



Human Machine Interface  
Application Specification  
Global Common

SD-1020

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## 1. Scope and Purpose

### 1.1 Scope

- 1.1.1 This specification describes Human Machine Interface (HMI) programming functional requirements and format for Nexteer Automotive facilities. This specification shall be used by the Original Equipment Manufacturers (OEM) in their design of HMI systems.
- 1.1.2 This specification applies to the purchase of new equipment and control system rebuilds. It should not be implied that any existing equipment is required to be retrofitted to comply with this specification.
- 1.1.3 This specification references HMI screen library files. These Nexteer HMI screen library files reflect the requirements of this specification; they provide additional HMI screens for specific applications; and they provide examples for applying the Nexteer screens and specifications to all types of machines. The HMI screen library files are available at [www.nexteerdatabase.com](http://www.nexteerdatabase.com).
- 1.1.4 Additional applications specific guidelines that include HMI related topics (such as associated PLC logic library files, RFID, or traceability) are also available at [www.nexteerdatabase.com](http://www.nexteerdatabase.com). These HMI screens were created to work in conjunction with the PLC logic library files located on the website.
- 1.1.5 The use of the word "shall" indicates requirements and the use of the word "should" indicates recommendations. The use of the word "may" indicates permission or allowance and the use of the word "can" indicates a possibility.
- 1.1.6 This document is not intended for off-the-shelf equipment (SD-010) or for HMI's associated with CNC equipment, as those HMI's are typically equipment specific.
- 1.1.7 The general principles embodied in this specification are applicable to the different brands of HMI's currently available in the market.

### 1.2 Purpose

- 1.2.1 The purpose of this specification is to provide Nexteer requirements and guidance to Original Equipment Manufacturers (OEM) for use in their design of HMI programs.
- 1.2.2 The objective of this specification is to provide common, maintainable, and cost-effective HMI programs that enhance both the productivity and ease-of-use of the systems, plus ensure the quality of Nexteer products produced. The application of this specification will result in common HMI software that:
  - 1. provides ease of customer use. Ease of customer use relates to screens that provide plant personnel a quick understanding as to how the machine processes the part, screens that can be quickly used to troubleshoot failures, and screens that can be easily used to interface with standard Nexteer logic routines. The Nexteer libraries provide common structure and naming conventions for the purpose of improved plant production, independent of which OEM supplied the equipment.
  - 2. facilitates the OEM design and Nexteer HMI approval process. Nexteer's specifications require HMI software approval prior to MQ1. Nexteer's approval process, adherence to this specification, and use of the screen libraries, provides an opportunity for the OEM to demonstrate compliance to the requirements.
- 1.2.3 The screens listed on this document shall be modified when the application requires it.
- 1.2.4 These standard screens were developed for HMI's with only "touch screen" capabilities. Consequently, all functions are assigned to touch screen buttons.

## 2. General

### 2.1 General Requirements

- 2.1.1 The following operator interface functions shall be done by means of hardwired control devices:
- Control Power ON (Master Start) Illuminated (Green) Pushbutton
  - Control Power OFF (Master Stop) Pushbutton
  - E-Stop Pushbutton(s)
  - Fault Reset Pushbutton
- 2.1.2 The HMI model and programming software version(s) specified in SD-007, Approved Components List, shall be used. See Annex A for Pro-Face HMI specific requirements.
- 2.1.3 The HMI program file names shall include the asset tag number (SD number) of the machine. *Note: The preferred naming convention also includes the date of the latest revision, for example: SD123456\_20250715a.APA.*
- 2.1.4 HMI programs and the conversion to development projects for those programs shall not be password protected. *Note: FactoryTalk View ME Studio runtime (.MER) files shall be created with "Conversion to Development Application" set to "Always Allow Conversion".*
- 2.1.5 Access to the HMI configuration shall be provided and located on the Machine Support screen. This pushbutton shall not be protected by a password.
- 2.1.6 User login/logout (password protection) shall be provided on the HMI application working in conjunction with the Login routine from the logic library files. The HMI software built in user account/security management shall not be used. User login details, such as: specific password(s), login timeout settings, and access levels shall be determined based on the application and the Nexteer Engineer in charge. *Note: The default password at the time of machine delivery should be the machine's SD number, for example: SD123456.*
- 2.1.7 The HMI display date and time shall be synchronized with the PLC controller clock. Global Connections shall be set up to connect with standard date and time PLC tags located in the Date and Time routine in the logic library files.
- 2.1.8 The HMI application and hardware shall be provided with 10% spare screens and alarms for future expansion.
- 2.1.9 The HMI application shall be provided with dual language when the machine's destination is outside of the US. English and the native language of the machine's destination shall be selectable using a language switch button located on the Directory Screen. *Note: Language translation is not required for embedded variable objects displaying part traceability, lot tracking, tool life, and similar information stored in the PLC returned from Nexteer's Traceability Application.*
- 2.1.10 The Maximum Update Rate (refresh time) for Global Connections shall remain at the default setting of 1 second.
- 2.1.11 The HMI inactivity (screensaver) functions shall be disabled.
- 2.1.12 The HMI screen cursor shall be disabled.
- 2.1.13 HMI tags shall not be used for object connections, PLC tag names shall be used.
- 2.1.14 The as-shipped HMI program back up files shall be provided to the Engineer in charge at time of machine shipment. *Note: Archive (.APA) and Runtime (.MER) files are both required for FactoryTalk View ME Studio programs and Project (.PRX) files are required for GP-Pro EX programs.*
- 2.1.15 The administrative (desktop access) password set during initial setup of the HMI unit shall be set to "Nexteer1!". The challenge (security) question and answer shall both be set to "Nexteer1!" as well.

### 2.2 Screen Requirements

- 2.2.1 The HMI shall be programmed so upon power-up the initial screen is the Directory Screen.
- 2.2.2 The Directory screen shall be accessible from every additional screen, except the Clean screen.

- 2.2.3 Pop-up (On Top) display types shall not be used. This does not apply to built-in pop-ups like keyboards for settable values or password entry. *Note: Pop-up display types may lead to several displays being open at once, leading to high usage of HMI resources and communication bandwidth.*
- 2.2.4 The Maximum Tag Update Rate (refresh time) for each display shall remain at the default setting of 1 second, unless the application requires a faster screen refresh time for that display. When changing this setting, caution shall be used so as not to negatively impact HMI/MSG (Class 3) PLC communication utilization. *Note: This does not affect the screen response time to an operator touching the screen.*
- 2.2.5 All screens shall have their functional description in a screen name box at the top, left-hand corner of the display.
- 2.2.6 When multiple screens are used for the same display function the screen name box shall also include "SCREEN X OF Y". Screen access (Goto Display) pushbuttons, "PREVIOUS SCREEN" and "NEXT SCREEN" shall be added to the left of the directory screen access pushbutton to navigate between screens.
- 2.2.7 Fault and machine message banners shall appear on the bottom of every screen, unless specifically detailed otherwise below.
- 2.2.8 Fault and machine message text shall be static messages contained within the HMI program following the Nexteer standard fault and machine message display approach demonstrated in the HMI library files. Fault and machine message HMI display text shall not be stored within the PLC as a text string. *Note: Storing fault and message text in the PLC to display on the HMI as an embedded string variable significantly impacts the controller HMI/MSG (Class 3) communication utilization.*
- 2.2.9 Changes in machine state shall not be indicated by changes in color alone. Machine states (conditions) shall be indicated by both color and unique text.
- 2.2.10 The colors used for pushbuttons, pilot lights, and screens shall conform to the current version of SD-004 specification and IEC 60204-1. Requirements detailed in SD-004 take precedence. In the absence of clear direction, pushbuttons should be gray in color. Any exceptions to this rule will be illustrated throughout this document.
- 2.2.11 Pushbuttons shall be momentary. Maintained or latched pushbuttons shall not be used, unless required based on the application. Nexteer CSE prior approval is required for the use of maintained pushbuttons.
- 2.2.12 All descriptions used on the operator interface shall agree with the descriptions used in the PLC. For example, if the HMI has a pushbutton labeled "RAISE DRILL SLIDE", the PLC input bit description shall be "Raise Drill Slide HMI-PB". The use of abbreviations should be avoided.
- 2.2.13 Text font type shall be Arial with a minimum font size of 8pt. Equipment destined for China shall use a minimum font size of 9pt for alphabetical text.

### 3. Screen Functions

#### 3.1 Common (Global) Functions

3.1.1 The following display boxes, pushbuttons, and lights shall be present on all screens, except the Clean screen and Andon screen. They shall have the same colors and appear in the same location on every screen. Any exceptions to this will be explained in the individual screen descriptions section.

- Directory Screen Pushbutton
- Current Model Text Object
- Automatic Mode Pushbutton
- Manual Mode Pushbutton
- PSDI Mode Pushbutton (when applicable)
- Return All Motions Pushbutton
- Fault History Screen Pushbutton
- Fault Display Banner
- Machine Message Display Banner
- User Login Pushbutton

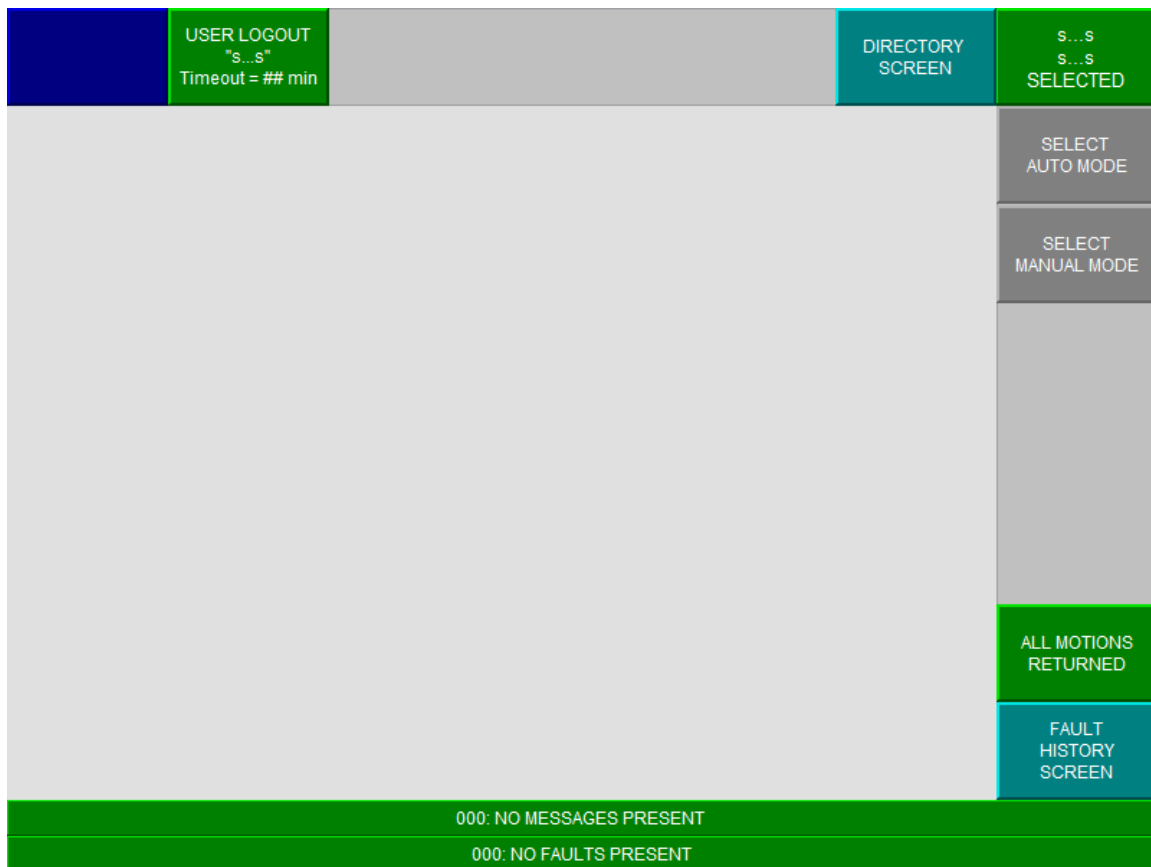


Figure 1: Common (Global) Objects

3.1.2 All objects provided in the HMI screen library files are configured with appropriately defined tag connections for use with the standard Nexteer logic library file logic.

3.1.3 Additional pushbutton objects are provided in the Global Objects "Common" screen for use as required based on the application.



- 3.1.4 A screen name box is provided in the upper left corner of the screen that shall contain the functional description of each HMI screen. The background color shall be Blue, and text shall be White.
- 3.1.5 An indicator in the upper right-hand corner of the screen shall be provided to indicate the current model selected. This shall display "No Model Selected" when a model is not selected, for example: machine power up.
- 3.1.6 A pushbutton that provides access to the Directory Screen shall be provided. The pushbutton shall be located to the left of the current model display object.
- 3.1.7 Pushbuttons shall be provided for selecting automatic or manual mode of the machine. If a Presence Sensing Device Initiation (PSDI) cycle is required, a third pushbutton for PSDI cycle shall be provided. *Note: The standard PSDI pushbutton is provided in the HMI screen library files Global Objects Common screen for use.*
  - 1. An Automatic Mode button shall be provided to request a change to automatic mode. When automatic mode is selected in the PLC, the pushbutton shall change color and indicate "AUTO MODE SELECTED". *Note: When automatic mode is selected the PLC may command the HMI to display the Automatic Cycle Screen.*
  - 2. A Manual Mode button shall be provided to request a change to manual mode. When manual mode is selected in the PLC, the pushbutton shall change color and indicate "MANUAL MODE SELECTED". *Note: When manual mode is selected the PLC may command the HMI to display the first Manual Screen.*
  - 3. If PSDI Cycle is required, a button shall be provided to request a change to PSDI cycle. When PSDI cycle is enabled in the PLC, the pushbutton shall change color and indicate "PSDI CYCLE SELECTED". *Note: The PSDI cycle button should only be provided for equipment requiring the use of PSDI cycle.*
  - 4. A PSDI "ARMED" status indicator may be added to the HMI screen as needed. *Note: This indicator is also required to be accompanied by a hardwired light per SD-011 specification.*
- 3.1.8 A Return All Motions pushbutton shall be included to return the machine to its home or start position.
  - 1. When in Automatic mode and the machine is not in cycle, the Return All pushbutton is allowed to be momentarily pressed to initiate an automatic return all sequence based on Clear to Move conditions for each motion.
  - 2. When in Manual mode the Return All pushbutton is required to be pressed continuously to enable the return all function. *Note: The return all functions are still a sequence of movements based on the Clear to Move conditions for each motion.*
- 3.1.9 A pushbutton that provides access to the Fault History Screen shall be provided. The pushbutton shall be located on the lower right-hand corner of the screen.
- 3.1.10 A single-line fault indicator (banner) across the entire length of the bottom of the screen shall be provided.
  - 1. When no faults are present, the banner shall have white text with a green background and the text "NO FAULTS PRESENT" indicated. *Note: This is a static text display layered on top of the fault banner with conditional visibility.*
  - 2. When a fault is present, the banner shall have white text with a red background and the specific fault indicated. *For example: "001: Emergency Stop Detected", "002: Air Pressure Low", "003: Light Curtain Blocked During Cycle".*
  - 3. The fault text shall match the fault description in the PLC program and include the fault number for debug purposes.
  - 4. The fault text shall be static text contained within the HMI programs Alarm Setup following the Nexteer standard fault display approach demonstrated in the HMI screen library files. Fault display text shall not use embedded variables stored within the PLC as a text string.
  - 5. The logic requirements for fault control and display are covered in SD-1032. *Note: Fault Reset is a hardwired pushbutton.*
- 3.1.11 A single-line machine message indicator (banner) shall be across the entire length of the screen just above the fault indicator.
  - 1. When no messages are present, the banner shall have white text with a green background and the text "NO MESSAGES PRESENT" indicated.

2. When a message is present, the banner shall have black text with a yellow background and the specific message indicated. *Typical message examples: "001: Control Power Is Off", "002: PLC Battery Low", "003: Bowl Feeder Low", "004: Part Conveyor Full", "005: Lube Level Low".*
  3. The message text shall match the message description in the PLC program and include the message number for debug purposes.
  4. The message text shall be static text contained within the HMI program following the Nexteer standard message display approach demonstrated in the HMI screen library files. Message display text shall not use embedded variables stored within the PLC as a text string.
  5. When control power is turned OFF, a "CONTROL POWER IS OFF" message shall be indicated.
  6. The logic requirements for message control and display are covered in SD-1032.
- 3.1.12 A user login pushbutton shall be provided enabling users to login with a password prior to allowing modification of restricted values. These values may include, for example, model setup parameters or process control limits. *Note: The login usernames and passwords shall be hard coded on the PLC program and the initial password should be the machine's SD number.*
1. The user Login pushbutton shall appear next to the screen name box on as many screens as possible. The currently logged in user shall be displayed as text on this button. The user login shall be set up to automatically log out after a time set by the Nexteer Engineer in charge. *Note: The default time is set to 10 minutes.*

## 4. Required Screens

The following is a list of required screens. Application specific screens may need to be developed for process related control. Each required screen and its objects will be described in detail below.

- Directory
- Manual Control
- Automatic Cycle
- Counters
- Machine Support
- PLC I/O Monitor
- Fault History
- Clean Touch Screen
- Model Selection and Setup
- Shift Times

### 4.1 Directory Screen

This section details requirements for the Directory Screen.

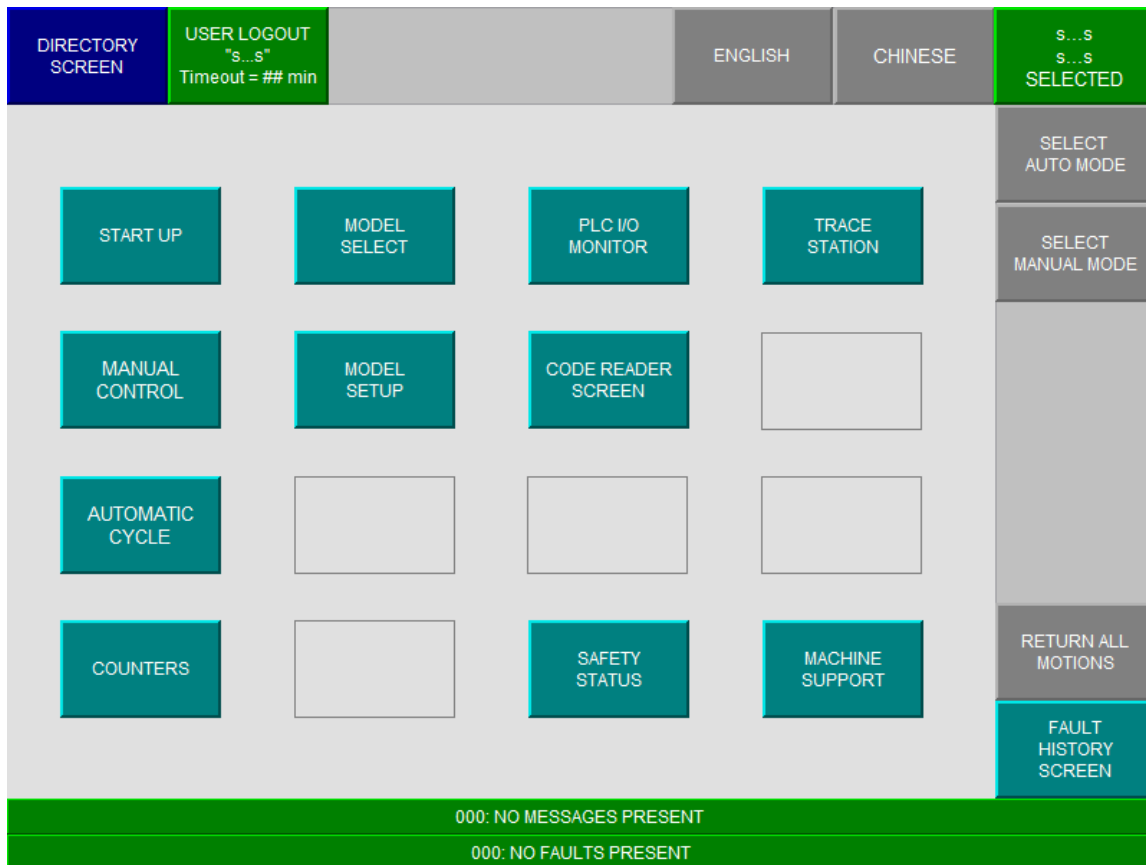


Figure 2: Directory Screen

- 4.1.1 The Directory Screen shall be programmed as the initial screen displayed upon HMI power up.
- 4.1.2 The screen name box shall contain the text "DIRECTORY SCREEN".
- 4.1.3 Screen change pushbuttons, with appropriate and descriptive labels, shall be provided to access all screens or at a minimum the first screen of a multiple screen set for similar functions.

- 4.1.4 The Language change buttons shall be shown directly to the left of the model selected indicator. The language change buttons shall only be provided when dual language is required based on machine destination.

## 4.2 Manual Control Screen

This section details requirements for the Manual Screen(s).

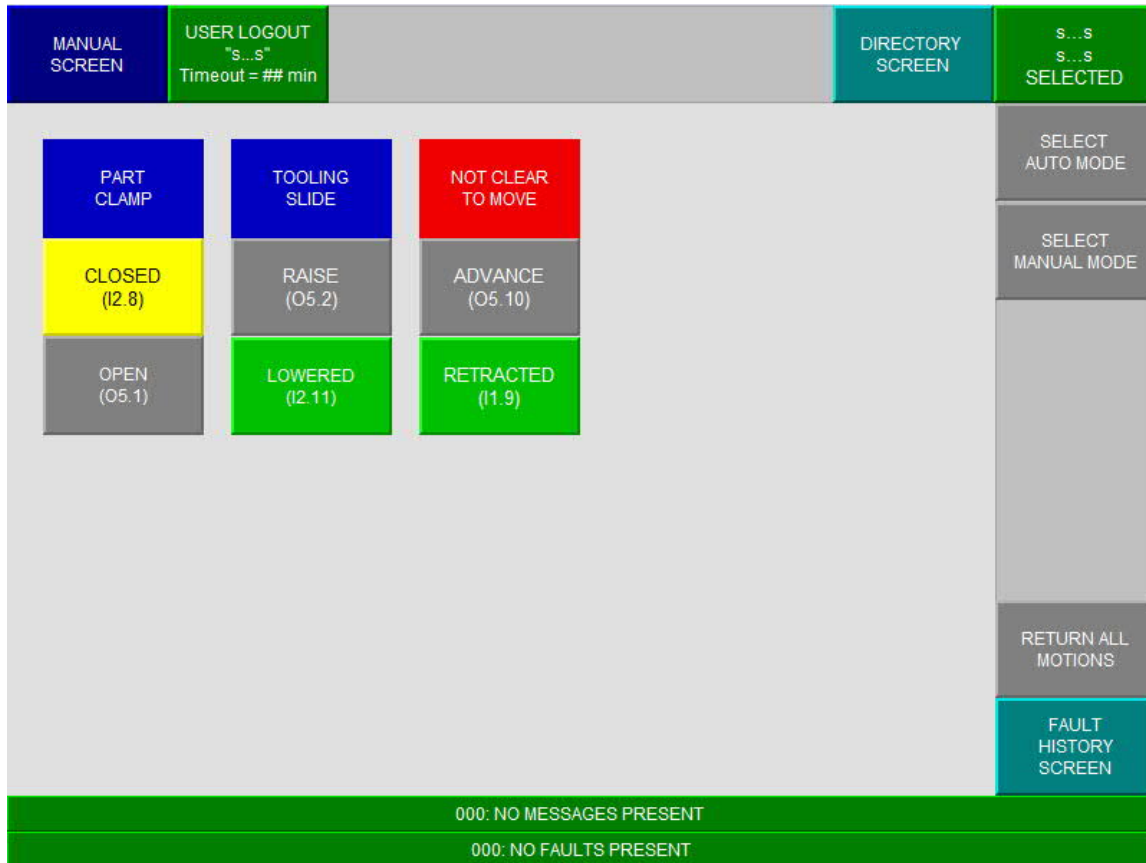


Figure 3: Manual Screen

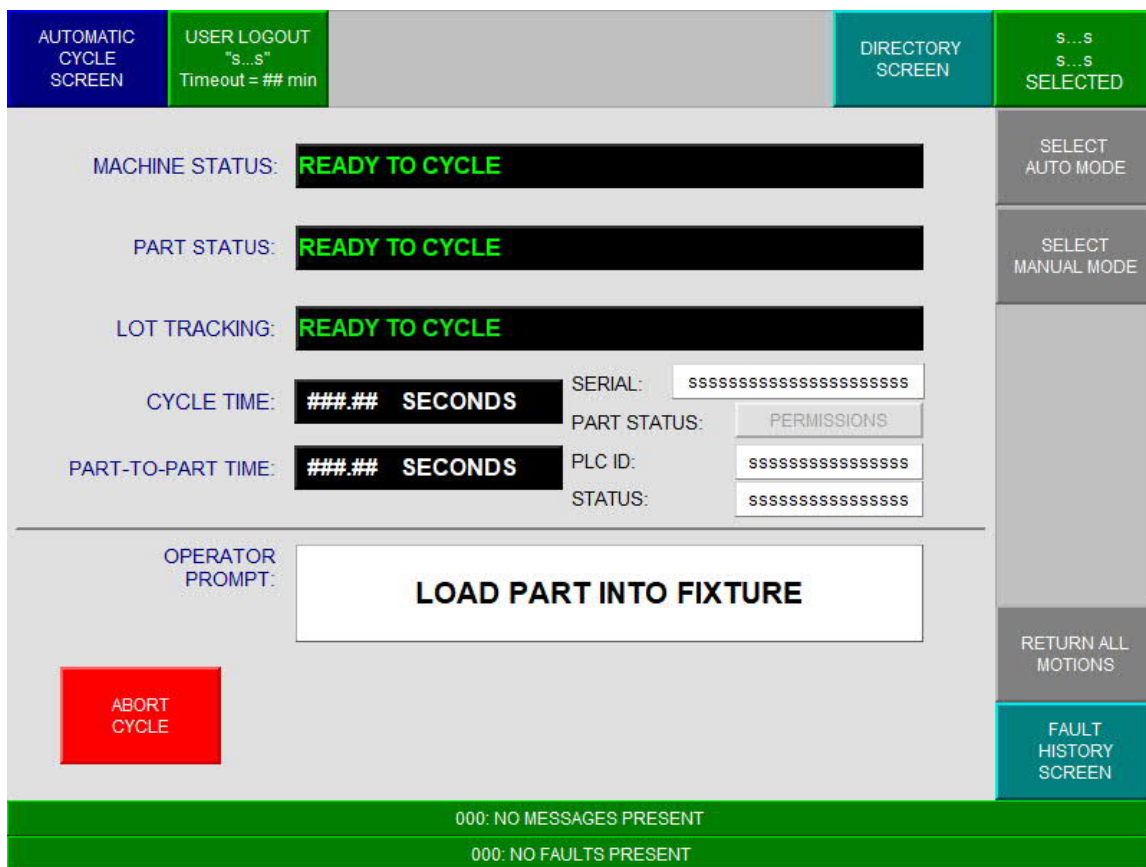
- 4.2.1 The screen name box shall contain the text "MANUAL CONTROL SCREEN 1 of x".
- 4.2.2 The typical manual function consists of three (3) objects grouped vertically. The behavior of each object shall be as follows:
1. The top object shall be a multistate indicator and have two states.
    - a. State "0" shall use white text on a blue background to indicate the description of the motion matching the description on the electrical drawings.
    - b. State "1" shall use white text on a red background to indicate the motion is not clear to move only when the motion is requested.
  2. The middle object shall be a momentary pushbutton used to command the motion to its advanced (work) position and have two states based on the motion's sensor. Both states shall include the motion's I/O address in the description.
    - a. State "0" (sensor OFF) shall use white text on a gray background to indicate the motion it commands and that the motion sensor is OFF.
    - b. State "1" (sensor ON) shall use black text on a yellow background to indicate the motion commanded has completed and the motion sensor is ON.

3. The bottom object shall be a momentary pushbutton used to command the motion to return to its initial (home) position and have two states based on the motion's sensor. Both states shall include the motion's I/O address in the description.
  - a. State "0" (sensor OFF) shall use white text on a gray background to indicate the motion it commands and that the motion sensor is OFF.
  - b. State "1" (sensor ON) shall use white text on a green background to indicate the motion commanded has completed and the motion sensor is ON.

4.2.3 The manual control functions should be organized left to right based on the sequence of a normal automatic cycle of the machine.

### 4.3 Automatic Cycle Screen

This section details requirements for the Automatic Cycle Screen.



The screenshot displays the 'AUTOMATIC CYCLE SCREEN' interface. At the top, there are navigation buttons: 'AUTOMATIC CYCLE SCREEN' (blue), 'USER LOGOUT "s...s" Timeout = ## min' (green), 'DIRECTORY SCREEN' (teal), and 'S...S S...S SELECTED' (green). The main area shows 'MACHINE STATUS: READY TO CYCLE', 'PART STATUS: READY TO CYCLE', and 'LOT TRACKING: READY TO CYCLE'. Below these are 'CYCLE TIME: ###.## SECONDS' and 'PART-TO-PART TIME: ###.## SECONDS'. To the right, there are input fields for 'SERIAL', 'PART STATUS', 'PLC ID', and 'STATUS', each with a 'PERMISSIONS' button. A large white box in the center contains the text 'LOAD PART INTO FIXTURE'. A red 'ABORT CYCLE' button is on the left. On the right side, there are buttons for 'SELECT AUTO MODE', 'SELECT MANUAL MODE', 'RETURN ALL MOTIONS', and 'FAULT HISTORY SCREEN'. The bottom status bar shows '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

Figure 4: Automatic Screen

4.3.1 The screen name box shall contain the text "AUTOMATIC CYCLE SCREEN".

4.3.2 As a minimum, this screen shall indicate the following:

1. Machine Status - A machine status indicator that should include the following states. "FAULTED" in red text. "NOT AT HOME POSITION", "AUTOMATIC MODE NOT SELECTED", "PART NOT LOADED", and "IN CYCLE" in yellow text. "READY TO CYCLE" and "CYCLE COMPLETE" in green text.
2. Part Status - A part status indicator that should include the following states. "REJECT" in red text. "NOT PRESENT" and "BEING PROCESSED" in yellow text. "PRESENT" and "ACCEPT" or "GOOD" in green text.

3. Cycle Time - An overall machine cycle time numeric display labeled, "CYCLE TIME". The last value of machine cycle time shall be displayed until the next cycle begins. The value should be to a two decimal point accuracy.
4. Part-To-Part Time - A machine takt time numeric display labeled, "PART-TO-PART TIME". The last part-to-part time shall be displayed until the next cycle begins. The value should be to a two decimal point accuracy.
- 4.3.3 Depending on the application, additional indicators or pushbuttons may be included. The standard automatic screen library file provides additional indicators and pushbuttons for use. The following are some examples.
  1. Lot Tracking - A lot tracking status indicator provides the operator with an indication on the status of material quantities being used to build the part. For example, "UPPER SHAFT LOW" in yellow text, "MAGNETS EMPTY" in red text. "ENABLED AND READY" in green text.
  2. Traceability - The traceability status indicators: Result ID, Part Status, and Operation status indicator are added for applications that require traceability or part tracking.
  3. Operator Prompt - An operator prompt indicator giving instructions as to what needs to be done next. For example, "LOAD PART INTO FIXTURE", "HIT CYCLE START SWITCH", "REMOVE PART FROM FIXTURE". The current prompt message shall be displayed until the process step is completed. Responses to incorrect process steps by operators shall not be displayed in this window, Faults and machine message indicators shall be used for such communication. The prompt indicator messages shall be black text on white background.
  4. Cycle Abort - A cycle abort pushbutton may be included to stop the machine cycle immediately. When used, the machine shall be returned to home position prior to initiating the next cycle.
- 4.3.4 Depending on the application, additional pushbuttons may be included. The HMI screen library file provides additional standard pushbuttons on the Global Objects "Common" screen for use. The following are some examples.
  1. Cycle Start - A cycle start pushbutton may be included on automatic cycling machines that do not have a hardwired start button.
  2. Cycle Stop - A cycle stop pushbutton shall be included on continuous cycle machines to stop the machine at its normal start or home position at the end of its current cycle.
  3. Reset Operator Sequence - A reset operator sequence pushbutton is used to abort the operator process immediately and allows re-start of the sequence of operations. *Note: This typically only applies to manually intensive assembly benches.*
  4. Operator Reject - An operator reject pushbutton is used to stop the processing of the part and allows the operator to assign a reject status to the part. *Note: This typically applies to manually assembly stations on an assembly line.*
  5. Cycle Arm - A cycle arm pushbutton shall be included on fully automated (no operator present) stations on an assembly line to arm the station for cycle initiation once a pallet or part arrives.
  6. Cycle Dis-Arm - A cycle dis-arm pushbutton shall be included wherever a cycle arm is provided to disarm a station to prevent cycle initiation once a pallet or part arrives.

#### 4.4 Counters Screen

This section details requirements for the Counters Screen.

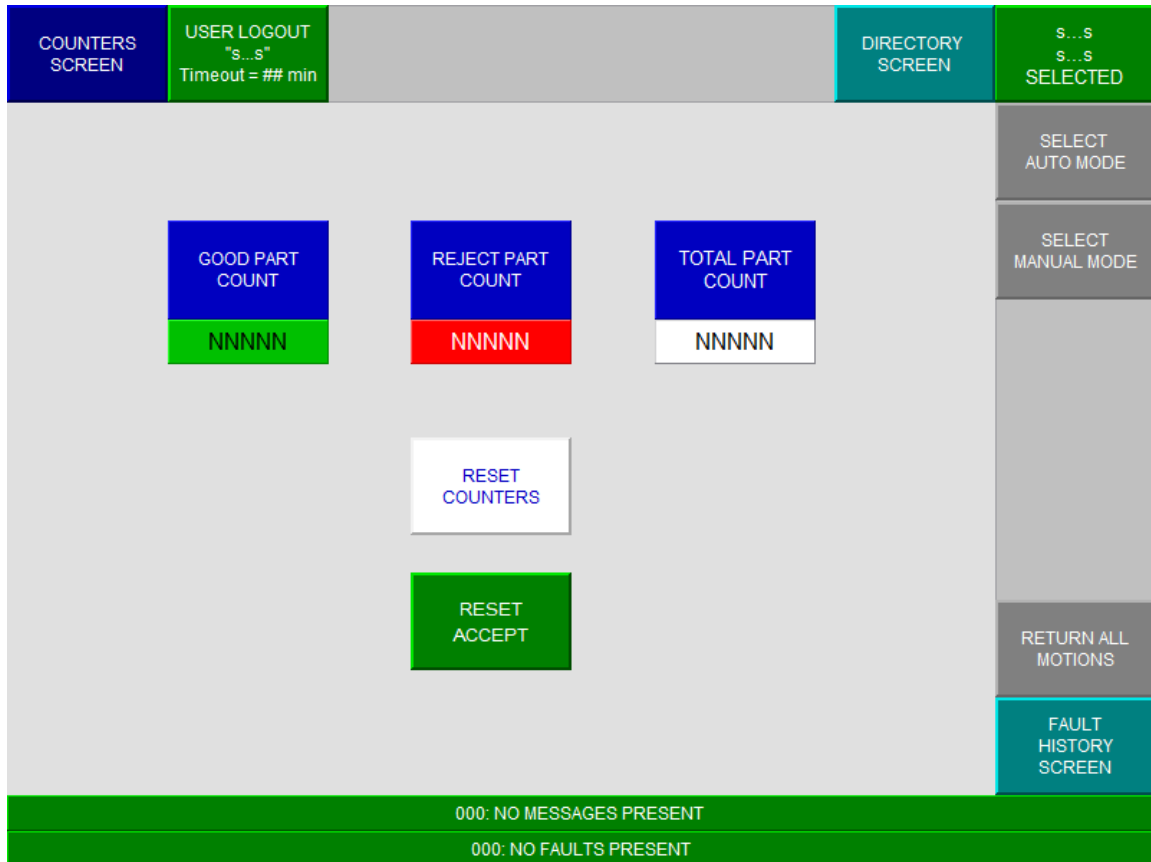
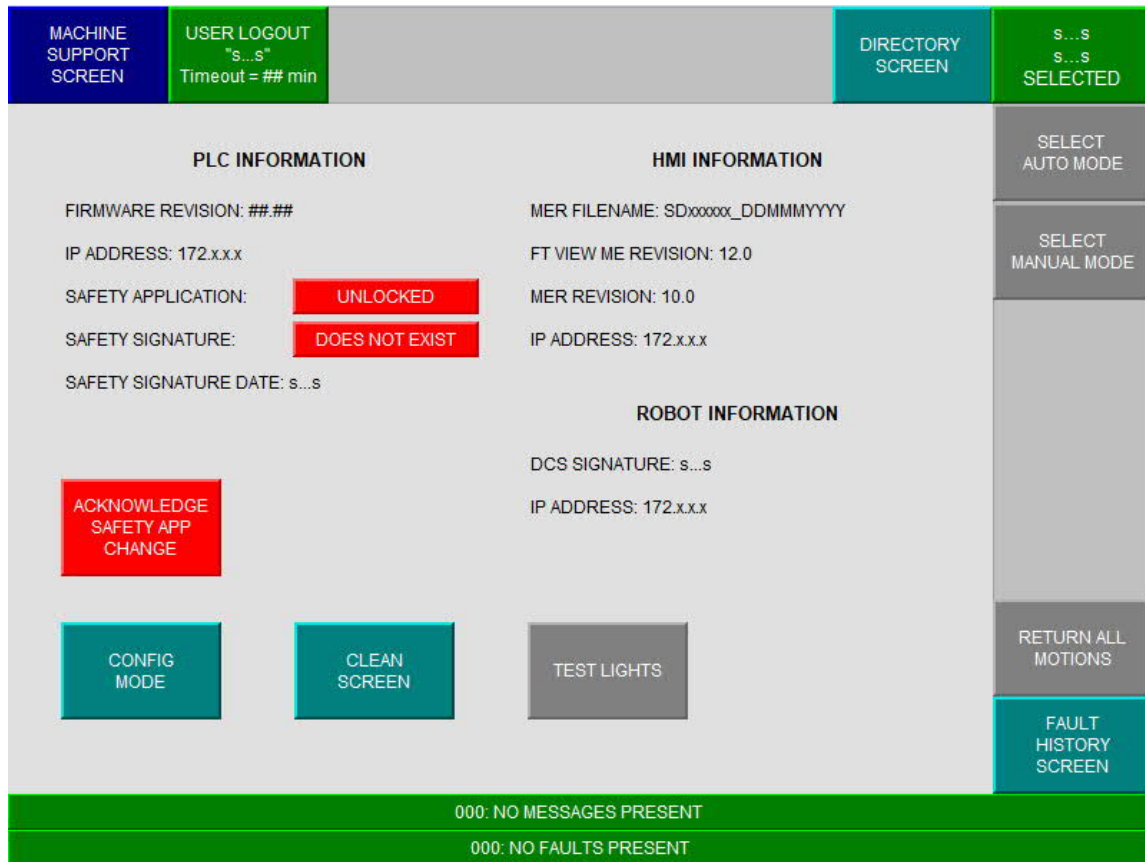


Figure 5: Counters Screen

- 4.4.1 The screen name box shall contain the text "COUNTERS SCREEN".
- 4.4.2 This screen shall have the following reset-able counters: Good Parts, Reject Parts, and Total Parts.
- 4.4.3 A reset part counters pushbutton shall be provided.
- 4.4.4 A reset accept pushbutton shall be used to accept counter resets.

## 4.5 Machine Support Screen

This section details requirements for the Machine Support Screen.



The Machine Support Screen UI is divided into several sections:

- Top Bar:** Contains navigation buttons: "MACHINE SUPPORT SCREEN" (blue), "USER LOGOUT 's...s' Timeout = ## min" (green), "DIRECTORY SCREEN" (teal), and "s...s s...s SELECTED" (green).
- PLC INFORMATION:** Displays "FIRMWARE REVISION: ##.##", "IP ADDRESS: 172.x.x.x", "SAFETY APPLICATION: UNLOCKED" (red button), "SAFETY SIGNATURE: DOES NOT EXIST" (red button), and "SAFETY SIGNATURE DATE: s...s".
- HMI INFORMATION:** Displays "MER FILENAME: SDxxxxx\_DDMMYYYY", "FT VIEW ME REVISION: 12.0", "MER REVISION: 10.0", and "IP ADDRESS: 172.x.x.x".
- ROBOT INFORMATION:** Displays "DCS SIGNATURE: s...s" and "IP ADDRESS: 172.x.x.x".
- Buttons:** Includes "ACKNOWLEDGE SAFETY APP CHANGE" (red), "CONFIG MODE" (teal), "CLEAN SCREEN" (teal), "TEST LIGHTS" (grey), "SELECT AUTO MODE" (grey), "SELECT MANUAL MODE" (grey), "RETURN ALL MOTIONS" (grey), and "FAULT HISTORY SCREEN" (teal).
- Status Bar:** Displays "000: NO MESSAGES PRESENT" and "000: NO FAULTS PRESENT" (green).

Figure 6: Machine Support Screen

4.5.1 The screen name box shall contain the text "MACHINE SUPPORT SCREEN".

4.5.2 As a minimum, this screen shall indicate the following:

1. PLC information including firmware revision and device IP address. The firmware revision tag connection values are populated automatically from the Main routine in the logic library files.
2. HMI information shall include MER runtime file name, FactoryTalk View ME Studio version, MER runtime file version, and device IP address.

4.5.3 Access to the HMI configuration shall be provided on this screen. This pushbutton shall not be protected by a password. *Note: This is referred to as a Goto Config Mode pushbutton in FactoryTalk View ME Studio software.*

4.5.4 A Test Lights pushbutton shall be provided on this screen for machines that include hardwired pilot lights and/or operator indicator lights.

4.5.5 Safety PLC applications shall include the following. If the application does not include a safety PLC, these objects shall be removed.

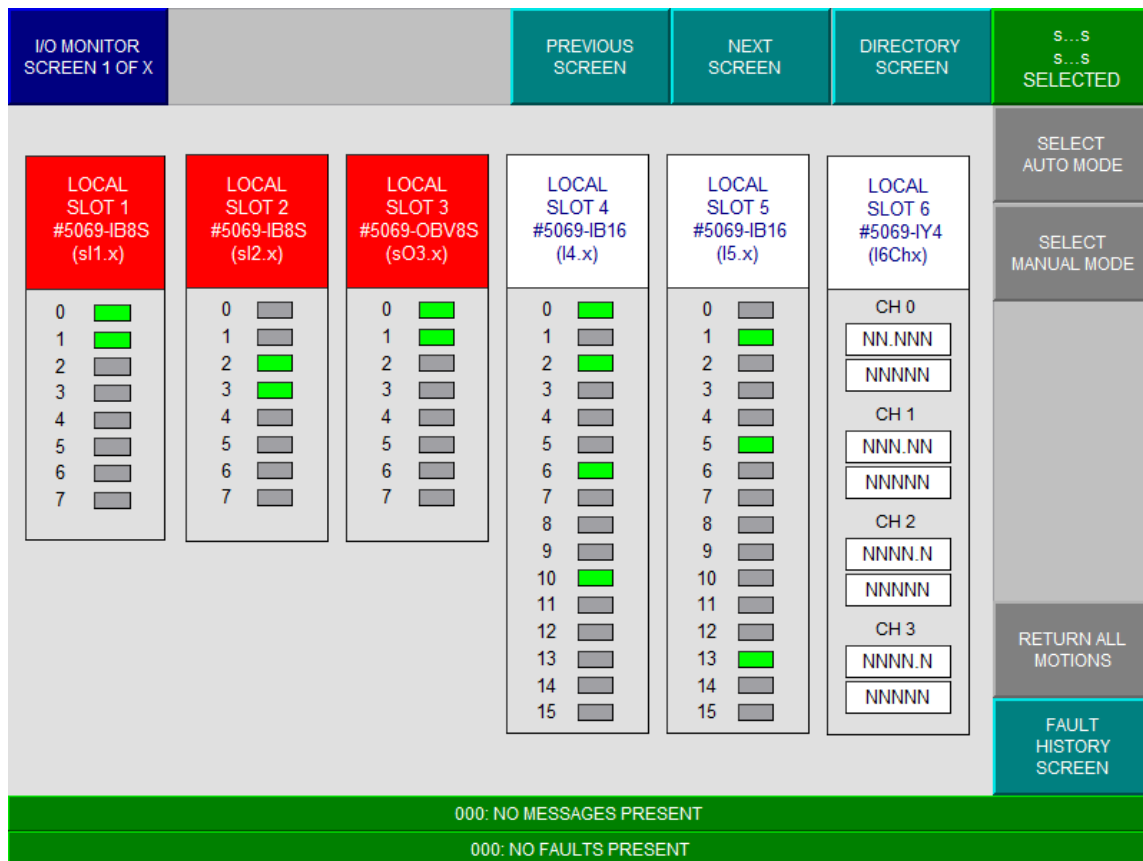
1. Safety PLC application locked/unlocked status, safety signature status, and the current safety signature date. The tag connection values are populated automatically from the Main routine in the logic library files.
2. A safety application change acknowledgement pushbutton. This is used as confirmation that safety application modifications were made. This pushbutton interacts with standard logic in the Main routine as well.



- 4.5.6 Robotic applications shall include the DCS signature and the IP address for all robot controllers. If the application does not include a robot, these objects shall be removed.

#### 4.6 I/O Monitor Screen

This section details requirements for the PLC I/O Monitor Screen.



The screenshot displays the PLC I/O Monitor Screen. At the top, there is a navigation bar with buttons: "I/O MONITOR SCREEN 1 OF X", "PREVIOUS SCREEN", "NEXT SCREEN", "DIRECTORY SCREEN", and "S...S S...S SELECTED". Below the navigation bar, there are six columns representing different I/O modules:

- LOCAL SLOT 1 #5069-IB8S (sl1.x)**: 8 digital input channels (0-7). Channel 0 is green, 1 is green, 2 is gray, 3 is gray, 4 is gray, 5 is gray, 6 is gray, 7 is gray.
- LOCAL SLOT 2 #5069-IB8S (sl2.x)**: 8 digital input channels (0-7). Channel 0 is gray, 1 is gray, 2 is green, 3 is green, 4 is gray, 5 is gray, 6 is gray, 7 is gray.
- LOCAL SLOT 3 #5069-OBV8S (sO3.x)**: 8 digital output channels (0-7). Channel 0 is green, 1 is green, 2 is gray, 3 is gray, 4 is gray, 5 is gray, 6 is gray, 7 is gray.
- LOCAL SLOT 4 #5069-IB16 (l4.x)**: 16 digital input channels (0-15). Channel 0 is green, 1 is gray, 2 is green, 3 is gray, 4 is gray, 5 is gray, 6 is green, 7 is gray, 8 is gray, 9 is gray, 10 is green, 11 is gray, 12 is gray, 13 is gray, 14 is gray, 15 is gray.
- LOCAL SLOT 5 #5069-IB16 (l5.x)**: 16 digital input channels (0-15). Channel 0 is gray, 1 is green, 2 is gray, 3 is gray, 4 is gray, 5 is green, 6 is gray, 7 is gray, 8 is gray, 9 is gray, 10 is gray, 11 is gray, 12 is gray, 13 is green, 14 is gray, 15 is gray.
- LOCAL SLOT 6 #5069-IY4 (l6Chx)**: 4 analog input channels (CH 0, CH 1, CH 2, CH 3). Each channel has two input fields for raw and scaled values. CH 0: NN.NNN, NNNNN. CH 1: NNN.NN, NNNNN. CH 2: NNNN.N, NNNNN. CH 3: NNNN.N, NNNNN.

On the right side of the screen, there are buttons for "SELECT AUTO MODE", "SELECT MANUAL MODE", "RETURN ALL MOTIONS", and "FAULT HISTORY SCREEN". At the bottom, there is a green status bar with the text "000: NO MESSAGES PRESENT" and "000: NO FAULTS PRESENT".

Figure 7: PLC I/O Monitor Screen

- 4.6.1 The screen name box shall contain the text "I/O MONITOR SCREEN 1 OF x".
- 4.6.2 The screen or set of screens shall display the status of all inputs and outputs used by the PLC. This includes all local and remote I/O modules.
- 4.6.3 Each I/O module shall have a description box above the module indicators describing the I/O modules slot location, module part number, and I/O address prefix. The description box for all safety I/O modules shall have a red background with white text while standard I/O modules shall have a white background with blue text.
- 4.6.4 The status indicator for digital I/O shall have two states. State "0" (sensor OFF) shall be a solid gray background. State "1" (sensor ON) shall be a solid green background.
- 4.6.5 The indicator for analog I/O shall display both the raw and scaled values for each channel.



#### 4.8 Clean Screen

This section details requirements for the Clean Screen.

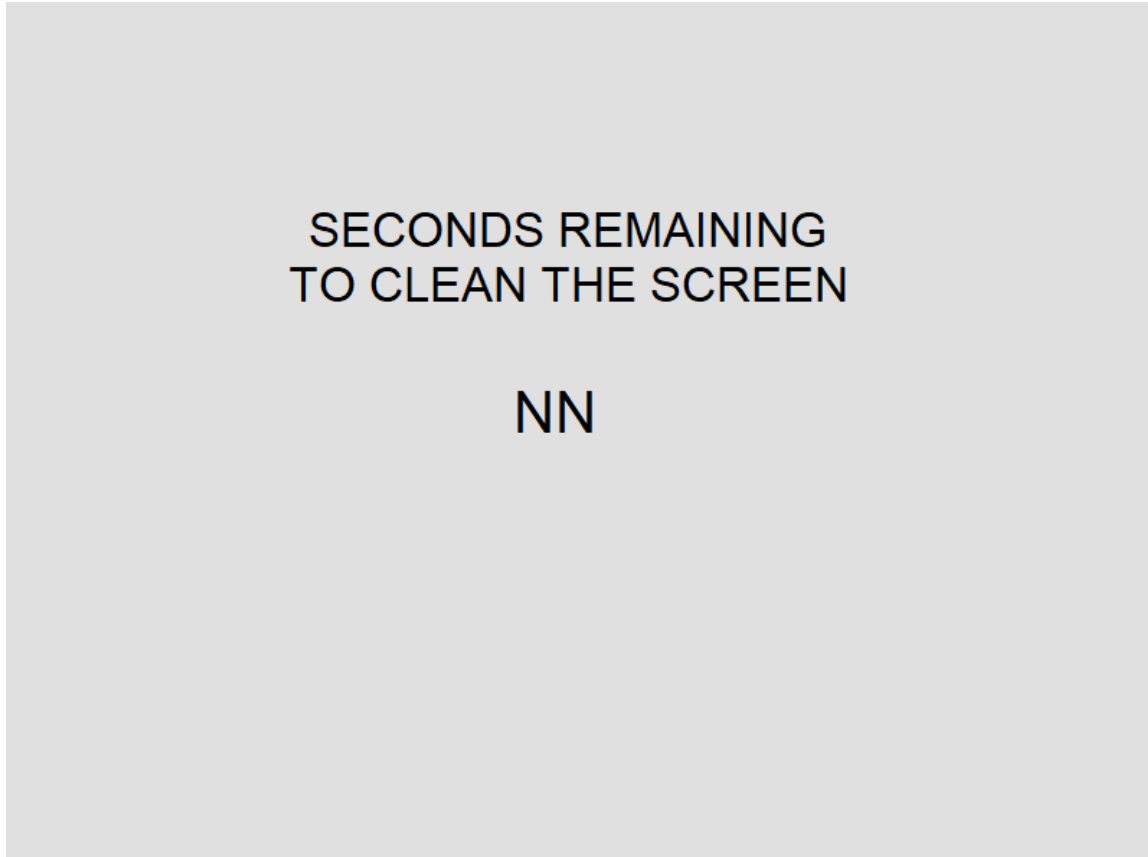


Figure 9: Clean Screen

- 4.8.1 This screen has no pushbuttons or indicators. Its purpose is to allow the operator to wipe the touchscreen clean with a cloth without accidentally operating an object on the screen.
- 4.8.2 The screen shall have a completely blank background with the following sentence centered on the screen: "SECONDS REMAINING TO CLEAN THE SCREEN"
- 4.8.3 When the operator selects this screen from the Directory Screen, the PLC shall initialize a count-down timer of 15 seconds. As the timer decreases towards zero, the number of remaining seconds shall be indicated as shown on the Clean Screen above.
- 4.8.4 When the timer reaches zero seconds, the PLC shall command the HMI to return to the Directory Screen.
- 4.8.5 The functions described above are met using logic contained in the HMI routine in the logic library files.

#### 4.9 Model Selection Screen

This section details requirements for the Model Selection Screen.

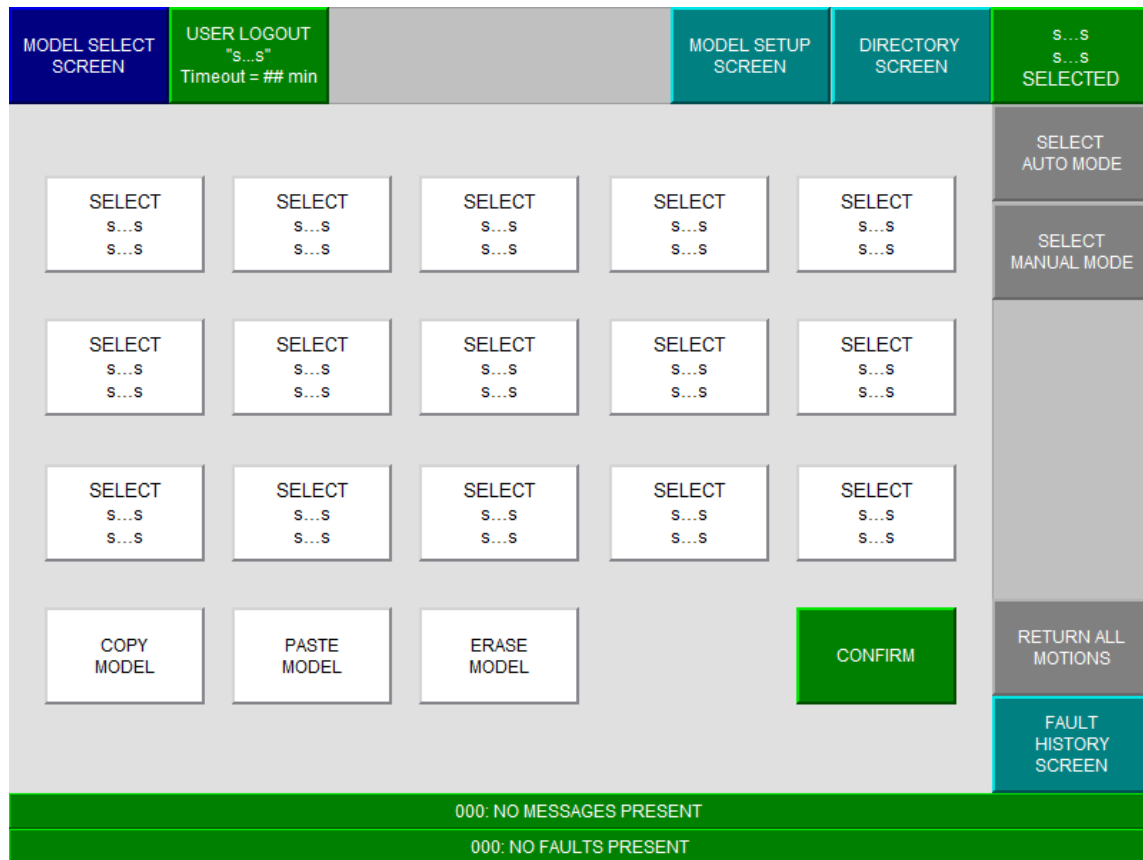
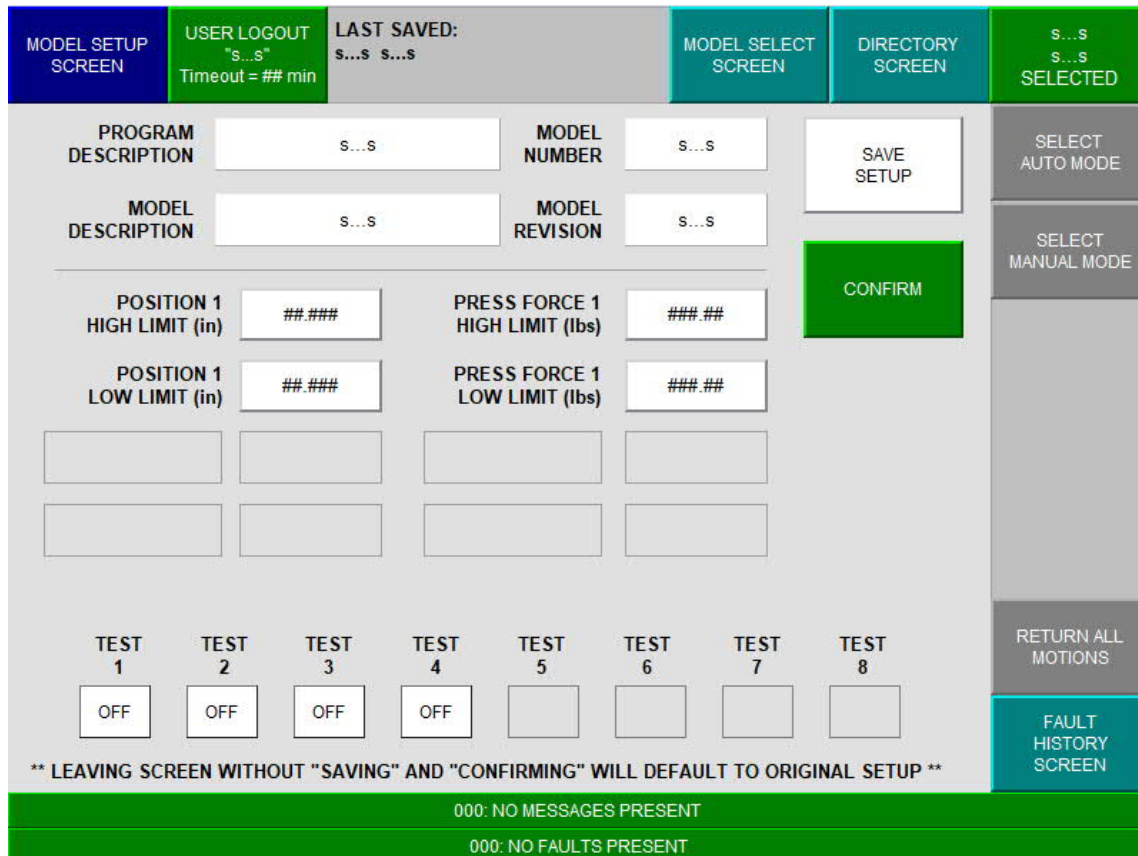


Figure 10: Model Selection Screen

- 4.9.1 The screen name box shall contain the text "MODEL SELECTION SCREEN".
- 4.9.2 This screen shall be used to allow the operator to change from one model to another.
- 4.9.3 The model selection pushbuttons shall display the model description and model part number stored in the PLC on the button.
- 4.9.4 A model change shall be allowed only when the machine is not in cycle as programmed in the logic library Model routine.
- 4.9.5 Copy, Paste, and Erase Model pushbuttons shall be provided and function as programmed in the logic library. The ability to use these pushbuttons requires the user to be logged in.
- 4.9.6 Model selection on multi-station assembly lines is preferred to be selected at the "lead-off" (part load) station and the model selection is stored within the pallet data array. The model selection at downstream station should be determined from the stored model value in the pallet data array for the specific pallet as it enters the station.

## 4.10 Model Setup Screen

This section details requirements for the Model Setup Screen.



The Model Setup Screen is a graphical user interface for configuring machine parameters. It features a top navigation bar with buttons for 'MODEL SETUP SCREEN', 'USER LOGOUT', 'LAST SAVED:', 'MODEL SELECT SCREEN', 'DIRECTORY SCREEN', and a status bar showing 'S...S S...S SELECTED'. The main area contains several input fields and buttons:

- PROGRAM DESCRIPTION**: A text input field with placeholder 'S...S'.
- MODEL NUMBER**: A text input field with placeholder 'S...S'.
- MODEL DESCRIPTION**: A text input field with placeholder 'S...S'.
- MODEL REVISION**: A text input field with placeholder 'S...S'.
- POSITION 1 HIGH LIMIT (in)**: A numeric input field with placeholder '##.###'.
- PRESS FORCE 1 HIGH LIMIT (lbs)**: A numeric input field with placeholder '###.##'.
- POSITION 1 LOW LIMIT (in)**: A numeric input field with placeholder '##.###'.
- PRESS FORCE 1 LOW LIMIT (lbs)**: A numeric input field with placeholder '###.##'.
- TEST 1 through TEST 8**: A row of eight toggle buttons, each labeled 'OFF'.
- SAVE SETUP**: A button to save the current configuration.
- CONFIRM**: A green button to confirm changes.
- SELECT AUTO MODE**: A button to select automatic mode.
- SELECT MANUAL MODE**: A button to select manual mode.
- RETURN ALL MOTIONS**: A button to return all motions.
- FAULT HISTORY SCREEN**: A button to view fault history.

At the bottom, a green status bar displays '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

Figure 11: Model Setup Screen

- 4.10.1 The screen name box shall contain the text "MODEL SETUP SCREEN".
- 4.10.2 The initial model setup displayed is the current setup stored in the PLC.
- 4.10.3 This screen shall be used to allow the operator to view model setup information and process control related parameters.
- 4.10.4 This screen shall be used to allow engineers to view and edit model setup parameters as needed within pre-defined limits. The ability to save edits requires the user to be logged in.
- 4.10.5 The name of each parameter or test pushbutton shall be indicated. The units of measurement shall also be indicated.
- 4.10.6 The Test On/Off pushbuttons along the lower portion of the screen may be used to enable/disable test functions, tooling presence, or error proofing as required by the application.
- 4.10.7 The displayed model setup may be edited at any time. All displayed edits require the save setup pushbutton to be pressed to overwrite the currently running and stored model setup. *Note: The save setup pushbutton shall only appear when the user is logged in and the machine is not in cycle.*
- 4.10.8 Parameter changes, on the currently running model, shall be allowed only when the machine is not in cycle as programmed in the logic library Model routine.

#### 4.11 Shift Times Screens

This section details requirements for the Shift Times Screens.

	"A" SHIFT		"B" SHIFT		"C" SHIFT		
	START	END	START	END	START	END	
SHIFT	HOUR	MIN	HOUR	MIN	HOUR	MIN	OPTION "1" SHIFT TIMES SCREEN
	START	END	START	END	START	END	DIRECTORY SCREEN
BREAK "1"	START	END	START	END	START	END	NEXT SCREEN
	START	END	START	END	START	END	PREVIOUS SCREEN
LUNCH	START	END	START	END	START	END	SHIFT OPTION "1" SELECTED
	START	END	START	END	START	END	SELECT SHIFT OPTION "2"
BREAK "2"	START	END	START	END	START	END	SELECT SHIFT OPTION "3"
	START	END	START	END	START	END	

Figure 12: Shift Times Screen

4.11.1 The screen name box shall contain the text "OPTION x SHIFT TIMES SCREEN"

4.11.2 This screen shall be used to allow the selection of the shift schedule option being used by the plant. These are the most common options used within Nexteer plants.

1. Option #1: Three 8-hour shifts (A, B, & C), Monday through Sunday.
2. Option #2: Two 9-hour shifts (A & B), Monday through Sunday.
3. Option #3: Two 10-hour shifts (A & B), Monday through Thursday, two 12-hour (AWS) shifts, Friday through Sunday.

4.11.3 This screen shall be used to allow for the entry of the hour and minute values for the following times on each shift.

1. Shift start and end time.
2. Break #1, lunch, and break #2 start and end times.
3. Break #3 and break #4 (extra hour) start and end times for options 2 and 3.

4.11.4 Modifications to these screens are allowed as required based on the schedules used in the plant.

## 5. Application Specific Screens

Additional screens may be required to meet the application requirements. If the application requires additional machine functionality, for example: traceability, lot tracking, servo axis, or camera inspection, the library screens provided shall be used. Modifications to these screens are expected based on application requirements. Contact the Nexteer Engineer to determine the applicable screens.

### 5.1 Automatic Cycle – DIAL TABLE Screen

This section details requirements for the Automatic Cycle Screen for dial table applications.

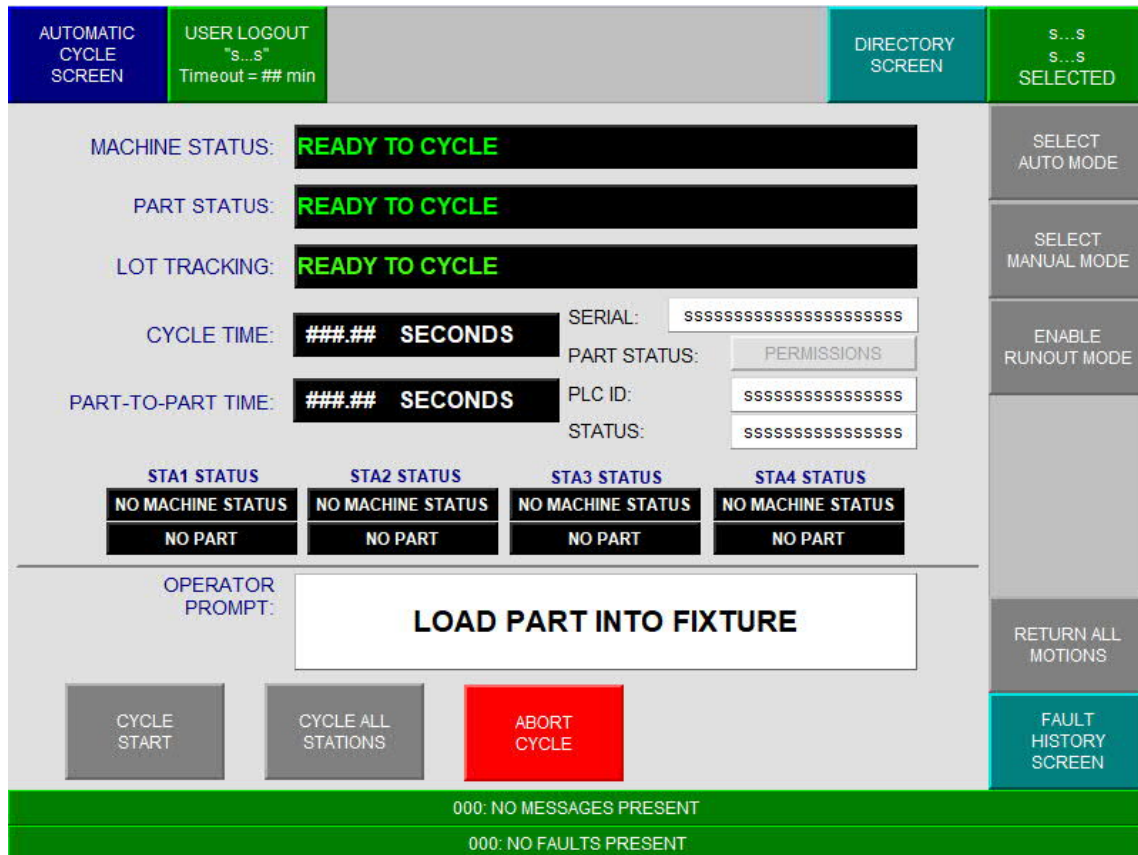


Figure 13: Automatic Cycle Screen – DIAL TABLE

- 5.1.1 The screen name box shall contain the text "AUTOMATIC CYCLE SCREEN".
- 5.1.2 As a minimum, this screen shall indicate the same information as the standard Automatic Cycle screen detailed above.
- 5.1.3 The machine status and part status for each dial station shall be indicated.
- 5.1.4 Manual control functions for controlling the dial cycle shall be provided. The typical cycle control functions are as follows:
  1. A Cycle Start pushbutton that is used as the global cycle initiation for the dial. This does not initiate the cycle at each individual station on the dial but only places the entire dial in cycle. Each station will have its own individual cycle initiation.
  2. A Cycle All Stations pushbutton that controls a manual request to initiate the cycle at each station in the event the dial has already indexed, the cycle was initiated at each station, and the cycle was interrupted. This provides the ability to re-initiate a cycle without having to index the dial.



## 5.2 Safety Status Screen

This section details requirements for the Safety Status Screen.

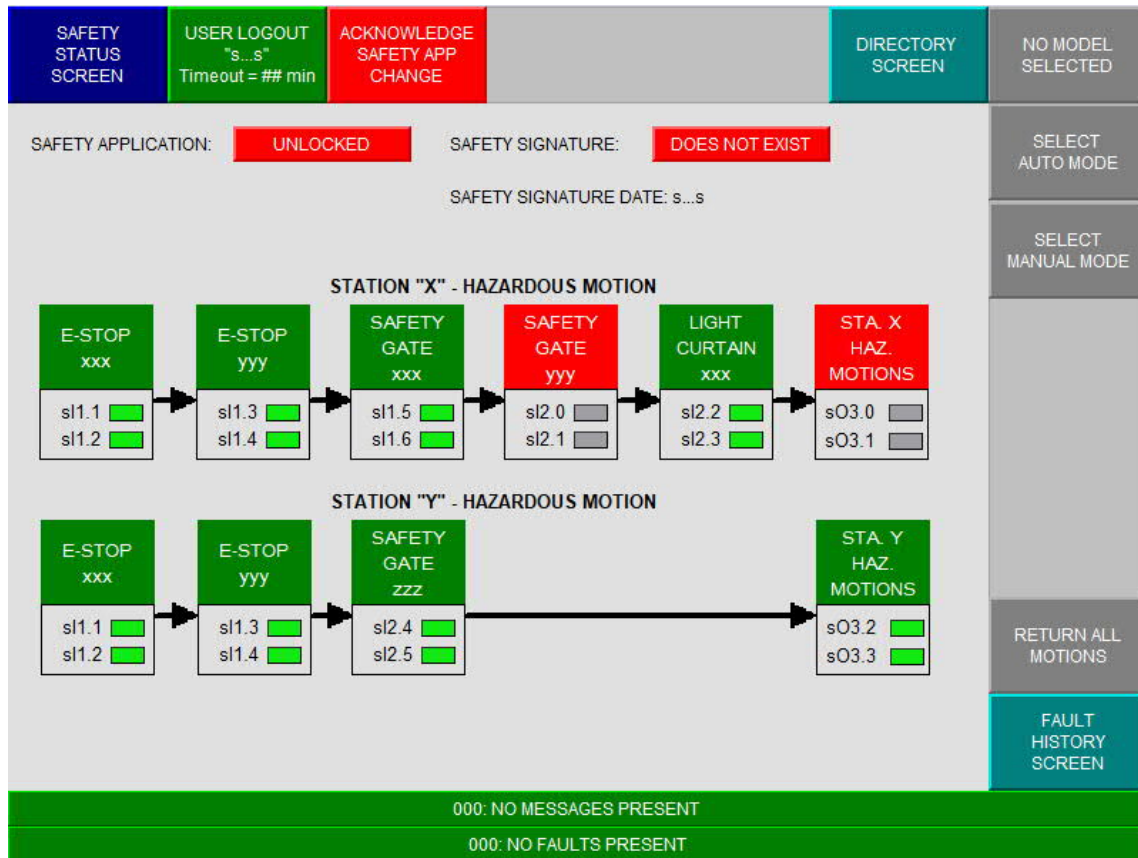


Figure 14: Safety Status Screen

- 5.2.1 The screen name box shall contain the text "SAFETY STATUS SCREEN".
- 5.2.2 The status of the safety controller application shall be indicated as follows:
  1. Locked/unlocked status
  2. Safety signature status
  3. Safety signature date
- 5.2.3 The screen shall provide a safety application change acknowledgement pushbutton. This is required to confirm that safety application modifications were made.
- 5.2.4 The status and description of each safety device, including both input and output channels that exist shall be indicated.
- 5.2.5 The screen shall also provide indication of the safety circuit status in a flow chart fashion from left to right, ending with the hazardous motion output status.



### 5.3 Start-Up Screen

This section details requirements for the Start-Up Screen.

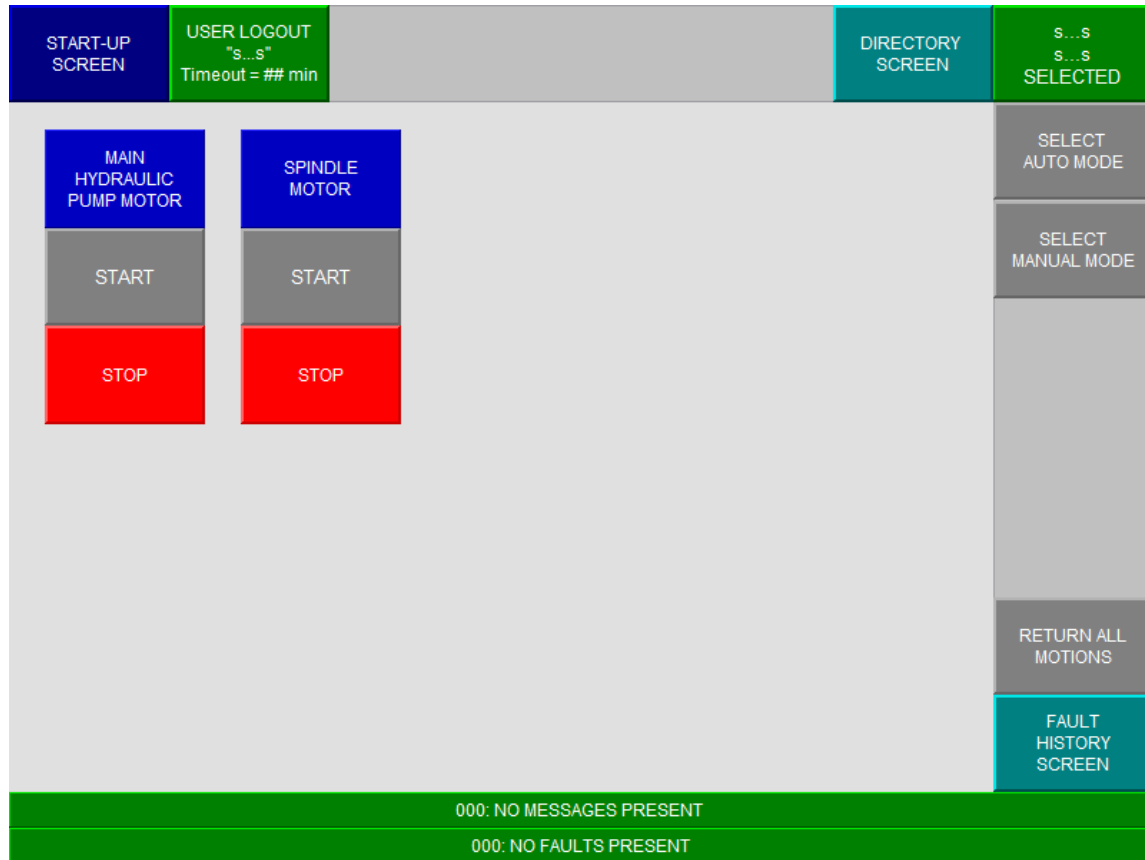


Figure 15: Start-Up Screen

- 5.3.1 The screen name box shall contain the text "START-UP SCREEN".
- 5.3.2 The Start-Up Screen, when used, shall be the first (top left) screen in the Directory Screen layout.
- 5.3.3 Start-stop functions are used to turn ON/OFF devices such as motors, variable frequency drives, and servo drive amplifiers.
- 5.3.4 The top object shall provide a functional description for that device.
- 5.3.5 The middle object shall be a momentary pushbutton used to start the device and have two states based on the device's state.
  1. State "0" (device OFF) shall use white text on a gray background to indicate the device start function.
  2. State "1" (device ON) shall use white text on a green background to indicate the device is running.
- 5.3.6 The bottom object shall be a momentary pushbutton used to stop the device and have two states based on the device state.
  1. State "0" (device ON) shall use white text on a red background to indicate the device stop function.
  2. State "1" (device OFF) shall use white text on a black background to indicate the device is stopped.

## 5.4 Servo Axis Screen

This section details requirements for the Servo Axis Screen.

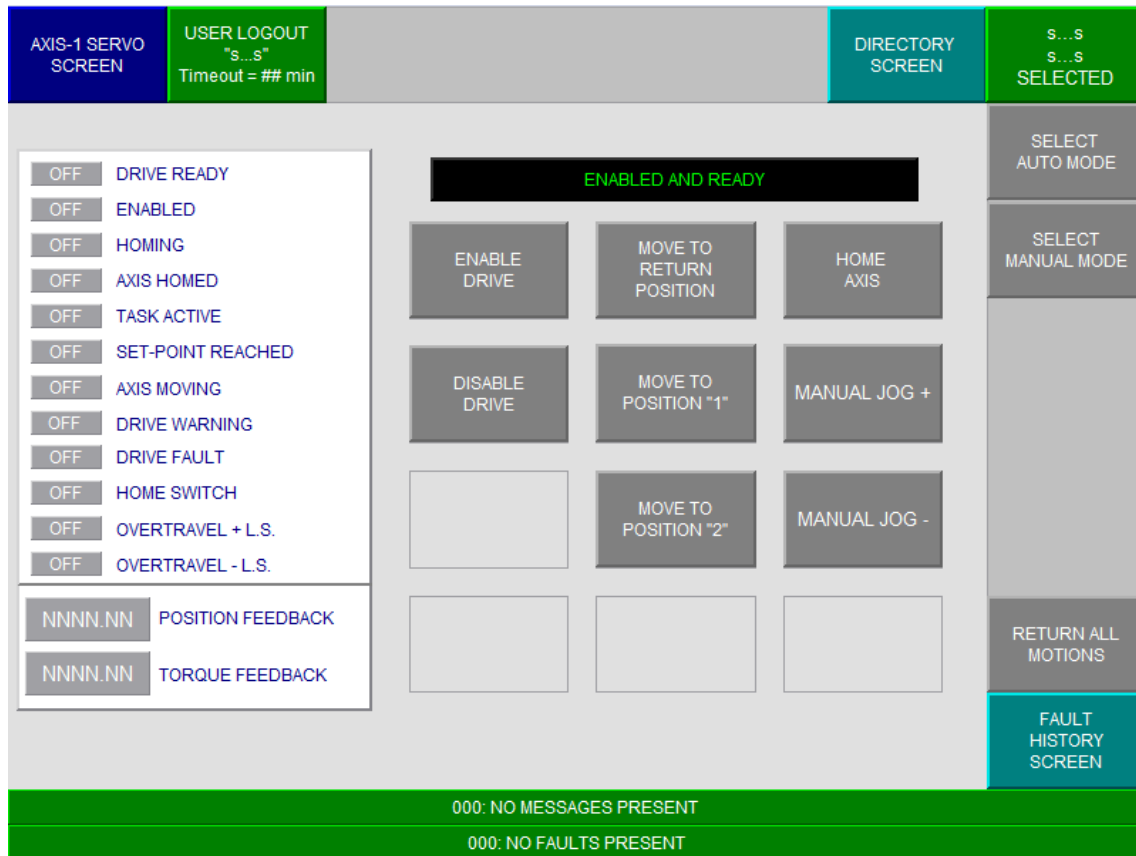


Figure 16: Servo Axis Screen

- 5.4.1 The screen name box shall contain the text "AXIS-x SERVO SCREEN".
- 5.4.2 The current position and velocity of the axis shall be indicated.
- 5.4.3 The status of important servo drive functions shall be indicated. These functions include such things as drive enabled, drive in position, or safe torque off.
- 5.4.4 Manual control functions for the servo axis shall be provided. The pushbuttons for these functions shall indicate the functions status. The typical manual functions are as follows:
  1. Jog axis plus (+) and minus (-). Indicate the direction that the axis moves or rotates.
  2. Move axis to Home position.
  3. Move axis to some alternate position(s).

## 5.5 Robot Screen

This section details requirements for the Robot Screen.

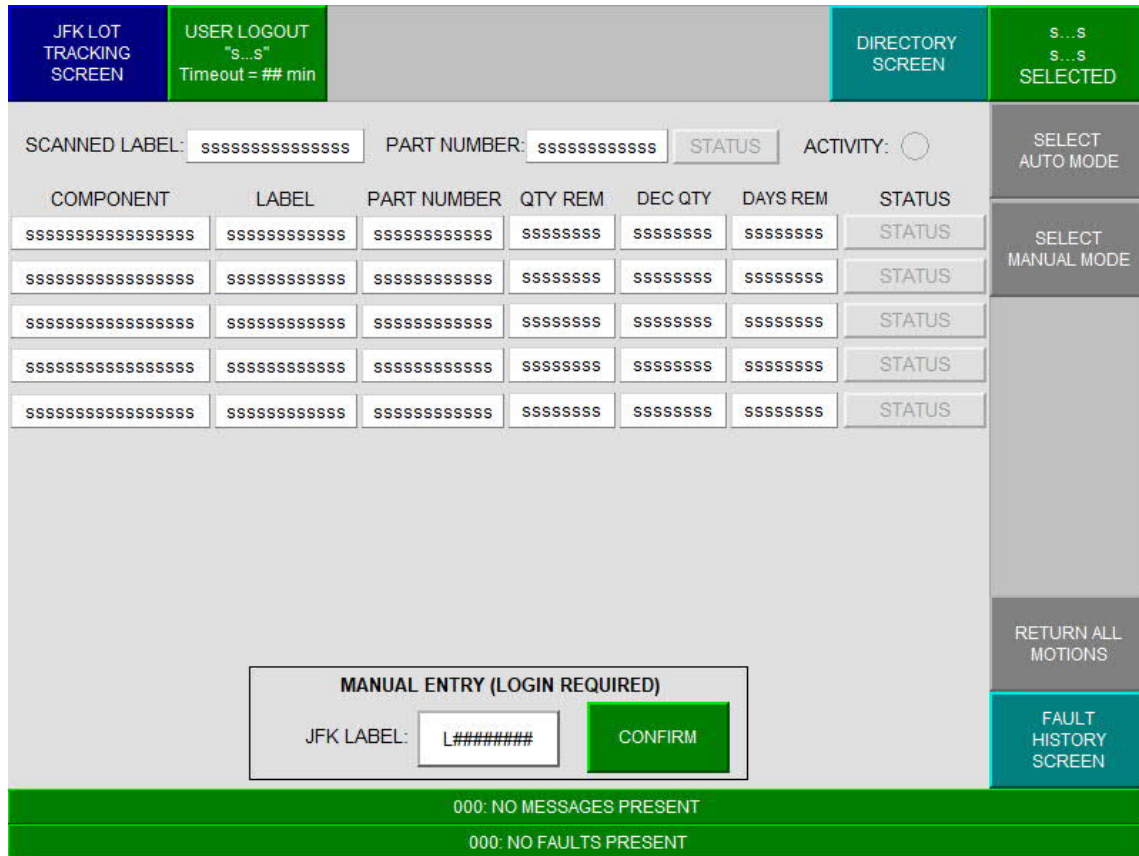
[illegible]

Figure 17: Robot Screen

- 5.5.1 The screen name box shall contain the text "ROBOT SCREEN".
- 5.5.2 The current value of the controller DCS signature shall be displayed.
- 5.5.3 The status of all robot controller DCS signals shall be indicated.
- 5.5.4 The status of all robot controller UOP signals shall be indicated.
- 5.5.5 The current active alarm, if any exists, shall be displayed.
- 5.5.6 The current value of the program selection, showing both the PNS (program number selection) value and the SNO (selected number) echoed value.
- 5.5.7 Manual control functions for the robot shall be provided. The pushbuttons for these functions shall indicate the functions status. The typical manual functions are as follows:
  - 1. Aborting the current program.
  - 2. Recover robot to home position.
  - 3. Move robot to the maintenance position.

## 5.6 Lot Tracking Screen

This section details requirements for the Lot Tracking Screen.



JFK LOT TRACKING SCREEN    USER LOGOUT "s...s" Timeout = ## min    DIRECTORY SCREEN    S...S S...S SELECTED

SCANNED LABEL: sssssssssssss PART NUMBER: sssssssssss STATUS ACTIVITY: ☐

COMPONENT	LABEL	PART NUMBER	QTY REM	DEC QTY	DAYS REM	STATUS
ssssssssssssssss	ssssssssssss	ssssssssssss	ssssssss	ssssssss	ssssssss	STATUS
ssssssssssssssss	ssssssssssss	ssssssssssss	ssssssss	ssssssss	ssssssss	STATUS
ssssssssssssssss	ssssssssssss	ssssssssssss	ssssssss	ssssssss	ssssssss	STATUS
ssssssssssssssss	ssssssssssss	ssssssssssss	ssssssss	ssssssss	ssssssss	STATUS
ssssssssssssssss	ssssssssssss	ssssssssssss	ssssssss	ssssssss	ssssssss	STATUS

SELECT AUTO MODE  
SELECT MANUAL MODE  
RETURN ALL MOTIONS  
FAULT HISTORY SCREEN

MANUAL ENTRY (LOGIN REQUIRED)  
JFK LABEL: L##### CONFIRM

000: NO MESSAGES PRESENT  
000: NO FAULTS PRESENT

Figure 18: Lot Tracking Screen

- 5.6.1 The screen name box shall contain the text "LOT TRACKING SCREEN".
- 5.6.2 Each component that is being scanned and tracked on the machine or station needs to be shown on this screen.
- 5.6.3 The scanned lot label and the returned part number and part number status shall be displayed at top of lot tracking screen. If the part number returned from the scanned lot label does not match the programmed (expected) part numbers, the status shall indicate "NOT OK". If it does match, the status shall indicate "OK".
- 5.6.4 The following lot tracking information shall be provided for each component being tracked as a minimum: component name, JFK label, part number, quantity remaining, decrement quantity, expiration days remaining, and lot status.
- 5.6.5 A Manual Entry object shall be provided to allow the operator to manually enter the lot label information in the event the label cannot be scanned. The manual entry object shall only be visible when the user is logged in.

## 5.7 Traceability Screen

This section details requirements for the Traceability Screen.

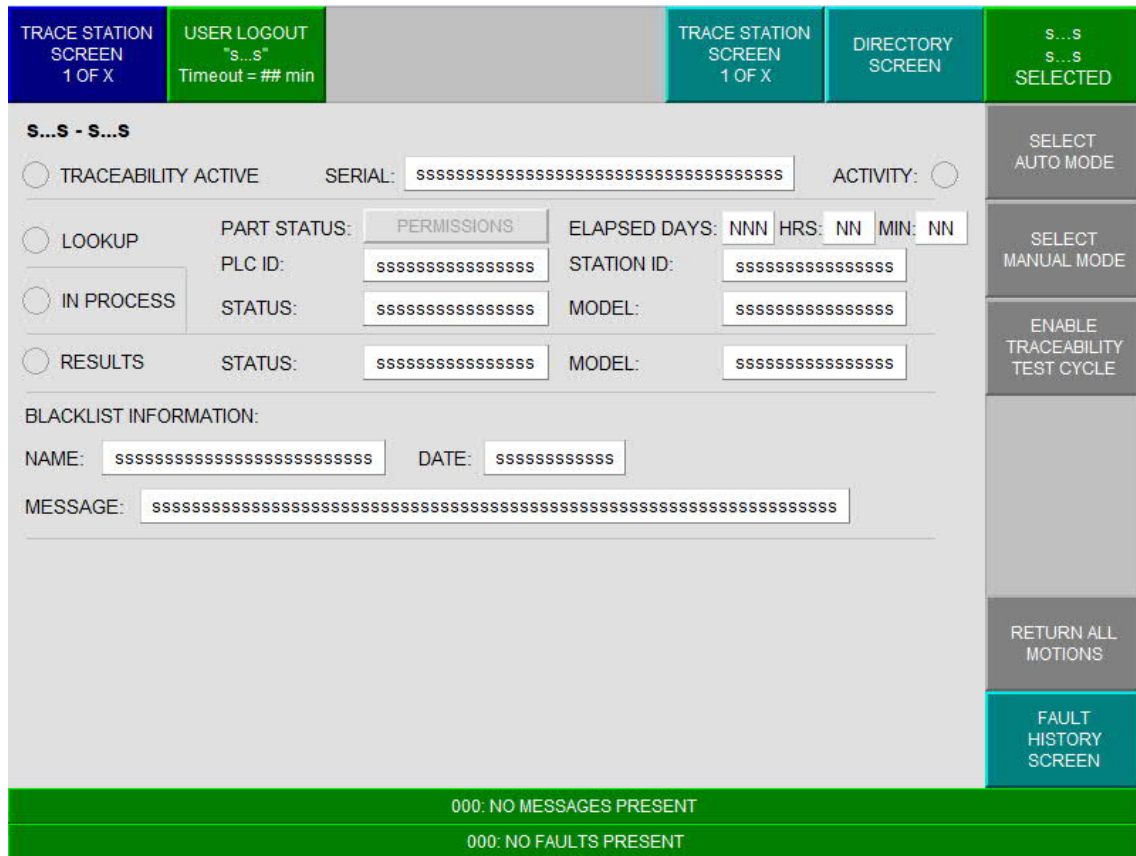


Figure 19: Traceability Screen

- 5.7.1 The screen name box shall contain the text "TRACEABILITY STATION SCREEN".
- 5.7.2 The traceability station screen is provided for viewing traceability information and status for a specific station.
- 5.7.3 If there is more than one station on an assembly line or cell that is interfacing with a traceability system, a screen for each trace station routine in the PLC program is required.
- 5.7.4 This screen is arranged in the sequence of a typical traceability application from top to bottom. Traceability Lookup (Permission to Run) would occur first, In Process/Ownership next, and then the Station Results written to the traceability system. This information is part specific and will be updated each cycle.
- 5.7.5 The information on this screen is linked to a Trace Station logic routine in the PLC and will require tag connections to be updated as required for the application.

## 5.8 Part and Pallet RFID Screens

This section details requirements for the Part and Pallet RFID Screens.

[illegible]

Figure 20: Part RFID Screen

PALLET RFID SCREEN	USER LOGOUT "s..s" Timeout = ## min		DIRECTORY SCREEN	NO MODEL SELECTED
PALLET LINE <input type="text" value="NNNNN"/> PALLET NUMBER <input type="text" value="NNNNN"/> RFID ANTENNA STATUS <input type="button" value="OK"/>				<input type="button" value="SELECT&lt;br/&gt;AUTO MODE"/> <input type="button" value="SELECT&lt;br/&gt;MANUAL MODE"/>
<input type="button" value="READ&lt;br/&gt;PALLET RFID"/>				<input type="button" value="RETURN ALL&lt;br/&gt;MOTIONS"/>
<input type="button" value="FAULT&lt;br/&gt;HISTORY&lt;br/&gt;SCREEN"/>				
000: NO MESSAGES PRESENT				
000: NO FAULTS PRESENT				

Figure 21: Pallet RFID Screen

- 5.8.1 The screen name box shall contain the text "PART RFID SCREEN" and "PALLET RFID SCREEN" respectively.
- 5.8.2 These screens shall be provided for all pallet and part RFID antennas on an assembly line or cell. The screen(s) shall be provided at each station's HMI.
- 5.8.3 The screen layout of the values shall follow the part and pallet RFID memory map values that apply to the machine or station on an assembly line or cell.
- 5.8.4 These values shall be extracted and formatted appropriately to properly display meaningful values read from the RFID tag.
- 5.8.5 A manual read pushbutton shall be provided to trigger the request. The read status shall be displayed above the read pushbutton, as shown. The triggering of this read request shall only occur in Manual mode.

## 5.9 Batch Audit Screen

This section details requirements for the Batch Audit Screen.

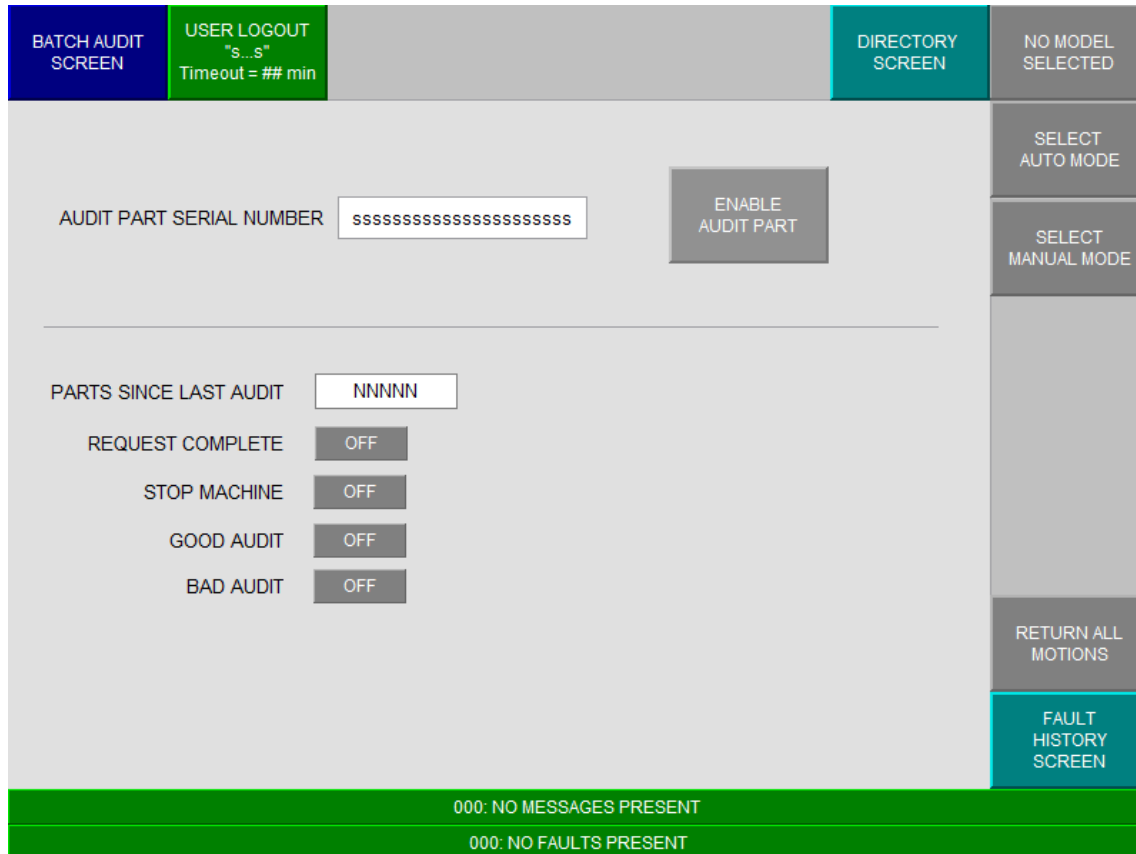


Figure 22: Batch Audit Screen

- 5.9.1 The screen name box shall contain the text "BATCH AUDIT SCREEN."
- 5.9.2 The batch audit screen is provided for viewing batch audit release information and status.
- 5.9.3 The batch audit serial number shall be displayed.
- 5.9.4 A push button to allow a manual request of an audit part shall be provided, which also provides indication if the request for an audit part is enabled.
- 5.9.5 The general status information related to the batch audit logic is also required to be shown here, such as:
  - Machine stopping status, which prevents further potentially bad parts to be pro
  - 1. Parts since last audit part was created.
  - 2. Machine stop request status.
  - 3. Good audit part status from audit station.
  - 4. Bad audit part status from audit station.



## 5.10 Screwdriver Screen

This section details requirements for the Screwdriver Screen.

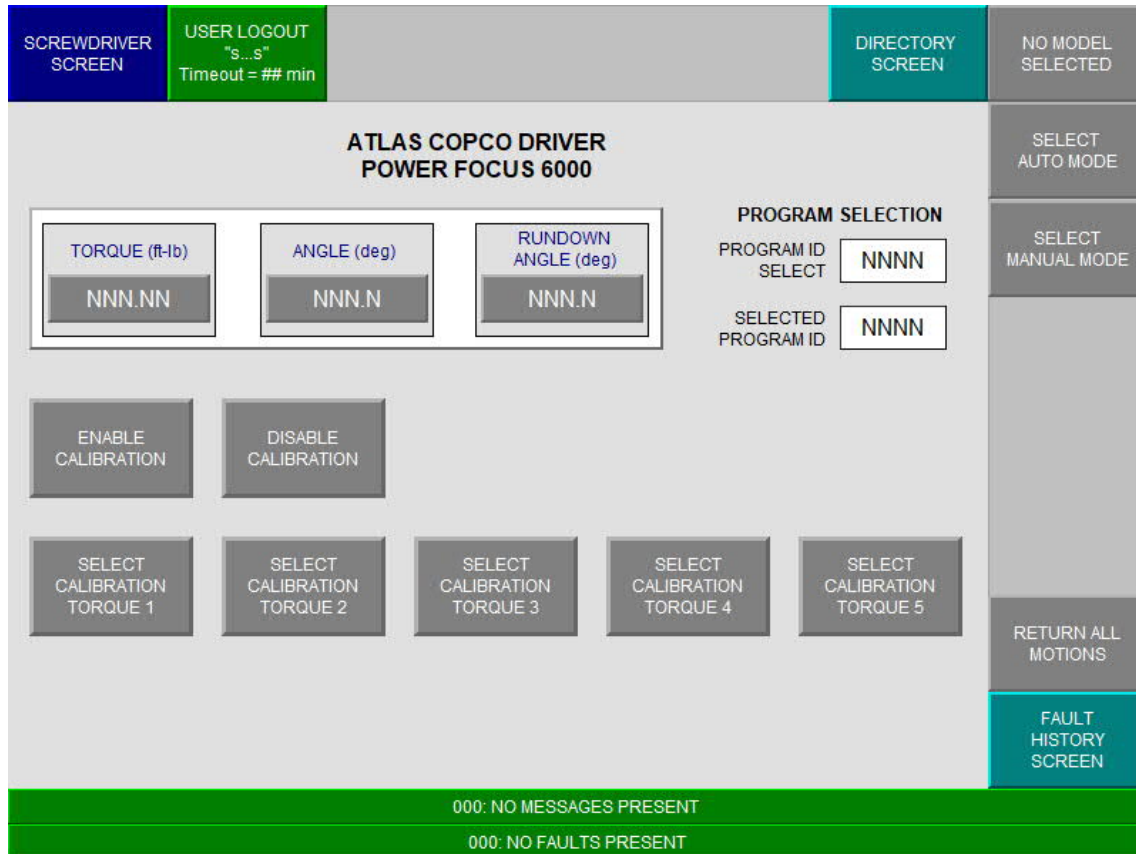


Figure 23: Screwdriver Screen

- 5.10.1 The screen name box shall contain the text "SCREWDRIVER SCREEN."
- 5.10.2 The current value of the final torque, final angle and rundown angle shall be displayed.
- 5.10.3 The current value of the program selection shall be displayed.
- 5.10.4 Manual control functions for the screwdriver controller shall be provided. The pushbuttons for these functions shall indicate the functions status. The typical manual functions are as follows:
  1. Enable/disable calibration.
  2. Selection of type of calibration.

### 5.11 Code Reader Screen

This section details requirements for the Code Reader Screen.

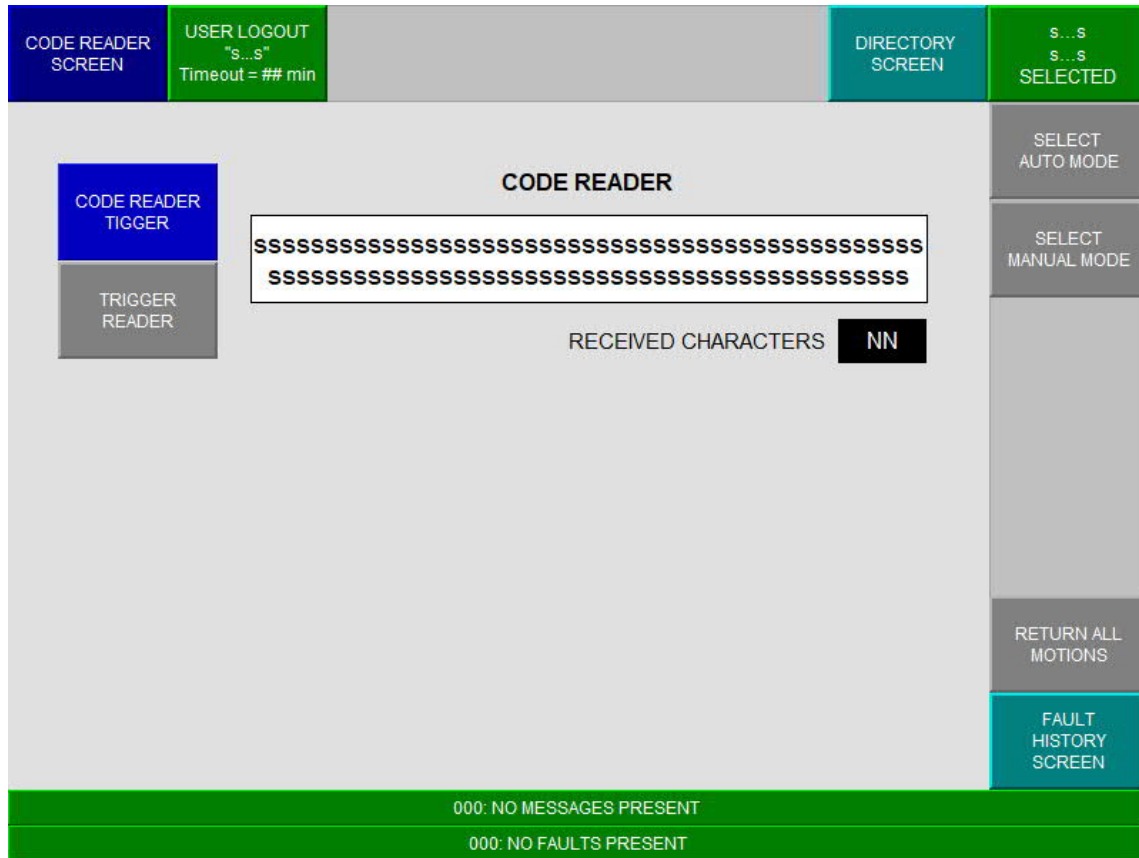


Figure 24: Code Reader Screen

- 5.11.1 The screen name box shall contain the text "CODE READER SCREEN."
- 5.11.2 Manual trigger pushbutton for all fixed mount code readers shall be provided. The pushbuttons for these functions shall indicate the functions status (Read Complete). *Note: A manual trigger is not required for all handheld readers but may be provided.*
- 5.11.3 The scanned character data received shall be displayed. The scanned data may be extracted on this screen to display part number, serial number, lot number, or similar information.
- 5.11.4 The length of the scanned data shall also be displayed.

## 5.12 Camera Screen

This section details requirements for the Camera Screen.

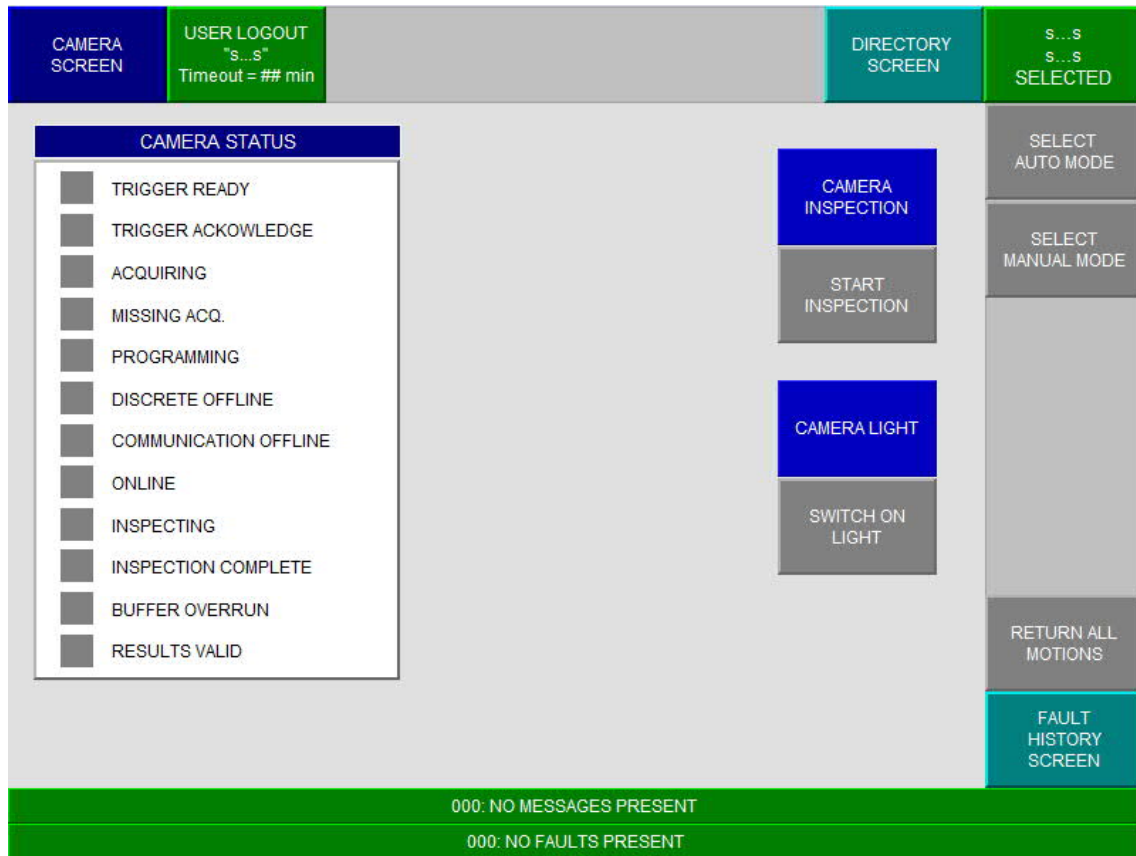


Figure 25: Camera Screen

- 5.12.1 The screen name box shall contain the text "CAMERA SCREEN."
- 5.12.2 The status of important camera functions shall be indicated. These functions include such things as trigger ready, communication offline, or results valid.
- 5.12.3 The current value of the inspection program selection shall be displayed.
- 5.12.4 Manual control functions for the camera shall be provided. The pushbuttons for these functions shall indicate the functions status. The typical manual functions are as follows:
  1. Start inspection.
  2. Switch On Light



## 5.14 Badge Reader Screen

This section details requirements for the Badge Reader Screen.

OPERATOR BADGE ID SCREEN	USER LOGOUT "s..s" Timeout = ## min			DIRECTORY SCREEN	NO MODEL SELECTED
FACILITY ID: <input type="text" value="SSSSSSSSSSSSSSSS"/> ACTIVITY: <input type="radio"/>				SELECT AUTO MODE	
OPERATOR ID: <input type="text" value="SSSSSSSSSSSSSSSS"/>				SELECT MANUAL MODE	
QUALIFICATION: <input type="text" value="NO BADGE"/>					
				RETURN ALL MOTIONS	
				FAULT HISTORY SCREEN	
000: NO MESSAGES PRESENT					
000: NO FAULTS PRESENT					

Figure 27: Badge Reader Screen

- 5.14.1 The screen name box shall contain the text "BADGE READER SCREEN."
- 5.14.2 The current value of the badge facility ID.
- 5.14.3 The current value of the badge operator ID.
- 5.14.4 The status of the badge qualification shall be indicated.
- 5.14.5 The status of the logic communication activity with the associated application shall be indicated.
- 5.14.6 A pushbutton to allow the currently logged in operator to manually request to log out.

## 5.15 Tool Life Screen

This section details requirements for the Tool Life Screen.

TOOL LIFE SCREEN		USER LOGOUT "s...s" Timeout = ## min		DIRECTORY SCREEN		s...s s...s SELECTED	
COMPONENT NAME				ACTIVITY: <input type="radio"/>			
TOOL NUMBER:		<input type="text" value="ssssssssssssssssssss"/>		TOOL LIFE STATUS:		<input type="text" value="STATUS"/>	
CYCLE LIMIT (LOGIN):		<input type="text" value="#####"/>		CYCLES COMPLETED:		<input type="text" value="NNNNNNN"/>	
INCREMENT PER CYCLE:		<input type="text" value="NNNNNNN"/>		CYCLES REMAINING:		<input type="text" value="NNNNNNN"/>	
<input type="radio"/> INCREMENT							
<p>COPY THE GROUPED OBJECTS ABOVE THE LINE AND PASTE HERE, IF MORE THAN ONE "R29_TOOLLIFE_V2_COMPONENT" ROUTINE EXISTS IN PLC PROGRAM. UPDATE TAG CONNECTIONS AS REQUIRED.</p> <p>!!! DELETE THIS NOTE !!!</p>							
<div> <div>SELECT AUTO MODE</div> <div>SELECT MANUAL MODE</div> <div>RETURN ALL MOTIONS</div> <div>FAULT HISTORY SCREEN</div> </div>							
000: NO MESSAGES PRESENT 000: NO FAULTS PRESENT							

Figure 28: Tool Life Screen

- 5.15.1 The screen name box shall contain the text "TOOL LIFE SCREEN."
- 5.15.2 The tool life screen is provided for viewing tool usage information and status for a specific machine.
- 5.15.3 If there is more than one tool being monitored, additional objects shall be added to the lower half of this screen for display of the added routine(s) in the PLC program is required.
- 5.15.4 The information on this screen is linked to a Tool Life logic routine in the PLC and will require tag connections to be updated as required for the application.

## 5.16 Interlocks Screen

This section details requirements for the Interlocks Screen.

The screenshot displays the 'INTERLOCKS SCREEN' with a top navigation bar containing 'INTERLOCKS SCREEN', 'USER LOGOUT "s...s" Timeout = ## min', 'DIRECTORY SCREEN', and 'S...S S...S SELECTED'. The main content area is titled 'SDxxxxxx - MACHINE xxx INTERLOCK SIGNALS' and is divided into four quadrants: 'FROM SDxxxxxx - STANDARD', 'FROM SDxxxxxx - SAFETY', 'TO SDxxxxxx - STANDARD', and 'TO SDxxxxxx - SAFETY'. Each quadrant lists various interlock signals with 'OFF' status indicators. The 'SAFETY' quadrants have a red background. On the right side, there are buttons for 'SELECT AUTO MODE', 'SELECT MANUAL MODE', 'RETURN ALL MOTIONS', and 'FAULT HISTORY SCREEN'. At the bottom, a green status bar shows '000: NO MESSAGES PRESENT' and '000: NO FAULTS PRESENT'.

SDxxxxxx - MACHINE xxx INTERLOCK SIGNALS	
FROM SDxxxxxx - STANDARD	
OFF	POWER ON
OFF	IN CYCLE
OFF	READY TO UNLOAD
OFF	READY TO LOAD
OFF	FAULTED
SSSSSSSSSSSSSSSSSSSSSS	MODEL NUMBER
SSSSSSSSSSSSSSSSSSSSSS	SERIAL NUMBER
TO SDxxxxxx - STANDARD	
OFF	POWER ON
OFF	IN CYCLE
OFF	CLEAR TO INDEX
OFF	SPARE
OFF	FAULTED
SSSSSSSSSSSSSSSSSSSSSS	MODEL NUMBER
SSSSSSSSSSSSSSSSSSSSSS	SERIAL NUMBER
FROM SDxxxxxx - SAFETY	
OFF	EMERGENCY STOP OK
OFF	SAFETY GATE OK
OFF	LIGHT CURTAIN OK
OFF	AREA SCANNER OK
OFF	INTERLOCK 5 OK
OFF	INTERLOCK 6 OK
OFF	INTERLOCK 7 OK
TO SDxxxxxx - SAFETY	
OFF	EMERGENCY STOP OK
OFF	SAFETY GATE OK
OFF	LIGHT CURTAIN OK
OFF	AREA SCANNER OK
OFF	INTERLOCK 5 OK
OFF	INTERLOCK 6 OK
OFF	INTERLOCK 7 OK

000: NO MESSAGES PRESENT  
000: NO FAULTS PRESENT

Figure 29: Interlocks Screen

- 5.16.1 The screen name box shall contain the text "INTERLOCKS SCREEN."
- 5.16.2 The SD numbers for each machine communicating shall be displayed in the object descriptions.
- 5.16.3 This screen displays the standard u\_Interlock UDT tag data from the standard Interlock logic routine containing produced and consumed tag communications between two machines.
- 5.16.4 This screen also displays the safety u\_SafeInterlock UDT tag data from the safety Interlock logic routine containing produced and consumed safety tag communications between two machines.
- 5.16.5 The screen should be updated based on the application and additional members added to the UDTs as needed.







EPV SETUP SCREEN	USER LOGOUT "s...s" Timeout = ## min			EPV CYCLE SCREEN	DIRECTORY SCREEN	s...s s...s SELECTED
---------------------	--	--	--	---------------------	---------------------	----------------------------

LAST SAVED: s...s

PART NUMBER	s...s	PART SERIAL NUMBER	s...s		
----------------	-------	-----------------------	-------	--	--

PART STATUS	TEST 1 ENABLE	TEST 2 ENABLE	TEST 3 ENABLE	TEST 4 ENABLE
s...s	OFF	OFF	OFF	OFF

PART TEST  
ENABLE / DISABLE

DISABLED

EPV REQUIRED (Global)	
CYCLE COUNTS	ELAPSED TIME (HR)
#####	####

CONFIRM

SAVE  
SETUP

SELECT  
AUTO MODE

SELECT  
MANUAL MODE

SELECT  
EPV CYCLE

RETURN ALL  
MOTIONS

FAULT  
HISTORY  
SCREEN

000: NO MESSAGES PRESENT

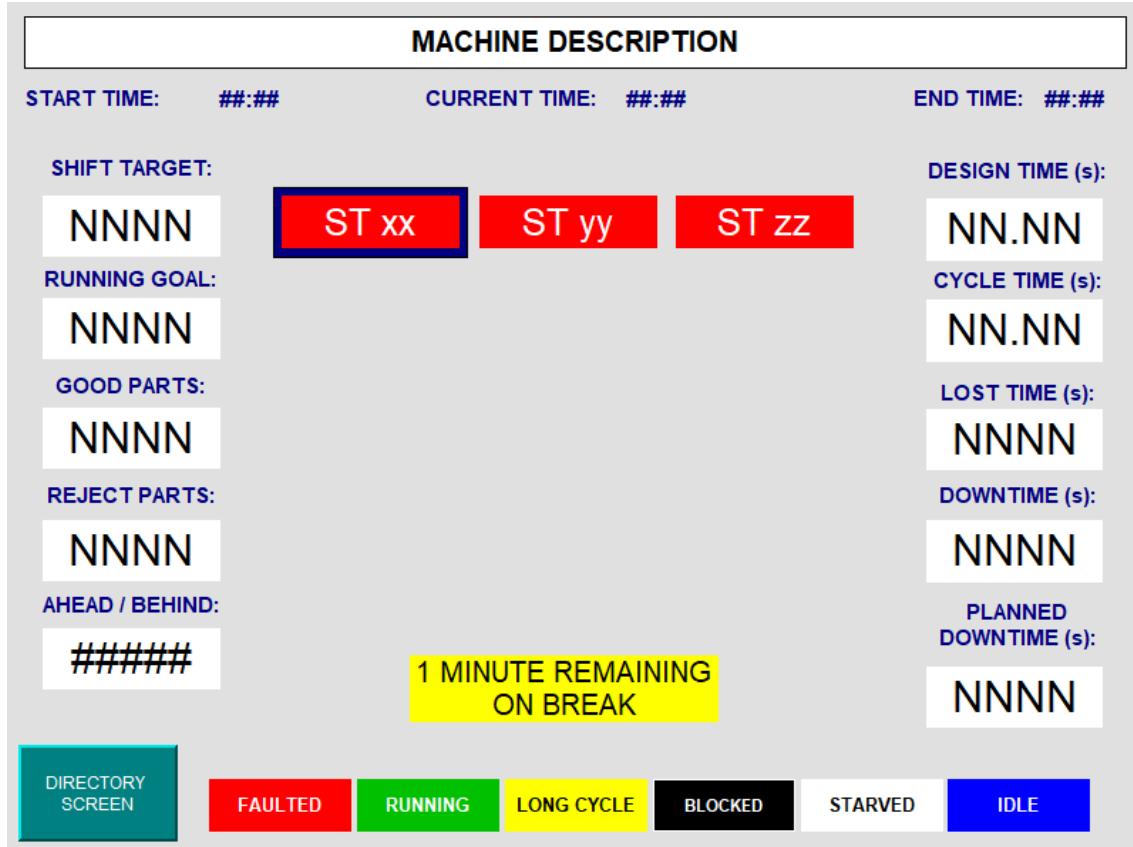
000: NO FAULTS PRESENT

Figure 31: EPV Setup Screen

- 5.17.8 The screen name box shall contain the text "EPV SETUP SCREEN".
- 5.17.9 This screen is provided for the test and parameter setup of Error Proof Verification parts.
- 5.17.10 EPV part number and associated serial number entry objects shall be provided based on the application.
- 5.17.11 EPV expected part status and test parameter entry objects shall be provided based on the application.
- 5.17.12 A Part Test Enable / Disable selection shall be provided to allow an EPV part to not be required to be cycled.
- 5.17.13 Numeric entry objects shall be provided to allow entry of required elapsed time and number of cycles since the last EPV cycle. These shall be provided as global parameters for all EPV parts.
- 5.17.14 The saving of modifications to the EPV setup shall only be allowed when Logged In and the machine is not in cycle.
- 5.17.15 The information on this screen is linked to the EPV Part Setup logic library routine.

## 5.18 Andon Screen

This section details requirements for the Andon Screen.



**MACHINE DESCRIPTION**

START TIME: ##:##      CURRENT TIME: ##:##      END TIME: ##:##

SHIFT TARGET:      DESIGN TIME (s):

NNNN      ST xx      ST yy      ST zz      NN.NN

RUNNING GOAL:      CYCLE TIME (s):

NNNN      NN.NN

GOOD PARTS:      LOST TIME (s):

NNNN      NNNN

REJECT PARTS:      DOWNTIME (s):

NNNN      NNNN

AHEAD / BEHIND:      PLANNED DOWNTIME (s):

#####      NNNN

1 MINUTE REMAINING ON BREAK

DIRECTORY SCREEN      FAULTED      RUNNING      LONG CYCLE      BLOCKED      STARVED      IDLE

Figure 32: Andon Screen

- 5.18.1 The screen name box shall contain the text "ANDON SCREEN."
- 5.18.2 This screen is provided as a typical example of an assembly line Andon screen and may be modified as required based on the application. Modifications to this Andon screen may also be made based on plant preferences.
- 5.18.3 The values and multistate indicators shown on the screen are linked to tags in the logic libraries Andon routine, which should exist in all machine programs.

## 6. Multiple HMI Station Equipment

This section applies to multi-station, multiple HMI, synchronous-transfer systems, where machine motion can be initiated from more than one HMI. Reference SD-1032 for logic requirements.

*Note: This section does not apply to asynchronous transfer systems such as pallet-and-free conveyor lines. These requirements also do not apply to HMI stations included solely for remote display purposes.*

### 6.1 Requirements

- 6.1.1 Main control console shall have a screen(s) to indicate "STATION RETURNED", "STATION CYCLED", and Manual/Off/Auto indication for each station.
- 6.1.2 Manual control of any indexing or transfer mechanism shall be located at, but not limited to, the main control console.
- 6.1.3 Remote station consoles shall have the required screens as detailed in HMI Required Screens section.
- 6.1.4 In addition, each remote-control console shall have the following functions as a minimum:
  - Manual/Off/Auto selection (Required on each HMI station that can initiate motion).
  - Cycle Stop (For entire machine - required only on continuous cycle equipment)
  - Indication of Cycled (or Full Depth)
- 6.1.5 Additional screens may be required at remote station consoles for process related control. Consult the Nexteer Engineer to determine the applicable screens.

## A. Pro-Face HMI Requirements

Due to the differences between Pro-Face GP-Pro EX and FactoryTalk View ME software packages, there are several display system settings and screens in the HMI library file that require modifications to maintain the same functional use as the Panelview Plus HMIs. The Nexteer logic library R35\_HMI\_TOOLS routine contains standard logic for use in maintaining the same functionality. The logic in this routine is required to be copied into the standard R35\_HMI routine when a Pro-Face HMI unit is used.

### A.1 System Settings (OFFLINE) – Security Settings

- A.1.1 The “System Password” shall be set to “0” during initial setup, indicating no password is necessary. This is not required to be set to “Nexteer1!” like Panelview Plus units.

### A.2 System Settings

- A.2.1 The “Display Unit” System Data area is required to be configured with a tag array assigned to monitor the current screen and the change to screen parameters. Additional logic from the HMI Tools routine is required for this function.
- A.2.2 The “Device/PLC” configuration under peripheral settings is required to have the “Wait to Send” parameter set to 100ms or as required based on the application. *Note: The default setting of 0ms is typically much faster than required for Nexteer applications and causes high HMI/MSG (Class 3) PLC communication utilization.*

### A.3 Common Settings

- A.3.1 The “Alarm” settings configuration shall be modified to include all Immediate Stop and Cycle Stop fault conditions and their associated fault messages.
- A.3.2 The “Security” settings configuration shall not use the GP-Pro EX security password management system. All login passwords shall be managed in the PLC program and interface with the standard logic library Login routine.
- A.3.3 The “Language Change” and “Text Table” shall be configured as required for dual language functionality when equipment is being shipped outside of the U.S. This configuration shall include both English and translations for the language of the destination site.
- A.3.4 The “Clock Update Settings” configuration shall be modified to include appropriate tag references to synchronize the HMI clock with the PLC clock. Additional logic from the HMI Tools routine is required for this function.

### A.4 Screen Functions

- A.4.1 The Common (Global) Objects shall be duplicated in the projects “Header” and “Footer” sections in the same manner as required in the FactoryTalk View ME Studio application above.
- A.4.2 All screen objects with text shall be configured to use a “Text Table” instead of the default Direct Text. This allows for the use of dual language when required.
- A.4.3 Embedded string variables on object labels are not supported in GP-Pro EX software. This requires additional data display objects to be used to display this information and be grouped with associated objects. Notable differences are the model selection pushbuttons, selected model information in upper right-hand corner of header, and EPV cycle screen.

### A.5 Required Screens

The following screens have modifications made to their indicators to allow for the same functionality as the FactoryTalk View ME Studio application. These modifications also require the use of standard HMI logic in the logic library. The list of screens is as follows:

#### A.5.1 Machine Support Screen

- The machine support screen shall have a switch pushbutton object configured with a “special action” of “offline”. This will allow access to the HMI configuration and exit the runtime application.

- The machine support screen shall be modified to include the Pro-Face .PRX runtime file name, GP-Pro EX revision and device IP address.

#### A.5.2 Fault History Screen

- The fault history screen shall be configured with the same layout and information as done on the FactoryTalk View ME software. The Scroll Up / Down and Clear All functions are not available and have not been provided on the screen.
- Use of the "History" Display mode will show all active faults and faults that have been reset (recovered). The time value that the fault was acknowledged shall also be shown. Additional logic is not required for this to function.

#### A.5.3 Lot Tracking Screen

- The lot tracking screen display is required to use a Switch/Lamp object for Status indications of each Component. Pro-Face does not support the number of conditional expressions for the status indicator; therefore, a Switch/Lamp object is required to be used with associated logic. Additional logic from the HMI Tools routine is required to be created for each component being tracked.

#### A.5.4 Traceability Screen

- The traceability screen displays all the same information as the FactoryTalk View ME Studio screens, but the Pro-Face GP-Pro EX software is not compatible with the 2500-character string data type member (STRING\_2500) in the Traceability UDT. Therefore, additional logic is required to be used to map the standard traceability information from the Traceability UDT tag values to dedicated Pro-Face tag values. Additional logic from the HMI Tools routine is required to be created for each Trace Station routine.

**RECORD OF REVISIONS**

Revision No	Date	Section	Description
001	01JUL04	ALL	Original Issue
002...017	15DEC04 ... 02DE11	ALL	Revision Records Consolidated. See Rev 02DE11 for Revision Records.
018	14JL14	ALL	Updated Per Central CSE BPI-2.
019	15OC25	ALL	Updated Per CSE Proposed Update Tracker
020			
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