

User Manual for OEE Solution



MAN1348 R02

07 SEP 2023

LIMITED WARRANTY AND LIMITATION OF LIABILITY

For more information about the warranty and limitation of liability, please contact the Horner Solutions Group Manager at 877-665-5666 or visit our website at www.hornersolution.com.

PREFACE

This manual explains how to use the Horner OEE Solution.

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Table of Contents

Change Log	6
Chapter 1: Safety and Compliance	8
1.1: Warnings	8
1.2: FCC Compliance	9
1.3: Safety Precautions	9
1.4: Contact Information	9
Chapter 2: Introduction	11
2.1: OEE Overview	11
2.2: Production Data Availability	12
2.3: Types of Reports	12
2.4: Contractual Requirements	12
Chapter 3: Electrical Installation	14
3.1: OEE Power Wiring	14
3.2: OEE Electrical I/O	15
Chapter 4: Electrical Grounding	17
4.1: Grounding Definition	17
4.2: Ground Specifications	17
4.3: How to Test for Good Ground	17
Chapter 5: System Navigation	19
5.1: Power On	19
5.2: Home	20
5.2.1: Screen Header	21
5.2.2: User	22
5.2.3: Work Interfaces: Detailed, Simplified, Basic	22
5.2.4: Shift Configuration and Status	22
5.2.5: System Navigation	22
5.2.6: System Status	22
5.2.7: OEE Scores	22
5.3: Trends	22
5.3.1: Main Trend Screen – OEE and All Components	23
5.3.2: Availability Score Trend	23
5.3.3: Performance Score Trend	24
5.3.4: Quality Score Trend	24
5.3.5: OEE Score Trend	24
5.4: Summary	25
5.5: Events	25
5.6: Downtime Accumulators	26
5.7: Call Accumulators	26
Chapter 6: Calls	28
6.1: Placing a Call	28
6.2: Acknowledging a Call	29
6.3: Clearing a Call	30
Chapter 7: Configuration	32
7.1: Configuration Overview	32
7.1.1: Copying Files to/from USB Drive	32
7.1.2: Configuration Access	33
7.1.3: Using the Configuration Menu	33
7.2: Cell Configuration: General	34
7.2.1: Plant ID	34
7.2.2: Cell ID	34
7.2.3: Datalog Interval Settings	34
7.3: Cell Configuration: Options	35
7.3.1: OEE Mode	35
7.3.2: OEE Calculations Configuration	36

7.3.3: Light Tower Link	36
7.3.4: Screen Background	36
7.4: Cell Configuration: Automatic Downtime Codes	37
7.5: Cell Configuration: Remote Triggers	37
7.5.1: Cell Up/Down Method	38
7.5.2: Input I4 Call	39
7.5.3: Calls via Comms	39
7.5.4: Comms Type	39
7.6: Shift Configuration	39
7.6.1: General Shift Configuration	40
7.6.2: Shift 1/2/3 Configuration	41
7.7: Part Editor/Viewer	41
7.7.1: Batch Mode OEE	45
7.7.2: Load Part from Flash	46
7.7.3: Update Part Currently Loaded	46
7.7.4: Save Part To Flash	46
7.8: Downtime Code Configuration	47
7.9: Ethernet Configuration	48
7.9.1: Modbus TCP/IP Access	48
7.9.2: Ethernet/IP Access	49
7.9.3: FTP Access	49
7.10: Email Configuration	51
7.10.1: Email SMTP Server	51
7.10.2: Email Addresses	52
7.11: System Information	53
Chapter 8: OEE Score Calculation Overview	55
8.1: Availability	55
8.2: Performance	55
8.3: Quality	56
8.4: Overall Equipment Effectiveness	56
8.5: Scheduled Breaks and Changeover; Effect on Scoring	56
Chapter 9: Login/Logout	58
9.1: Login	58
9.2: Logout	59
Chapter 10: Work Interfaces	61
10.1: Detailed	61
10.2: Simplified	63
10.3: Basic	64
Chapter 11: Downtime	67
11.1: Manual Downtime	67
11.2: Automatic Downtime	67
11.3: Downtime Code Prompt	67
11.4: Automatic Downtime Code Entry	68
11.4.1: Automatic Operator Shortage Downtime	68
11.4.2: Automatic Upstream Blockage Downtime	68
11.4.3: Automatic Changeover Downtime	68
Chapter 12: Part Changeover	70
12.1: Changeover Mode	71
Chapter 13: Datalogging and Configuration Files	73
13.1: Datalogging	73
13.1.1: Process Log Files	73
13.1.2: Downtime Event Log Files	74
13.1.3: Call Log Files	75
13.2: Configuration Files	76
13.3: Datalog and Configuration File Transfer	76
Chapter 14: Configuration Utility	78
14.1: Part Configuration	79
14.2: Shift Configuration	82

14.3: Downtime Code Configuration	85
14.4: Login Configuration	86
14.5: Email/SMS Configuration	87
14.6: File Locations	87
Chapter 15: Data Concentrator	89
15.1: Data Concentrator Configuration	91
15.1.1: OEE Cell Configuration	91
15.2: Web Browser Access	93
Chapter 16: Modbus TCP/IP Access	95
16.1: Read-Only Information	95
16.2: Configuration Information	96
16.3: OEE Data	97
16.3.1: Accumulator Data Assembly	98
16.4: Light Tower and Call Status	98
16.5: Triggering via Modbus TCP/IP Communications	99
Chapter 17: Ethernet/IP Access	101
17.1: Ethernet/IP Produced Data	101
17.1.1: Accumulator Data Assembly	102
17.2: Ethernet/IP Consumed Data	103
Index	104

Change Log

Date	Rev #	Description of Revision	Location in Doc
07 SEP 2023	02	Converted to Madcap Flare	Throughout

Safety and Compliance



Chapter 1: Safety and Compliance

1.1: Warnings

When found on the product, the following symbols specify:

WARNING:  Consult user documentation.

WARNING:  Electrical Shock Hazard.

WARNING: EXPLOSION HAZARD – Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: EXPLOSION HAZARD – Substitution of components may impair suitability for Class I, Division 2.

WARNING: EXPLOSION HAZARD – BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS.

WARNING: Battery May Explode If Mistreated. Do Not Recharge, Disassemble or Dispose Of In Fire.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

1.2: FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

1.3: Safety Precautions

All applicable codes and standards need to be followed in the installation of this product. For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

Adhere to the following safety precautions whenever any type of connection is made to the module.

1. Connect the green safety (earth) ground first before making any other connections.
2. When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.
3. Make connections to the module first; then connect to the circuit to be monitored.
4. Route power wires in a safe manner in accordance with good practice and local codes.
5. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
6. Ensure hands, shoes, and floors are dry before making any connection to a power line.
7. Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.
8. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

1.4: Contact Information

To contact the factory, please contact the Horner Solutions Group Manager at 877-665-5666 or visit our website at www.hornersolution.com.

Introduction to the OEE Solution



HG-274

Chapter 2: Introduction

2.1: OEE Overview	11
2.2: Production Data Availability	12
2.3: Types of Reports	12
2.4: Contractual Requirements	12

2.1: OEE Overview

The Horner OEE Solution is a pre-programmed system that is easy and quick to implement with no further programming development required by the user end. After a simple initialization setup via the touchscreen interface (CONFIG /SETUP area), the OEE kit will start collecting and monitoring production data immediately, though more complex configuration is available as well. This setup should take around 30 minutes or less.

The OEE kit provides tools for management, including real-time plant and individual work cell level visibility of all the work cells that have the Horner OEE machine monitoring solution kit installed and running on the production floor. The system logs uptime, downtime, good parts, bad parts, and it also gives the operator the ability to flag the work cell as down and designate why the work cell is down. The system calculates OEE scores in real time as the part run or shift progresses.

Operators also have a Call for Help function (part of lean manufacturing) to call for raw materials, maintenance, and supervisors. This gives operators further empowerment with ability to define what might be causing work processes to miss production quotas.

There is no need to write program logic to use the OEE kit. The system comes pre-programmed and ready to use as soon as configuration parameters are in place specific to the manufacturing facility in which the system is installed. The program logic that is in place is not normally accessible.

Management can access OEE data and Call for Help data to understand production timeline, analysis, and methods to improve the production process.

The OEE Kit is designed to be flexible for diverse types of processes. The system configuration allows for:

- Manual cycle and scrap triggers via the touchscreen.
- Automatic cycle and scrap triggers via input signals from the manufacturing equipment.
- Batch mode operation for single part runs where calculations start over for each part change.
- Shift mode operation for calculations that encompass multiple part changes in a single shift.
- Part configuration that allows for Changeover times to either affect or not affect OEE scoring.
- Shift configuration that allows for multiple break times to either affect or not affect OEE scoring.
- Remote access to configuration over an Ethernet network.
- Email notification for Calls and for shift-end data log files.
- A separate configuration utility that makes constant or cumbersome changes to the system easier to implement.

2.2: Production Data Availability

Production data is available from the touchscreen interface itself and on displays created separate from those normally used by the production personnel operating the machine. Management can view shift, day, week, and even monthly production data and information.

A separate Data Concentrator allows monitoring of up to 32 OEE stations brought to a single point. The centralized data can be accessed with any Internet browser for both large-screen production monitor viewing and mobile device viewing.

OEE offers three main points of data to gather data to lead to more productive and valuable operating time:

1. **Availability Loss** – Due to unplanned stops, equipment failure, planned stops, and setup adjustments.
2. **Performance Loss** – Due to small stops, idling or minor stops, slow cycles, and reduced speed.
3. **Quality Loss** – Due to production rejects, process defects, startup rejects, and reduced yield.

2.3: Types of Reports

Reports offered by OEE:

- Production Log Data (available to all users on the network).
- Downtime durations and reason codes.
- Call for help, Acknowledge Call and Clear Call for help data log files.
- Log files created in CSV format for the ability to create custom dashboards and reports.

2.4: Contractual Requirements

There are contractual requirements and a signed NDA required for anyone that wants access to the Intellectual Property of the Horner Solutions Group contained in the OEE solution kit and/or for any customization of the logic already in place.

The OEE Machine Monitoring Solution Program allows configuration changes and adjustments to parameters that need to be tailored for each customer's individual work cell requirements. Also, this program is locked down and password protected from viewing, copying, changing, uploading or downloading logic, data log setup, or operator interface displays. If a customer, channel partner, or system integrator would like to modify the program logic, operator interface screens, or data log information, they must contact the factory to discuss with the Horner Solutions Group Manager.

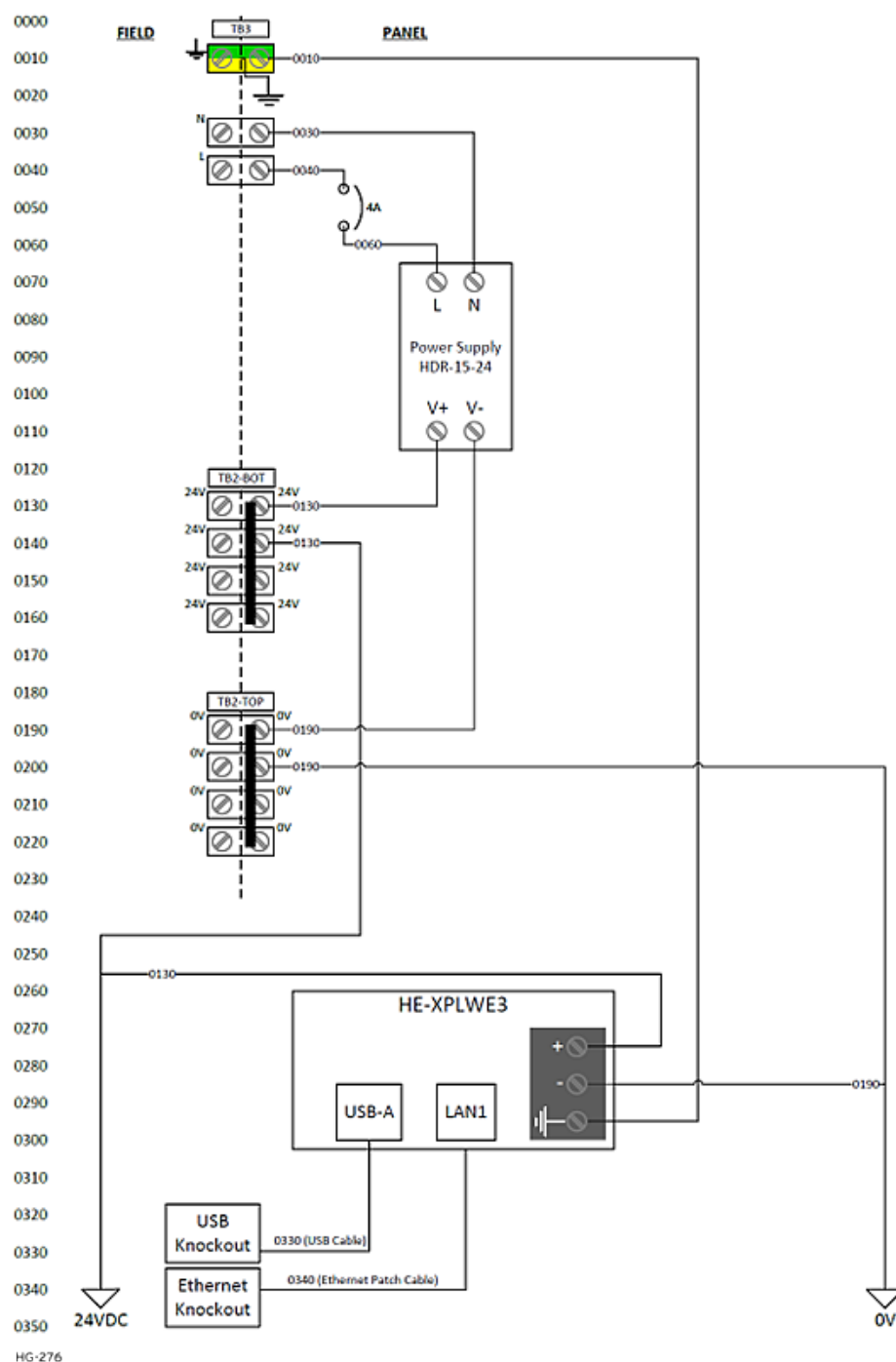
Each of these cases will be handled on a case-by-case basis determined by the size of the project and who requested the modification. Finally, a signed NDA protecting the IP of this product for the Horner Solutions Group is needed, which will include who will support the application changes that are made and what the costs are that are associated with the individual project requirements.

To contact the factory, please contact the **Horner Solutions Group Manager at 877-665-5666**.

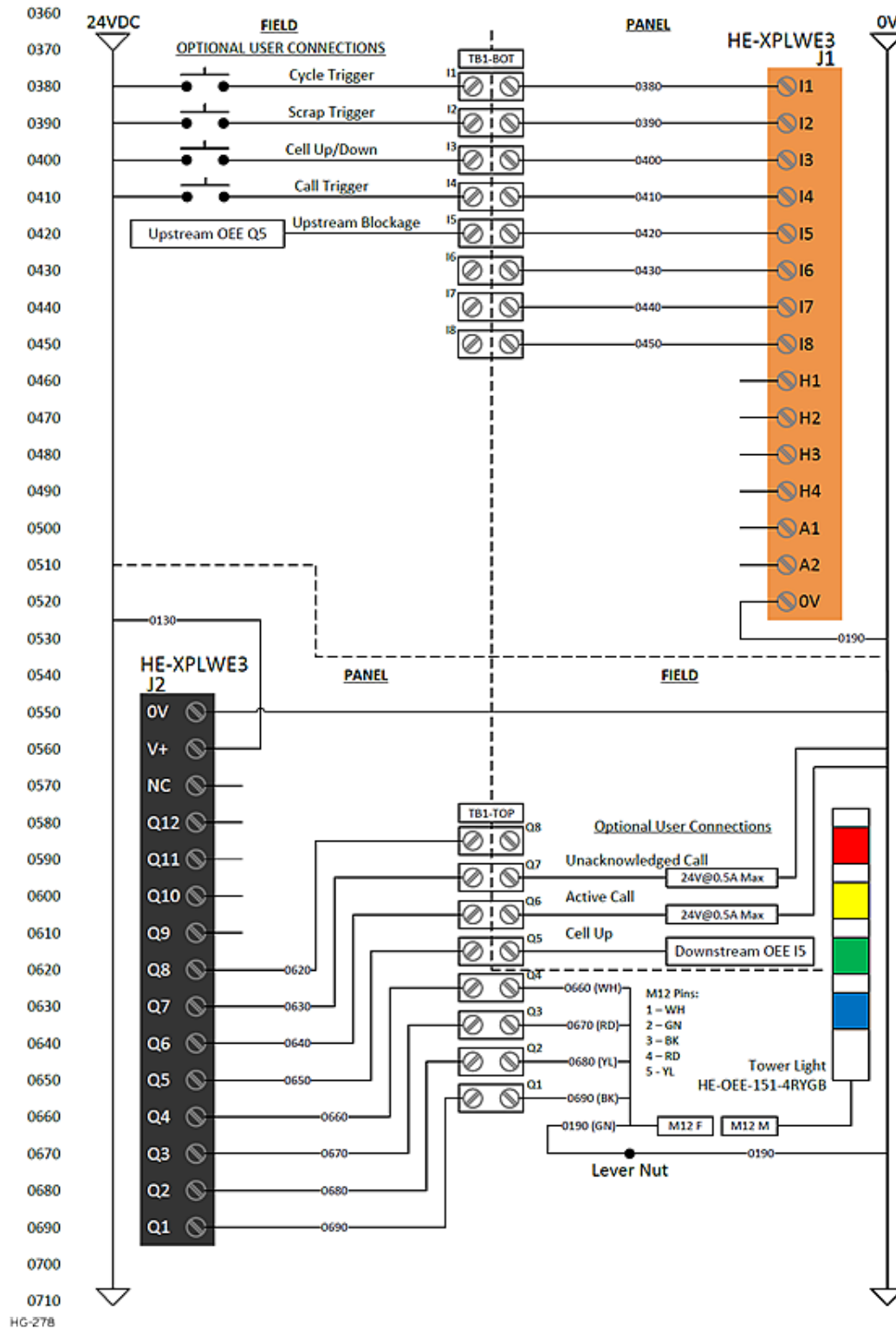
Electrical Installation



3.1: OEE Power Wiring	14
3.2: OEE Electrical I/O	15



3.2: OEE Electrical I/O



Electrical Grounding



Chapter 4: Electrical Grounding

4.1: Grounding Definition	17
4.2: Ground Specifications	17
4.3: How to Test for Good Ground	17

4.1: Grounding Definition

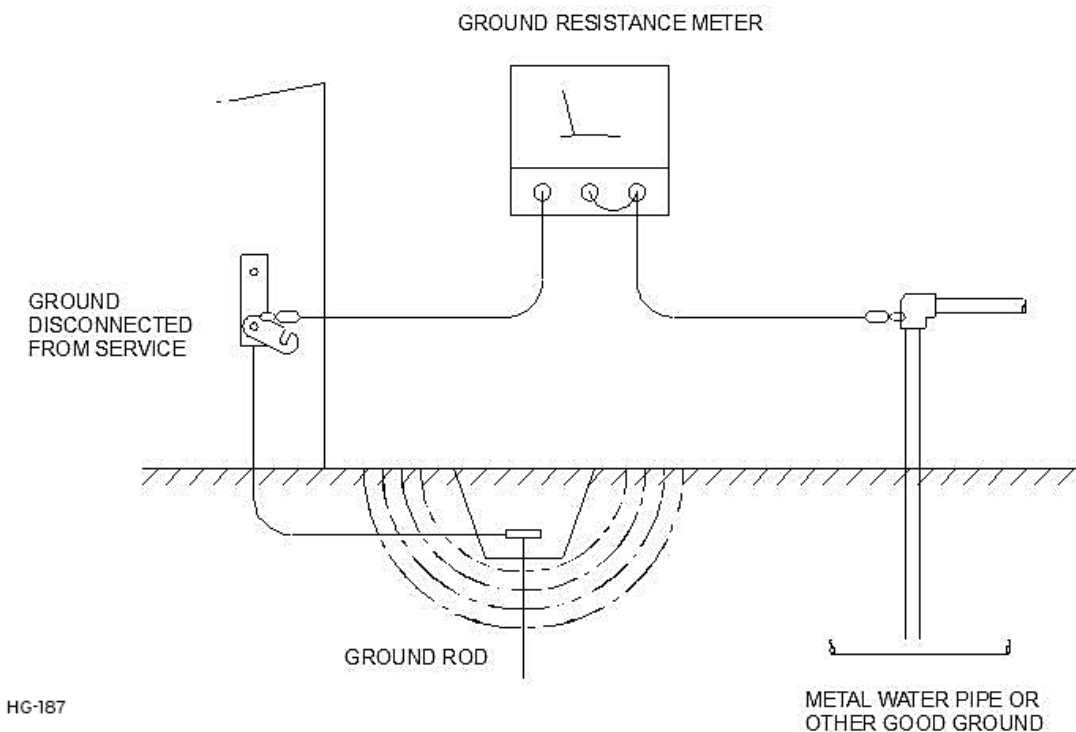
Grounding Definition - The term **ground** is defined as a conductive connection between a circuit or piece of equipment and the earth. Grounds are fundamentally used to protect an application from harmful interference causing either physical damage such as by lightning or voltage transients or from circuit disruption often caused by radio frequency interference (RFI).

4.2: Ground Specifications

Ideally, a ground resistance measurement from equipment to earth ground is 0Ω . In reality it typically is higher. The US National Electrical Code (NEC) states the resistance to ground shall not exceed 25Ω . Horner Automation recommends less than 15Ω resistance from the equipment to ground. Resistance greater than 25Ω can cause undesirable or harmful interference to the device.

4.3: How to Test for Good Ground

In order to test ground resistance, a Ground Resistance Tester must be used. A typical Ground Resistance Meter Kit contains a meter, two or three wire leads, and two ground rods. Instructions are supplied for either a two-point or a three-point ground test. The figure shows a two-point ground connection test.



System Navigation



Chapter 5: System Navigation

5.1: Power On	19
5.2: Home	20
5.3: Trends	22
5.4: Summary	25
5.5: Events	25
5.6: Downtime Accumulators	26
5.7: Call Accumulators	26

5.1: Power On

Each time the OEE system is powered on, a caution appears to inform the user that outputs may become active immediately upon the acceptance of the warning message. Since the OEE system may be wired into existing control systems, this caution serves as notice that incorrect wiring may cause inadvertent machine operation resulting in damage or harm.

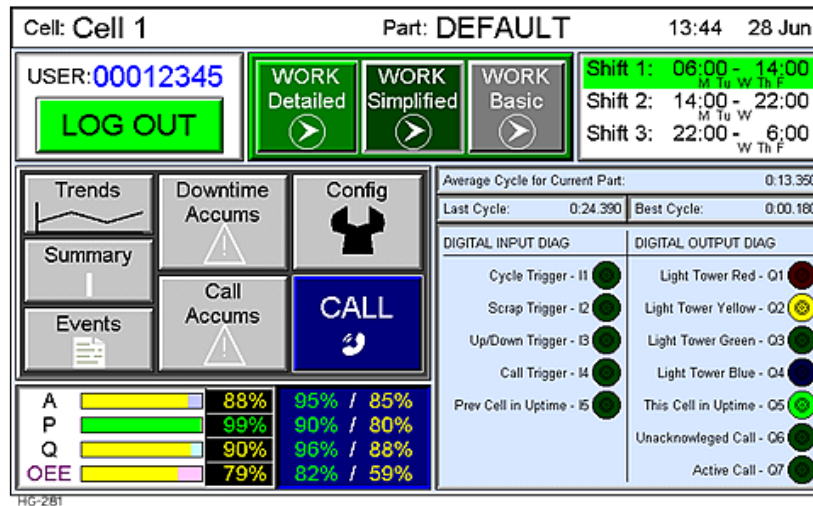


No outputs will become active until this CAUTION message is accepted. Please refer to wiring diagrams and be sure to fully understand the intended connections before accepting this message.

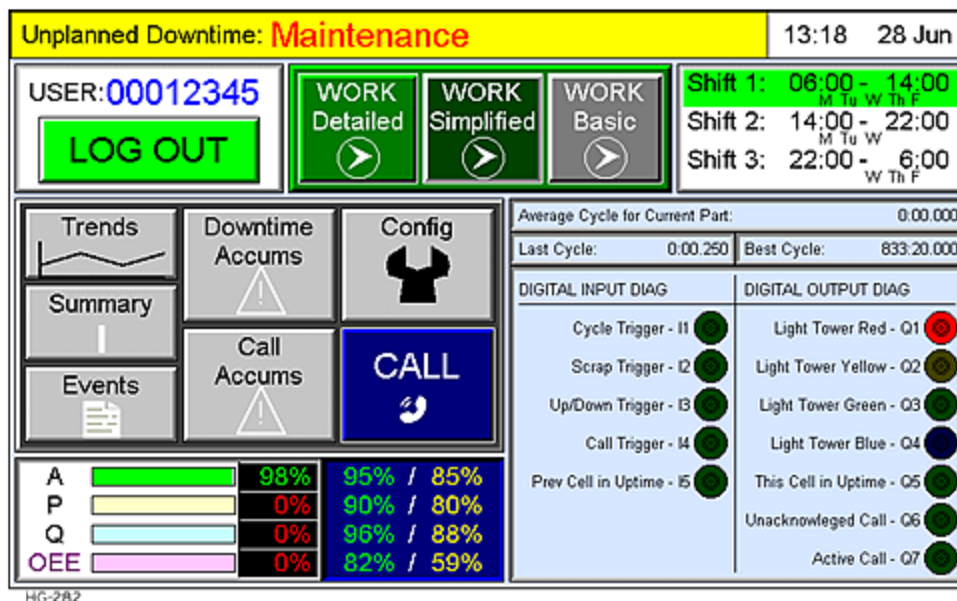
5.2: Home

Home is the central navigation and status interface that displays as soon as the CAUTION message is accepted. Access to Work interfaces, Trends, Summaries, Downtime accumulators, and other features are available from Home. All 'Back', 'Exit', and 'Home' buttons eventually lead to Home.

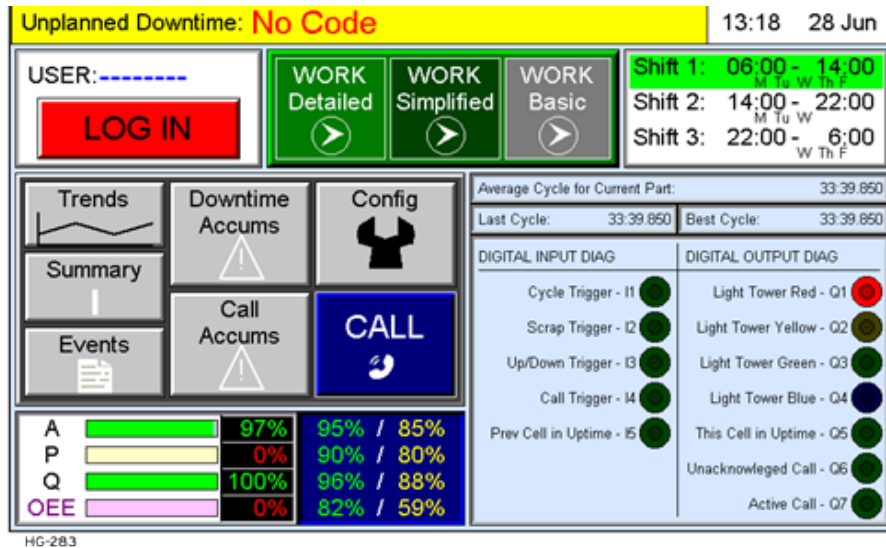
An example of the Home interface during an active Shift 1:



An example of the Home interface during an active Shift with active Downtime that has been specified as "Maintenance":



An example of the Home interface without a user logged in but during an active Shift, with Downtime active that has yet to be assigned to a specific reason:

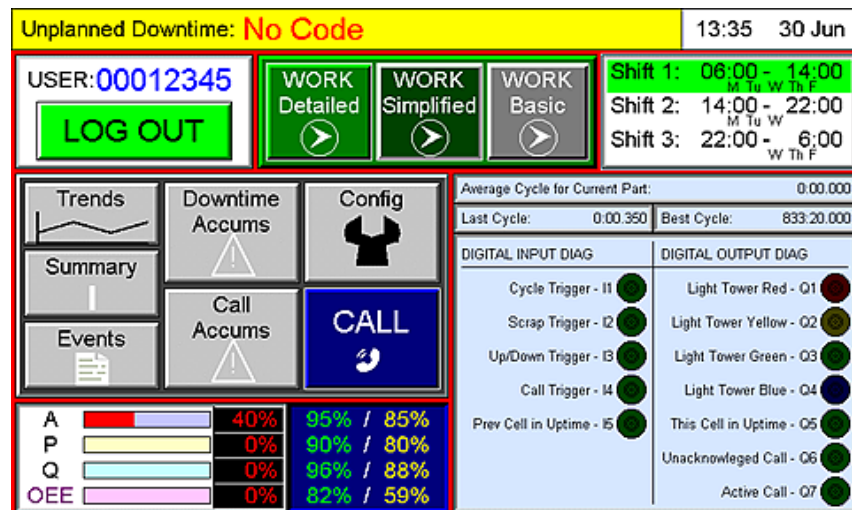


HG-283

5.2.1: Screen Header

The banner at the top of the screen displays the Cell identifier text and the current Part, as well as the current system time and date. If downtime is currently active, a notification is displayed here.

The Downtime description may display as '**No Code**' if the reason for Downtime has not yet been specified. Users are forced to specify a Downtime Code before any further manual operation can occur, but only from the Work interfaces. This is to keep from interrupting other operations, such as system configuration or viewing historical data.



HG-284

The background color of many displays can be linked to the current Light Tower color, such as the red background shown in the Home display above. (See ["Screen Background" on page 36.](#))

5.2.2: User

The current user is included in log entries made by the OEE system. A user must be logged in to be able to use the Work interfaces.. If no user is logged in, the box will show a 'LOG IN' button. If a user is currently logged in, the User area will show the current user along with a 'LOG OUT' button. Both the 'LOG IN' and 'LOG OUT' buttons result in navigation to either the Log In interface or the Log Out interface. Once those operations are complete, the system returns to the Home display.

See ["Login/Logout" on page 58](#) and ["Login Configuration" on page 86](#)

5.2.3: Work Interfaces: Detailed, Simplified, Basic

These navigation buttons take the operator to a screen where cycles and scrap can be triggered manually, Machine Up/Down can be triggered manually, parts can be changed, Downtime Codes specified, etc.

See ["Work Interfaces" on page 61](#)

5.2.4: Shift Configuration and Status

Configured shift times are displayed. Any shift that is not configured is shown as dashes. A shift that is currently in progress is highlighted in green.

See ["General Shift Configuration" on page 40](#) and ["Shift Configuration" on page 82](#)

5.2.5: System Navigation

Access to Trends, Summaries, Events, Downtime accumulators, Call accumulators, the Call interface, and OEE Configuration are available via these navigation buttons.

See ["Trends" below](#), ["Summary" on page 25](#), ["Events" on page 25](#), ["Downtime Accumulators" on page 26](#), ["Call Accumulators" on page 26](#), ["Calls" on page 28](#), and ["Configuration" on page 32](#).

5.2.6: System Status

The Average Cycle Time, Last Cycle Time (most recent cycle), and the Best Cycle Time are displayed. The current state of the Digital Inputs and Digital Outputs is shown for troubleshooting purposes.

5.2.7: OEE Scores

The running scores for the system are shown in bar graph and numeric format. The bar graph fill and the numeric data will change colors to reflect the current OEE targets. The current OEE targets are shown to the right of the running scores.

5.3: Trends

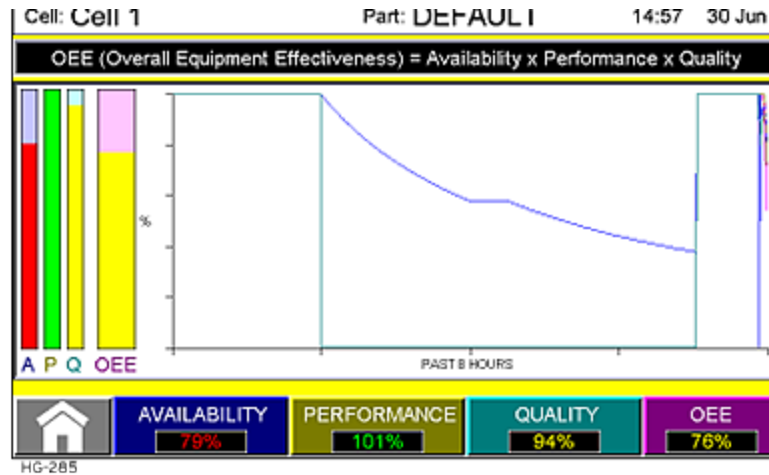
The Trend button accesses a running trend of OEE data that has collected for the past 8 hours. The user will first see a single trend that includes all OEE data in the same trend. Navigation buttons at the bottom of the screen provide access to each separate attribute of OEE as well as the total OEE alone.

When viewing any of the single attributes alone (A, P, Q, OEE), pressing the same button again will return to the trend containing all the attributes together.

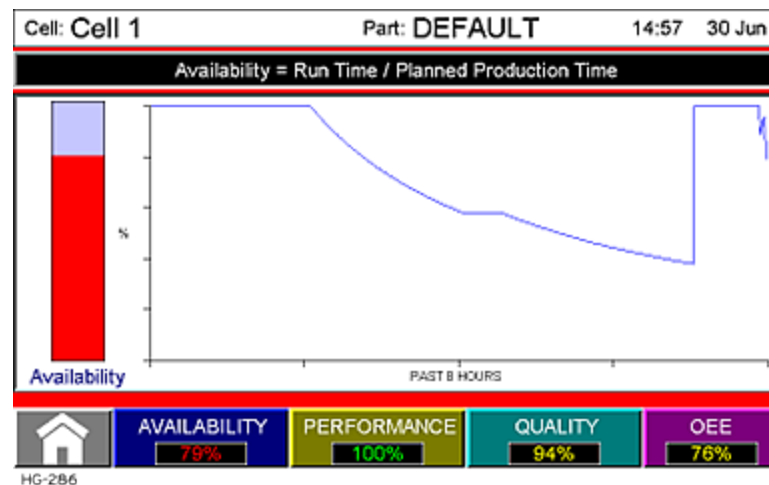
The screen background color reflects green/yellow/red according to the current attribute score and the respective current targets.

Pressing the **Home** button will return to Home.

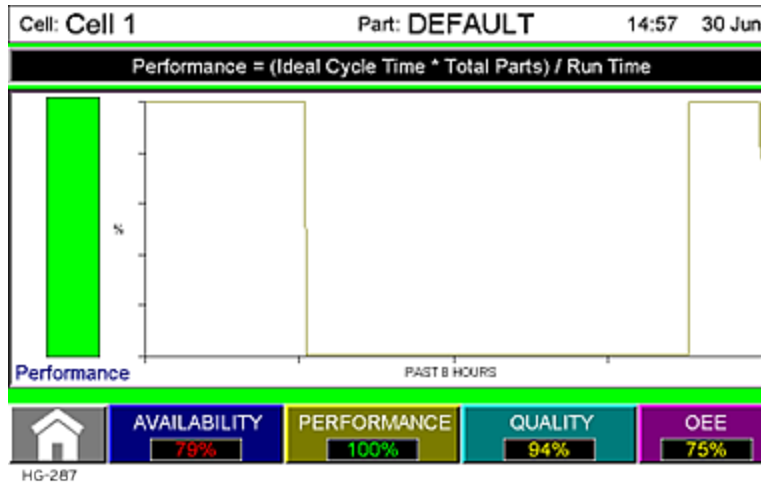
5.3.1: Main Trend Screen – OEE and All Components



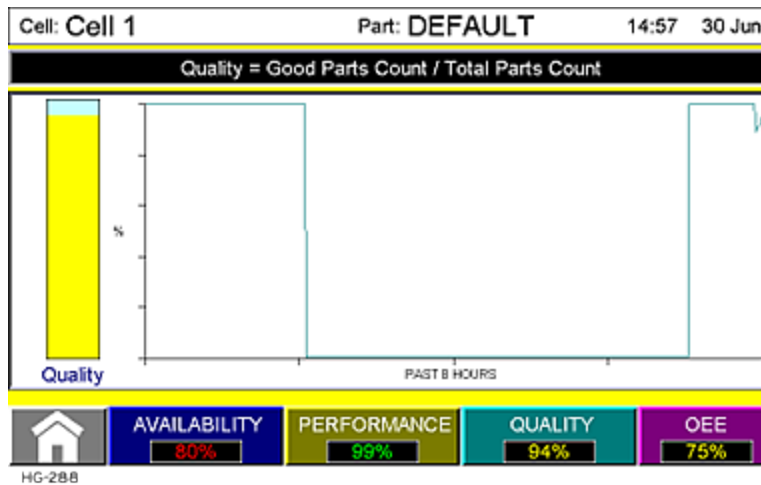
5.3.2: Availability Score Trend



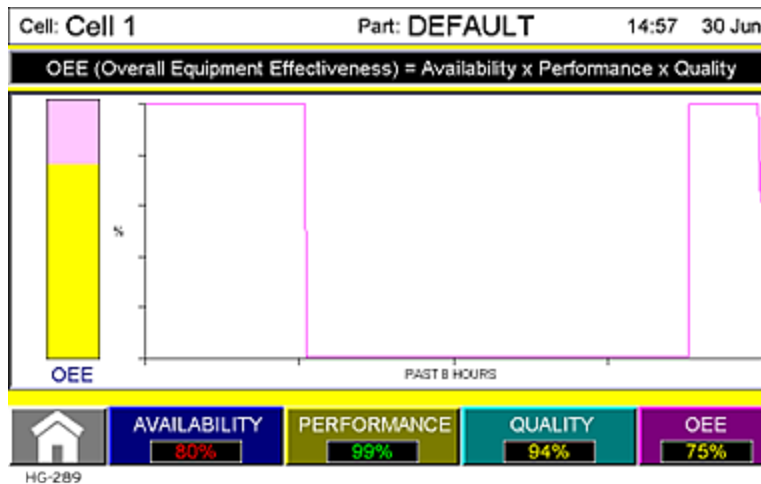
5.3.3: Performance Score Trend



5.3.4: Quality Score Trend

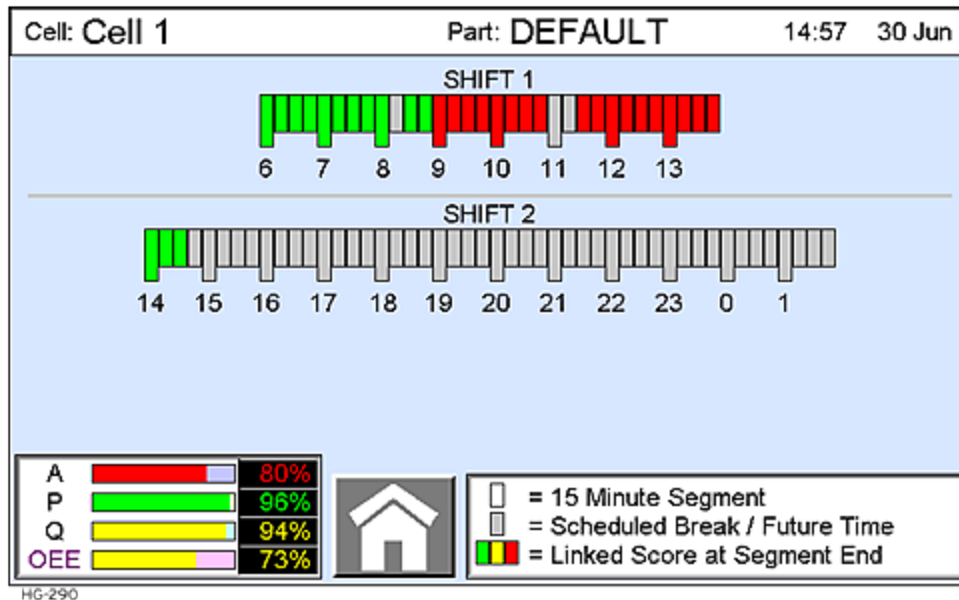


5.3.5: OEE Score Trend



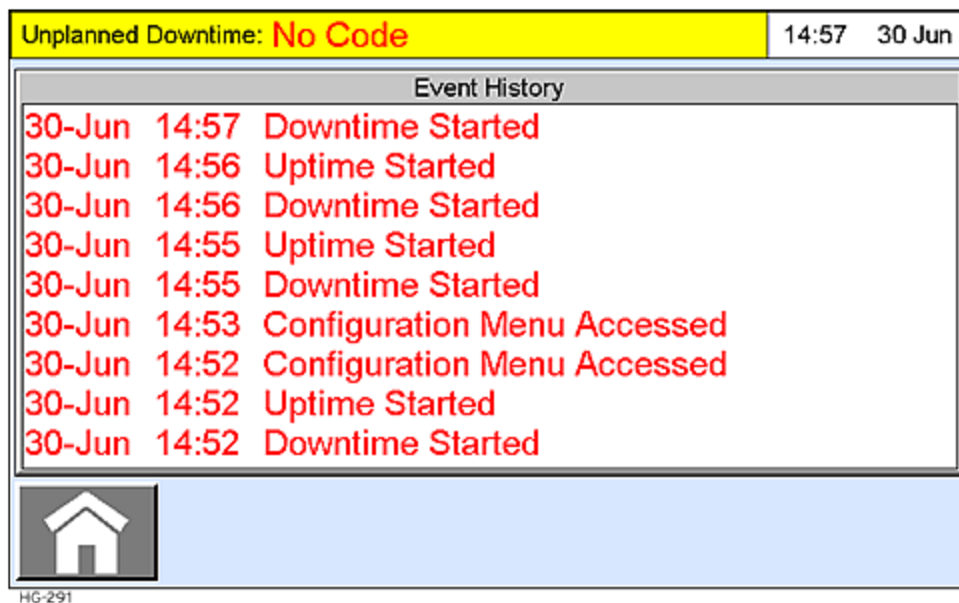
5.4: Summary

The Summary gives an overview of the current shift and any shifts not currently active that have completed. A block is shown for each 15-minute slice of time during the shift. A block may be colored grey to indicate it is either in the future or was scheduled break time. The block is colored Red, Yellow, or Green to reflect the linked score at the end of that time segment.




5.5: Events

An event log is provided to show a timestamped history of system events. Touching the list will display a window that can be navigated back in time.



5.6: Downtime Accumulators


The accumulated downtime for each downtime code is shown in a chart format. The total amount of downtime is shown for each Shift. Scheduled Changeover time that has accumulated is shown. If there is any unassigned downtime accumulating, it is shown at the top of the screen.

No Code: 0:03:19		DOWNTIME ACCUMULATORS		18:32	30 Jun
1. Operator Shortage	0:00:00	11. Break / Lunch	0:00:00		
2. Upstream Blockage	0:00:00	12. Safety Stop	0:00:00		
3. Changeover	2:43:21				
4. Setup	0:00:00				
5. Maintenance	0:00:00				
6. Quality	0:00:00				
7. Machine Adjustments	0:00:10				
8. Machine Idling	0:29:22				
9. Minor Stop	0:01:36				
10. Call for Parts	0:00:00				
		Scheduled Changeover: 0:01:15	0:00:00	3:17:48	0:01:10
			Shift 1	Shift 2	Shift 3

HG-292

5.7: Call Accumulators

The amount of time each call has been active and unacknowledged is shown for each shift. Only configured shifts will display.

CALL ACCUMULATORS				14:59	30 Jun
Shift 1 Raw Materials Call	Active:	0:00:00	Unacknowledged:	0:00:00	
Shift 1 Maintenance Call	Active:	0:00:00	Unacknowledged:	0:00:00	
Shift 1 Supervisor Call	Active:	0:00:00	Unacknowledged:	0:00:00	
Shift 2 Raw Materials Call	Active:	0:01:01	Unacknowledged:	0:00:28	
Shift 2 Maintenance Call	Active:	0:01:06	Unacknowledged:	0:01:06	
Shift 2 Supervisor Call	Active:	0:00:00	Unacknowledged:	0:00:00	
					

HG-293

Calls



Chapter 6: Calls

6.1: Placing a Call	28
6.2: Acknowledging a Call	29
6.3: Clearing a Call	30

The Call interface is available from the Home interface, from all Work interfaces, and from the Login interface. It allows a machine operator to make calls to one or more departments via light tower notification and, if configured, e-mail notification.

Accessing this screen is also how a call is acknowledged or cleared by the corresponding department after they have responded to the call. Depending on e-mail configuration, an e-mail will be sent after a timeout period if an active call has not been acknowledged.

The blue light on the OEE Light Tower will flash if there are any unacknowledged active calls. The blue light will remain solid blue if all active calls have been acknowledged.

The Call button itself, on any interface with a Call button, will reflect an active call by flashing the icon on the button face.

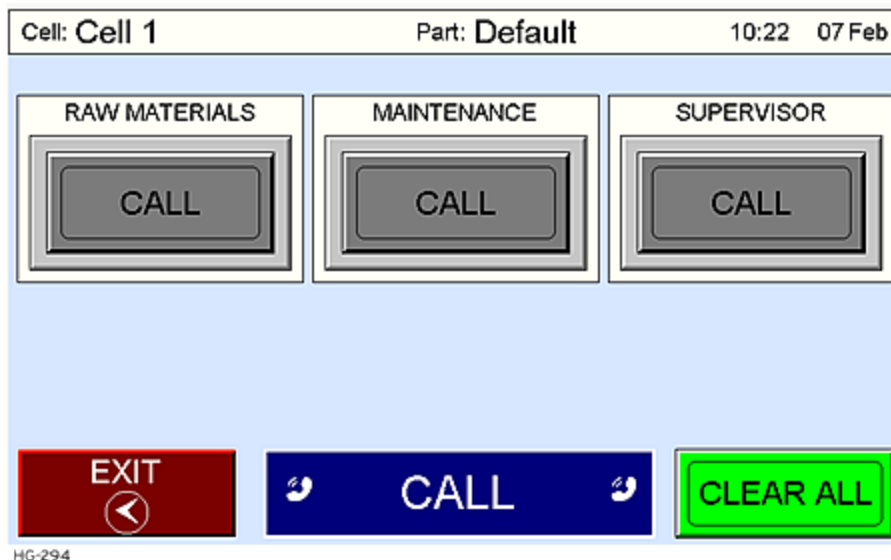
Pressing any activated Call button will clear that Call. Pressing the '**CLEAR ALL**' button will clear all active calls. Calls can be cleared whether they have been acknowledged or not.

6.1: Placing a Call

Access the Call interface by pressing the '**CALL**' button. The current state of the Calls are shown. Press the button for the type of call needed. The button will remain pressed in to indicate an Active Call. The blue tower light immediately will start to flash, as will the Call icons on all '**CALL**' buttons.

If configured, an e-mail message is sent when a call becomes active.

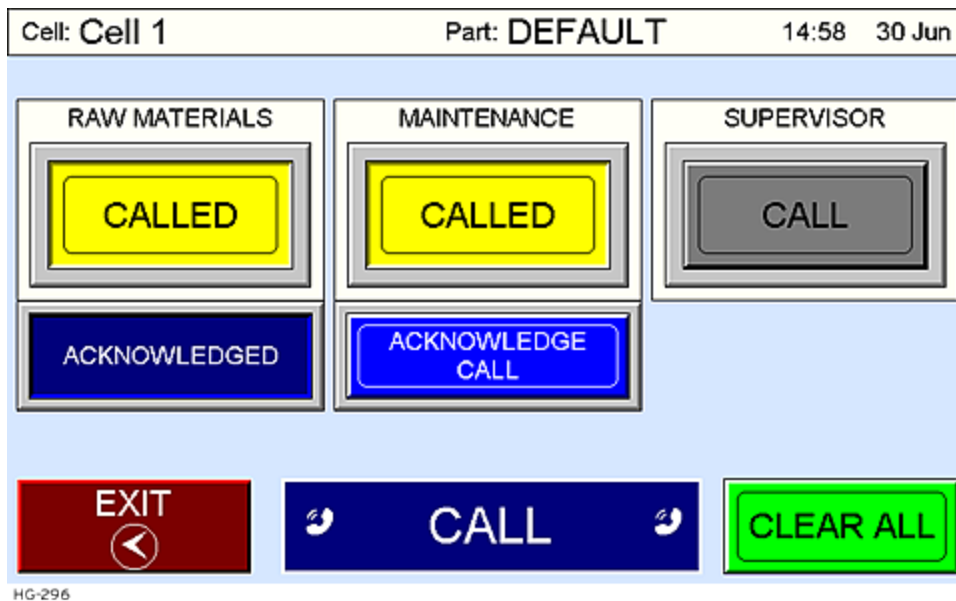
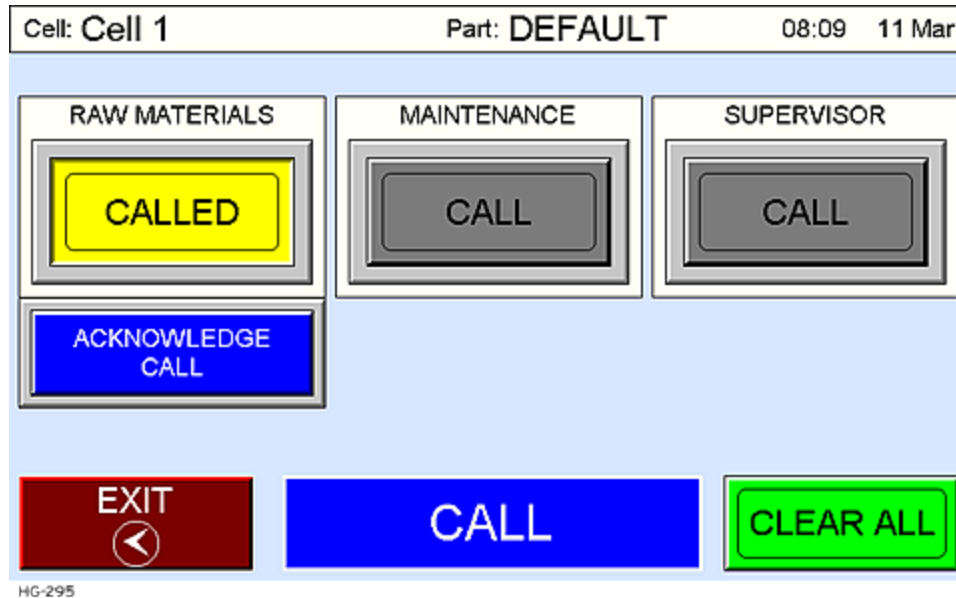
The user may exit the Call interface once a call is placed to continue work or other operations as needed.



HG-294

6.2: Acknowledging a Call

When the appropriate department responds to the Call, they should Acknowledge the Call. Access the Call Interface, then press the corresponding '**Acknowledge Call**' button.



If e-mail has been configured and the timeout expires before the Call has been Acknowledged, a follow-up e-mail is sent to an additional address, if so configured.

6.3: Clearing a Call

Once someone from the appropriate department addresses the Call issue, they should clear the call. Access the Call Interface, then press the corresponding “**CALLED**” button to clear that Call.

All active Calls can be cleared at once by pressing the ‘**Clear All**’ button. The blue tower light will become inactive once there are no active calls.

To maintain flexibility, Calls can be Cleared without first Acknowledging them. This allows for a Call that is quick to address, such as Raw Materials delivering parts, and to be addressed without first making an extra trip to the station to acknowledge the Call.

Follow company policy on Acknowledging Calls before Clearing Calls. The Call Logs will reflect activity to include an Active and Cleared call without an Acknowledgment step in between

Configuration



Chapter 7: Configuration

7.1: Configuration Overview	32
7.2: Cell Configuration: General	34
7.3: Cell Configuration: Options	35
7.4: Cell Configuration: Automatic Downtime Codes	37
7.5: Cell Configuration: Remote Triggers	37
7.6: Shift Configuration	39
7.7: Part Editor/Viewer	41
7.8: Downtime Code Configuration	47
7.9: Ethernet Configuration	48
7.10: Email Configuration	51
7.11: System Information	53

7.1: Configuration Overview

The Config button provides a password prompt to access the configuration of the OEE system. The password prompt screen also displays versions that may assist with technical support when needed. Options to copy files from a USB drive to the installed MicroSD card are provided to allow datalog and configuration files to be transferred.

7.1.1: Copying Files to/from USB Drive

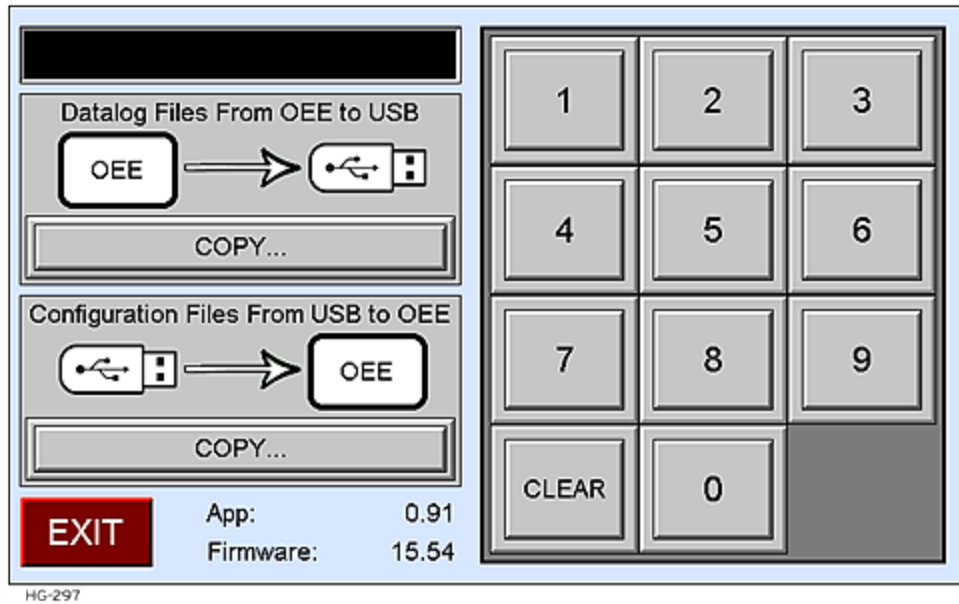
One option to transfer datalog files from the OEE system is to plug in a USB thumb drive and use the button on the Configuration Password display to copy all datalog files and the contents of the PART directory from the OEE system to the thumb drive. Or configuration files can be transferred from the USB drive to the OEE system.

Pressing either button will turn the button green. The button face text will change from “COPY...” to “DONE” when the transfer is complete or if there were problems during the transfer. Transfers normally take place within a couple of seconds depending on the number of files that need to be copied. An instantaneous change to “DONE” may indicate an error, such as a missing USB drive or other problems.

To reset the “COPY” buttons, exit the password interface and return.

7.1.2: Configuration Access

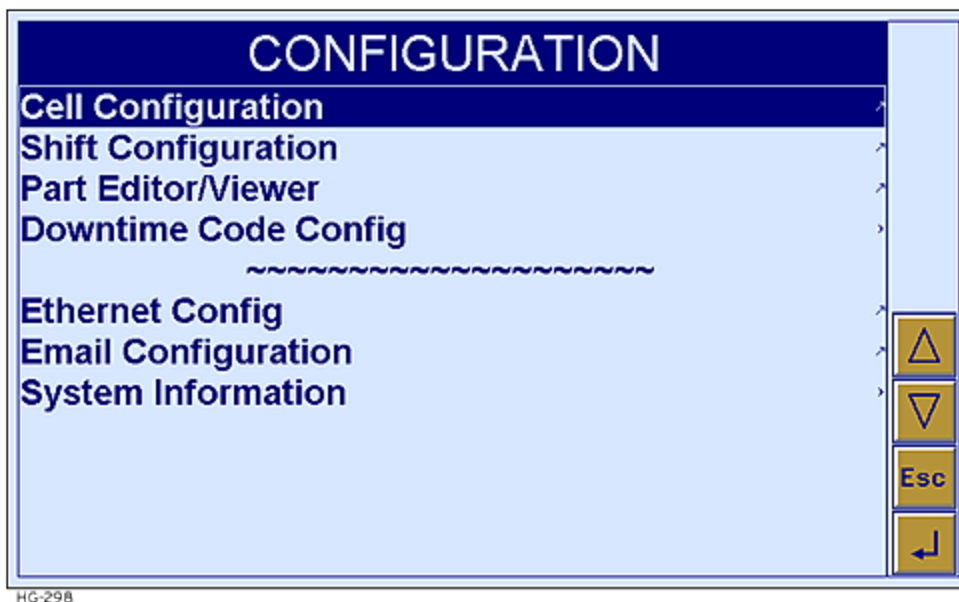
The password for Configuration access is linked to the first User ID of the twenty available User IDs that can be configured for the system. By default, this password is 12345. (See ["Login Configuration" on page 86](#))



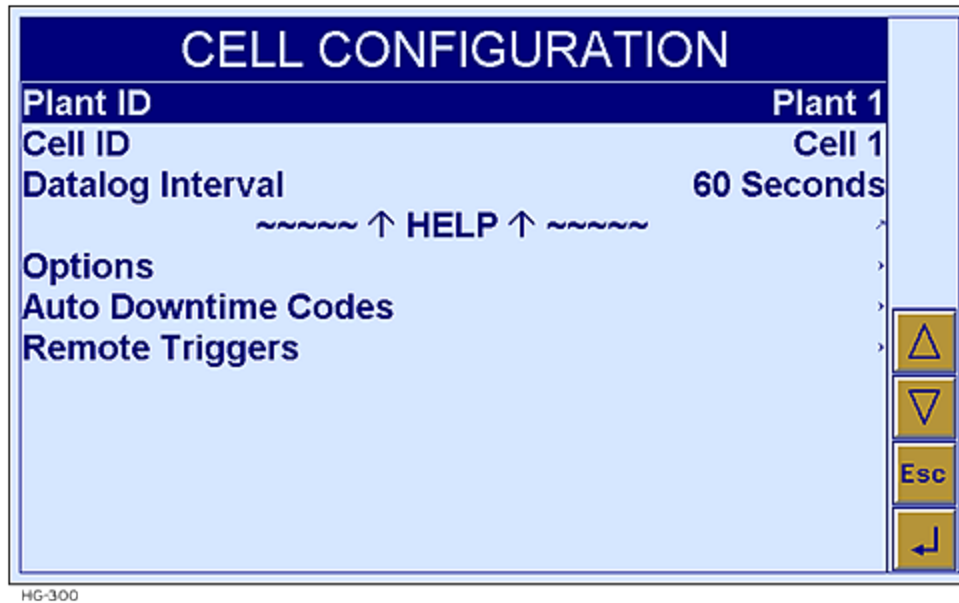
Successful password entry gains access to the main Configuration Menu as soon as the last digit of the correct password is pressed. The '**CLEAR**' button can be used to clear an errant entry before retrying. Any incorrect or incomplete entry will be cleared automatically if 5 seconds elapses without any input or if the '**EXIT**' button is pressed.

7.1.3: Using the Configuration Menu

Touch the desired menu option or use the up/down arrow keys to highlight the selection, then press ↵.



7.2: Cell Configuration: General

A screenshot of a 'CELL CONFIGURATION' screen. The title 'CELL CONFIGURATION' is at the top in a dark blue bar. Below it, the screen is divided into two columns. The left column contains labels: 'Plant ID', 'Cell ID', 'Datalog Interval', 'Options', 'Auto Downtime Codes', and 'Remote Triggers'. The right column contains values: 'Plant 1', 'Cell 1', '60 Seconds', and four right-pointing chevrons. Between the columns, there is a line of text: '~~~~~ ↑ HELP ↑ ~~~~~'. On the far right, there is a vertical stack of four buttons: an up arrow, a down arrow, 'Esc', and a left arrow. The label 'HG-300' is at the bottom left of the screen.

CELL CONFIGURATION

Plant ID	Plant 1
Cell ID	Cell 1
Datalog Interval	60 Seconds
~~~~~ ↑ HELP ↑ ~~~~~	
Options	›
Auto Downtime Codes	›
Remote Triggers	›

HG-300

### 7.2.1: Plant ID

Information that is included with Log files to identify this plant location. This will help corporate applications identify data from different plant locations.

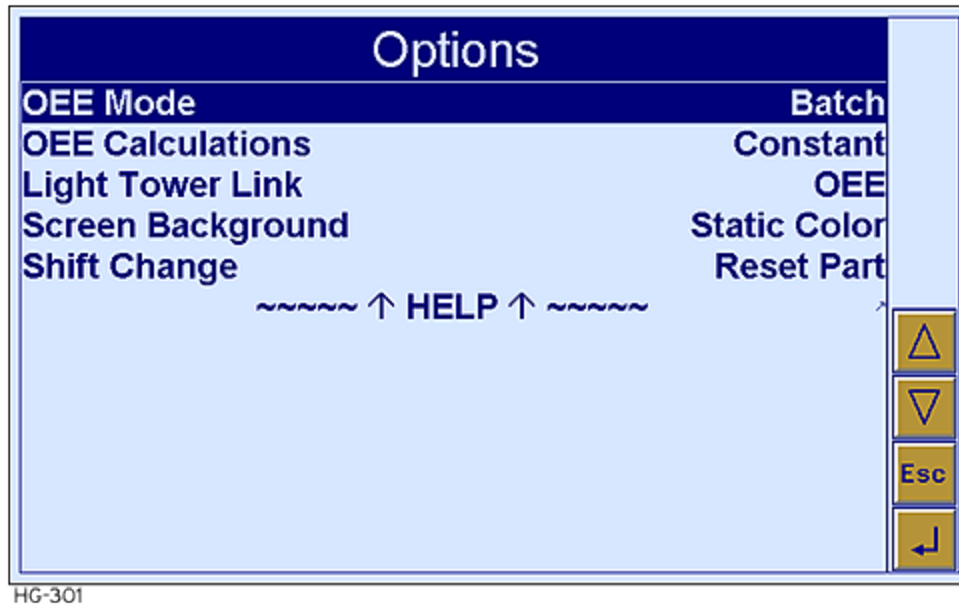
### 7.2.2: Cell ID

Information that is included with Log files to identify individual work cell within a plant or multi-plant application

### 7.2.3: Datalog Interval Settings

A setting for how often the system makes an entry in the data log file. This can be set in the range from 3 seconds to 32767 seconds

## 7.3: Cell Configuration: Options



### 7.3.1: OEE Mode

The displayed OEE calculations can be either Shift calculations or Batch calculations.

Shift calculation mode is intended to encompass one or more part changes during the shift. If no part changes are intended, it is suggested to use Batch mode.

In Shift mode, up to 16 parts per shift are given a time allotment where the total of all part allotments is equal to the total length of the shift. The OEE calculations take the current part and all previous parts in this shift into consideration, as well as the overrun of a part into the next part's scheduled run.

Shift mode operation requires detailed and knowledgeable configuration that is currently only available through the separate configuration utility. It is intended that planners possibly alter this configuration on a shift-by-shift and day-by-day basis. (See: ["Shift Configuration" on page 82](#))

When using Shift mode, each part's Batch OEE targets are ignored in favor of the Shift OEE targets.

Batch mode keeps the OEE calculations to just the part currently selected. Each part configuration includes OEE targets, which are used when in this mode (but ignored in Shift mode). When in Batch mode, all OEE calculations are restarted with each Part changeover or new Shift.

### 7.3.2: OEE Calculations Configuration

The OEE calculations update on a running basis. This allows accurate OEE reporting at any point during the shift or batch.

When a shift starts or a new part is selected in Batch mode, the scores all initialize to 100% and do not get updated until the first part cycle, the first scrap cycle, or the configured grace period timeout occurs.

After that initial trigger, Availability and Quality scoring is always calculated once per second. The 'OEE Calculations' configuration option allows Performance scoring and total OEE scoring to be calculated once per second in the same fashion or calculated only when a new cycle occurs when in Uptime. During downtime, all components of OEE are calculated once per second.

**Constant:** All OEE scoring is calculated once per second. This provides consistent updates for processes with cycles that are expected every couple of seconds or faster. When a part has a longer cycle time, this can lead to large dips and jumps in the OEE score between cycles, especially towards the beginning of a shift or batch.

**On Cycle:** The OEE system will only calculate the Performance and OEE scores when a cycle is triggered. Availability and Quality continue to be updated continuously. This allows for calculations that do not fluctuate wildly because of long cycle times, especially towards the beginning of a shift or batch. However, during downtime, all OEE calculations revert to once per second.

### 7.3.3: Light Tower Link

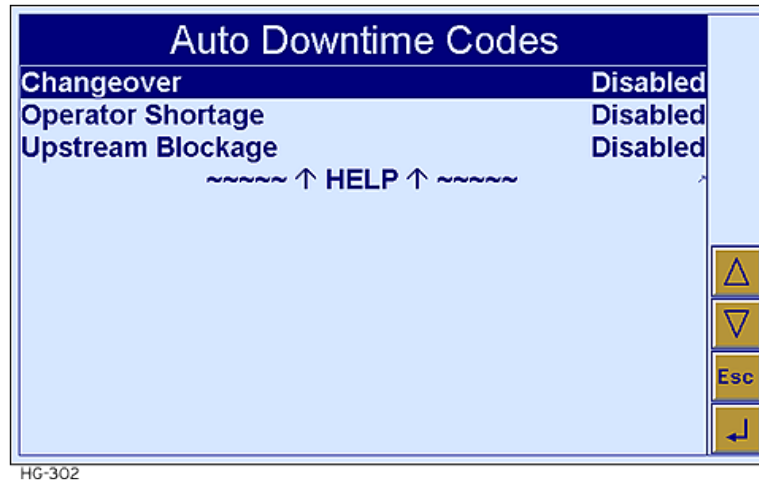
The light tower is linked to the OEE score by default. It can also be linked to just one of the OEE parameters, such as Availability, Performance, or Quality.

### 7.3.4: Screen Background

Many of the OEE interfaces have a dynamic background color that can follow the Light Tower. Alternately, they can be set to the standard, static background color.

The Configuration menu pages have this dynamic background around the outside border of the menu. Changing this option will immediately provide an example of the difference between the two choices.

## 7.4: Cell Configuration: Automatic Downtime Codes

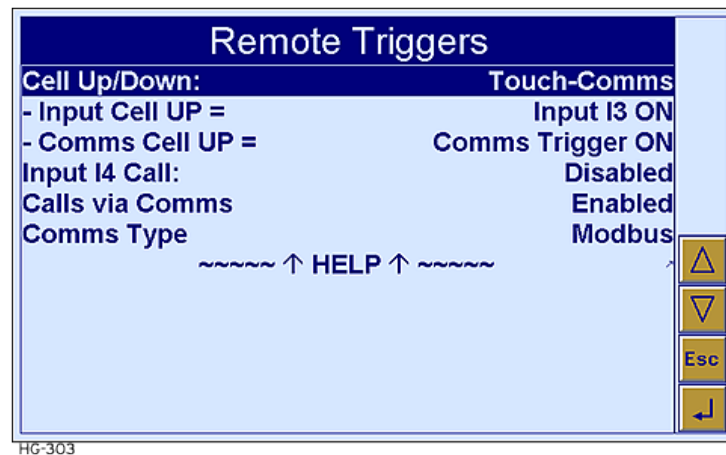


Downtime codes can be triggered automatically to reflect the following:

- Changeover: Upon Changeover, if Changeover has not been ended before timing out
- Operator Shortage: If Downtime occurs and no user is logged in
- Upstream Blockage: If Downtime occurs and the signal from the previous OEE Cell is currently indicating that it is in Downtime

See ["Automatic Downtime Code Entry" on page 68](#)

## 7.5: Cell Configuration: Remote Triggers



Certain operations of the OEE system may be triggered remotely by either digital signals from the machinery, external pushbuttons, photoeyes or other sensors, or signaling over communications.

### 7.5.1: Cell Up/Down Method

The OEE Cell may be flagged as Up or Down, which corresponds directly to clocking Uptime or Downtime, by several means. Some of these means are automatic and determined by the OEE system. Other means can be due to user input or triggers from machinery. The options are as follows:

- **Touchscreen:** The OEE Cell can be determined Up or Down by buttons on the touchscreen in any of the 'Work' interfaces. All other triggering methods are ignored.
- **Sensor:** The OEE Cell can be determined Up or Down by a signal to the Digital Input 3 pin. The operation of this input pin is further determined by the "Input Cell UP" option detailed below. All other triggering methods are ignored.
- **Comms:** The OEE Cell can be determined Up or Down by a signal via the selected Communications Protocol. The Protocol is determined by the "Comms Type" option detailed below. The operation of the comms signal is further determined by the "Comms Cell UP" option detailed below. The "Modbus Write to OEE" option must be ENABLED. All other triggering methods are ignored.
- **Touch-Sensor:** The OEE Cell can be determined Up or Down by either the buttons on the touchscreen in any of the 'Work' interfaces, or as configured for Sensor input via the Digital Input 3 pin.
- **Touch-Comms:** The OEE Cell can be determined Up or Down by either the buttons on the touchscreen in any of the 'Work' interfaces, or as configured for Comms via the selected Protocol.

The Sensor signal wired to Digital Input 4 and the Comms signal via the selected Protocol can be configured as follows:

#### Input Cell UP =

- **Input I3 ON:** The OEE Cell is to be determined in Uptime on the RISING edge of the I3 input signal, and in Downtime on the FALLING edge of the I3 input signal.
- **Input I3 OFF:** The OEE Cell is to be determined in Uptime on the FALLING edge of the I3 input signal, and in Downtime on the RISING edge of the I3 input signal.
- In either case, other automatic Up/Down determinations may still be in effect.
- These options only take effect if either the **Sensor** or **Touch-Sensor** options are selected for the Cell Up/Down method.

#### Comms Cell UP =

- **Comms Trigger ON:** The OEE Cell is to be determined in Uptime on the RISING edge of the Comms signal, and in Downtime on the FALLING edge of the Comms signal.
- **Comms Trigger OFF:** The OEE Cell is to be determined in Uptime on the FALLING edge of the Comms signal, and in Downtime on the RISING edge of the Comms signal.
- In either case, other automatic Up/Down determinations may still be in effect.
- These options only take effect if either the **Comms** or **Touch-Comms** options are selected for the Cell Up/Down method.

### 7.5.2: Input I4 Call

Digital Input 4 may be used to place one of the available types of Call.

- **Disabled:** Signals to Digital Input 4 are ignored
- **Raw Materials:** A call to Raw Materials is placed upon the Rising Edge of the Digital Input 4 signal. The call is cancelled on the Falling Edge of the Digital Input 4 signal.
- **Maintenance:** A call to Maintenance is placed upon the Rising Edge of the Digital Input 4 signal. The call is cancelled on the Falling Edge of the Digital Input 4 signal.
- **Supervisor:** A call to Supervisor is placed upon the Rising Edge of the Digital Input 4 signal. The call is cancelled on the Falling Edge of the Digital Input 4 signal.
- Calls via the touchscreen are still active and may override the state of the input.

### 7.5.3: Calls via Comms

To enable the associated trigger for calls over the selected Communications Protocol, set this option to ENABLED. If Modbus TCP/IP is to be used, the “Modbus Write to OEE” option must be ENABLED.

### 7.5.4: Comms Type

The supported Communications Protocols are Modbus TCP/IP and Allen-Bradley Ethernet/IP. Comms triggers in various portions of the configuration must be enabled and the correct protocol selected here for Communications to be able to trigger these functions.

See ["Triggering via Modbus TCP/IP Communications" on page 99](#) and ["Ethernet/IP Consumed Data" on page 103](#).

## 7.6: Shift Configuration

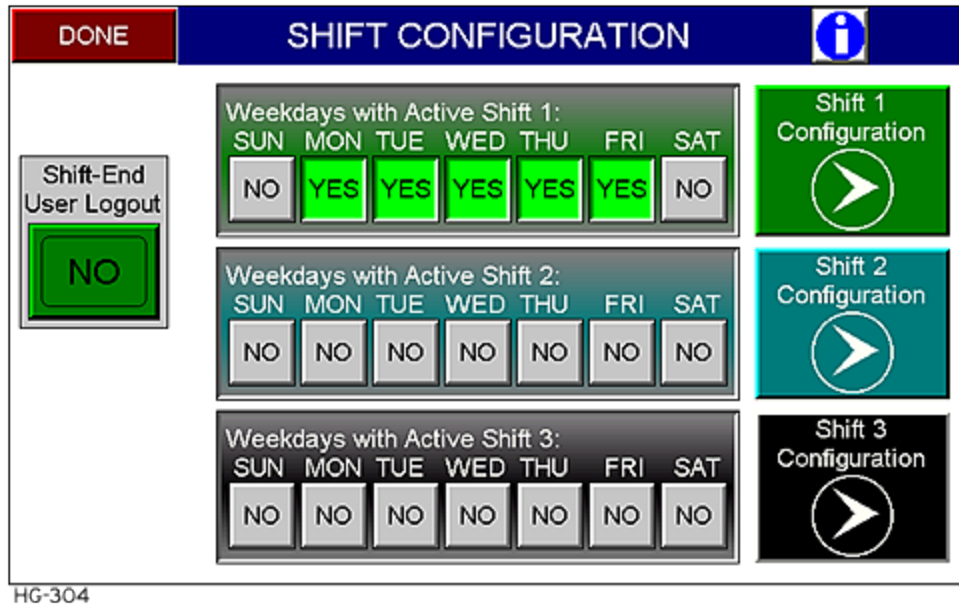
The Shift Configuration described here determines the schedule of when the OEE system is active. Operation of the OEE system in Batch Mode still requires this general Shift Configuration.

For Shift Mode operations, Shift configuration via the touchscreen interface is currently simplified as is detailed in this section. Additional Shift Mode configuration must be done with the configuration utility.

See ["Shift Configuration" on page 82](#)

## 7.6.1: General Shift Configuration

**NOTE:** To edit any parameter, tap the parameter on the touchscreen to toggle the option or use the pop-up keypad to edit.



**SHIFT CONFIGURATION**

**Shift-End User Logout**  
NO

**Weekdays with Active Shift 1:**  
SUN MON TUE WED THU FRI SAT  
NO YES YES YES YES YES NO

**Weekdays with Active Shift 2:**  
SUN MON TUE WED THU FRI SAT  
NO NO NO NO NO NO NO

**Weekdays with Active Shift 3:**  
SUN MON TUE WED THU FRI SAT  
NO NO NO NO NO NO NO

**Shift 1 Configuration**

**Shift 2 Configuration**

**Shift 3 Configuration**

HG-304

For each Shift, select the days of the week with an active Shift on this Work Cell. Configured shifts will start and end automatically on these days. These active days are mirrored within each separate shift configuration screen.

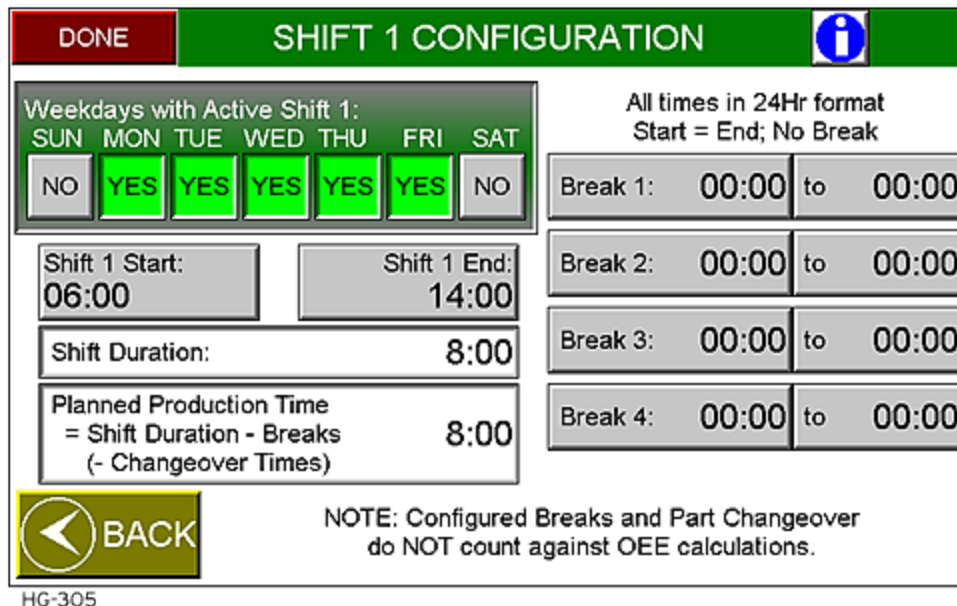
If the logged-in user should automatically be logged out of the system when the shift ends, set the 'Shift-End Logout' option to **YES**.

A help screen is provided by pressing the 'i' button in the screen header.

Pressing **DONE** returns to the main OEE Configuration Menu.



## 7.6.2: Shift 1/2/3 Configuration



Select the days of the week this shift is active. (The Days of the Week selection is mirrored on the main Shift Configuration interface.) Specify Start and End times for the shift. The shift duration is calculated based on these setup parameters.

Up to four pre-determined breaks can be scheduled. Scheduled breaks are not included in Planned Production Time and will not count negatively against OEE calculations.

### Should Breaks Be Configured?

If the goal is to determine production time lost due to idle machinery during breaks or not having overlapping workers to cover break times while machinery sits idle, set the Start and End times to zeroes or equal, meaning no break time. OEE calculations will suffer during these idle break times accordingly.

If there is no plan to ever run machinery in some fashion over break times, configure the breaks accordingly so that the break time does not adversely affect the OEE scores. All time accumulation will cease during these pre-configured times. The Planned Production Time will decrease accordingly.

Part Changeover time, which is intended as planned downtime, is not included in the Planned Production Time calculations shown on this screen.

See ["Scheduled Breaks and Changeover; Effect on Scoring" on page 56](#)

## 7.7: Part Editor/Viewer

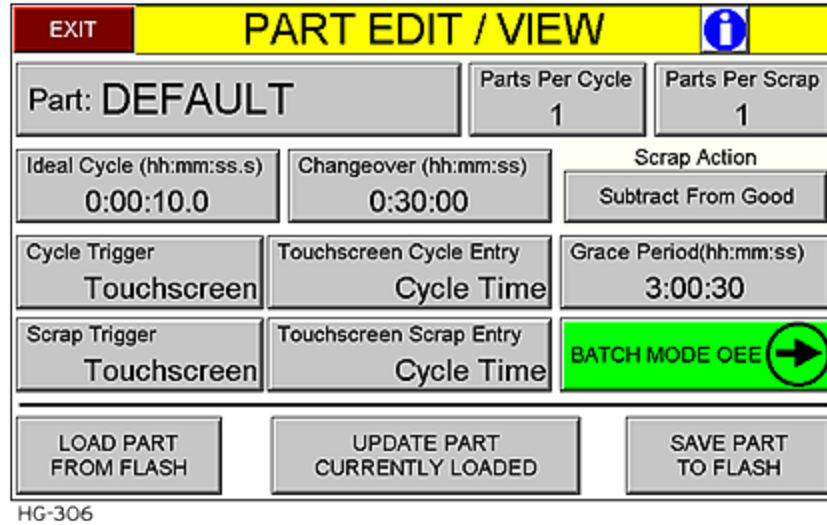
The Part Editor/Viewer allows the creation of different parts to be manufactured at each work cell. Each part has parameters as described below. Each part configuration is saved as a file on the MicroSD memory installed in the OEE system. These parts can be loaded by the operator by selecting "Change Part" on Work screens.

Alternately, part files can be created using the configuration utility and then placed in the OEE\PART directory of the MicroSD using FTP access or by transferring from a USB drive.

See ["Part Configuration" on page 79](#).

Upon entering the Part Editor/Viewer, the current part configuration is loaded into the editor.

**NOTE:** To edit any parameter, tap the parameter on the touchscreen and use the pop-up keypad to edit. Some parameters are numeric or alphanumeric, others provide only an up/down arrow to select an option.



The screenshot shows the 'PART EDIT / VIEW' screen with the following parameters and controls:

- EXIT** button (top left)
- Part: DEFAULT** (top left)
- Parts Per Cycle**: 1 (top middle)
- Parts Per Scrap**: 1 (top right)
- Ideal Cycle (hh:mm:ss.s)**: 0:00:10.0 (middle left)
- Changeover (hh:mm:ss)**: 0:30:00 (middle middle)
- Scrap Action**: Subtract From Good (middle right)
- Cycle Trigger**: Touchscreen (bottom left)
- Touchscreen Cycle Entry**: Cycle Time (bottom middle)
- Grace Period(hh:mm:ss)**: 3:00:30 (bottom right)
- Scrap Trigger**: Touchscreen (bottom left)
- Touchscreen Scrap Entry**: Cycle Time (bottom middle)
- BATCH MODE OEE** button with a right arrow (bottom right)
- LOAD PART FROM FLASH** button (bottom left)
- UPDATE PART CURRENTLY LOADED** button (bottom middle)
- SAVE PART TO FLASH** button (bottom right)

HG-306

**Part:** Enter the name of the part to create. This will also be the file name of the saved part that the operator will choose.

**NOTE:** Part names should not contain any spaces. Names will be truncated at the first space encountered when selecting the part for changeover.

**Parts Per Cycle:** Enter how many parts are made per one cycle trigger

**Parts Per Scrap:** Enter how many scrap parts are to be counted per one scrap trigger (See Scrap Action below)

**Ideal Cycle Time:** Enter the time (hh:mm:ss.s) it takes to complete an ideal cycle for this part on this work cell. This time is used in OEE calculations for Performance. Along with the Grace Period and Touchscreen Cycle Entry, it is used to determine automatic downtime if no cycle is triggered.

**Changeover Time:** Enter the time (hh:mm:ss) allowed to complete a part changeover to this part on this work cell

- **0 seconds:** Automatic downtime will occur when the part parameters determine a timeout. Changeover mode is ignored.
- **1 second:** Automatic downtime will never occur due to the Changeover process. Changeover mode takes effect meaning cycle triggers are ignored until the user confirms that Changeover is done.
- **> 1 second:** Automatic downtime will occur when this time expires if "Changeover Done" has not yet been confirmed by the user. Changeover mode takes effect meaning cycle triggers are ignored until the user confirms that Changeover is done.

See ["Part Changeover"](#) on page 70

**Scrap Action:** Determines what happens when Scrap is triggered.

- **Subtract from Good:** A Scrap trigger causes parts to be subtracted from Good and added to Scrap. A cycle will produce parts whether they are good or scrap. The system assumes they are Good until the operator specifies Scrap, thus moving the already counted part from Good to Scrap. The total number of parts is not affected by this operation
- **Replace Cycle:** Scrap is added to the Scrap parts accumulator as well as adding to the Total parts accumulator. The Good parts accumulator is not altered.

**Cycle Trigger:** Determines the method for which a new cycle is triggered.

- **Touchscreen:** Cycles are triggered via the green touchscreen pushbutton on any one of the Work interfaces. The option of Touchscreen Cycle Entry is presented:
  - **Cycle Time:** A Cycle trigger is expected within the time determined by adding the 'Ideal Cycle Time' to 'Grace Period'. If this time is exceeded without a Cycle trigger, an Automatic Downtime event is triggered and Downtime Code entry is required.
  - **Hourly:** A Cycle trigger is expected within the time determined by adding one hour to the 'Grace Period'. If this time is exceeded without a Cycle trigger, an automatic Downtime event is triggered, which requires downtime code entry..
  - **End of Shift:** Disables Automatic Downtime. Cycle triggers are not expected within any timeout period.
- **Sensor:** Cycles are triggered using the I1 I/O terminal on the OEE system. This can be any 12-24VDC signal from the machinery or from an external pushbutton. Triggers are expected within the time determined by adding the 'Ideal Cycle Time' to 'Grace Period'. If this time is exceeded without a Cycle trigger, an Automatic Downtime event is triggered and Downtime Code entry is required. The option of **Remote Cycle Entry** is presented:
  - **Signal ON:** Trigger a cycle on the RISING edge of the signal
  - **Signal OFF:** Trigger a cycle on the FALLING edge of the signal
  - **Signal Toggle:** Trigger a cycle on both the RISING and FALLING edge of the signal
- **Comms:** Cycles are triggered via Communications protocols. The default protocol is Modbus TCP/IP but is also selectable for Allen-Bradley Ethernet/IP. Triggers are expected within the time determined by adding the 'Ideal Cycle Time' to 'Grace Period'. If this time is exceeded without a Cycle trigger, an Automatic Downtime event is triggered and Downtime Code entry is required. The option of **Remote Cycle Entry** is presented:
  - **Signal ON:** Trigger a cycle on the RISING edge of the signal
  - **Signal OFF:** Trigger a cycle on the FALLING edge of the signal
  - **Signal Toggle:** Trigger a cycle on both the RISING and FALLING edge of the signal

- **Touch-Sensor:** Either the Touchscreen button or the I1 I/O terminal can be used as described above. Triggers are expected within the time determined by adding the 'Ideal Cycle Time' to 'Grace Period'. If this time is exceeded without a Cycle trigger, an Automatic Downtime event is triggered and Downtime Code entry is required. The option of **Remote Cycle Entry** is presented:
  - **Signal ON:** Trigger a cycle on the RISING edge of the signal
  - **Signal OFF:** Trigger a cycle on the FALLING edge of the signal
  - **Signal Toggle:** Trigger a cycle on both the RISING and FALLING edge of the signal
- **Touch-Comms:** Either the Touchscreen button or triggers via Communications protocols can be used as described above. Triggers are expected within the time determined by adding the 'Ideal Cycle Time' to 'Grace Period'. If this time is exceeded without a Cycle trigger, an Automatic Downtime event is triggered and Downtime Code entry is required. The option of **Remote Cycle Entry** is presented:
  - **Signal ON:** Trigger a cycle on the RISING edge of the signal
  - **Signal OFF:** Trigger a cycle on the FALLING edge of the signal
  - **Signal Toggle:** Trigger a cycle on both the RISING and FALLING edge of the signal

**Grace Period:** The Grace Period is a cushion before Automatic Downtime is triggered if a cycle takes any longer than the Ideal Cycle Time. This time is used to determine Automatic Downtime in conjunction with the Ideal Cycle Time and Touchscreen Cycle Entry as described in those sections above.

**Scrap Trigger:** Determines the method for which Scrap is triggered.

- **Touchscreen:** Scrap is triggered via the red touchscreen pushbutton on any one of the Work interfaces. The option of **Touchscreen Scrap Entry** is presented:
  - This selection currently has no effect on the system
- **Sensor:** Scrap is triggered using the I2 I/O terminal on the OEE system. This can be any 12-24VDC signal from the machinery or from an external pushbutton. The option of **Remote Scrap Entry** is presented:
  - **Signal ON:** Trigger Scrap on the RISING edge of the signal
  - **Signal OFF:** Trigger Scrap on the FALLING edge of the signal
  - **Signal Toggle:** Trigger Scrap on both the RISING and FALLING edge of the signal
- **Comms:** Scrap is triggered via Communications protocols. The default protocol is Modbus TCP/IP but is also selectable for Allen-Bradley Ethernet/IP. The option of Remote Scrap Entry is presented:
  - **Signal ON:** Trigger Scrap on the RISING edge of the signal
  - **Signal OFF:** Trigger Scrap on the FALLING edge of the signal
  - **Signal Toggle:** Trigger Scrap on both the RISING and FALLING edge of the signal
- **Touch-Sensor:** Either the Touchscreen button or the I1 I/O terminal can be used as described above. The option of **Remote Scrap Entry** is presented:
  - **Signal ON:** Trigger Scrap on the RISING edge of the signal
  - **Signal OFF:** Trigger Scrap on the FALLING edge of the signal
  - **Signal Toggle:** Trigger Scrap on both the RISING and FALLING edge of the signal

- **Touch-Comms:** Either the Touchscreen button or triggers via Communications protocols can be used as described above. The option of **Remote Scrap Entry** is presented:
  - **Signal ON:** Trigger Scrap on the RISING edge of the signal
  - **Signal OFF:** Trigger Scrap on the FALLING edge of the signal
  - **Signal Toggle:** Trigger Scrap on both the RISING and FALLING edge of the signal

### 7.7.1: Batch Mode OEE

OEE Score targets for Batch Mode operations are configured here. The Red 'Alarm Below' and Green 'Ideal Target' can be changed as desired for Availability, Performance, and Quality.

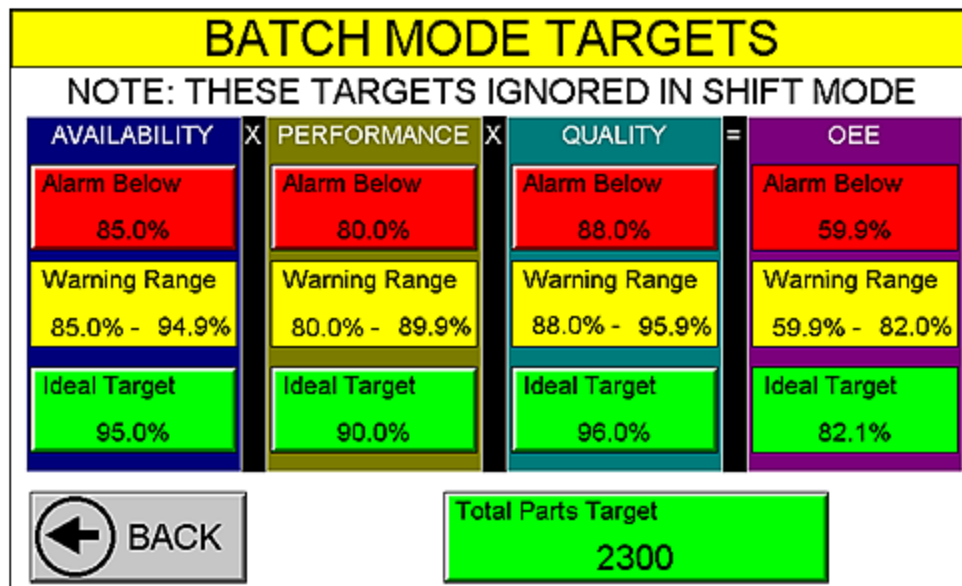
The 'Warning Range' and all the OEE levels are automatically calculated based on the editable parameters noted above.

The OEE parameters shown on the screen are in the same orientation as the OEE light tower, with Red on top, Yellow as the second light down from the top, and Green as the third light down from the top.

The Total Parts Target will load automatically upon Changeover to this part if in Batch mode. The target number is simply to display a goal for the user and does not affect OEE scoring. Ideally, this number is a product of the number of Ideal Cycle Times that can fit within the Planned Production Time. This can be expressed as:

$$Total\ Parts\ Target = Parts\ Per\ Cycle * \left( \frac{Planned\ Production\ Time}{Ideal\ Cycle\ Time} \right)$$

HG-307



HG-308

**NOTE:** All Batch Mode Ranges and Targets are ignored if the OEE system is operating in Shift Mode.

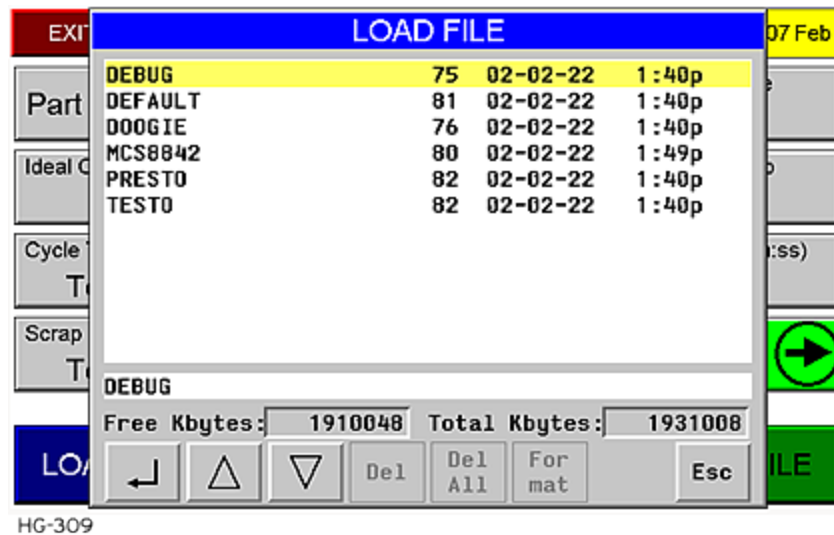
**Back:** Return to the Part Editor/Viewer.

### 7.7.2: Load Part from Flash

Use this button to load an existing part file into the Part Editor/Viewer. A directory of parts is displayed. Select one by touching the file name or using the arrow keys to highlight the desired part, then press the **↵** key and confirm the selection.

**NOTE:** Part names that exceed 8 characters will be truncated in the directory list but can be viewed in full by highlighting a file and noting the full name in the field just below the directory listing.

**NOTE:** Any Parts that may have had a space entered in the name will be truncated at the point the space was present. For example, if “Part ABCDEF” were created, it would only show here as “PART”.



### 7.7.3: Update Part Currently Loaded

If the changes made here are to be used immediately as the part being manufactured at this cell, press this button.

**NOTE:** This will NOT save this part as a file for later selection!

### 7.7.4: Save Part To Flash

Press this button to Save the part parameters as a file on the MicroSD memory card for future use such as operator selection for Changeover.

**NOTE:** This will NOT update the current part being produced on this Cell.

**WARNING:** No changes are saved automatically! Be sure to **Update Part Currently Loaded** and/or **Save Part to Flash** before exiting. Re-entering the Part Editor/Viewer will reload the currently loaded Part.

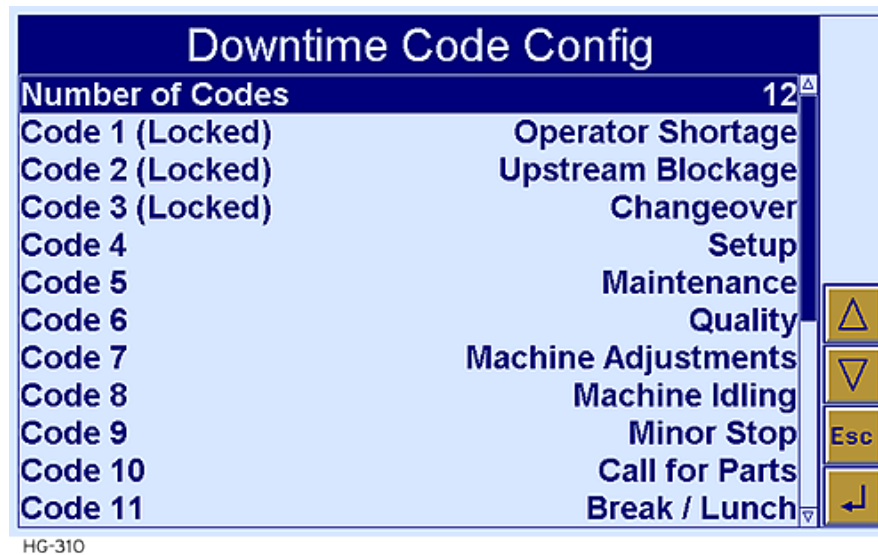
**Exit...** click on this when you have completed the Part Number configuration setup.

## 7.8: Downtime Code Configuration

Up to 20 Downtime Codes can be configured for selection at downtime events. Use this menu to edit the Downtime Codes via the Touchscreen.

The Downtime Codes can also be edited using the Configuration Utility.

See ["Downtime Code Configuration" on page 85](#).



By default, 12 Downtime Codes are enabled as follows:

1. Operator Shortage (Not Editable; See: 11.4.1 Automatic Operator Shortage Downtime)
2. Upstream Blockage (Not Editable; See: 11.4.2 Automatic Upstream Blockage Downtime)
3. Changeover (Not Editable; See: 11.4.3 Automatic Changeover Downtime)
4. Setup
5. Maintenance
6. Quality
7. Machine Adjustments
8. Machine Idling
9. Minor Stop
10. Call for Parts
11. Break Lunch
12. Safety Stop

The total number of codes may be edited to any number between 3 and 20, which then enables that number of entries to configure and select from during downtime events. Select the 'Number of Codes' entry, press the **↵** key, and use the numeric keypad to edit the number accordingly before pressing **Enter** to accept the change. Numbers outside the range of 0-20 are ignored.



To edit the Downtime Code description, select any entry and press the **↵** key. Use the alphanumeric keyboard that appears to edit the description, then press the **'Enter'** key to accept the changes. Each entry may contain up to 20 characters.

These description codes will be datalogged exactly as entered during downtime events, including any capitalization and misspellings.

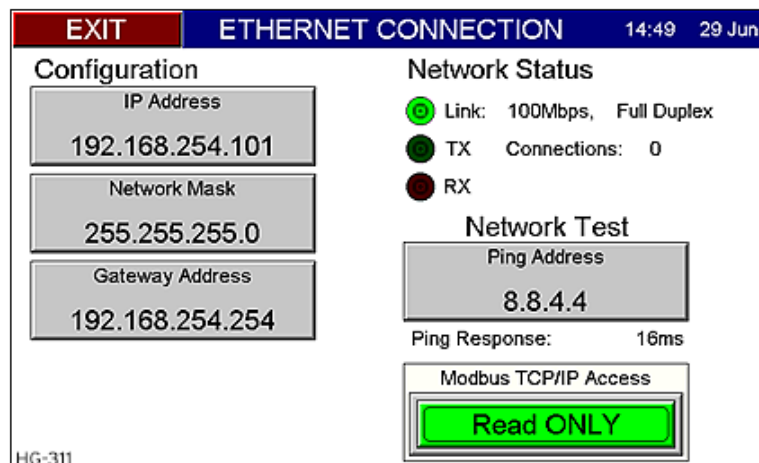
Press the **'ESC'** button to exit the Downtime Code configuration.

## 7.9: Ethernet Configuration

An Ethernet connection is used to allow communications for the following features:

- Connection to the OEE data concentrator
- E-mails sent from the OEE system
- FTP transfer of datalog and configuration files
- Triggering via Communications

Ethernet configuration may require IT personnel to properly configure. Set the IP Address, Network Mask, and Gateway Address according to IT guidelines in the facility where the OEE system is installed.



The IP address configured here is normally how the Data Concentrator will know how to find this work cell. This may not be true of advanced networking through routers, firewalls, cell modems, etc.

Network Status is provided to troubleshoot the connection along with a way to ping any IP address. A Ping Response time other than -1ms indicates successful configuration and communication with the Ping Address at a basic level.

### 7.9.1: Modbus TCP/IP Access

The OEE system acts as a Modbus TCP/IP server. Monitoring (Read Only operation) of the system is always available. Configuration options are available in several places to allow Remote Triggering via communications, such as Cycle and Scrap triggering, Cell Up/Down determination, and Call triggering. Read/Write access is required for these Remote Triggering options or to be able to



When set to 'Read Only', any Write operations from a Modbus TCP/IP Client to the OEE System will result in an error being reported to that client.

See ["Modbus TCP/IP Access" on page 95.](#)

### 7.9.2: Ethernet/IP Access

The OEE system acts as an Ethernet/IP server or remote I/O drop. Monitoring of the system is always available and, if communications options are set, Cycle and Scrap triggering can be done via Ethernet/IP, as well as Cell Up/Down determination and Call triggering.

The OEE system Produces 248 16-bit Words of data and Consumes 50 16-bit Words of data.

See ["Ethernet/IP Access" on page 101.](#)

### 7.9.3: FTP Access

Files can be transferred to and from the OEE system using FTP (File Transfer Protocol). Data log files can be retrieved from the OEE system in this manner. Configuration files can be sent to the OEE System in this manner.

If there is a path from the PC to the OEE System over the Ethernet network, this can be as easy as opening a Windows File Explorer window or web browser and entering the OEE system address. Using the default IP Address of 10.0.0.1 as an example:

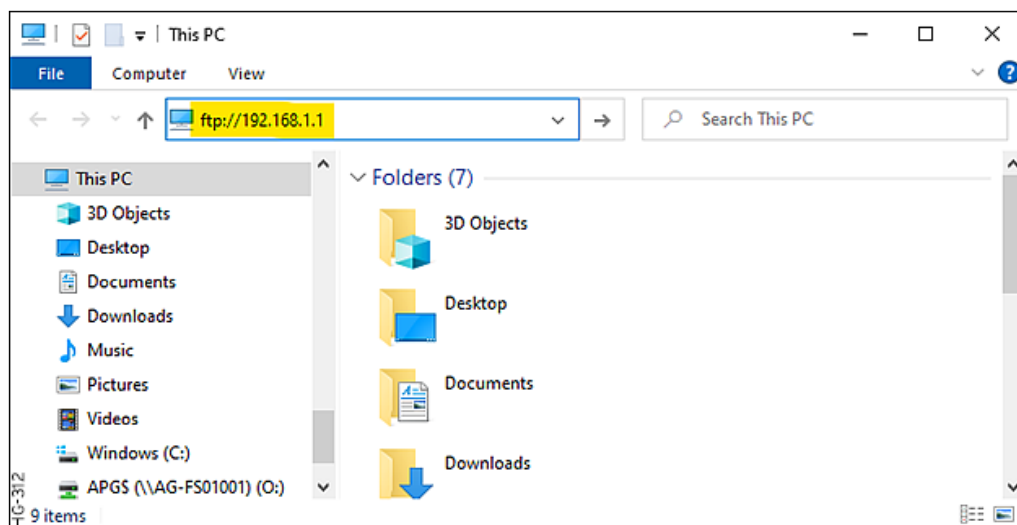
- ftp://10.0.0.1

At the prompt for a Username and Password, use 'OEE' and 'RW'. (Subject to change.)

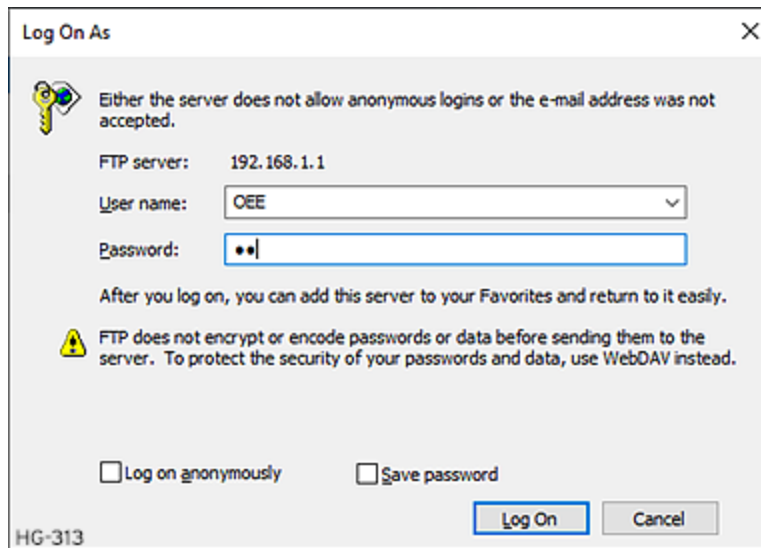
**NOTE:** When the route from the PC to the OEE system is through routers or firewalls, the address used to access the OEE system may differ from the one used in the OEE Configuration. Consult with IT personnel for correct address usage.

### FTP Example

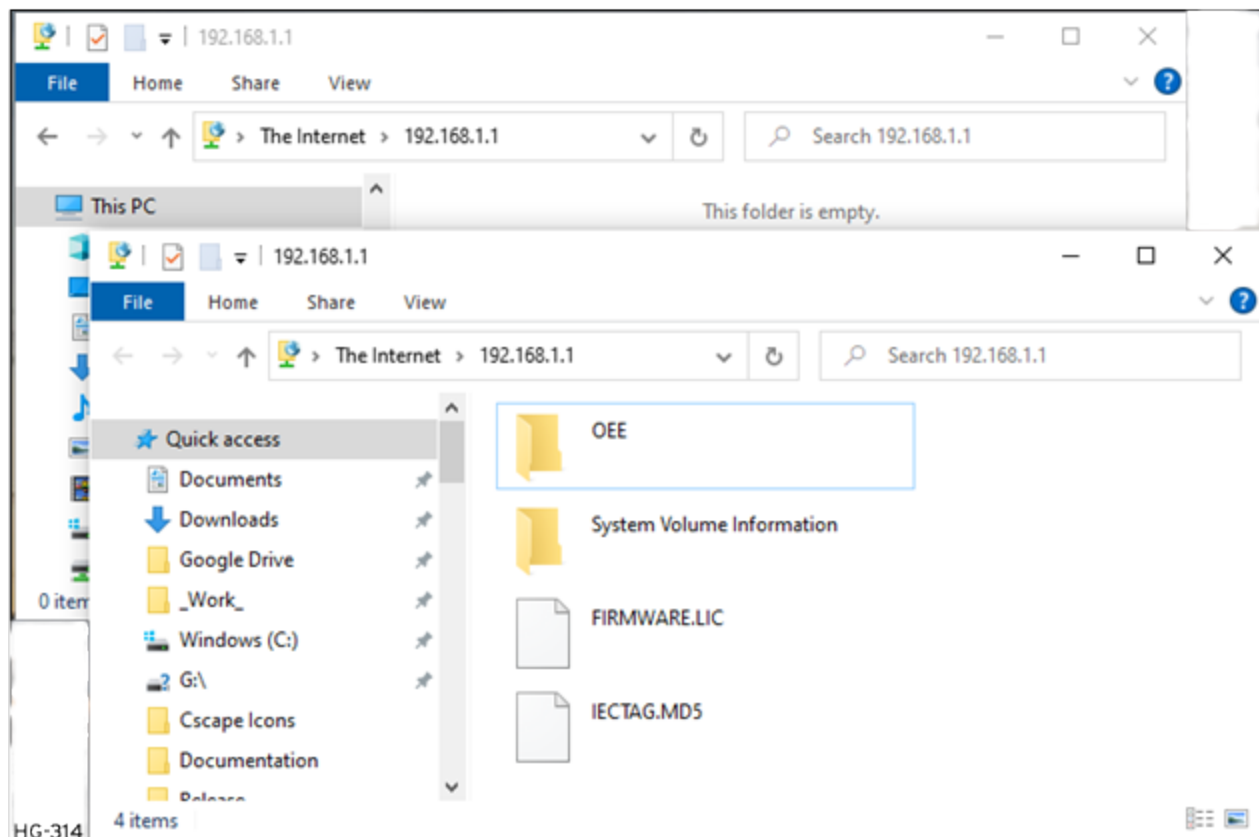
Using Windows File Explorer as an example to connect using FTP to an OEE system at 192.168.1.1, type the FTP target into the address bar, then press **Enter**:



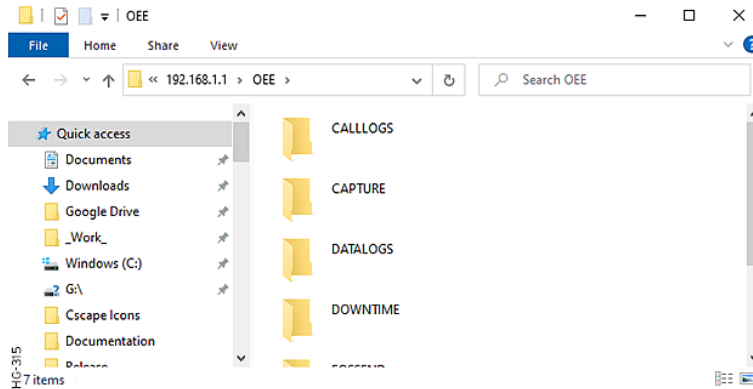
Enter the Username and Password when prompted, then click 'Log On':



**NOTE:** The original window may remain open and blank while another window opens with the contents of the OEE system. The window with the contents of the OEE system may appear behind the blank window. The blank window can be closed without closing the FTP connection.



All files pertaining to the OEE system are held in the 'OEE' directory.



Files can be copied/pasted or dragged/dropped to and from this window from other windows. For the best results, files should be copied to the local PC before attempting to open.

## 7.10: Email Configuration

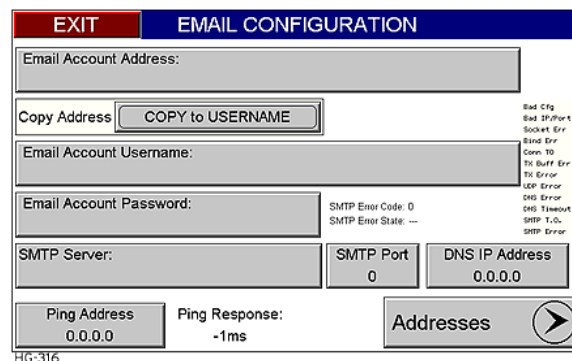
The OEE System can send e-mails as Calls are triggered. Additionally, e-mails with attached log files can be sent at the end of each shift.

See ["Ethernet Configuration" on page 48](#)

### 7.10.1: Email SMTP Server

To initiate e-mails from the OEE system, an overall Email Configuration is first needed. This could be an internal e-mail server provided by the IT department or an external service, e.g. Gmail. In any case, proper Ethernet Configuration is required, followed by proper Email SMTP server configuration.

These settings will depend on the requirements of the Email service used. Therefore, a one-size-fits-all guide within this manual is not provided. Please refer to documentation provided by the Email service used; specifically, for help with SMTP access.



**Email Account Address:** Most Email servers require this address to match the address of the account being used.

**Email Account Username:** This may be a username or may be an entire e-mail address. If the Account Username is the same as the Account Address, use the 'COPY to USERNAME' button to copy the Account Address to the Account Username.

**Email Account Password:** This is the password associated with the Email account.

**NOTE:** The password is not obscured here!

**SMTP Server:** This is the server name of the Email server, e.g. smtp.gmail.com

**SMTP Port:** This is the port number the Email server requires to send e-mail through it. Common ports are 587, 465, and 25

**DNS IP Address:** This is the IP address of a Domain Name Server. This is what will translate the SMTP Server Name into an IP address. If access to the Internet is in place, a server such as Google's Public DNS at 8.8.4.4 might be possible.

**Ping Address:** Provided as a troubleshooting tool on this screen. For example, a possible DNS address can be entered here and, if the Response Time comes back as something other than -1ms, that address is visible to this OEE system. Successfully pinging 8.8.4.4 will confirm a path to the internet.

**Status:** Status is provided to help with troubleshooting. The "SMTP Error Code" can normally be searched for on the internet to provide more information on the error given. Example, search "SMTP 530". These codes are normally universally defined but are ultimately up to the Email service provider for a full definition of the meaning as to their Email system.

## 7.10.2: Email Addresses

From the main Email Configuration window, Email addresses for recipients of different events can be entered by pressing the 'Addresses' button in the lower right corner. There are several screens for e-mail address entry, not shown here. There is one for each of the events listed in the table below.

**NOTE:** Addresses for any given Shift will only be displayed if those shifts have been enabled.

For Calls, an e-mail is sent to the main addresses for each type of call when the call is triggered. If the call does not get acknowledged within the Timeout period, an e-mail is sent to the Timeout address.

At the end of a shift, an email with log file attachments is sent.

For SMS notifications of calls, cellular providers may or may not provide a way to send e-mail to a cell phone as a text message. Examples are shown here, check with the cellular provider of the recipient to confirm the correct configuration:

- AT&T example: 9876543210@txt.att.net
- Verizon example: 9876543210@vtext.com
- Sprint example: 9876543210@messaging.sprintpcs.com

Separate e-mail addresses for each event are provided for the separate shifts. Separate Timeout intervals are provided for each type of call.

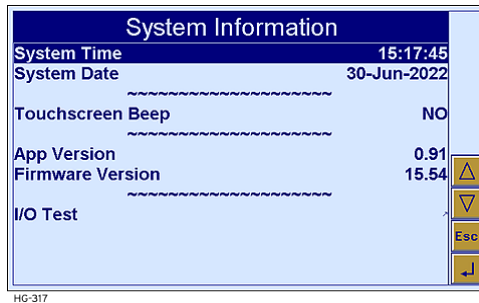
Configuration for email addresses are provided as follows for a total of up to 30 separate addresses:

Event:	Shift 1	Shift 2	Shift 3
Raw Materials Call:	Up to two addresses	Up to two addresses	Up to two addresses
Raw Materials Timeout	One address	One address	One address
Maintenance Call	Up to two addresses	Up to two addresses	Up to two addresses
Maintenance Timeout	One address	One address	One address
Supervisor Call	Up to two addresses	Up to two addresses	Up to two addresses
Supervisor Timeout	One address	One address	One address
End of Shift Reports	One address	One address	One address

See "Calls" on page 28

## 7.11: System Information

Select System Information is shown for configuration and/or troubleshooting purposes.



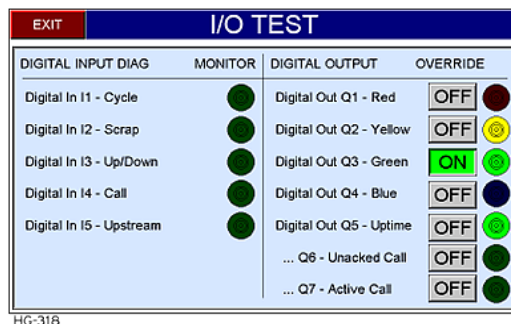
**System Time/Date:** Allows you to view and change the real-time clock time (hh:mm:ss) in 24 hour time format, and the real-time clock date (dd-mmm-yyy)

**Touchscreen Beep:** Any press of the touchscreen normally produces a beep from the OEE system. To silence this beep, set this option to 'NO'

**App Version:** Shows the loaded version of the OEE application

**SW Version:** Shows the loaded software version of the OEE application

**I/O Test:** A screen will display allowing monitoring of the Digital Inputs as well as the ability to test the Digital Outputs by pressing a button.



# OEE Score Calculation Overview



## Chapter 8: OEE Score Calculation Overview

8.1: Availability .....	55
8.2: Performance .....	55
8.3: Quality .....	56
8.4: Overall Equipment Effectiveness .....	56
8.5: Scheduled Breaks and Changeover; Effect on Scoring .....	56

An OEE score consists of a number that is normally between 0 and 100%. Scores over 100% can indicate over-performing in some area, temporary or otherwise. Consistent scores over 100% can indicate improper Part settings. Each separate component of OEE is calculated on a running basis. The overall OEE score is a product of the separate components.

### 8.1: Availability

Availability is a measure of how much time machinery has been in Uptime vs how much time it is expected to be in Uptime. It is calculated by taking the Actual Production Time (APT) divided by the Planned Production Time (PPT).

APT is an accumulation of the equivalent of Uptime but may represent total Shift uptime or single-part Batch uptime depending on the OEE system operating in Shift mode or Batch mode.

PPT is what is expected according to the configuration and does not include any configured breaks or configured Part Changeover times. For example:

- A Shift starts at 6AM and ends at 2PM. This results in an initial PPT of 8 hours.
- Configured breaks are subtracted; two 15-minute breaks and one 30-minute break results in a PPT of 7 hours
- Part Changeover is subtracted; Two part changes are planned, each part has a Changeover Time of 10 minutes, or 20 minutes total, resulting in a PPT of 6 hours and 40 minutes.

Any downtime will not allow APT to achieve PPT, therefore resulting in a score less than 100%.

Availability is affected by Breaks and Changeover times as noted in "[Scheduled Breaks and Changeover; Effect on Scoring](#)" on the next page.

### 8.2: Performance

Performance is calculated by determining how many Total parts (both Good and Scrap) have been made up until the current time, then comparing that to how many parts could have been made given the Ideal Cycle Time. Performance is how many Ideal Cycle Times can fit into the accumulated PPT.

Performance Scores are capped at 320%. Scores above 100% can be normal temporarily but can also indicate improper system configuration, namely Ideal Cycle Times that allow too much time to complete a cycle.

Performance is affected by Breaks and Changeover times as noted in "[Scheduled Breaks and Changeover; Effect on Scoring](#)" on the next page.

### 8.3: Quality

Quality is calculated by taking Good Parts divided by Total Parts. Any Scrap parts counted will not allow Quality to achieve 100%. Quality scores above 100% are not possible.

### 8.4: Overall Equipment Effectiveness

The total OEE score is a product of the separate components:  $OEE = Availability * Performance * Quality$ .

### 8.5: Scheduled Breaks and Changeover; Effect on Scoring

Part of the flexibility of the Horner OEE system is the ability to allow for configuration of scheduled break times and part changeovers. Scheduling these times relaxes the scoring to account for those times by shortening the Planned Production Time (PPT) used in both Availability and Performance scoring. Zeroing these times keeps the scoring running instead of pausing them for breaks or changeover.

Determining whether to configure Breaks or Changeover time is something that must be determined based on what is needed from the OEE system.

For consideration to help with this determination:

- Is there the desire to know how much more production could take place during breaks if there were overlapping employees to cover break times?
- Are there already overlapping employees covering breaks?
  - If the answer to either question is 'Yes', then do NOT configure breaks. Availability and Performance will suffer during times when operators are on breaks with no backup operators to cover that time
- Is there no plan to ever run production over scheduled breaks?
- Is there no need to know what could possibly be produced during those times given sufficient employees or overlapping breaks?
  - Configure the break times. The Uptime accumulator will pause during those times to keep breaks from affecting scores. Automatic Downtime timeouts are also on hold during breaks
- Should Changeover times, the time it takes to convert machinery from one part to the next, be considered downtime or just part of the normal manufacturing process that should not negatively affect scores?
  - To keep Changeover from affecting scores, specify Changeover times for parts that reflect the amount of time it should take to prepare for the new part. Any time taken over that amount will trigger downtime.
- Is there a need to determine the impact of scheduling longer runs of parts before changing to a different part rather than having more frequent part changes?
  - Leave Changeover times for parts zeroed to get automatic downtime immediately on part changes



# Login/Logout



## Chapter 9: Login/Logout

9.1: Login	58
9.2: Logout	59

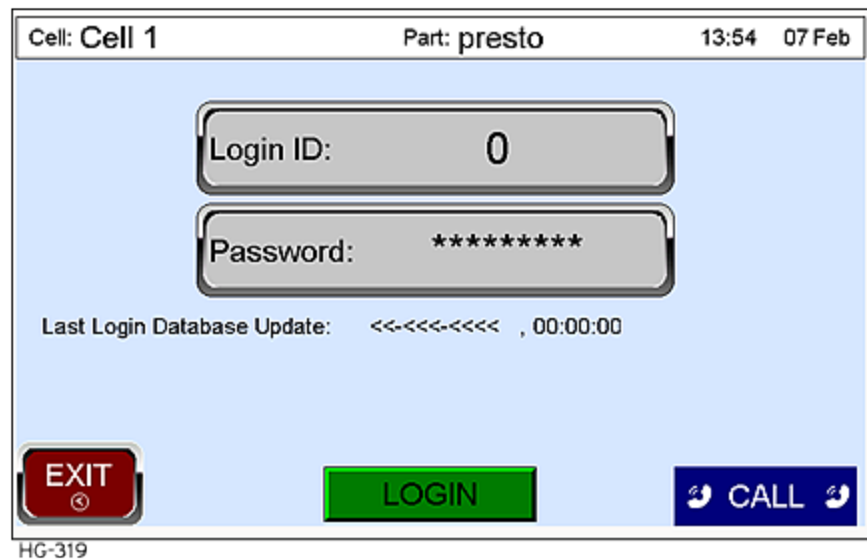
The OEE System requires a user to be logged in to operate within any of the Work interfaces, which includes adding cycles and scrap and assigning any Downtime Codes. The user is then included in log files.

Any amount of time during an active shift without a user logged in is a cause for Automatic Downtime. Configuration is possible to allow an Automatic Downtime Code of "Operator Shortage" entered by the OEE system.

See: ["Automatic Operator Shortage Downtime" on page 68](#)

### 9.1: Login

For an operator to run the work cell, they must be logged in to be able to access the Work. Click on the flashing LOG IN button on the Home interface to login. Currently, login IDs are numeric.



The screenshot shows a login interface with the following elements:

- Header: Cell: Cell 1, Part: presto, 13:54 07 Feb
- Login ID field: Login ID: 0
- Password field: Password: *****
- Last Login Database Update: <<<<<<<<<< , 00:00:00
- Buttons: EXIT (red), LOGIN (green), CALL (blue)
- Footer: HG-319

The time and date of the last Login Database Update is shown.

Tap the 'Login ID' field and use the pop-up keypad to enter a Login ID followed by the 'Enter' button.

Tap the 'Password' field and use the pop-up keypad to enter a Password followed by the 'Enter' button.

Once both fields have been entered, press the 'LOGIN' button. If a valid Login ID and Password combination has been entered, Home is immediately displayed and the Logged In user is shown. Otherwise, a message showing 'Invalid Login' is displayed when pressing the 'LOGIN' button.

Up to 20 users can be configured. User IDs and Passwords are numeric and can be up to 9 digits each. The Password for the first Login ID configured is also used to access the Configuration menu. Logins/Passwords are as follows and can be changed with the configuration utility:

Login ID	Password	Configuration Access
12345	12345	YES
22222	222	NO
33333	333	NO
44444	444	NO
55555	555	NO
66666	666	NO
77777	777	NO
88888	888	NO
99999	999	NO
10100	100	NO
10101	101	NO
10102	102	NO
10103	103	NO
10104	104	NO
10105	105	NO
10106	106	NO
10107	107	NO
10108	108	NO
10109	109	NO
10110	110	NO

See ["Login Configuration" on page 86](#)

## 9.2: Logout

To log out of the OEE system, press 'LOG OUT' from the Home interface. The Logout interface will display and prompt for confirmation.



# Work Interfaces



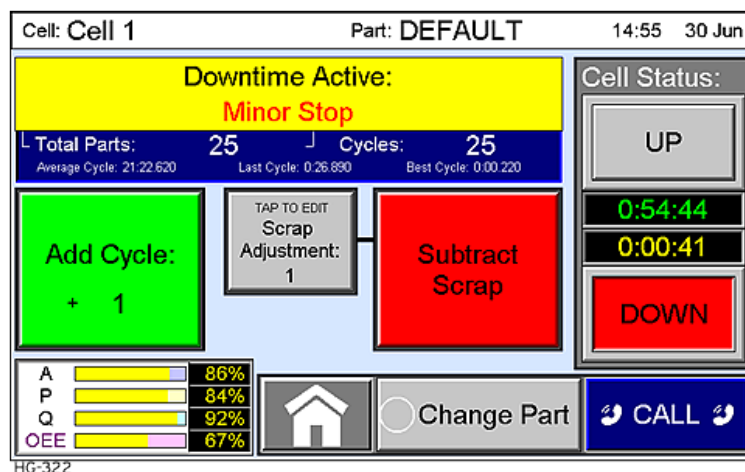
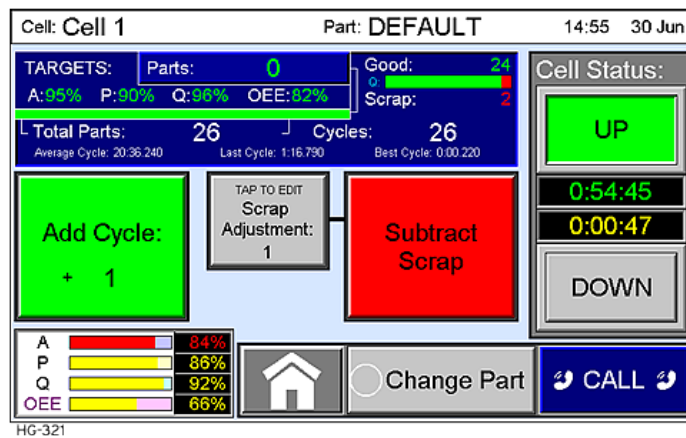
## Chapter 10: Work Interfaces

10.1: Detailed .....	61
10.2: Simplified .....	63
10.3: Basic .....	64

Work interfaces display details about the ongoing process and provide an interface for manual operation. The banner at the top shows the Cell identifier and the Part currently selected. The current time and date are also displayed.

### 10.1: Detailed

This Work interface provides a detailed set of process data and an interface for manual operation. This interface shows the most process data of any of the Work interfaces.



**Target Parts:** The 'Parts' field initializes to the configured number of parts upon Changeover but can be edited by the user to set an arbitrary goal. This number is not used in any of the OEE calculations. Together with the 'Total Parts' count, the bar graph under the 'TARGETS' area will update as a visual progress report towards the Parts Target. To edit the target, press the field and use the pop-up keypad to enter a number.

**Target Scores:** The targets shown are those configured for either the current shift or the current part depending on Shift mode or Batch mode operation.

**Good/Scrap:** The Good part count and Scrap part count are shown along with a bar graph visualization of the Good/Bad split. This is effectively the Quality parameter of OEE.

**Total Parts:** The total number of parts produced is shown. Together with the editable 'Target Parts' field, the bar graph above this Total Parts display will update as a visual progress report.

**(Total) Cycles:** The Total number of Cycles is shown.

**Cycle Times:** The Average Cycle Time, the Last (most recent) Cycle, and the Best (shortest) Cycle is shown. The Average and Best times can be used to fine tune part configuration settings, specifically the 'Ideal Cycle Time' parameter.

**Cell Status:** A selection for 'UP' and 'DOWN' is provided for changing the cell status manually. Running time accumulations for Uptime and Downtime are shown.

Other system events may trigger UP or DOWN time automatically, such as the triggering of another cycle or the expiration of the grace period. These automatic events are subject to configuration options.

**Add Cycle:** For Touchscreen cycle triggering, the green Add Cycle button will trigger a single cycle each time it is pressed. The number shown on the face of the button is the configured number of parts that will be added for each cycle.

If the Cell Status is currently 'DOWN' and a cycle is triggered, the Cell Status will automatically return to 'UP' status.

**Scrap Adder:** This editable data field allows for one or more parts to be added to the Scrap parts count using the Subtract Scrap/Count Scrap button. It is possible to make the Scrap Adder a negative number, which will cause parts to be removed from Scrap.

The Scrap Adder initializes to the current part configuration upon Changeover. If altered, it will revert to the configured number after the Scrap button is pressed.

**Subtract Scrap/Count Scrap:** The Scrap button will be labeled differently depending on the part configuration, specifically the Scrap Action parameter.

- When labeled as 'Subtract Scrap', it is assumed that a cycle will produce parts regardless of them being Good or Scrap. Therefore, the Subtract Scrap button will subtract from the Good count and add to the Scrap count. The Total Parts and Cycle counts are not affected. Mistakenly scrapped parts can be remedied by changing the Scrap Adder to a negative number, which will then increase the Good count and decrease the Scrap count.
- When labeled as 'Count Scrap', the amount of scrap will increase or decrease according to the Scrap Adder as well as the total number of parts. The Good Parts and Cycle counts are not affected. Mistakenly scrapped parts can be remedied by changing the Scrap Adder to a negative number, which will then decrease both the Scrap and Total part counts.

**Realtime OEE Scores:** The Availability, Performance, Quality, and resulting OEE scores are shown as a bar graph representation as well as the scores themselves. They are color-coded per the configuration.

**Home:** Returns the user to the Home interface.

**Change Part:** Allows the user to select a different part to produce. The current part configuration is shown, along with the option to select a new part.

- See ["Part Changeover" on page 70](#)

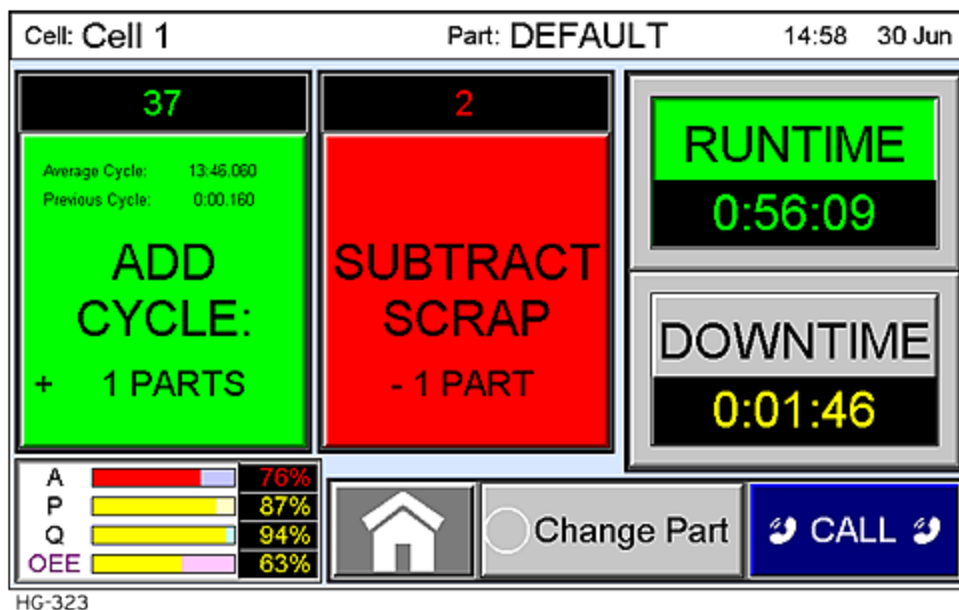
**Call:** The Call interface allows calls to different departments to be made.

- See ["Calls" on page 28](#).

**Home:** Returns to the Home interface.

## 10.2: Simplified

This Work interface provides a simplified set of process data and an interface for manual operation.



**Total Parts:** The total number of parts is shown above the Add Cycle button.

**Total Scrap:** The total number of Scrap is shown above the Scrap button.

**Add Cycle:** For Touchscreen cycle triggering, the green Add Cycle button will trigger a single cycle each time it is pressed. The number shown below the button label is the configured number of parts that will be added for each cycle.

Average and Previous cycle times are shown above the button label.

If the Cell Status is currently 'DOWN' and a cycle is triggered, the Cell Status will automatically return to 'UP' status.

**Subtract Scrap/Count Scrap:** The Scrap button will be labeled differently depending on the part configuration, specifically the Scrap Action parameter.

- When labeled as 'Subtract Scrap', it is assumed that a cycle will produce parts regardless of them being Good or Scrap. Therefore, the Subtract Scrap button will subtract from the Good count and add to the Scrap count. The Total Parts and Cycle counts are not affected.

- When labeled as 'Count Scrap', the amount of scrap will increase as well as the total number of parts. The Good Parts and Cycle counts are not affected.
- The number shown below the button label is the Parts Per Scrap parameter of the Part Configuration.

**Cell Status:** A selection for 'RUNTIME' and 'DOWNTIME' is provided for changing the cell status manually. Running time accumulations for Uptime and Downtime are shown.

Other system events may trigger UP or DOWN time automatically, such as the triggering of another cycle or the expiration of the grace period. These automatic events are subject to configuration options.

**Realtime OEE Scores:** The Availability, Performance, Quality, and resulting OEE scores are shown as a bar graph representation as well as the scores themselves. They are color-coded per the configuration.

**Home:** Returns the user to the Home interface.

**Change Part:** Allows the user to select a different part to produce. The current part configuration is shown, along with the option to select a new part.

- See ["Part Changeover" on page 70](#)

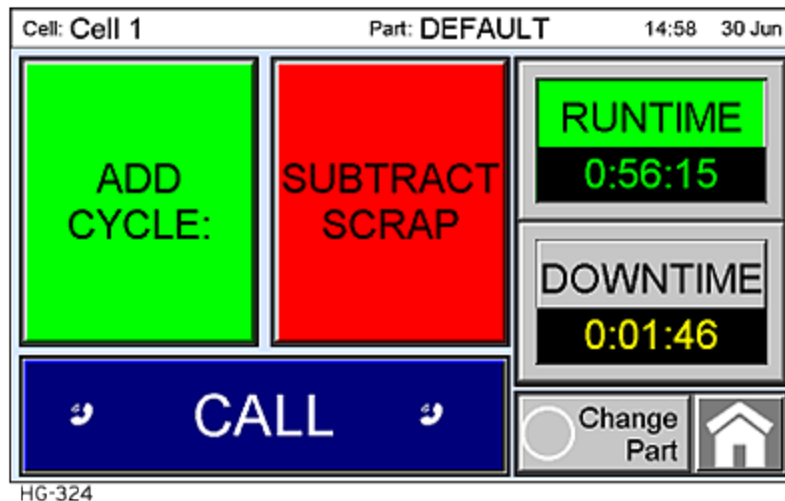
**Call:** The Call interface allows calls to different departments to be made.

- See ["Calls" on page 28](#).

**Home:** Returns to the Home interface.

## 10.3: Basic

This Work interface displays a basic set of process data and an interface for manual operation.



**Add Cycle:** For Touchscreen cycle triggering, the green Add Cycle button will trigger a single cycle each time it is pressed.

If the Cell Status is currently 'DOWN' and a cycle is triggered, the Cell Status will automatically return to 'UP' status.



**Subtract Scrap/Count Scrap:** The Scrap button will be labeled differently depending on the part configuration, specifically the Scrap Action parameter.

- When labeled as 'Subtract Scrap', it is assumed that a cycle will produce parts regardless of them being Good or Scrap. Therefore, the Subtract Scrap button will subtract from the Good count and add to the Scrap count. The Total Parts and Cycle counts are not affected.
- When labeled as 'Count Scrap', the amount of scrap will increase as well as the total number of parts. The Good Parts and Cycle counts are not affected.

**Cell Status:** A selection for 'RUNTIME' and 'DOWNTIME' is provided for changing the cell status manually. Running time accumulations for Uptime and Downtime are shown. Other system events may trigger UP or DOWN time automatically, such as the triggering of another cycle or the expiration of the grace period. These automatic events are subject to configuration options.

**Call:** The Call interface allows calls to different departments to be made.

- See ["Calls" on page 28](#).

**Change Part:** Allows the user to select a different part to produce. The current part configuration is shown, along with the option to select a new part.

- See ["Part Changeover" on page 70](#)

**Home:** Returns to Home.

# Downtime



## Chapter 11: Downtime

11.1: Manual Downtime .....	67
11.2: Automatic Downtime .....	67
11.3: Downtime Code Prompt .....	67
11.4: Automatic Downtime Code Entry .....	68

Downtime is time that will negatively affect OEE scoring. A Downtime Code is required as an explanation of any downtime that occurs. Downtime can be triggered manually by the user or it can be triggered automatically according to the current part configuration.

During Downtime, the Uptime timer stops accumulating and the Downtime timer starts accumulating. The active OEE Tower Light (Green/Yellow/Red) will start to flash. Until a Downtime Code is selected, a general “No Code” accumulator keeps the unassigned downtime. Once a Downtime Code is assigned, the accumulated “No Code” time gets added into an accumulator specifically for that Downtime Code. If Downtime is still active, that specific accumulator continues to accumulate until Downtime is over.

Any accumulated Downtime means that the Planned Production Time (PPT) cannot be attained, and Availability can no longer attain 100%. (Total Downtime of only 1-5 minutes at the end of a shift may still result in 100% Availability.)

### 11.1: Manual Downtime

From any Work interface, pressing the ‘DOWN’ or ‘DOWNTIME’ button will manually put the OEE system into Downtime. The Downtime Code selection immediately prompts for a code. No other functions can occur until a code is selected.

Once a code is selected, the selected code is displayed on Work interfaces and on the Home interface while Downtime remains active.

### 11.2: Automatic Downtime

Downtime will occur automatically depending on the ‘Cycle Entry Method’ setting within the Part configuration. When Automatic Downtime occurs, the user must select a Downtime Code as an explanation to the downtime. Below shows examples for a sample part with the given settings and the operation of Automatic Downtime.

Example Cycle Entry Method	Example Ideal Cycle Time	Example Grace Period	Resulting Automatic Downtime
Cycle Time	30 seconds	2 minutes	If no cycle within 2 minutes and 30 seconds
Hourly	30 seconds	2 minutes	If no cycle within 1 hour and 2 minutes
End of Shift	30 seconds	2 minutes	Automatic downtime is disabled

### 11.3: Downtime Code Prompt

When any Work interface is active, the Downtime Code Prompt will immediately display if Downtime occurs. Downtime Code entry is required before any further operation is allowed. To refrain from nuisance prompting during system configuration or other operations, the prompt will only be forced when a Work Interface is active.

If a Work interface is not active when Downtime occurs, a banner showing “No Code” will display on the Home interface or otherwise will not be indicated on the screen itself, leaving indication to the blinking tower light. Immediately upon returning to any Work screen, the Downtime Code Prompt will display. Downtime Code entry is required before any further operation is allowed.

## **11.4: Automatic Downtime Code Entry**

The first three Downtime Codes have configuration options for automatic specification and cannot be changed in the System Configuration. Each of these codes can be separately configured to be automatically selected with no user input needed if the proper conditions exist. These will only be automatically specified if the option is turned on in the System Configuration.

### **11.4.1: Automatic Operator Shortage Downtime**

Automatic Operator Shortage Downtime can be specified if downtime occurs while no user is logged in. This is most likely to occur at the beginning of a shift when no user is logged in yet.

### **11.4.2: Automatic Upstream Blockage Downtime**

Automatic Upstream Blockage can be specified if downtime occurs while the signal from the previous station is not active. For this functionality, the Q5 Digital Output terminal becomes active during Uptime and inactive during Downtime or during the time when no shift is active. This output signal can be run to the next OEE Cell downstream that is being fed parts from this Cell. The signal is wired into the I5 Digital Input of the downstream Cell. If the downstream Cell goes into Automatic Downtime and the signal from this Cell is not active, the next Cell can specify ‘Upstream Blockage’ automatically.

### **11.4.3: Automatic Changeover Downtime**

Automatic Changeover Downtime can be specified if downtime occurs during Changeover Mode. (See Part Changeover section.) This code has priority over any further automatic codes should they occur simultaneously.

See ["Cell Configuration: Automatic Downtime Codes" on page 37](#)

# Part Changeover

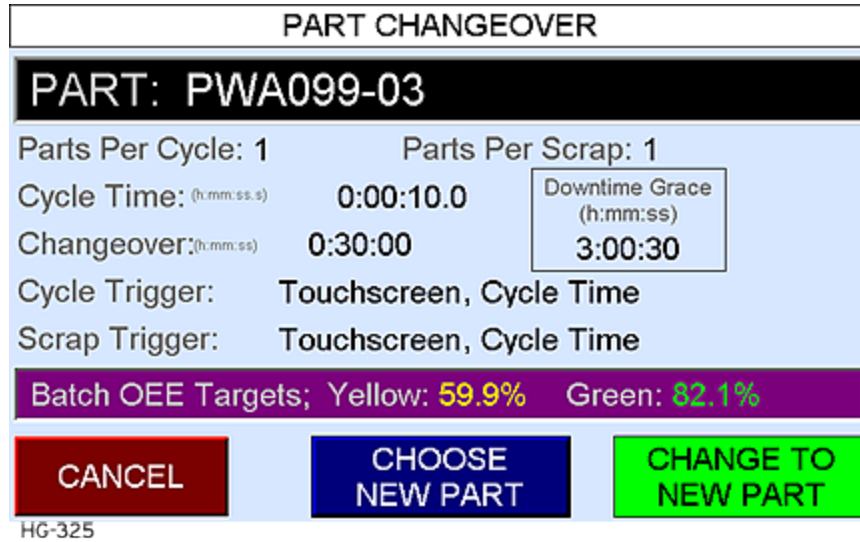


## Chapter 12: Part Changeover

### 12.1: Changeover Mode .....71

From any Work interface, the operator is allowed the option to select a different part. Depending on the System Configuration, this will restart OEE calculations when in Batch mode or initiate the next step of the OEE calculations when in Shift mode.

The 'Change Part' button shows the current part configuration.



**PART CHANGEOVER**

**PART: PWA099-03**

Parts Per Cycle: 1      Parts Per Scrap: 1

Cycle Time: (h:mm:ss) 0:00:10.0      Downtime Grace (h:mm:ss) 3:00:30

Changeover: (h:mm:ss) 0:30:00

Cycle Trigger: Touchscreen, Cycle Time

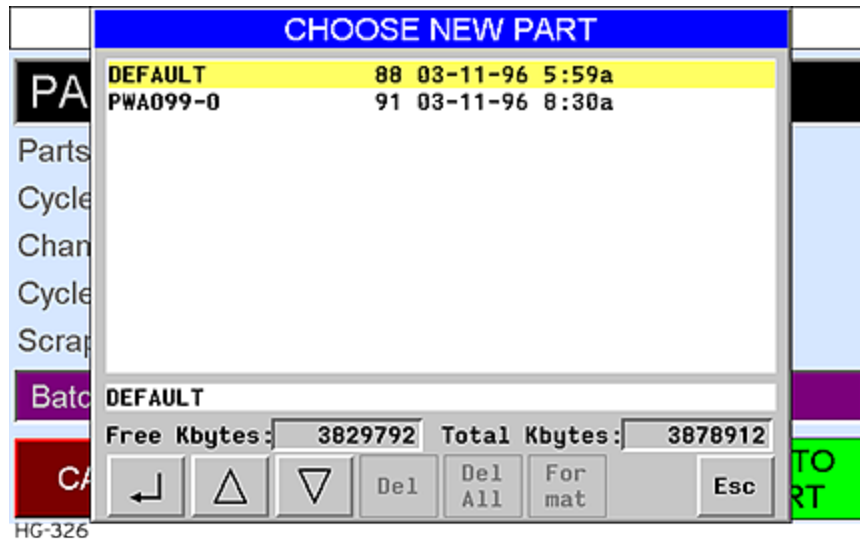
Scrap Trigger: Touchscreen, Cycle Time

Batch OEE Targets; Yellow: 59.9%      Green: 82.1%

**CANCEL**      **CHOOSE NEW PART**      **CHANGE TO NEW PART**

HG-325

Selecting 'Choose New Part' will present the user with a directory of available parts from which to select. The MicroSD card must be in place for this operation to be available. These part files are created using the Part Editor/Viewer in the Configuration menu or by using the Configuration Utility.



**CHOOSE NEW PART**

PA	DEFAULT	88	03-11-96	5:59a
PWA099-0		91	03-11-96	8:30a

Parts  
Cycle  
Chan  
Cycle  
Scrap

Batch

Free Kbytes: 3829792      Total Kbytes: 3878912

**CANCEL**      **CHOOSE NEW PART**      **CHANGE TO NEW PART**

HG-326

Use the touchscreen to highlight a new part or use the up/down arrow keys on the touchscreen to move the highlight cursor to the desired part. If the part name is longer than eight characters, it will be truncated in the directory list but shown in full in the field immediately below the directory list when the part is highlighted. If the part was created with any spaces in the name, the part file name will be truncated at the first instance of the space character.

Press the **↵** key once the new part is selected and confirm the selection. The newly selected part configuration is shown on the screen, but these parameters have not yet taken effect.

To start working on the new part with the new parameters shown, press the 'Change to New Part' button. The display will immediately revert to the Work interface. The parameters for the new part are now in effect.

See ["Scheduled Breaks and Changeover; Effect on Scoring" on page 56](#).

## 12.1: Changeover Mode

When Changeover mode is active, cycle and scrap triggers are disabled so that work on the machine does not inadvertently alter totals. The user is required to acknowledge that the Changeover process is done before triggers are re-enabled.

Changeover mode operation depends on the newly selected Part's configuration as follows:

Part Changeover Time = 0 seconds	The OEE System enters Changeover mode and immediately enters Downtime, requiring a Downtime Code selection. Automatic Changeover Downtime can be enabled to do this automatically if desired. Cycle and Scrap triggers are ignored. The Changeover Timer accumulates the amount of time the Changeover process has taken. User confirmation of 'Changeover Process DONE' is required via the touchscreen to re-enable Cycle and Scrap triggers. Once confirmed DONE, the system stays in Downtime until either manually put into Uptime or until a Cycle is triggered.
Part Changeover Time = 1 second	The OEE System does NOT enter Changeover Mode. The new Part parameters take effect immediately to include the Grace Period countdown timer that determines automatic downtime if so configured. Cycle and Scrap triggers are never ignored. Production of the new part is intended to start immediately.
Part Changeover Time greater than 1 second	The OEE System enters Changeover Mode. Cycle and Scrap triggers are ignored. The Changeover Timer counts down the amount of time configured for the new Part's Changeover Time parameter. Both Uptime and Downtime pause. Automatic downtime will occur if the Changeover time expires before the user confirms that Changeover is done. Automatic Changeover Downtime can be enabled to do this automatically. The Changeover countdown timer changes to a count-up timer to note the overage. User confirmation of 'Changeover Process DONE' is required via the touchscreen to re-enable Cycle and Scrap triggers. If confirmed DONE before the Changeover Time runs out, the system enters Uptime. If confirmed DONE after the Changeover Time runs out, the system remains in Downtime until either manually put into Uptime or until a Cycle is triggered.

See ["Automatic Changeover Downtime" on page 68](#).

# Datalogging and Configuration Files





## Chapter 13: Datalogging and Configuration Files

<b>13.1: Datalogging</b>	<b>73</b>
<b>13.2: Configuration Files</b>	<b>76</b>
<b>13.3: Datalog and Configuration File Transfer</b>	<b>76</b>

All manufacturing production data is recorded and stored on the MicroSD memory card installed in the OEE system. The data files are stored in a comma-separated value (CSV) file format that is easy to open in spreadsheet software for use in production analysis and reporting.

Downtime events, Call events are logged to their own event files, also in CSV format.

Configuration of the OEE system is possible via configuration files that can be placed on the MicroSD card for the system to load.

### 13.1: Datalogging

Several different datalog files are kept for various features. These files are stored on the microSD installed in the OEE system. Files may be retrieved by copying them to a USB drive or by FTP access. It is not recommended that the MicroSD card be removed from the OEE system.

#### 13.1.1: Process Log Files

Process datalog files are stored on the MicroSD card in the OEE\DATALOGS folder. An entry is made to this file based on the Datalog Interval setting in the Cell Configuration.

- YYMMDD.CSV = the currently active log, which should not be tampered with
- YYMMDD_S1DATA.CSV = the finalized process log for Shift 1 from the date noted
- YYMMDD_S2DATA.CSV = the finalized process log for Shift 2 from the date noted
- YYMMDD_S3DATA.CSV = the finalized process log for Shift 3 from the date noted
- Any shift spanning the midnight hour is matched to the date on which it was started

**Example:** The file for Shift 2 on March 17, 2022 is OEE\DATALOGS\220317_S2DATA.CSV

Data included per entry in each Process Log:	
Date	Date of entry
Time	Time of entry
CFG_Plant_ID[0]	Plant Identification
CFG_Cell_ID[0]	Cell Identification
User_LoggedIn[0]	Current User Logged In
OEE_Mode[0]	OEE Mode, either 'Batch Mode' or 'Shift Mode'
OEE_PctX10	OEE Score as of entry, i.e. 876 = 87.6%
A_PctX10	Availability Score as of entry, i.e. 789 = 78.9%
P_PctX10	Performance Score as of entry, i.e. 1354 = 135.4%
Q_PctX10	Quality Score as of entry, i.e. 925 = 92.5%
Part_Current.Nam	Current Part Name
Cycles_Part	Cycles for current Part

Data included per entry in each Process Log:	
Cycle_Avg_Part	Part Cycle average in 1/100 second increments, i.e. 345 = 3.45 seconds
Cycle_Best_Part	Part Cycle best in 1/100 second increments, i.e. 92 = 0.92 seconds
Part_Good	Good parts count for this part
Part_Scrap	Scrap parts count for this part
Cycles_Shift	Cycles for current Shift
Cycle_Avg_Shift	Shift Cycle average in 1/100 second increments, i.e. 345 = 3.45 seconds
Cycle_Best_Shift	Shift Cycle best in 1/100 second increments, i.e. 92 = 0.92 seconds
Parts_Good_Shift	Good parts count for this Shift
Parts_Scrap_Shif	Scrap parts count for this Shift
Cycles_Today	Cycles for current day
Cycle_Avg_Today	Today Cycle average in 1/100 second increments, i.e. 345 = 3.45 seconds
Cycle_Best_Today	Today Cycle best in 1/100 second increments, i.e. 92 = 0.92 seconds
Parts_Good_Today	Good parts count for this day
Parts_Scrap_Toda	Scrap parts count for this day
Up_HrMinSec[0]	Total Uptime accumulation as of this entry, formatted Hr:Min:Sec
Down_HrMinSec[0]	Total Downtime accumulation as of this entry, formatted Hr:Min:Sec
Up_Seconds	Total Uptime accumulation as of this entry, raw seconds
Down_Seconds	Total Downtime accumulation as of this entry, raw seconds

### 13.1.2: Downtime Event Log Files

Downtime Event log files are stored on the MicroSD card in the OEE\DOWNTIME folder. Every downtime event is logged as an entry to this file. Additionally, the end of the shift is logged, which will be the only entry if no downtime occurred during the shift.

- YYMMDD.CSV = the currently active log file, which should not be tampered with
- YYMMDD_S1DOWN.CSV = the finalized downtime log for Shift 1 from the date noted
- YYMMDD_S2DOWN.CSV = the finalized downtime log for Shift 2 from the date noted
- YYMMDD_S3DOWN.CSV = the finalized downtime log for Shift 3 from the date noted
- Any shift spanning the midnight hour is matched to the date on which it was started

**Example:** The file for Shift 2 on March 17, 2022 is OEE\DOWNTIME\220317_S2DOWN.CSV

Data included per entry in each Downtime Log:	
Date	Date of Downtime Event
Time	Time of Downtime Event
CFG_Plant_ID[0]	Plant Identification
CFG_Cell_ID[0]	Cell Identification
User_LoggedIn[0]	Current User Logged In
Part_Current.Nam	Current Part Name
Downtime_Event[0]	Downtime Event description
DT_Code_Selected	Downtime Code selected, 0 if not yet selected
Downtime_Desc[0]	Downtime Code description
Down_HrMinSec[0]	Downtime total in Hr:Min:Sec
Down_Seconds	Downtime total in raw seconds

### 13.1.3: Call Log Files

Call log files are stored on the MicroSD card in the OEE\CALLLOGS. Every Call event is logged as a time and date stamped entry in this log. Events include any Call going active, any Call being acknowledged, and any Call being cleared. Additionally, the end of the shift is logged, which will be the only entry if no calls were made during a shift.

- YYMMDD.CSV = the currently active log, which should not be tampered with
- YYMMDD_S1CALLS.CSV = the finalized call log for Shift 1 from the date noted
- YYMMDD_S2CALLS.CSV = the finalized call log for Shift 2 from the date noted
- YYMMDD_S3CALLS.CSV = the finalized call log for Shift 3 from the date noted
- Any shift spanning the midnight hour is matched to the date on which it was started

**Example:** The file for Shift 2 on March 17, 2022 is OEE\CALLLOGS\220317_S2CALLS.CSV

Data included per entry in each Call Log:	
Date	Date of Downtime Event
Time	Time of Downtime Event
CFG_Plant_ID[0]	Plant Identification
CFG_Cell_ID[0]	Cell Identification
User_LoggedIn[0]	Current User Logged In
Part_Current.Nam	Current Part Name
Call_Event[0]	Description of Call Event
RM_Call_Active[0]	Hr:Min:Sec total Raw Materials Active Call Time as of Event
RM_Call_Unack[0]	Hr:Min:Sec total Raw Materials Unacknowledged Call Time as of Event
Maint_Call_Activ	Hr:Min:Sec total Maintenance Active Call Time as of Event
Maint_Call_Unack	Hr:Min:Sec total Maintenance Unacknowledged Call Time as of Event
Super_Call_Activ	Hr:Min:Sec total Supervisor Active Call Time as of Event
Super_Call_Unack	Hr:Min:Sec total Supervisor Unacknowledged Call Time as of Event
RM_Active_Sec	Raw Seconds total Raw Materials Active Call Time as of Event
RM_Unack_Sec	Raw Seconds total Raw Materials Unacknowledged Call Time as of Event
Maint_Active_Sec	Raw Seconds total Maintenance Active Call Time as of Event
Maint_Unack_Sec	Raw Seconds total Maintenance Unacknowledged Call Time as of Event
Super_Active_Sec	Raw Seconds total Supervisor Active Call Time as of Event
Super_Unack_Sec	Raw Seconds total Supervisor Unacknowledged Call Time as of Event

## 13.2: Configuration Files

This OEE system has been designed so that configuration can be more easily changed on a constant basis as required in some manufacturing facilities. This is accomplished with configuration files that are loaded to the MicroSD card in one of several ways listed below, which are then loaded by the OEE system. Interaction with the touchscreen itself is not required for most configuration.

Part files are stored in the OEE\PART folder. This is the only directory that is accessible by the operator from which to select a new part for Changeover. New parts created with the Part Editor / Viewer are saved here. Subdirectories may be made to group parts if needed.

Configuration files should be placed in the OEE folder in order for the OEE system to automatically load them.

See ["Configuration Utility" on page 78](#).

## 13.3: Datalog and Configuration File Transfer

Several methods are available for the retrieval of log files or for the placement of configuration files. For various reasons, it is not recommended that the MicroSD card be removed from the OEE system.

Methods of accessing files are as follows:

- FTP access via the Ethernet connection (See ["FTP Access" on page 49](#))
- Copying files to/from a USB drive (See ["Copying Files to/from USB Drive" on page 32](#))
- Log files sent via e-mail automatically at the end of a shift (See ["Email Configuration" on page 51](#))
- Last Resort: Remove the MicroSD card and use a card reader device

**NOTE:** Many of the operations of the OEE system depend on the MicroSD card being in place. If removing the MicroSD card from the system for any reason, replace it as soon as possible.

# Configuration Utility



## Chapter 14: Configuration Utility

14.1: Part Configuration .....	79
14.2: Shift Configuration .....	82
14.3: Downtime Code Configuration .....	85
14.4: Login Configuration .....	86
14.5: Email/SMS Configuration .....	87
14.6: File Locations .....	87

Much of the OEE configuration can be done via the OEE Touchscreen itself using the password-protected Configuration menu. However, some of the more tedious configuration is better served using the companion Configuration Utility. For Shift Mode usage, the full Shift Configuration currently requires use of the Configuration Utility.

The Configuration Utility is a spreadsheet-based utility, "OEE Setup.xlsm". It is a Macro-enabled sheet and requires macros to be enabled to use the utility. This is subject to change in the future.

**NOTE:** To configure one of the OEE features, click the link on the main menu of the Configuration Utility. Links are also provided to open the folders into which the Configuration Utility will save new files.

v0.92	<b>OEE CONFIGURATION</b>
	MAIN MENU
	<a href="#">Part Configuration</a>
	<a href="#">Open Part Folder</a>
	<a href="#">Shift Configuration</a>
	<a href="#">Downtime Code Configuration</a>
	<a href="#">Login Configuration</a>
	<a href="#">E-Mail Configuration</a>
	<a href="#">Open Config Folder</a>
HG-327	

## 14.1: Part Configuration

Part Configuration allows for creation of Part files that can then be selected when changing parts on the OEE system. Part files may also be created or edited via the OEE touchscreen interface as noted elsewhere in this manual.

MAIN MENU		PART CONFIGURATION	
	EDIT THIS COLUMN ONLY	Helper Calculations	
PartName (no spaces, 20 chars max)	Default	(7 Characters)	
Changeover Time (h:mm:ss)	0:30:00	(0.5 Hours)	
Ideal Cycle Time (h:mm:ss.s)	00:00:10.0	(0.17 Minutes)	
Down Time Grace Period (h:mm:ss)	0:00:30	(0.5 Minutes)	
Parts per Cycle	1	(360 Parts per Hour)	
Cycle Trigger Method	Touchscreen		
Digital Input Cycle Method	ON	Ignored if 'Touchscreen'	
Manual Cycle Entry Interval	Cycle Time		
Parts per Scrap	1		
Scrap Trigger Method	Touchscreen		
Digital Input Scrap Method	ON	Ignored if 'Touchscreen'	
Manual Scrap Entry Interval	Cycle Time		
Scrap Action	Subtract From Good		
Batch Mode Total Parts Target	2300		
Batch Mode OEE Target Availability:	85.0%	95.0%	Batch Mode OEE:
Batch Mode OEE Target Performance:	80.0%	90.0%	59.8%
Batch Mode OEE Target Quality:	88.0%	96.0%	82.1%

[Open Part Folder](#)

CREATE PART FILE

- Part file will be "PartName" with no file extension.
- Place Part files in the OEE/PART directory of the OEE MicroSD
- Use subdirectories of that path to group parts.

HG-328

Each parameter for part configuration is available for editing. Each field is restricted to valid entries and Helper Calculations are provided.

**Part Name:** Enter a part name of 20 characters or less. This will also be the filename.

**NOTE:** Spaces in Part Names will cause the part name to be truncated at the space character when selecting the part in the OEE system.

**Changeover Time:** To schedule Changeover Time as time that will not negatively affect OEE scoring, enter the amount of time expected to change the machine over to this part. Any time exceeding this without exiting Changeover Mode will be added to Downtime.

- If set to 0 seconds, automatic downtime will occur when the part parameters determine a timeout. Changeover mode is ignored.
- If set to 1 second, automatic downtime will never occur due to the Changeover process. Changeover mode takes effect meaning cycle triggers are ignored until the user confirms that Changeover is done.
- If set to > 1 second, automatic downtime will occur when this time expires if “Changeover Done” has not yet been confirmed by the user. Changeover mode takes effect meaning cycle triggers are ignored until the user confirms that Changeover is done.

See ["Part Changeover" on page 70](#)

**Ideal Cycle Time:** Enter the target amount of time expected for each cycle of this part. This will be used in the Performance calculation. Unrealistic entries will result in skewed OEE calculations:

- Low Performance if actual cycle times consistently fall below the Ideal Cycle Time specified here
- Performance numbers above 100% if the Ideal Cycle Time is too lenient.

**Down Time Grace Period:** A time adder to the Ideal Cycle Time to determine when automatic downtime should be started. See ‘Manual Cycle Entry Interval’.

**Parts per Cycle:** How many parts are added to the Total Parts and Good Parts accumulators each time a Cycle is triggered.

**Cycle Trigger Method:** Dropdown selection specifying how a cycle is to be triggered:

- **Touchscreen:** Cycles are triggered via the OEE touchscreen
- **Digital Input (Sensor):** Cycles are triggered via the I1 I/O terminal in the OEE panel
- **Comms:** Cycles are triggered over Ethernet communications (under development)
- **Touchscreen/Digital Input:** Cycles can be added by either of these two methods
- **Touchscreen/Comms:** Cycles can be added by either of these two methods

**Digital Input Cycle Method:** Dropdown selection specifying the state of the digital input that triggers a Cycle:

- **ON:** When the input receives a 12-24VDC signal, a cycle is triggered. The signal must be turned off and reapplied to register additional cycles.
- **OFF:** When the input loses a 12-24VDC signal, a cycle is triggered. The signal must be reapplied and then turned off again to register additional cycles.
- **Toggle:** Each transition of the 12-24VDC signal will trigger a cycle, either from OFF to ON, or from ON to OFF.



**Manual Cycle Entry Interval:** Dropdown Selection specifying how often cycles are expected. Automatic Downtime is determined by this setting.

- **Cycle Time:** Cycles are expected within the time determined by adding the Ideal Cycle Time parameter to the Grace Period parameter. If no cycle is triggered within this time limit, the OEE system is automatically placed in Downtime and a Downtime Code must be selected before Work can continue.
- **Hourly:** Cycles are expected to be added within the time determined by the Grace Period plus one hour. If no cycle is triggered within this time limit, the OEE system is automatically placed in Downtime and a Downtime Code must be selected before Work can continue. This is intended for manual triggering where cycles may not be added on a real-time basis yet still expected.
- **End of Shift:** Automatic Downtime is disabled. Cycles may be entered at any time during the shift.

**Parts per Scrap:** Determines how many parts are added to the Scrap Parts accumulator each time a Scrap Cycle is triggered. See also ["Scrap Action:" on the next page](#)

**Scrap Trigger Method:** Dropdown selection specifying how a cycle is to be triggered:

- **Touchscreen:** Scrap is triggered via the OEE touchscreen
- **Digital Input (Sensor):** Scrap is triggered via the I2 I/O terminal in the OEE panel
- **Comms:** Scrap is triggered over Ethernet communications (under development)
- **Touchscreen/Digital Input:** Scrap can be added by either of these two methods
- **Touchscreen/Comms:** Scrap can be added by either of these two methods

**Digital Input Scrap Method:** Dropdown selection specifying the state of the digital input that triggers a Cycle:

- **ON:** When the input receives a 12-24VDC signal, scrap is triggered. The signal must be turned off and reapplied to register additional scrap.
- **OFF:** When the input loses a 12-24VDC signal, scrap is triggered. The signal must be reapplied and then turned off again to register additional scrap.
- **Toggle:** Each transition of the 12-24VDC signal will trigger scrap, either from OFF to ON, or from ON to OFF.

**Manual Scrap Entry Interval:** Dropdown Selection specifying how often scrap is expected. Automatic Downtime is determined by this setting. (Currently not operational, setting makes no difference in operation.)

- **Cycle Time:** Cycles are expected within the time determined by adding the Ideal Cycle Time parameter to the Grace Period parameter. If no cycle is triggered within this time limit, the OEE system is automatically placed in Downtime and a Downtime Code must be selected before Work can continue.
- **Hourly:** Cycles are expected to be added within the time determined by the Grace Period plus one hour. If no cycle is triggered within this time limit, the OEE system is automatically placed in Downtime and a Downtime Code must be selected before Work can continue. This is intended for manual triggering where cycles may not be added on a real-time basis yet still expected.
- **End of Shift:** Automatic Downtime is disabled. Cycles may be entered at any time during the shift.

**Scrap Action:**

- By default, a Scrap Trigger will Subtract from the Good Parts and add to the Scrap Parts. This assumes that all parts are Good Parts unless they are later found to be Scrap Parts, at which point they are moved from Good to Scrap. Total Parts are not affected by this operation.
- If set to Replace Cycle, a Scrap Trigger will add parts to the Scrap Parts as well as adding parts to the Total Parts. Good Parts are not affected by this operation.

**Batch Mode Total Parts Target:** The Total Parts Target will load automatically upon Changeover to this part if in Batch mode. The target number is simply to display a goal for the user and does not affect OEE scoring. Ideally, this number is a product of the number of Ideal Cycle Times that can fit within the Planned Production Time. This can be expressed as:

$$Total\ Parts\ Target = Parts\ Per\ Cycle * \left( \frac{Planned\ Production\ Time}{Ideal\ Cycle\ Time} \right)$$

HG-307

**Batch Mode OEE Targets:** A Yellow and Green target can be specified in 10ths of a percentage for each of the OEE Score parameters; Availability, Performance, and Quality. The resulting OEE targets are calculated automatically. These parameters are ignored if running in Shift Mode.

**Create Part File:** Once the parameters have been altered as desired for this part, click the 'Create Part File' button. A confirmation window will display the location of the file, which is the same directory in which this configuration utility is placed. If a part file by the same name already exists, a prompt to overwrite will appear before the file is written.

**Part File Location:** Part files created with this utility should be placed on the MicroSD card of the OEE system in the OEE\PART directory or in any subdirectory of that location for part grouping purposes. Part files have no filename extension and the filename is the part name itself.

Clicking the "Main Menu" link at the top left returns to the main menu.

## 14.2: Shift Configuration

Shift Configuration using the Configuration Utility is currently required if Shift Mode is to be used. A more generalized shift configuration is available via the touchscreen interface for number of shifts, days active, start and end times, and break times. The parameters available via the touchscreen interface are sufficient for Batch Mode operation.

**NOTE:** The selection for Days of the Week that any given shift is active is currently only available through the OEE System touchscreen.

See ["General Shift Configuration" on page 40](#).

For Shift Mode operation of the OEE system, the Shift Configuration allows specification of up to 16 separate parts and allotted times for each part run. The target OEE Scores are a target for the entire shift instead of on a part-by-part basis.

Configuration of Shift Mode parameters requires an understanding of the OEE system and how calculations are made. Shift configurations might change daily and need to be put into place before the start of the shift. The Shift configuration for any given shift is loaded at the beginning of the shift only.

OEE Scores in Shift Mode consider the current part's individual running OEE scores as well as the OEE scores of previous parts. The allotted time for each part and the configuration of that part are used to determine those individual OEE scores. Shift scores are then weighted accordingly to provide an accurate running OEE score throughout the shift, regardless of different part configurations.

Helper calculations will indicate if settings do not match, i.e. 7 hours of Planned Production Time but only 6:30 of total Time Allotted for Parts runs.

[MAIN MENU](#)

## SHIFT CONFIGURATION

	SHIFT 1			SHIFT 2			SHIFT 3		
	EDIT THIS COLUMN ONLY	Helper Calculations		EDIT THIS COLUMN ONLY	Helper Calculations		EDIT THIS COLUMN ONLY	Helper Calculations	
Shift Start	6:00	Total Shift Length:		14:30	Total Shift Length:		0:00	Total Shift Length:	
Shift End	14:30	8:30		23:00	8:30		0:00	0:00	
Break 1 Start	8:15			16:45			0:00		
Break 1 End	8:30	Planned Production		17:00	Planned Production		0:00	Planned Production	
Break 2 Start	11:00	Time (Shift - Breaks):		19:30	Time (Shift - Breaks):		0:00	Time (Shift - Breaks):	
Break 2 End	11:30	7:30		20:00	7:30		0:00	0:00	
Break 3 Start	1:15			21:45			0:00		
Break 3 End	1:30	Start = End; No Break		22:00	Start = End; No Break		0:00	Start = End; No Break	
Break 4 Start	0:00			0:00			0:00		
Break 4 End	0:00			0:00			0:00		
Target Parts / Time Allotted Run 1	500	4:00		500	7:30		0	0:00	
Target Parts / Time Allotted Run 2	1000	3:30	Total Parts:	0	0:00	Total Parts:	0	0:00	Total Parts:
Target Parts / Time Allotted Run 3	0	0:00	1500	0	0:00	500	0	0:00	0
Target Parts / Time Allotted Run 4	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 5	0	0:00	Total Time Allotted:	0	0:00	Total Time Allotted:	0	0:00	Total Time Allotted:
Target Parts / Time Allotted Run 6	0	0:00	7:30	0	0:00	7:30	0	0:00	0:00
Target Parts / Time Allotted Run 7	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 8	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 9	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 10	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 11	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 12	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 13	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 14	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 15	0	0:00		0	0:00		0	0:00	
Target Parts / Time Allotted Run 16	0	0:00		0	0:00		0	0:00	
Shift Mode OEE Target Availability:	85.0%	95.0%	Shift Mode OEE:	85.0%	95.0%	Shift Mode OEE:	85.0%	95.0%	Shift Mode OEE:
Shift Mode OEE Target Performance:	80.0%	90.0%	59.8%	80.0%	90.0%	59.8%	80.0%	90.0%	59.8%
Shift Mode OEE Target Quality:	88.0%	96.0%	82.1%	88.0%	96.0%	82.1%	88.0%	96.0%	82.1%

HG-329

CREATE SHIFT 1 FILE

CREATE SHIFT 2 FILE

CREATE SHIFT 3 FILE

**Shift Start/End:** Set the Start and End times for the shift. Total Shift Length is calculated from these values.

**Break Start/End:** Break times can be configured or left zeroed depending on the intended production analysis:

- If scheduled break times are not to be included in Planned Production Time, configure up to 4 breaks per shift. During those configured break times, Uptime and Downtime accumulators will not increment.
- If break times are not configured, (Start time = End time), then any breaks taken by the operator are considered Down Time. This can help to analyze how much production capacity is being lost to idle machinery during break times that could otherwise be run by overlapping personnel.

**Target Parts/Time Allotted:** Up to 16 different parts runs can be configured for each shift. The target number of total parts and the allotted time for each run is specified. OEE Scoring calculations will then take these parameters into effect to calculate a score that encompasses the entire shift. These parameters are ignored if running in Batch Mode.

**NOTE:** Which part is to be run for each allotment is not specified. The operator must otherwise be notified of this schedule and which parts are to be run. (Subject to change in future revisions.)

**OEE Score Targets:** A Yellow and Green target can be specified in 10ths of a percentage for each of the OEE Score parameters; Availability, Performance, and Quality. The resulting OEE targets in the 'Helper Calculations' column are calculated automatically and should not be changed. The Shift Mode OEE Targets are ignored if running in Batch Mode.

**Create Shift File:** Once the parameters have been altered as desired for any shift, click the 'Create Shift File' button for the corresponding shift. A confirmation window will display the location of the file, which is the same directory in which this configuration utility is placed. If a shift file for this shift already exists, a prompt to overwrite will appear before the file is written.

- Shift1.CFG = Shift 1 configuration
- Shift2.CFG = Shift 2 configuration
- Shift3.CFG = Shift 3 configuration

**Shift File Location:** Shift files created with this utility should be placed on the MicroSD card of the OEE system in the OEE directory. The configuration will be read within several seconds of being placed on the OEE system if the shift itself is not already active.

For example, if Shift 2 is currently active and configuration files for Shifts 1 and 2 are placed on the OEE system, the Shift 1 configuration would be loaded immediately but the Shift 2 configuration would not be loaded until the current Shift 2 is complete.

Clicking the "Main Menu" link at the top left returns to the main menu.

## 14.3: Downtime Code Configuration

Configuration of the available downtime codes can be configured here or within the password protected OEE Config menu on the OEE touchscreen.

These downtime codes will be available to select in the event of downtime that is either manually or automatically triggered. The downtime code will be recorded as the reason for the downtime.

[MAIN MENU](#)

### DOWNTIME CONFIGURATION

	EDIT THIS COLUMN ONLY	Helper Calculations
Number of Codes Available	12	1 to 20
Downtime Code 1 (Locked)	Operator Shortage	(17 Characters)
Downtime Code 2 (Locked)	Upstream Blockage	(17 Characters)
Downtime Code 3 (Locked)	Changeover	(10 Characters)
Downtime Code 4	Setup	(5 Characters)
Downtime Code 5	Maintenance	(11 Characters)
Downtime Code 6	Quality	(7 Characters)
Downtime Code 7	Machine Adjustments	(19 Characters)
Downtime Code 8	Machine Idling	(14 Characters)
Downtime Code 9	Minor Stop	(10 Characters)
Downtime Code 10	Call for Parts	(14 Characters)
Downtime Code 11	Break / Lunch	(13 Characters)
Downtime Code 12	Safety Stop	(11 Characters)
Downtime Code 13	Default 13	(10 Characters)
Downtime Code 14	Default 14	(10 Characters)
Downtime Code 15	Default 15	(10 Characters)
Downtime Code 16	Default 16	(10 Characters)
Downtime Code 17	Default 17	(10 Characters)
Downtime Code 18	Default 18	(10 Characters)
Downtime Code 19	Default 19	(10 Characters)
Downtime Code 20	Default 20	(10 Characters)

[Open Config Folder](#)

CREATE DOWNTIME CODE FILE

- Downtime Code file will be "DTC.CFG"  
- Place Downtime Code file in the OEE directory of the OEE MicroSD  
- File will be deleted from card once loaded

**Number of Codes Available:** Up to 20 Downtime Codes can be made available to the user. Each code must be 20 characters or less.

**Downtime Codes:** Enter a description of each code. Downtime logging will display these codes exactly as typed. The first three codes are locked into place to support Automatic Downtime Code features.

**Create Downtime Code File:** Once the downtime codes have been configured, click the 'Create Downtime Code File' button. A confirmation window will display the location of the file, which is the same directory in which this configuration utility is placed. If a downtime code file already exists, a prompt to overwrite will appear before the file is written. The resulting file is named DTC.CFG.

**Downtime Code File Location:** Downtime Code files created with this utility should be placed on the MicroSD card of the OEE system in the OEE directory. The OEE System will read the file within a few seconds of it being placed on the MicroSD card and then delete it. Files may be transferred using FTP (See FTP access in Ethernet configuration) or by transferring from a USB drive (not currently implemented).

Clicking the “Main Menu” link at the top left returns to the main menu.

## 14.4: Login Configuration

Configuration of the OEE Login IDs and Passwords can be configured here. This configuration is currently not available via the OEE touchscreen. (Subject to change in future revisions.)

[MAIN MENU](#)

### LOGIN CONFIGURATION

	Login ID	Password
User 1 / Settings	12345	12345
User 2	22222	222
User 3	33333	333
User 4	44444	444
User 5	55555	555
User 6	66666	666
User 7	77777	777
User 8	88888	888
User 9	99999	999
User 10	10100	100
User 11	10101	101
User 12	10102	102
User 13	10103	103
User 14	10104	104
User 15	10105	105
User 16	10106	106
User 17	10107	107
User 18	10108	108
User 19	10109	109
User 20	10110	110

[Open Config Folder](#)

CREATE LOGIN FILE

- Login file will be "LOGIN.CFG"  
 - Place Login file in the OEE directory of the OEE MicroSD  
 - File will be deleted from card once loaded

Fill in the 20 available spots for Login ID and the corresponding Password. The Login IDs will be included in datalogging as a record of the operator logged in at the time of any datalogged event. Login IDs and Passwords can be any positive number up to 999999999 (9 digits).

The password for the first login entry is used for the Configuration Menu of the OEE system

**Create Login File:** Once the Login IDs and Passwords been configured, click the ‘Create Login File’ button. A confirmation window will display the location of the file, which is the same directory in which this configuration utility is placed. If a downtime code file already exists, a prompt to overwrite will appear before the file is written. The resulting file is named LOGIN.CFG.



**Login File Location:** Login files created with this utility should be placed on the MicroSD card of the OEE system in the OEE directory. The OEE System will read the file within a few seconds of it being placed on the MicroSD card and then delete it. The changes take effect immediately, though any operator logged in at the time of the file being read will remain logged in until logged out.

## 14.5: Email/SMS Configuration

With up to 30 Email addresses that can be configured for various Call and End-of-Shift functions, the Configuration Utility can make this process easier compared to touchscreen entry.

Though it still requires an Email service, it is possible to Email directly to a mobile number. Cellular service carriers may provide Email-to-Text options for Mobile Numbers so that these messages appear as a text message rather than an Email.

- Example: AT&T Email to Mobile Number = 1234567890@txt.att.net

MAIN MENU		EMAIL ADDRESSES		
Calls: 1-2 Email addresses for initial notification of call. If Timeout expires before Call is acknowledged, Timeout Address is used for a followup message.				
	Timeout (s)	Shift 1	Shift 2	Shift 3
Raw Materials Call 1		Biff@DynaCrunch.com	Willy@DynaCrunch.com	
Raw Materials Call 2		Lunchbox@DynaCrunch.com		
... Raw Materials Timeout Call	300	Lefty@DynaCrunch.com	Smoky@DynaCrunch.com	
Maintenance Call 1		TRex@DynaCrunch.com	ElMariachi@DynaCrunch.com	
Maintenance Call 2			Dingdong@DynaCrunch.com	
... Maintenance Timeout Call	300	Trugoy@DynaCrunch.com		
Supervisor Call 1		Mongo@DynaCrunch.com	MrsCrunch@DynaCrunch.com	
Supervisor Call 2				
... Supervisor Timeout Call	300	Charleyhorse@DynaCrunch.com		
End of Shift Report Recipient 1		BigDave@DynaCrunch.com	LilDave@DynaCrunch.com	
<a href="#">Open Config Folder</a>		<b>CREATE EMAIL CONFIGURATION FILE</b>		
<small>           HG-332            - Email Configuration file will be "EMAIL.CFG"            - Place Email file in the OEE directory of the OEE MicroSD            - File will be deleted from card once loaded         </small>				

**Raw Materials Call 1 / 2... Maintenance Call 1 / 2... Supervisor Call 1 / 2:** Up to two addresses can be specified to receive an Email message when any of these Calls is made active.

**Timeouts:** If a Call goes active but is not Acknowledged within this amount of time, another message is sent to the Timeout addresses. These addresses can be the same or different from the original address.

**End of Shift Report:** At the end of each shift, all Datalog files, Downtime event files, and Call logs can be sent to the address specified as .CSV file attachments.

## 14.6: File Locations

Methods of transferring configuration files are as follows:

- FTP access via the Ethernet connection (See "[FTP Access](#)" on page 49)
- Copying files to/from a USB drive (See "[Copying Files to/from USB Drive](#)" on page 32)
- Log files sent via E-mail automatically at the end of a shift (See "[Email Configuration](#)" on page 51)
- Last Resort: Remove the MicroSD card and use a card reader device

**NOTE:** Many of the operations of the OEE system depend on the MicroSD card being in place. If removing the MicroSD card from the system for any reason, replace it as soon as possible.

# Data Concentrator





## Chapter 15: Data Concentrator

15.1: Data Concentrator Configuration	91
15.2: Web Browser Access	93

The Data Concentrator is a separate device that is meant to compile select data from up to 32 OEE Cells to monitor them all from a central location.

The Data Concentrator unit obtains data from each OEE cell via an Ethernet connection using the Modbus TCP/IP protocol. Therefore, Ethernet settings must be valid for both the Data Concentrator as well as each OEE cell meant to be monitored. There must be a path through routers, firewalls, modems, etc. for the data to be able to be monitored. IT personnel may need to be involved for proper operation.

The Data Concentrator also acts as the host for a web page that is a mirror of the Data Concentrator Unit's screen. This web page can be displayed using a web browser on any computer or device with access to the same Ethernet network. This allows for remote viewing of the data, for production monitors on large screens, etc.

When 17 or more Cells are enabled, or if any cells in the second column are enabled, display space is limited and each cell will show either the Cell ID or the current Part per the configuration.

PLANT: Plant 1				13:45	05 JUL
Cell 1	73%		RAILS 1	67%	
BRACKETS 1	90%		RAILS 2	48%	
BRACKETS 2	88%		RAILS 3	92%	
CASES 1	95%		SPACERS	65%	
CASES 2	78%		RIBBING 1	85%	
CASES 3	95%		RIBBING 2	95%	
CASES 4	67%		HANDLES 1	95%	
PANEL DOORS	48%		HANDLES 2	78%	
HINGES	92%		CASTERS 1	95%	
BACKING PLATES	65%		CASTERS 2	67%	
BRACING 1	85%		FITTINGS 1	48%	
BRACING 2	95%		FITTINGS 2	92%	
PACKAGING 1	88%		PACKAGING 2	65%	
PALLETIZER 1	95%		WRAPPING 1	85%	
PALLETIZER 2	78%		WRAPPING 2	95%	
PALLETIZER 3	95%		WRAPPING 3	87%	

HG-333

With 16 or less Cells enabled entirely within the first column, there is more space. Therefore, both the Cell ID and the current Part are displayed in this case.

PLANT: Plant 1		= Q		13:45 05 JUL	
CELL:	Cell 1	PART:	DEFAULT	82%	
CELL:	BRACKETS 1	PART:	BRACKET B5	90%	
CELL:	BRACKETS 2	PART:	BRACKET B58	88%	
CELL:	CASES 1	PART:	CASE C12	95%	
CELL:	CASES 2	PART:	CASE C6	78%	
CELL:	CASES 3	PART:	CASE C14	95%	
CELL:	CASES 4	PART:	CASE C4	67%	
CELL:	PANEL DOORS	PART:	DOOR 1	48%	
CELL:	HINGES	PART:	HINGE H1	92%	
CELL:	BACKING PLATES	PART:	PLATE 1	65%	
CELL:	BRACING 1	PART:	BRACE 1	85%	
CELL:	BRACING 2	PART:	BRACE 2	95%	
CELL:	PACKAGING 1	PART:	P101	88%	
CELL:	PALLETIZER 1	PART:	PALLETIZER 1	95%	
CELL:	PALLETIZER 2	PART:	PALLETIZER 2	78%	
CELL:	PALLETIZER 3	PART:	PALLETIZER 3	95%	

HG-334

Any Cell may be tapped to zoom into further detail for that Cell.

PLANT: Plant 1		CELL: Cell 1		13:46 05 JUL	
PART: DEFAULT		USER: 00012345			
TOTAL:	14	CYCLES:	14		
SCRAP:	1	AVG CYCLE	0:17.400		
		LAST CYCLE	0:03.270		
		BEST CYCLE	0:00.200		
UP:	1:09:39	CHANGEOVER:	0:30:00		
DOWN:	0:57:51	ACTIVE CALL:	0:00:10		
A: 95%	P: 69%	Q: 92%	OEE: 61%		

HG-335

## 15.1: Data Concentrator Configuration

Configuration of the Data Concentrator itself on the Ethernet Network is accomplished by pressing the 'Config' gear icon in the title bar at the top of the main display. This results in the display of the main OEE Cell configuration covered in the next section.

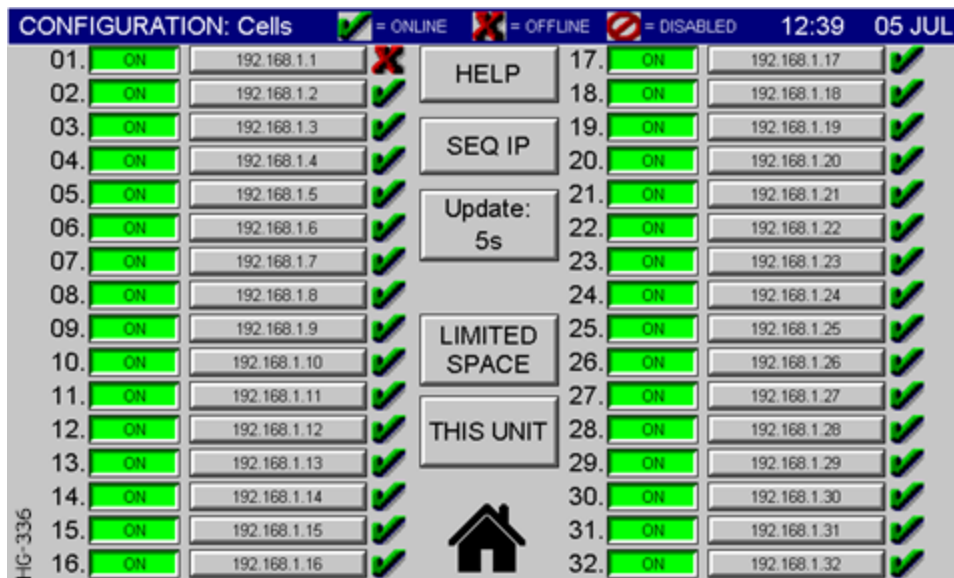
Pressing the button labeled 'This Unit' will allow configuration of the Data Concentrator. Enter an IP address, a Netmask, and a Gateway address according to the network being utilized.

**NOTE:** There is not a one-size-fits-all networking setup that will work in every case. Facility IT personnel should be consulted for addressing and other Ethernet setup parameters. There must be a path via routers, firewalls, etc., between the Data Concentrator and any OEE cells that are to be monitored. Specifically, Ethernet traffic on Port 502 for the Modbus TCP/IP protocol must be open between the Data Concentrator and all monitored OEE cells.

A Ping utility is provided to test the connection and configuration. Any IP address can be entered, whether it be an OEE Cell or a server on the network or a known address on the internet. A response time of -1 indicates no response, otherwise the response time is reflected in milliseconds.

### 15.1.1: OEE Cell Configuration

Each Cell to be monitored must be enabled, then the IP address must match that of the OEE Cell. One of three possible states are shown next to each cell: Offline, Online, or Disabled.



**NOTE:** With most or all cells enabled, or with slower connections, it may not be possible to update all configured cells within the configured Update time. In this case, the Data Concentrator will update all configured cells as fast as possible.

**NOTE:** Configured cells that are non-responsive (no response within 1 second) will be marked OFFLINE. Communications to those cells will be put on hold for at least 30 seconds to favor responsive cells. Communications will be retried every 30 seconds to configured cells marked OFFLINE.

**NOTE:** A green checkmark may initially appear for some amount of time even though communications are not currently operational. This is normal as there is some amount of communications timeout in addition to the Update interval before the Data Concentrator considers the OEE Cell offline.

The '**HELP**' button serves as a refresher for what each of the items on the screen is meant for.

A configuration helper is provided if the IP addresses of Cells happen to be in Sequential order. Pressing the '**SEQ IP**' button prompts for confirmation to use the Cell 01 IP address as a starting point to fill all IP addresses sequentially. IP addresses will not be filled beyond the valid address range.

The '**Update**' interval defines how often the Data Concentrator will poll all the configured OEE Cells for data.

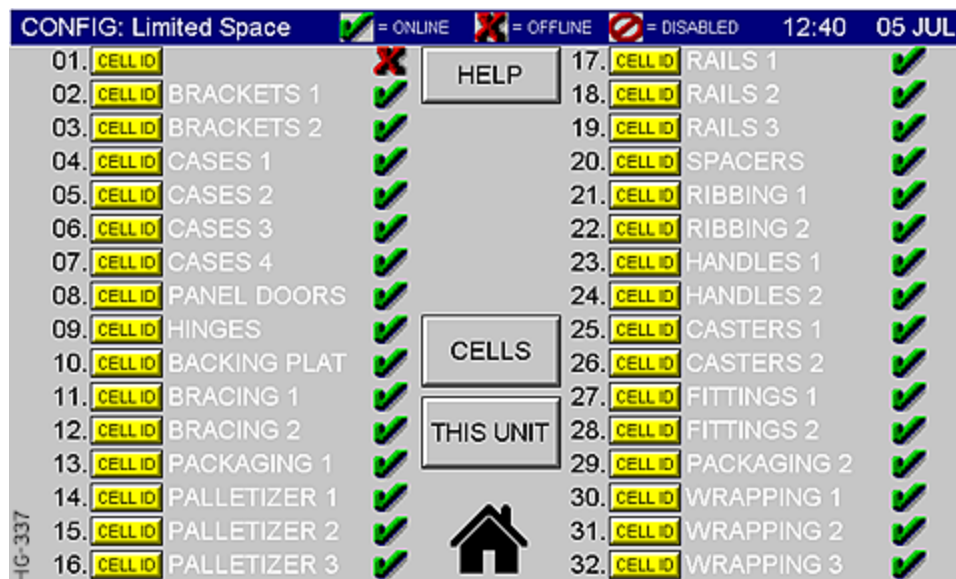
To configure any OEE Cell to be monitored, toggle the button in any location to ON. Empty space between cells is possible for visual separation.

Once an OEE Cell is toggled on, press the IP address field and edit the IP address to match that of the OEE Cell.

Any cell enabled in the 17-32 column will result in the "Limited Space" main display, which gives the choice of showing either the Cell ID or Current Part for any given OEE Cell. Otherwise, there is enough space to display both of those parameters.

Pressing the '**LIMITED SPACE**' button allows configuration of the Limited Space display that is active if the second column of OEE Cells has any cells enabled. The only option to specify within this screen is whether the Cell ID or the Current Part is shown for each cell.

**NOTE:** The entire 'Limited Space Display' configuration is disregarded completely when 16 or less cells are configured.



The '**HELP**' button displays a refresher on what each item on this configuration screen indicates.

Press '**CELLS**' to return to the main OEE Cell configuration.

Press the Home icon to display the main Data Concentrator monitoring screen.

## 15.2: Web Browser Access

The Data Concentrator is accessible via any web browser running on a PC or mobile device. The interface will appear nearly identical to the screen captures shown here, which were taken from the Data Concentrator device itself. These web screens may then be displayed on a monitor of any size. The screens will scale automatically to the resolution of the web browser being used.

To access the Data Concentrator with a web browser, enter the IP address of the Data Concentrator into the address bar. For example, `http://10.0.0.1` using the default address. This requires a path between the browser device and the Data Concentrator via Ethernet in some fashion. This path may exist only when signed onto a specific facility's network, or it may be available from anywhere on the internet. The determination of this depends completely on the Ethernet configuration and IT department cooperation with configuration of network devices such as routers and firewalls.

The port used is the standard HTTP port 80.

Upon connection via web browser, a username and password is required. The default login is:

- Username: OEE
- Password: OEEWeb
- (Subject to change)

Once the proper username and password is entered, a prompt will display to confirm Terms and Conditions. Once confirmed, the browser will be synchronized to the Data Concentrator and can be used in the same manner as the touchscreen on the Data Concentrator itself. If the browser user accesses the Config screen or any other screen, the same screen will show on the Data Concentrator. In the same fashion, if a user at the Data Concentrator accesses the Config screen or any other screen, the browser user will see the synchronized screen changes.

The browser can be left active for any amount of time. Web browser access can be made from up to 4 separate browsers at the same time.

# Modbus TCP/IP Access





## Chapter 16: Modbus TCP/IP Access

<b>16.1: Read-Only Information</b>	<b>95</b>
<b>16.2: Configuration Information</b>	<b>96</b>
<b>16.3: OEE Data</b>	<b>97</b>
<b>16.4: Light Tower and Call Status</b>	<b>98</b>
<b>16.5: Triggering via Modbus TCP/IP Communications</b>	<b>99</b>

The Horner OEE System is a Modbus TCP/IP Server. Information can be monitored by any other device (such as the Data Concentrator) or software package (such as a SCADA package) that is able to be a Modbus TCP/IP Client. Remote triggering may be done via Modbus TCP/IP communications.

### 16.1: Read-Only Information

Process data is available as Read-Only Input Registers as follows:

6-Digit	5-Digit	Hex	Type	CMD	Parameter	Format	Notes
300201	30201	00C8	Input Reg	4	Availability Score Current %	INT	1% resolution
300202	30202	00C9	Input Reg	4	Performance Score Current %	INT	1% resolution
300203	30203	00CA	Input Reg	4	Quality Score Current %	INT	1% resolution
300204	30204	00CB	Input Reg	4	OEE Score Current %	INT	1% resolution
300205	30205	00CC	Input Reg	4	Total Parts Current Part	DINT	1 Double Word
300207	30207	00CE	Input Reg	4	Total Scrap Current Part	DINT	1 Double Word
300209	30209	00D0	Input Reg	4	Total Cycles Current Part	DINT	1 Double Word
300211	30211	00D2	Input Reg	4	Up-Time Seconds Current Shift	DINT	1 Double Word
300213	30213	00D4	Input Reg	4	Down-Time Seconds Current Shift	DINT	1 Double Word
300215	30215	00D6	Input Reg	4	Active Downtime Description	ASCII	20 Characters
300225	30225	00E0	Input Reg	4	Active Call Timer	INT	Seconds
300226	30226	00E1	Input Reg	4	Changeover Timer	INT	Seconds
300227	30227	00E2	Input Reg	4	Average Cycle Time	DINT	0.01s resolution
300229	30229	00E4	Input Reg	4	Last Cycle Time Current Part	DINT	0.01s resolution
300231	30231	00E6	Input Reg	4	Best Cycle Time Current Part	DINT	0.01s resolution
300233	30233	00E8	Input Reg	4	Plant ID	ASCII	20 Characters
300243	30243	00F2	Input Reg	4	Cell ID	ASCII	20 Characters
300253	30253	00FC	Input Reg	4	Current Part Name	ASCII	12 Characters
300259	30259	0102	Input Reg	4	Current User	ASCII	12 Characters

## 16.2: Configuration Information

A limited number of configuration parameters are available via Modbus TCP/IP Holding Registers as follows. It is not recommended that these parameters be changed via Modbus.

6-Digit	5-Digit	Hex	Type	CMD	Parameter	Format	Notes
415001	N/A	3A98	Holding Reg	3,6,16	Config Plant ID	ASCII	20 Characters
415011	N/A	3AA2	Holding Reg	3,6,16	Config Cell ID	ASCII	20 Characters
415021	N/A	3AAC	Holding Reg	3,6,16	Config Downtime Code Count	INT	Valid Range: 3-20
415023	N/A	3AAE	Holding Reg	3,6,16	Config Light Tower Link	INT	0=OEE, 1=A, 2=P, 3=Q
415024	N/A	3AAF	Holding Reg	3,6,16	Config DIN #4 Call Link	INT	0=Disable, 1=Raw Mat, 2=Maint, 3=Super
415026	N/A	3AB1	Holding Reg	3,6,16	OEE Mode	INT	0=Shift Mode, 1=Batch Mode
415027	N/A	3AB2	Holding Reg	3,6,16	Datalog Interval	INT	Valid Range: 5-32767 Seconds
415031	N/A	3AB6	Holding Reg	3,6,16	Config Shift 1 Days Active	INT	Bits 1-7 = Sun-Sat
415032	N/A	3AB7	Holding Reg	3,6,16	Config Shift 2 Days Active	INT	Bits 1-7 = Sun-Sat
415033	N/A	3AB8	Holding Reg	3,6,16	Config Shift 3 Days Active	INT	Bits 1-7 = Sun-Sat
415034	N/A	3AB9	Holding Reg	3,6,16	Config Call Timeout	INT	Seconds
415126	N/A	3B15	Holding Reg	3,6,16	Availability GREEN Target %x10	INT	Valid Range: 0-1000 (100.0%)
415127	N/A	3B16	Holding Reg	3,6,16	Performance GREEN Target %x10	INT	Valid Range: 0-1000 (100.0%)
415128	N/A	3B17	Holding Reg	3,6,16	Quality GREEN Target %x10	INT	Valid Range: 0-1000 (100.0%)
415129	N/A	3B18	Holding Reg	3,6,16	OEE GREEN Target %x10	INT	Valid Range: 0-1000 (100.0%)
415130	N/A	3B19	Holding Reg	3,6,16	Availability YELLOW Target %x10	INT	Valid Range: 0-1000 (100.0%)
415131	N/A	3B1S	Holding Reg	3,6,16	Performance YELLOW Target %x10	INT	Valid Range: 0-1000 (100.0%)
415132	N/A	3B1B	Holding Reg	3,6,16	Quality YELLOW Target %x10	INT	Valid Range: 0-1000 (100.0%)
415133	N/A	3B1C	Holding Reg	3,6,16	OEE YELLOW Target %x10	INT	Valid Range: 0-1000 (100.0%)



## 16.3: OEE Data

OEE data can be found in the Accumulators via Modbus TCP/IP Holding Registers as follows. Each accumulator consists of a total of 28 Words of data as described following this table. Each Accumulator contains data as described in the next section.

6-Digit	5-Digit	Hex	Type	CMD	Parameter	Format	Notes
418001	N/A	4650	Holding Reg	3,6,16	Today's Accumulators	N/A	28 Word Assembly
418036	N/A	4673	Holding Reg	3,6,16	Yesterday's Accumulators	N/A	28 Word Assembly
418071	N/A	4696	Holding Reg	3,6,16	Current Part Accumulators	N/A	28 Word Assembly
418106	N/A	46B9	Holding Reg	3,6,16	Previous Part Accumulator 1	N/A	28 Word Assembly
418141	N/A	46DC	Holding Reg	3,6,16	Previous Part Accumulator 2	N/A	28 Word Assembly
418176	N/A	46FF	Holding Reg	3,6,16	Previous Part Accumulator 3	N/A	28 Word Assembly
418211	N/A	4722	Holding Reg	3,6,16	Previous Part Accumulator 4	N/A	28 Word Assembly
418246	N/A	4745	Holding Reg	3,6,16	Previous Part Accumulator 5	N/A	28 Word Assembly
418281	N/A	4768	Holding Reg	3,6,16	Previous Part Accumulator 6	N/A	28 Word Assembly
418316	N/A	478B	Holding Reg	3,6,16	Previous Part Accumulator 7	N/A	28 Word Assembly
418351	N/A	47AE	Holding Reg	3,6,16	Previous Part Accumulator 8	N/A	28 Word Assembly
418386	N/A	47D1	Holding Reg	3,6,16	Previous Part Accumulator 9	N/A	28 Word Assembly
418421	N/A	47F4	Holding Reg	3,6,16	Previous Part Accumulator 10	N/A	28 Word Assembly
418456	N/A	4817	Holding Reg	3,6,16	Previous Part Accumulator 11	N/A	28 Word Assembly
418491	N/A	483A	Holding Reg	3,6,16	Previous Part Accumulator 12	N/A	28 Word Assembly
418526	N/A	485D	Holding Reg	3,6,16	Previous Part Accumulator 13	N/A	28 Word Assembly
418561	N/A	4880	Holding Reg	3,6,16	Previous Part Accumulator 14	N/A	28 Word Assembly
418596	N/A	48A3	Holding Reg	3,6,16	Previous Part Accumulator 15	N/A	28 Word Assembly
418631	N/A	48C6	Holding Reg	3,6,16	Previous Part Accumulator 16	N/A	28 Word Assembly
418666	N/A	48E9	Holding Reg	3,6,16	Current Shift Accumulators	N/A	28 Word Assembly
418701	N/A	480C	Holding Reg	3,6,16	Previous Shift Accumulators	N/A	28 Word Assembly
418736	N/A	492F	Holding Reg	3,6,16	Shift 1 Accumulators	N/A	28 Word Assembly
418771	N/A	4952	Holding Reg	3,6,16	Shift 2 Accumulators	N/A	28 Word Assembly
418806	N/A	4975	Holding Reg	3,6,16	Shift 3 Accumulators	N/A	28 Word Assembly

### 16.3.1: Accumulator Data Assembly

Data with a format of “28 Word Assembly” is as follows:

Accumulator Data Assembly	Format	Notes
Total Parts	UDINT	
Good Parts	UDINT	
Scrap Parts	UDINT	
Total Cycles	UDINT	
Total Up Time	UDINT	Seconds
Total Down Time	UDINT	Seconds
Total Time	UDINT	Seconds
Planned Production Time (PPT)	UDINT	Seconds
Actual Production Time (APT)	UDINT	Seconds
Cycle Average	UDINT	1000 = 10.00 sec
Cycle Best	UDINT	1000 = 10.00 sec
Total Changeover Time	UDINT	Seconds
Availability Score x 10	UINT	1000 = 100.0%
Performance Score x 10	UINT	1000 = 100.0%
Quality Score x 10	UINT	1000 = 100.0%
OEE Score x 10	UINT	1000 = 100.0%

### 16.4: Light Tower and Call Status

The Light Tower status and Call status can be monitored with the following Modbus TCP/IP Coil Status points.

**NOTE:** A flashing Green/Yellow/Red Tower Light would be indicated by the corresponding Tower Light being active along with the “Process Down” indicator. A flashing Blue Tower light would be indicated by both Call indicators being active, while a solid blue light would be indicated by an Active Call and NOT an Unacknowledged Call.

6-Digit	5-Digit	Hex	Type	CMD	Parameter	Format	Notes
100065	10065	0040	Input Status	2	Process Down	BOOL	1 Bit
100066	10066	0041	Input Status	2	Light Tower RED	BOOL	1 Bit
100067	10067	0042	Input Status	2	Light Tower YELLOW	BOOL	1 Bit
100068	10068	0043	Input Status	2	Light Tower GREEN	BOOL	1 Bit
100069	10069	0044	Input Status	2	Call Unacknowledged	BOOL	1 Bit
100070	10070	0045	Input Status	2	Call Active	BOOL	1 Bit
100071	10071	0046	Input Status	2	Light Tower Linked to Availability	BOOL	1 Bit
100072	10072	0047	Input Status	2	Light Tower Linked to Performance	BOOL	1 Bit
100073	10073	0048	Input Status	2	Light Tower Linked to Quality	BOOL	1 Bit
100074	10074	0049	Input Status	2	Light Tower Linked to OEE	BOOL	1 Bit
100075	10075	004A	Input Status	2	Changeover is Active	BOOL	1 Bit
100076	10076	004B	Input Status	2	Active Changeover is Scheduled	BOOL	1 Bit

6-Digit	5-Digit	Hex	Type	CMD	Parameter	Format	Notes
100077	10077	004C	Input Status	2	Raw Materials Call Active	BOOL	1 Bit
100078	10078	004D	Input Status	2	Maintenance Call Active	BOOL	1 Bit
100079	10079	004E	Input Status	2	Supervisor Call Active	BOOL	1 Bit

## 16.5: Triggering via Modbus TCP/IP Communications

Some functions of the OEE System can be triggered via the OEE Communications. Bits available for external control are as follows:

6-Digit	5-Digit	Hex	Type	CMD	Parameter	Format	Notes
65	65	0040	Coil Status	1,5,15	Cycle Trigger	BOOL	Trigger on Rising Edge
66	66	0041	Coil Status	1,5,15	Scrap Trigger	BOOL	Trigger on Rising Edge
67	67	0042	Coil Status	1,5,15	RM Call	BOOL	Active on Rising Edge, Reset on Falling
68	68	0043	Coil Status	1,5,15	RM Call ACK	BOOL	Trigger on Rising Edge
69	69	0044	Coil Status	1,5,15	Maint Call	BOOL	Active on Rising Edge, Reset on Falling
70	70	0045	Coil Status	1,5,15	Maint Call ACK	BOOL	Trigger on Rising Edge
71	71	0046	Coil Status	1,5,15	Super Call	BOOL	Active on Rising Edge, Reset on Falling
72	72	0047	Coil Status	1,5,15	Super Call ACK	BOOL	Trigger on Rising Edge
73	73	0048	Coil Status	1,5,15	Clear All Calls	BOOL	Trigger on Rising Edge
74	74	0049	Coil Status	1,5,15	Cell Up/Down	BOOL	Configurable operation on Unit

The trigger data may be used to trigger functions remotely. Configuration of the OEE system is required to allow this operation.

See ["Cell Configuration: Remote Triggers" on page 37](#).

# Ethernet/IP Access



## Chapter 17: Ethernet/IP Access

<b>17.1: Ethernet/IP Produced Data</b> .....	<b>101</b>
<b>17.2: Ethernet/IP Consumed Data</b> .....	<b>103</b>

The OEE System acts as a Generic Ethernet Device on Allen-Bradley Ethernet/IP networks. Devices acting as an Ethernet/IP Client can access OEE data over this connection. Remote triggering can be done via Ethernet/IP communications.

### 17.1: Ethernet/IP Produced Data

The OEE System Produces 248 16-bit Words as OEE System Status. Not all 248 Words are currently in use. The Produced data is as follows:

Ethernet/IP Produced Word Offset	Parameter	Format	Notes
0	Availability Score Current %	INIT	1% resolution
1	Performance Score Current %	INIT	1% resolution
2	Quality Score Current %	INIT	1% resolution
3	OEE Score Current %	INIT	1% resolution
4	Total Parts Current Part	DINT	1 Double Word
6	Total Scrap Current Part	DINT	1 Double Word
8	Total Cycles Current Part	DINT	1 Double Word
10	Up-Time Seconds Current Shift	DINT	1 Double Word
12	Down-Time Seconds Current Shift	DINT	1 Double Word
14	Active Downtime Description	ASCII	20 Characters
24	Active Call Timer	INIT	Seconds
25	Changeover Timer	INIT	Seconds
26	Average Cycle Time	DINT	0.01s resolution
28	Last Cycle Time Current Part	DINT	0.01s resolution
30	Best Cycle Time Current Part	DINT	0.01s resolution
32	Plant ID	ASCII	20 Characters
42	Cell ID	ASCII	20 Characters
52	Current Part Name	ASCII	12 Characters
58	Current User	ASCII	12 Characters
64	OEE Mode	INIT	0=Shift Mode, 1=Batch Mode
65	Datalog Interval	INIT	Valid Range: 5-32767 Seconds
66	Availability GREEN Target %x10	INIT	Valid Range: 0-1000 (100.0%)
67	Performance GREEN Target %x10	INIT	Valid Range: 0-1000 (100.0%)
68	Quality GREEN Target %x10	INIT	Valid Range: 0-1000 (100.0%)
69	OEE GREEN Target %x10	INIT	Valid Range: 0-1000 (100.0%)
70	Availability YELLOW Target %x10	INIT	Valid Range: 0-1000 (100.0%)
71	Performance YELLOW Target %x10	INIT	Valid Range: 0-1000 (100.0%)
72	Quality YELLOW Target %x10	INIT	Valid Range: 0-1000 (100.0%)
73	OEE YELLOW Target %x10	INIT	Valid Range: 0-1000 (100.0%)
74	Today's Accumulators	N/A	28 Word Accumulator Assembly
102	Yesterday's Accumulators	N/A	28 Word Accumulator Assembly

Ethernet/IP Produced Word Offset	Parameter	Format	Notes
130	Current Part Accumulators	N/A	28 Word Accumulator Assembly
158	Shift 1 Accumulators	N/A	28 Word Accumulator Assembly
186	Shift 2 Accumulators	N/A	28 Word Accumulator Assembly
214	Shift 3 Accumulators	N/A	28 Word Accumulator Assembly

Additionally, the following Produced Words are split into 1-bit status:

Ethernet/IP Produced Word Offset	Parameter	Format	Notes
242.0	Process Down	BOOL	1 Bit
242.1	Light Tower RED	BOOL	1 Bit
242.2	Light Tower YELLOW	BOOL	1 Bit
242.3	Light Tower GREEN	BOOL	1 Bit
242.4	Call Unacknowledged	BOOL	1 Bit
242.5	Call Active	BOOL	1 Bit
242.6	Light Tower Linked to Availability	BOOL	1 Bit
242.7	Light Tower Linked to Performance	BOOL	1 Bit
242.8	Light Tower Linked to Quality	BOOL	1 Bit
242.9	Light Tower Linked to OEE	BOOL	1 Bit
242.10	Changeover is Active	BOOL	1 Bit
242.11	Active Changeover is Scheduled	BOOL	1 Bit
242.12	Raw Materials Call Active	BOOL	1 Bit
242.13	Maintenance Call Active	BOOL	1 Bit
242.14	Supervisor Call Active	BOOL	1 Bit

### 17.1.1: Accumulator Data Assembly

Produced Data with a format of “28 Word Accumulator Assembly” is as follows:

Data	Format	Notes
Total Parts	UDINT	
Good Parts	UDINT	
Scrap Parts	UDINT	
Total Cycles	UDINT	
Total Up Time	UDINT	Seconds
Total Down Time	UDINT	Seconds
Total Time	UDINT	Seconds
Planned Production Time (PPT)	UDINT	Seconds
Actual Production Time (APT)	UDINT	Seconds
Cycle Average	UDINT	1000 = 100.0%
Cycle Best	UDINT	1000 = 100.0%
Total Changeover Time	UDINT	Seconds
Availability Score x 10	UINT	1000 = 100.0%
Performance Score x 10	UINT	1000 = 100.0%
Quality Score x 10	UINT	1000 = 100.0%
OEE Score x 10	UINT	1000 = 100.0%

## 17.2: Ethernet/IP Consumed Data

The OEE System Consumes 50 16-Bit Words as OEE System Triggers. Currently, only the first Word is used and is split into 1-bit triggers as follows:

Ethernet/IP Produced Word Offset (Word.Bit)	Parameter	Format	Notes
0.0	Cycle Trigger	BOOL	Trigger on Rising Edge
0.1	Scrap Trigger	BOOL	Trigger on Rising Edge
0.2	RM Call	BOOL	Active on Rising Edge, Reset on Falling
0.3	RM Call ACK	BOOL	Trigger on Rising Edge
0.4	Maint Call	BOOL	Active on Rising Edge, Reset on Falling
0.5	Maint Call ACK	BOOL	Trigger on Rising Edge
0.6	Super Call	BOOL	Active on Rising Edge, Reset on Falling
0.7	Super Call ACK	BOOL	Trigger on Rising Edge
0.8	Clear All Calls	BOOL	Trigger on Rising Edge
0.9	Cell Up/Down	BOOL	Configurable operation on Unit

The trigger data may be used to trigger functions remotely. Configuration of the OEE system is required to allow this operation.

See ["Cell Configuration: Remote Triggers" on page 37](#).

# Index





<b>A</b>	
Accumulator Data Assembly .....	98, 102
Acknowledging a Call .....	29

<b>B</b>	
Batch Mode OEE .....	82

<b>C</b>	
Call .....	28
Call Accumulators .....	26
Call Log .....	75
Clearing a Call .....	30
Placing a Call .....	28
Cell ID .....	34
Changeover Mode .....	71
Configuration .....	32, 76
Cell	
Automatic Downtime Codes .....	37
General .....	34
OEE .....	91
Options .....	35
Remote Triggers .....	37
Configuration Access .....	33
Configuration Information .....	96
Configuration Overview .....	32
Configuration Utility .....	78
Downtime Code .....	47, 85
Email .....	51

Ethernet .....	48
Login Configuration .....	86
OEE Calculations .....	36
Part .....	79
Shift .....	22, 39, 82
1/2/3 .....	41
General .....	40

<b>D</b>	
Data	
Data Log Transfer .....	76
Datalog Interval Settings .....	34
Datalogging .....	73
OEE .....	97
Downtime .....	67
Accumulators .....	26
Automatic Downtime .....	67
Automatic Changeover Downtime .....	68
Automatic Operator Shortage Downtime .....	68
Automatic Upstream Blockage Downtime .....	68
Code Entry .....	68
Code Configuration .....	47, 85
Code Prompt .....	67
Log .....	74
Manual .....	67

<b>E</b>	
Effect on Scoring .....	56

Electrical	Cell Configuration .....	91
Ground Specifications .....	Contractual Requirements .....	12
I/O .....	Data .....	97
Installation .....	Electrical I/O .....	15
Power Wiring .....	Events .....	17, 25
Electrical Installation	Mode .....	35
How to Test for Good Ground .....	Overall Equipment Effectiveness .....	56
	Overview .....	11
<b>F</b>	Power Wiring .....	14
FCC Compliance .....	Production Data Availability .....	12
FTP	Score Calculation	
Access .....	Availability .....	55
Example .....	Performance .....	55
	Quality .....	56
<b>G</b>	Score Trend .....	24
Ground Specifications .....	Scores .....	22
	System Navigation .....	19, 22
<b>H</b>	System Status .....	22
How to Test for Good Ground .....	System Summary .....	25
	Types of Reports .....	12
<b>L</b>	User .....	22
Light Tower .....		
Log .....	<b>P</b>	
Login .....	Part Editor/Viewer .....	41
Login Configuration .....	Batch Mode OEE .....	45
Logout .....	Load from Flash .....	46
	Save to Flash .....	46
<b>O</b>		
OEE .....		
Calculations Configuration .....		

Update Part .....	46
Plant ID .....	34
Process Log Files .....	73

## S

Safety and Compliance .....	8
FCC Compliance .....	9
Safety Precautions .....	9
Warnings .....	8
Scheduled Breaks and Changeover .....	56
Screen	
Background .....	36
Header .....	21
Main Trend Screen .....	23
System Information .....	53

## T

Trend	
Availability Score Trend .....	23
OEE Score .....	24
Performance Score .....	24
Quality Score .....	24
Trends .....	22
Main Screen .....	23

## U

USB Drive .....	32
-----------------	----

## W

Web Browser Access .....	93
Work Interfaces	
Basic .....	64
Detailed .....	61
Simplified .....	63