and Control Module (Idec PLC) software (listed as "SOFTWARE" in this document) is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The SOFTWARE is licensed at no charge to the end user when all components, including but not limited to the Control Module (Idec PLC components) and CE Color Touch Screen display are purchased from Future Design Controls. All ownership and rights remain with Future Design Controls.

### **I. LICENSE GRANT.** This LICENSE grants you the following rights:

A. You may use Future Design's SOFTWARE with Future Design Controls products or products marketed by Future Design Controls only. Products are considered Future Design Controls products (and products marketed by Future Design Controls) when the sale or shipment originates from our main headquarters in Bridgeview, IL or one of our authorized office locations. Products purchased from Future Design Controls distributors or OEM's with brand labels other than Future Design controls are not considered Future Design Controls products and cannot be used with Future Designs SOFTWARE. Using Future Design's SOFTWARE with any other manufacturer (or distributor) of hardware is a violation of this license and applicable copyright laws. The SOFTWARE is considered in "use" when it is installed into permanent or temporary memory (e.g. CE display unit/PLC, or other storage device)

B. Solely with respect to electronic documents included with the SOFTWARE, you may make a copy (either in hardcopy or electronic form), provided that the software is not resold without the knowledge and acceptance of terms by Future Design Controls.

### **II. TITLE; COPYRIGHT.**

All title and copyrights in and to the SOFTWARE (including but not limited to any images, photographs, animation, video, audio, music, text and "applets" incorporated into the SOFTWARE), the accompanying printed materials, and any copies of the SOFTWARE are owned by Future Design Controls or its suppliers. The SOFTWARE is protected by copyright laws and international treaty provisions. Therefore, you must treat the SOFTWARE like any other copyrighted material, except that you may either (A) make one copy of the SOFTWARE solely for backup or archival purposes or (B) install the SOFTWARE on each system purchase from Future Design Controls (CE display/PLC) provided you keep the original solely for backup or archival purposes. You may not copy the printed materials accompanying the SOFTWARE.

### **III. ADDITIONAL RIGHTS AND LIMITATIONS.**

A. Reverse Engineering, De-compilation, and Disassembly: You may not reverse engineer, decompile, disassemble or modify the SOFTWARE (CE display software and/or Control Module (PLC) code).

B. No Separation of Components. The SOFTWARE is licensed as a single product and the software programs comprising the SOFTWARE may not be separated for use on any hardware not supplied by Future Design Controls.

C. Rental. You may not rent or lease the SOFTWARE.

D. Software Transfer. You may NOT transfer any of your rights under this LICENSE.

E. Termination. Without prejudice to any other rights, Future Design Controls may terminate this LICENSE if you fail to comply with the terms and conditions of this LICENSE. In such event, you must destroy all copies of the SOFTWARE and agree not to modify/distribute the software or download to any hardware not purchased from Future Design Controls.

F. The selection, application or use of Future Design products or software is the purchaser or user's responsibility. No claims will be allowed for any damages or losses, whether direct, indirect, incidental, special or consequential. In addition, Future Design reserves the right to make changes without notification to purchaser or user to materials or processing that do not affect compliance with any applicable specification. Future Design Controls makes no warranties when using Future Design Controls SOFTWARE system.

### Software Usage Note:

The selection, application or use of Future Design Control products or software is the purchaser or user's responsibility. No claims will be allowed for any damages or losses, whether direct, indirect, incidental, special or consequential.

In addition, Future Design reserves the right to make changes without notification to purchaser or user to materials or processing that do not affect compliance with any applicable specification. Future Design makes no warranties when using the Orion-M system.

### Warranty:

Future Design Controls products described in this book are warranted to be free from functional defects in material and workmanship at the time the products shipped from Future Design Controls facilities and to conform at that time to the specifications set forth in the relevant Future Design Controls manual, sheet or sheets for a period of one year after delivery to the first purchaser.

Future Design Controls FDC-2107i and 2110i products are warranted to be free from functional defects in materials and workmanship at the time the products shipped from Future Design Controls facilities and to conform at that time to the specifications set forth in the relevant Future Design Controls manual, sheet or sheets for a period of one year after delivery to the first purchaser for use.

There are no expressed or implied Warranties extending beyond the Warranties herein and above set forth. Limitations: Future Design Controls provides no warranty or representations of any sort regarding the fitness of use or application of its products by the purchaser. Users are responsible for the selection, suitability of the products for their application or use of Future Design Controls products.

Future Design Controls shall not be liable for any damages or losses, whether direct, indirect, incidental, special, consequential or any other damages, costs or expenses excepting only the cost or expense of repair or replacement of Future Design Control products as described below.

Future Design Controls sole responsibility under the warranty, at Future Design Controls option, is limited to replacement or repair, free of charge, or refund of purchase price within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse.

Future Design Controls reserves the right to make changes without notification to purchaser to materials or processing that do not affect compliance with any applicable specifications.

### Return Material Authorization:

Contact Future Design Controls for Return Material Authorization Number prior to returning any product to our facility:



7524 West 98th Place – Bridgeview, IL 60455 – Phone 888.751.5444 – Fax 888.307.8014

<http://www.futuredesigncontrols.com>