



# Global 400 User Manual

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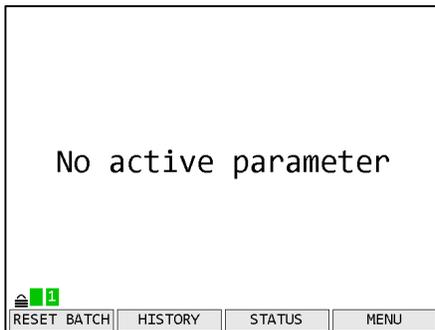
# Quick Start

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This quick start will guide you through the process of configuring the unit for first time use.



Plug the provided power cable into the unit and 100-240 VAC power and turn on the power switch. The beeper should sound a series of quick beeps and the display should show the loading progress.

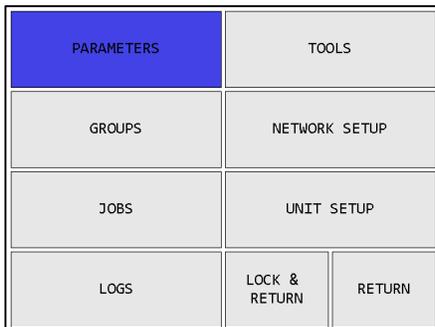


Once the loading is completed, the unit should go to the Run screen. If the unit stays on the loading screen with an error, please contact support.

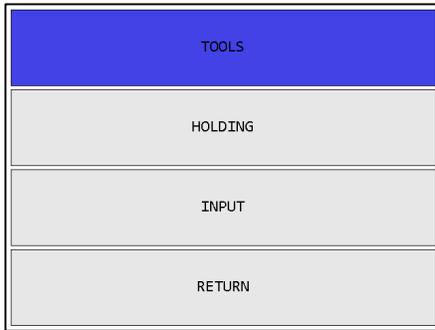
To use a tool with the Global 400, you must first “learn” the tool to the Global 400. To do so, press the button below **MENU**.



Enter the password (0104 by default) using the numeric keypad and pressing ENT when completed.



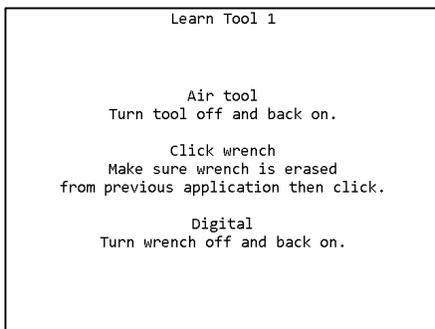
In the menu, press the right arrow to select TOOLS and press ENT.



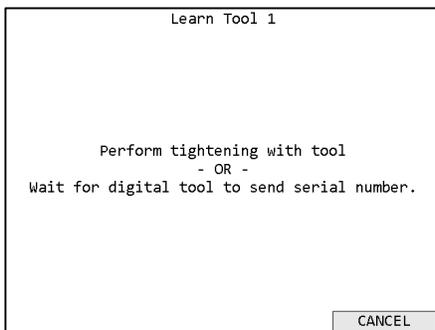
In the tools menu, press ENT to go to the main tools page.



If the tool you are going to learn to the Global 400 has previously been used with another unit, make sure the tool has been “forgotten” from that unit before continuing. Press the button beneath **LEARN** to begin the learn process.



Follow the directions on screen to learn the tool.



Once the tool has found the unit, you may need to perform an additional step for the unit to know which type of tool was just learned. Holding tools, air tools, and newer click tools can be distinguished by the unit, but digital tools and older click tools will require some additional information. The digital tools will automatically transmit their serial number in a few seconds. However, if you are learning an older click tool, you will need to perform a tightening (good or bad) with the wrench, or push the appropriate button on screen.





# Chapter 1: Overview

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## Warnings



Do not disassemble the unit for repair or modifications. There is a high electrical voltage inside the unit that could cause electric shock.



Do not allow any type of liquid to come into contact with any part of the unit.



Insert all fittings fully into their mating receptacles. Failure to do so could result in injury.



Do not fold, bend or apply excessive force to any cable or fitting.

## Cautions

Please use caution when handling this or any other electrical appliance.

- This unit accepts an AC input voltage from 100-240 VAC. Trying to operate this unit with a voltage outside that range may cause damage to the unit.
- Avoid placing or storing this unit in a location where it may become wet or dust covered.
- Do not place or mount this unit in an unstable area.
- Dropping this unit may result in personal injury or damage to the unit.
- Before performing any maintenance on the unit, make sure to turn it off and remove the power plugs.
- There are no user serviceable parts inside the main enclosure of the unit.

## Unit Overview



The Global 400 is equipped with a color LCD display, four function keys immediately below the LCD, a numeric keypad with decimal point, navigation keys, and enter and escape buttons. The current function of the function keys is indicated at the bottom of the LCD above the button.

The beeper provides an audio indication for any combination of accepts, rejects, and batch completions. The beeper volume can be adjusted through the user interface. (See the *Unit Setup* section in the next chapter.)



The Global 400 has two RJ-45 Ethernet ports to allow it to be used in a chain or ring network configuration.

The USB-A connector is used to provide firmware updates via a standard USB drive.

The RS232 DSUB9 connector can be used with a serial barcode reader or serial printer.

The 10-pin I/O connector provides discrete I/O capabilities. The 5-pin remote connector connects to other devices that can provide additional I/O capabilities.

The power plug accepts 100-240 VAC at 50-60 Hz.

## Compatible Tools

The Global 400 works with the following models of tools:

- SLTC-FM 2.4 GHz preset clicker-type torque wrenches
- 1100, 1200, and 1250-Series Exacta 2 digital torque wrenches
- PST series air tool transducers
- Holding wrenches

# Chapter 2: Using the unit

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# Concepts

## Tools

The Global 400 can associate with up to 16 Sturtevant Richmond radio torque tools and 8 holding tools. Additionally, you may define up to 8 input tools using the discrete I/O capabilities of the Global 400. At most, 4 torque or input tools and 4 holding tools will be active at a time, depending on the selected operation. To use a tool with the Global 400, you must first “learn” the tool to the qualifier. The process to do this is described in the Quick Start.

Tools are not activated directly by the unit. Instead, they are activated when a parameter that uses the tool is running. A tool may be used by more than one parameter.

The Global 400 can store some information about when calibration or preventative maintenance should occur. These are set up in the Tool Configuration screen, which is described in the next chapter.

## Parameters

Parameters are the basic unit of operation for the Global 400. A parameter contains a tool to run and some settings to use with it, such as the batch size and minimum and maximum torques. The Global 400 supports 100 parameters. Each parameter must be associated with one of the learned tools before it can be run.

A parameter may additionally have a holding tool assigned.

## Groups

Groups are multiple parameters that must all run together and can run simultaneously in any order. The Global 400 supports 100 groups with up to 4 parameters each. A group cannot contain more than one parameter that uses a given tool, as it would not be able to determine which parameter a result should be assigned to. Additionally, a group may only contain parameters with the same type of primary tools. When defining a group, you may override the batch count for parameters in the group while the group is running. This does not change the batch size defined in the parameter. When running a group, all parameters must complete a full batch before any parameter can begin running a second batch.

## Jobs

Jobs are the top level of operation in the Global 400, made up of multiple parameters or groups that must all run together in a sequence. The Global 400 supports 100 jobs with up to 30 steps each. Unlike groups, a job may have multiple parameters that use the same tool or even the same parameter or group multiple times and may use parameters with different types of primary tools. As with groups, you may override the batch count for parameter steps in the job. You cannot change the batch sizes for groups when run in a job.

## Run Screen

The run screen shows which parameters the unit is currently running. Depending on the number of active parameters, the run screen will be in one of several modes.

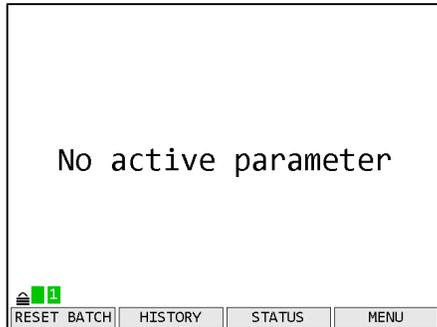


Figure 1: No active parameter

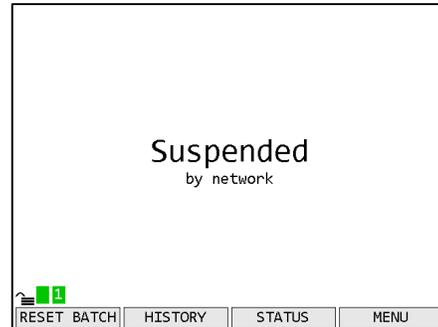


Figure 2: Suspended

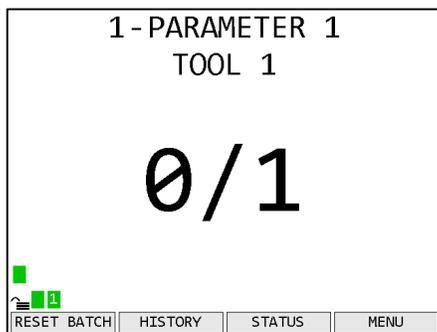


Figure 3: 1 active parameter



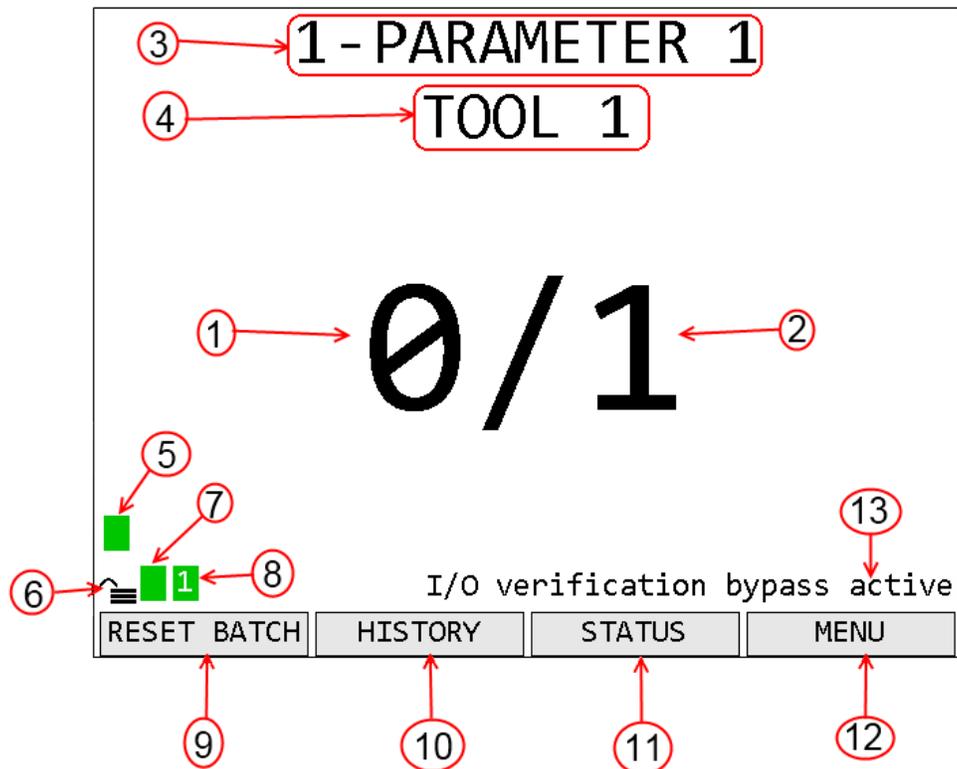
Figure 4: 2-4 active parameters

## Tightening Notifications

Every time a tightening is received from a running tool, the background of the area of the screen showing the current parameter and batch count for the tool will be shaded with a color indicating the status of the tightening.

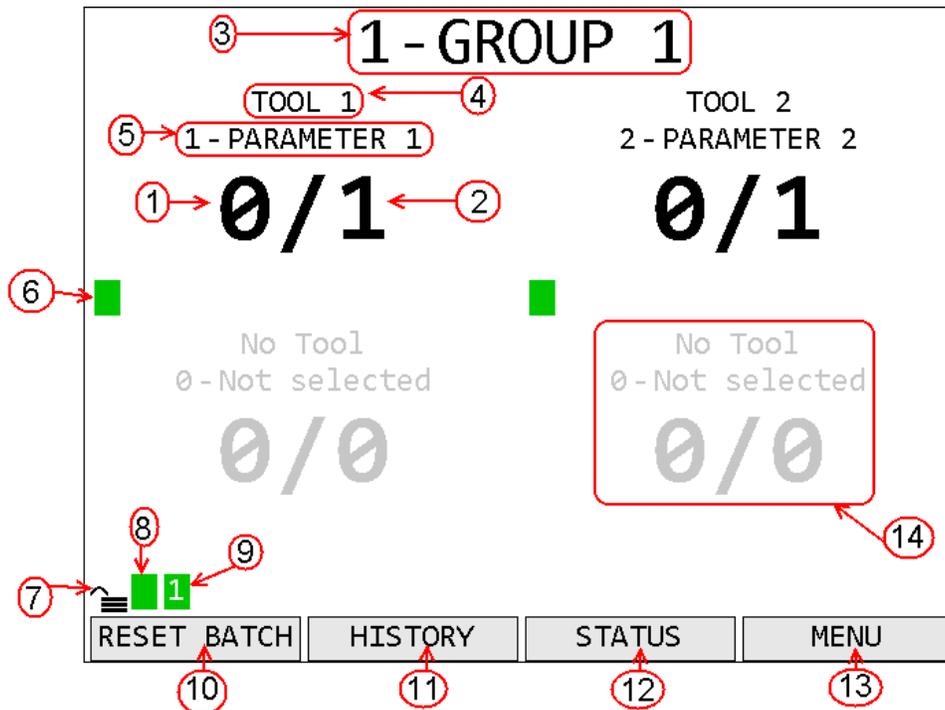
- Red – A rejected tightening occurred.
- Green – An accepted tightening occurred that did not complete a batch.
- Blue – An accepted tightening occurred that completed a batch. If the qualifier NOKs setting is set to Count, this further indicates that no rejected tightenings were counted towards this batch.
- Yellow – An accepted or rejected tightening occurred that completed a batch. This color will only occur when the qualifier NOKs setting is set to Count and one or more rejected tightenings were counted towards the current batch.

## 1 Active Parameter



1. Count – The number of tightenings completed in the current batch
2. Batch – The number of tightenings required for the current batch
3. Parameter Name – Name of the currently running parameter. When running a job, this is the job name and the parameter name is shown below the tool name.
4. Tool Name – Name of the tool for the currently running parameter
5. Tool Status Indicator – Shows the status of the tool for the parameter
6. Unit lock – Indicates if the unit is locked and requires a password to access menu functions
7. Unit Radio Status – Shows the status of the unit radio
8. Network Status – Shows the status of the Ethernet and current number of connections.
9. Function key 1 – Shows the current function of function key 1.
10. Function key 2 – Shows the current function of function key 2.
11. Function key 3 – Shows the current function of function key 3.
12. Function key 4 – Shows the current function of function key 4.
13. Notifications – Shows notifications of unit status beyond radio and network statuses

## 2-4 Active Parameters



1. Count – The number of tightenings completed in the current batch of the parameter. Repeated for each active parameter.
2. Batch – The number of tightenings required for the current batch of the parameter. Repeated for each active parameter.
3. Group Name – Name of the currently running group.
4. Parameter Name – Name of the parameter. Repeated for each active parameter.
5. Tool Name – Name of the tool for the parameter. Repeated for each active parameter.
6. Tool Status Indicator – Shows the status of the tool for the parameter. Repeated for each parameter.
7. Unit lock – Indicates if the unit is locked and requires a password to access menu functions.
8. Unit Radio Status – Shows the status of the unit radio.
9. Network Status – Shows the status of the Ethernet and current number of connections.
10. Function key 1 – Shows the current function of function key 1.
11. Function key 2 – Shows the current function of function key 2.
12. Function key 3 – Shows the current function of function key 3.
13. Function key 4 – Shows the current function of function key 4.
14. Inactive parameter – When not all the parameter slots on a screen are needed to show all the active parameters, the rest of the slots will be grayed out.

### Tool Radio Status Codes

The radio status indicator for each active parameter shows the status of the tool radio for the parameter. When the tool is ready to run, the indicator should be green with no number. If the tool is not ready to run or a warning or error condition occurs, the indicator will change to yellow for a warning or red for an error and display a code to indicate the radio condition. The possible codes are:

Code	Color	Meaning
1	Red	Tool has not communicated with the unit since power-up
2	Yellow	Programming tool
2	Red	Tool programming failed
3	Yellow	Tool is disabled
4	Yellow	The battery is low. It should be changed when possible to avoid interruptions in service. Only click and holding tools provide battery level information.
4	Red	The battery is very low. Interruptions in service may occur until the battery is replaced.
5	Yellow	Radio signal strength is below recommended level for best performance
5	Red	Radio signal strength is below recommended minimum level for use
6	Yellow	Tool requires calibration
7	Yellow	Tool requires preventative maintenance
8	Red	Tool programming failed

### Unit Radio Status Indicator

The unit radio status indicator shows the status of the radio in the unit. In normal use, the indicator should be green with no number. If the radio is not working correctly, the indicator will be red with an error code.

### Network Status Indicator

The network status indicator shows the status of the Ethernet ports on the unit. When the Ethernet is used, the indicator will be green and show the number of currently active network connections. If no Ethernet cable is plugged into either port, the indicator will be yellow. If the network initialization fails, the indicator will be red and show an error code. The Network Status screen shows more detailed information.

## History

Time	T#	Param	Count	Torque	Id
2014-10-21					
11:59:23	1	1 - PARAMETER 1	0/3		36
11:59:15	1	1 - PARAMETER 1	3/3		35
11:59:14	1	1 - PARAMETER 1	2/3		34
11:59:13	1	1 - PARAMETER 1	1/3		33
11:59:10	1	1 - PARAMETER 1	1/3		32
2014-10-20					
11:58:57	1	1 - PARAMETER 1	3/3		31
11:58:56	1	1 - PARAMETER 1	2/3		30
11:58:56	1	1 - PARAMETER 1	1/3		29
11:58:56	1	1 - PARAMETER 1	3/3		28
11:58:55	1	1 - PARAMETER 1	2/3		27
11:58:55	1	1 - PARAMETER 1	1/3		26
11:58:54	1	1 - PARAMETER 1	3/3		25
Time: 2014-10-21 11:59:30					
					NEXT
					RETURN

Figure 5: History screen

### *Function keys*

1. No function
2. PREVIOUS – Go to the previous page of more recent tightenings. When on the first page, this key will be blank.
3. NEXT [ENT] – Go to the next page of older tightenings. When on the last page, this key will be blank.
4. RETURN [ESC] – Returns to the Run Screen.

The History screen shows some information about the tightenings stored in unit memory. More information about the tightenings is not shown but is available via the network protocols. This screen shows

- Time – The time the tightening occurred. The date is indicated at the top of the table and each time it changes in a white row.
- T# – The tool number that produced the tightening
- Param – The number and name of the parameter that produced the tightening
- Count – The current batch count and batch size for the tightening
- Torque – The torque of the tightening. This value is only provided for digital tools. The unit of torque will be whatever the unit of the parameter that produced the tightening was at the time.
- Id – The tightening id number. This screen shows only the last 4 digits of the id number; additional digits may be present in the network commands.

## Unit Status

```
Firmware version: 1.3.0
Serial number: 000000002
XBEE Address: 945C
XBEE channel: 1
Average signal strength: -57 dBm
Time: 2017-03-07 14:12:32

Last barcode: No barcode scanned
VIN:
ID 2:
ID 3:
ID 4:
Selector:

NETWORK TOOL I/O
```

Figure 6: Unit Status screen

### Function keys

1. GRAPH – When a single air tool is running, goes to the Rundown Graph screen. For other tool types or when a group is running, this key has no function.
2. NETWORK – Go to the Network Status screen.
3. TOOL – Go to the Tool Status screen.
4. I/O – Go to the I/O State screen

The Unit Status screen shows some basic information about the current unit configuration that may be useful for diagnostics purposes. Press ESC to return to the Run Screen

The average signal strength is for all tools learned to the unit and should be from 0 to -70 dBm. If the signal strength is weaker, the unit may have frequent slow or failed communication. To improve the signal strength, try bringing the unit and tools closer together, changing the XBEE channel, or reducing sources of interference from the environment.

*Last barcode* shows the command number of the last barcode scanned (see *Chapter 4: Serial Communications*) or an error if the last attempt barcode could not be processed. *VIN* and *ID 2-4* show what will be included with tightenings in the associated result data fields. The *Selector* field is used with the *VIN Selections* field described in *Chapter 4: Serial Communications*.

## Rundown Graph

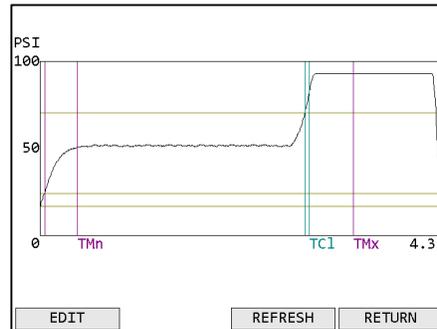


Figure 7: Rundown Graph screen

### Function keys

1. EDIT – Go to the Parameter Edit screen for the running parameter. This will require the password to be entered.
2. No function
3. REFRESH – Refresh the graph with the data for the most recent run of the tool.
4. RETURN [ESC] – Returns to the Unit Status Screen.

The Rundown Graph screen retrieves and shows the last rundown from an air tool. The rundown will be overlaid with yellow horizontal lines for each of the three thresholds and vertical lines showing the timers, purple for Timer Min and Timer Max, blue for Timer Clutch. Additionally, the total time for the rundown is shown at the right end of the horizontal axis.

## Network Status

```
MAC Address: 60:FF:DD:00:00:02
IP Address: 192.168.3.5
Subnet Mask: 255.255.248.0
Gateway: 192.168.1.59
Ethernet 1: Not connected
Ethernet 2: 100 Mb Full

      Active Connections
Source      Last Pkt  Info
192.168.4.127  11:25:32  MID=9999

PRESS ANY KEY TO RETURN
```

Figure 8: Network Status screen

The network status screen shows the current Ethernet status of the unit. The MAC address is assigned by the factory and cannot be changed. The IP address, subnet mask, and gateway may be edited from the Network Setup - General screen or assigned via DHCP.

The Ethernet 1 and 2 lines indicate if a physical cable connection is detected on the corresponding Ethernet ports of the unit. If no connection on a port is detected, the unit will show “Not connected”. If a connection is detected, the baud rate and duplex of the connection will be listed.

The rest of the screen shows some basic information about the active Ethernet connections. For each connection, this page shows the source address, time of the last packet on the connection, and some protocol specific information, such as last MID received or which EtherNet/IP™ connection points are being used.

## Tool Status

TOOL 1 1 -56 dBm	No Tool -255 dBm	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
SIGNAL	ADDRESS	BATTERY	HOLDING

Figure 9: Tool Status - Good Signal

TOOL 1 1 -85 dBm	No Tool -255 dBm	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
SIGNAL	ADDRESS	BATTERY	HOLDING

Figure 10: Tool Status – Low Signal

TOOL 1 1 -92 dBm	No Tool -255 dBm	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
No Tool	No Tool	No Tool	No Tool
SIGNAL	ADDRESS	BATTERY	HOLDING

Figure 11: Tool Status - Bad Signal

### Function keys

1. SIGNAL – Show the signal strength of each tool.
2. ADDRESS – Show the address of each tool
3. BATTERY – Shows the battery level of each tool, if available. Not all tools report battery level.
4. HOLDING / TOOLS – Toggles between showing main tools and holding tools.

The Tool Status screen shows the status of the tools learned into the unit. This screen shows the signal strength of the last packet from the tool but can also show the radio address and battery level of the tools. Press ESC to return to the Unit Status screen.

For signal strength, a less negative number indicates a better signal (-50 dBm is better than -60 dBm). The screen shows a color based on the quality of the signal.

- Green – The signal from this radio is strong and will work at best performance.
- Yellow – The signal from the radio is weaker than recommended for best performance. The radio should work but may have slower or occasionally interrupted communication with the unit.
- Red – The signal from the radio is weaker than recommended for any use. The radio may successfully transmit some results but will frequently have slow or failed communication with the unit. If only one tool is red, bring it and unit closer together. If multiple tools are red, consider using a different radio channel (changed from the Unit Setup screen).

For battery level, the charge remaining is shown. Not all tools report their current battery level. The screen shows a color based on the level.

- Green – The battery is full and will work at best performance.
- Yellow – The battery is low and should be changed when possible.
- Red – The battery is very low and should be changed. The tool may fail to transmit some results until the battery is changed.

## I/O State

I/O State								
Address: 1								Disconnected
Inputs								
1	2	3	4	5	6	7	8	
9	10	11	12	13	14	15	16	
Outputs								
1	2	3	4	5	6	7	8	
9	10	11	12	13	14	15	16	
							RETURN	

Figure 12: I/O State screen

### Function keys

1. No function
2. PREVIOUS – Show the I/O device with the previous address. When showing the first defined device, this key will be blank.
3. NEXT [ENT] – Show the I/O device with the next address. When showing the last defined device, this key will be blank.
4. RETURN [ESC] – Returns to the Unit Status Screen.

The I/O State screen shows the status of the defined I/O devices. If an input or output is active, its box will be shaded in green. Inactive inputs and outputs will be shown in yellow. See the GIM400 User Manual for more information about the available I/O options.

# Chapter 3: Configuring the unit

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## Introduction

Most of the features of the Global 400 can be configured directly on the unit. The configuration, along with parameter, group, and job selection is available from the unit menu. The menu is available from the Run screen by pressing function key 4 or ENT.

The navigation keys are used primarily to move from entry to entry on a screen. The numeric keypad is used for any data entry and occasionally to assist in navigation. When describing the function keys for a screen, [ENT] or [ESC] will be listed next to the key if the ENT or ESC buttons perform the same operation. The ESC key is generally used to cancel changes or exit a screen without performing an action.

## Saving Configuration Changes

Configuration editing screens will always have **SAVE** as function key 3 and **CANCEL** as function key 4. You may also press ESC for Cancel. If you enter a screen and have not made any changes or do not want to save the changes you have made, press **CANCEL**. To commit changes, press **SAVE**. Even if you have not made any changes, saving will update the last modified time for the item.

## Entering letters

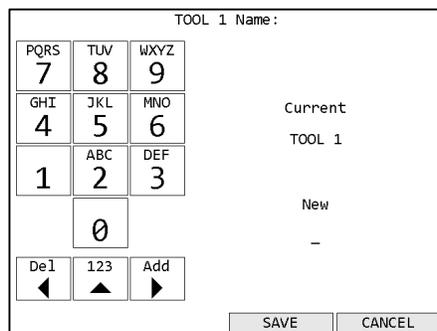


Figure 13: Letter Entry screen

associated with the new number pressed. Pressing the left arrow will remove the last entered character. Pressing the up arrow will toggle between entering letters and numbers or just numbers.

Pressing the right arrow will commit the current character and move to the next position. You do not have to use the right arrow for every letter. However, there are two situations when you must use the right arrow. The first is to enter a blank space, which is accomplished by pressing the right arrow twice in a row. The second is to enter a name with two letters in a row associated with the same number. For example, to enter "TOOL 1", you would need to press the following sequence of keys:

The unit has a special screen that allows using the numeric keypad to enter letters for fields that allow them, such as a parameter name. To get to this screen, press [ENT] when cursor is on a row with such a field. Lowercase letters cannot be entered from the unit but can be entered through the PC software application.

The left side of this screen shows the letters associated with each number. Pressing a number repeatedly will cycle through the letters associated with the number followed by the number itself. Pressing a different number will commit the character to the new value and add the first letter

Key	New name
8	T
6	TM
6	TN
6	TO
right arrow	TO_
6	TOM
6	TON
6	TOO
5	TOOJ
5	TOOK
5	TOOL
right arrow	TOOL_
right arrow	TOOL _
1	TOOL 1

(Since neither 1 nor 0 have associated letters, pressing them will only enter the number.)

Once you have entered the desired name, press **Save**. This does not permanently save the value just entered. You must also save from the screen that sent you to the letter screen. If you no longer want to change the value, press **Cancel**. At this point, the unit will return to the previous screen without changing the value.

## Main Menu

PARAMETERS	TOOLS	
GROUPS	NETWORK SETUP	
JOBS	UNIT SETUP	
LOGS	LOCK & RETURN	RETURN

Figure 14: Main menu

The Global 400 menu provides the entry point to configure and control the unit. You must enter the box password before entering the menu from the Run screen. If you cannot remember the password, you may reset it to the factory default (0104) by entering the sequence “6853.48” on the Run screen. Use the arrow keys to navigate to the desired entry and press ENT to go to the entry’s screen. To exit the menu, press ESC or navigate to **LOCK & RETURN** or **RETURN** and press ENT. Pressing ESC or **LOCK & RETURN** will “lock” the menu and return to the Run screen, requiring the password to be reentered before the menu can be accessed again. Pressing **RETURN** will return to the Run screen without locking the unit, allowing the menu to be reentered without entering the password.

## Tools

Tools in the Global 400 are divided into two groups, primary and holding tools. Primary tools are those that can perform tightenings, such as click and digital tools. Holding tools cannot perform a tightening themselves and are only used along with a primary tool. The Global 400 allows you to learn up to 16 primary tools and 8 holding tools and define up to 8 input tools using the discrete I/O. While each set of tools gets a separate screen, the processes for learning and editing them is similar.

PARAMETERS	TOOLS	
GROUPS	NETWORK SETUP	
JOBS	UNIT SETUP	
LOGS	LOCK & RETURN	RETURN

Figure 15: Main menu - Tools

TOOLS
HOLDING
INPUT
RETURN

Figure 16: Tools Menu

Main Tools			
34881 <b>1</b> Click	1892683 <b>2</b> Exacta 1200	892833 <b>3</b> Exacta 1200	C4 <b>4</b> Click
No Tool	No Tool	No Tool	No Tool
None	None	None	None
No Tool	<b>10</b> <b>10</b> Air 1200	No Tool	No Tool
None	None	None	None
No Tool	No Tool	No Tool	No Tool
None	None	None	None
REPLACE	EDIT	LEARN OPEN	RETURN

Figure 17: Learned tool selected

Main Tools			
34881 <b>1</b> Click	1892683 <b>2</b> Exacta 1200	892833 <b>3</b> Exacta 1200	C4 <b>4</b> Click
No Tool	No Tool	No Tool	No Tool
<b>5</b> None	None	None	None
No Tool	<b>10</b> <b>10</b> Air 1200	No Tool	No Tool
None	None	None	None
No Tool	No Tool	No Tool	No Tool
None	None	None	None
LEARN		LEARN OPEN	RETURN

Figure 18: Empty slot selected

### Function keys

When a learned tool is highlighted, the function keys are:

1. REPLACE – Learn a new tool in place of the current tool in this slot. If you cancel out of the learn sequence, the current tool will remain in the slot.
2. EDIT [ENT] – Go to the Tool Edit screen, which is discussed below, for the selected tool.
3. LEARN OPEN – Starts the learn sequence for the empty tool slot with the lowest number.
4. RETURN [ESC] – Returns to the main menu.

When an empty tool slot is highlighted, the function keys are:

1. LEARN [ENT] – Starts the learn sequence for the highlighted tool slot.
2. No function
3. LEARN OPEN – Starts the learn sequence for the empty tool slot with the lowest number.
4. RETURN [ESC] – Returns to the main menu.

### Tool Configuration

Depending on the type of tool, the Tool Edit screen will have a slightly different set of fields.

Tool 1		
Name:	TOOL 1	
Type:	Click	
Radio info:	E303 v1.9	
Serial number:		
Last calibration:	0001-01-01 00:00:00	Set Now
Next calibration:	0001-01-01 00:00:00	Set Now
Cycles:	43	
Last PM at:	0	Set Now
Cycles before PM:	250000	
<input type="button" value="FORGET"/> <input type="button" value="SAVE"/> <input type="button" value="CANCEL"/>		

Figure 19: Tool Edit Screen - Click

Tool 6		
Name:	890382	
Type:	Exacta 1100	
Radio info:	E115 v1.11	
Serial number:	890382	
Last calibration:	2012-12-20 00:00:00	
Next calibration:	2013-12-20 00:00:00	
Cycles:	4	
Last PM at:	0	Set Now
Cycles before PM:	250000	
Capacity:	25 FtLb	
<input type="button" value="FORGET"/> <input type="button" value="SAVE"/> <input type="button" value="CANCEL"/>		

Figure 20: Tool Edit Screen – Exacta 1100/1200/1250

Tool 5		
Name:	TOOL 5	
Type:	Air	
Radio info:	CBD4 v0.0	
Serial number:		
Last calibration:	0001-01-01 00:00:00	Set Now
Next calibration:	0001-01-01 00:00:00	Set Now
Cycles:	0	
Last PM at:	0	Set Now
Cycles before PM:	250000	
Air code:	◀ Pulse/Direct ▶	
<input type="button" value="FORGET"/> <input type="button" value="SAVE"/> <input type="button" value="CANCEL"/>		

Figure 21: Tool Edit Screen - Air

Tool 1		
Name:	HOLD 1	
Radio info:	3C59 v1.1	
Serial number:		
Last calibration:	0001-01-01 00:00:00	Set Now
Next calibration:	0001-01-01 00:00:00	Set Now
Cycles:	0	
Last PM at:	0	Set Now
Cycles before PM:	250000	
<input type="button" value="FORGET"/> <input type="button" value="SAVE"/> <input type="button" value="CANCEL"/>		

Figure 22: Tool Edit Screen - Holding

Tool 17		
Name:	TOOL 17	
Serial number:		
Last calibration:	0001-01-01 00:00:00	Set Now
Next calibration:	0001-01-01 00:00:00	Set Now
Cycles:	0	
Last PM at:	0	Set Now
Cycles before PM:	0	
Accept Input:	Board 0 Input 1	
Reject Input:	Board 0 Input 2	
<input type="button" value="SAVE"/> <input type="button" value="CANCEL"/>		

Figure 23: Tool Edit Screen - Input

## Function keys

1. FORGET – Removes the tool from the unit.
2. No function
3. SAVE – Saves changes made to the tool configuration.
4. CANCEL [ESC] – Cancels changes made to the tool configuration.

## Name

The tool name can be up to 25 numbers, letters, or decimal points.

The tool name is shown on screen when running a parameter that uses the tool but is not reported to the network.

## Radio Info

The radio info shows the radio address and the firmware version used by the radio to communicate with the qualifier.

This field cannot be edited.

## Serial Number

The tool serial number can be up to 14 numbers, letters, or decimal points.

The tool serial number is reported to the network with tightenings performed by the tool but is not shown anywhere on screen besides this menu.

### *Last Calibration*

This field is used to store the date when the tool was last calibrated. The display order of this field is:

year-month-day hour:minute:second

For digital tools, this field is reported by the tool and must be updated in the tool instead of edited in the unit.

For other tools, this field must be updated manually when the tool is calibrated and is for informational purposes only. The date can be set to the current time in the qualifier by selecting **Set Now** at the end of the Last Calibration row and pressing the ENT key.

### *Next Calibration*

This field is used to store the date at which the tool should be recalibrated. The display order of this field is:

year-month-day hour:minute:second

For digital tools, this field is reported by the tool and must be updated in the tool instead of edited in the unit.

For other tools, this field must be updated manually when the tool is calibrated. The date can be set to the current time in the qualifier by selecting **Set Now** at the end of the Next Calibration row and pressing the ENT key. This can be helpful when the recalibration period is a full month because you will only need to update the month (and year when at the end of the year).

The tool can be configured via the PC software application to reject all results after this date passes.

### *Cycles*

This field tracks the total number of cycles performed by the tool since it was learned to the box. This cycle count is incremented for both accepted and rejected cycles.

This field cannot be edited. If the tool is forgotten and relearned, the cycle count will restart at 0.

### *Last PM at*

This field stores the cycle count at which the tool last received preventative maintenance. This field must be updated manually when the tool is serviced. The count can be set to the current cycle count by selecting **Set Now** at the end of the row and pressing the ENT key.

### *Cycles before PM*

Range: 0 to 4,294,967,295

This field indicates the number of cycles between preventative maintenance for the tool. If this field is set to 0, no tracking of cycle counts for preventative maintenance is performed.

The tool can be configured via the PC software application to reject all results when the cycle count is greater than the 'Last PM at' value plus the 'Cycles before PM'.



The Choose Parameter screen shows all the parameters in the unit in a 10x10 grid. Only the parameters with tools assigned will show their numbers on the grid. A selectable parameter will have a black number. A defined, but not selectable, parameter will be shown in red. A parameter is defined when a tool number is assigned to it. If the assigned tool number is an empty tool slot, because either no tool was ever learned or the previous tool was forgotten, the parameter will become unselectable.

## Configuration Options

The configuration options for a parameter depend on the type of tool selected for the parameter.

Figure 26: Parameter Edit Screen - Click

Figure 27: Parameter Edit Screen - Exacta 1100

Figure 28: Parameter Edit Screen - Air

Figure 29: Parameter Edit Screen - Exacta 1200

Figure 30: Parameter Edit Screen - Exacta 1250

Figure 31: Parameter Edit Screen - Input

## Function keys

1. DELETE – Deletes all information in the parameter and returns to the Choose Parameter screen.
2. AUTOCAL – Begins the autocal procedure for an air tool. For other tool types, this key has no function.
3. SAVE – Saves changes to the parameter and returns to the Choose Parameter screen
4. CANCEL [ESC] – Discards changes to the parameter and returns to the Choose Parameter screen

## Common Fields

### Name

The parameter name can be up to 25 numbers, letters, or decimal points.

The parameter name is shown on screen when running the parameter and reported to the network with tightenings performed in the parameter.

### *Primary Tool*

This setting controls which tool is used by this parameter. You must select a learned tool before a parameter can be used.

If the tool used by a parameter is forgotten, the parameter will become invalid.

### *Holding Tool*

This setting controls which tool is used by this parameter as a holding tool. You must select a primary tool before a parameter can be used. Holding tools can only be used in a parameter with click, Exacta 1200, or Air 1200 tools.

If the holding tool used by a parameter is forgotten, the parameter will become invalid.

## **S**

Range: 1 to 100

These settings determine which socket is used with the tool for a parameter. If set to 0, no socket is defined for the tool. The socket settings are only relevant when combined with the Verify Socket discrete inputs. The socket cannot be the same for both the primary and holding tool within a parameter.

### *Batch*

Default: 1

Range: 1 to 255

This setting determines how many good tightenings must be performed in the parameter to complete a batch.

### *Lock on batch*

Default: no

This setting determines if the unit will lock or restart the parameter when a batch is completed. When set to yes, the qualifier will stop when a batch is completed and transition to a no active parameter state. When set to no, the qualifier will restart the parameter when a batch is completed.

This setting is ignored when running the parameter as part of a group or job.

### Click Tool Fields

#### *Timer Min*

Default: 0

Range: 0 to 2.55 seconds

This setting controls the minimum amount of time the tool must be held in the clicked position for a valid tightening. This value must be less than Timer Max.

### *Timer Max*

Default: 1.00 seconds

Range: 0 to 2.55 seconds

This setting controls the maximum amount of time the tool may be held in the clicked position for a valid tightening. This value must be greater than Timer Min.

### *Time between cycles*

Default: 0

Range: 0 to 9999 seconds

This setting controls the minimum amount of time after an accepted tightening before another tightening should be accepted. Any additional tightenings performed within this time after an accepted tightening will be automatically considered a reject.

### *Time between batches*

Default: 0

Range: 0 to 9999 seconds

This setting controls the minimum amount of time after a batch completion before another tightening should be accepted. Any additional tightenings performed within this time after a batch completion will be automatically considered a reject.

### Exacta 1100/1200 Tool Fields

#### *Unit*

Default: ft.lb

Values: in.lb, ft.lb, N.m, cm.kg, m.kg, cNm

This setting determines the units of the Torque Min and Max, as well as the torque reported with each tightening.

#### *Torque Min*

Default: 10% of tool capacity

Range: 0 to tool capacity

This setting controls the minimum required torque for a valid tightening. This value must be less than Torque Max.

#### *Torque Max*

Default: 99% of tool capacity

Range: 0 to tool capacity

This setting controls the maximum allowed torque for a valid tightening. This value must be greater than Torque Min.

## *Green Torque*

Default: 10% of tool capacity

Range: Torque Min to Torque Max

This setting controls the torque at which the green light on the tool will become active. This value allows you to keep the green light on the tool from activating at minimum torque to encourage the operator to pull to a torque farther up within the allowed range.

## *Mode*

Default: Peak

Values: Peak, Residual

This setting controls the mode the tool uses to determine the torque.

## *Direction*

Default: Positive

Values: Positive, Negative, Both

This setting controls the allowed torque directions for the parameter.

## *Autoclear Time*

Default: 1

Range: 1 to 255 seconds for Exacta 1100, 0.3 to 25.5 seconds for Exacta 1200

This setting controls the amount of time the torque must be steady before it is reported.

## *Head Length*

Default: 36.50 mm

Values: 0 to 100 mm

This setting is used to tell the tool how long the head is for the parameter. *If this value is not entered correctly, torque measurements will be invalid.*

Some standard head lengths based on capacity and head type are:

- 53.96 mm for 250 ft.lb ratchets
- 98.43 mm for 400 ft.lb dovetail
- 77.80 mm for 400 ft.lb ratchets and 600 ft.lb
- 36.50 mm for other wrenches

## Air Tool Fields

### *Timer Min*

Range: 0 to 65.5 s

This setting controls the minimum time the tool must run for a valid tightening.

### *Timer Max*

Range: 0 to 65.5 s

This setting controls the maximum time the tool can run for a valid tightening.

### *Timer Pulse*

Range: 0 to 65.5 s

This setting controls the minimum time a tool needs to pulse, if using a pulse tool algorithm.

### *Timer Bump*

Range: 0 to 65.5 s

This setting controls the maximum time the tool can run without creating a status. This setting is provided to allow the tool trigger to be bumped without creating a spurious reject.

### *Timer Clutch*

Range: 0 to 65.5 s

This setting controls the minimum time the tool's trigger must be held after clutching out.

### *Threshold 1*

Range: 0 to 99.9 psi

This setting controls the pressure at which the transducer will start monitoring a tightening.

### *Threshold 2*

Range: 0 to 99.9 psi

This setting controls the pressure at which the transducer will consider the tool to be in cycle.

### *Threshold 3*

Range: 0 to 99.9 psi

This setting controls the pressure at which the transducer will consider the tool to have clutched out.

### Exacta 1250 Tool Fields

Parameters using Exacta 1250 tools will have different settings based on the selected Mode option. All options will be described here.

### *Mode*

Default: Peak

Values: Peak, Residual, T2A (Torque to Angle), TAM (Torque with Angle Monitoring), PTM (Prevailing Torque Monitoring)

This setting controls the mode the tool uses to evaluate a tightening.

## *Unit*

Default: ft.lb

Values: in.lb, ft.lb, N.m, cm.kg, cN.m

Available Modes: all

This setting determines the units of the Torque Min and Max, as well as the torque reported with each tightening.

## *Min Trq*

Default: 10% of tool capacity

Range: 0 to tool capacity

Available Modes: all

This setting controls the minimum required torque for a valid tightening. This value must be less than Max Trq.

## *Grn Trq*

Default: 10% of tool capacity

Range: Min Trq to Max Trq

Available Modes: all except T2A

This setting controls the torque at which the green light on the tool will become active. This value allows you to keep the green light on the tool from activating at minimum torque to encourage the operator to pull to a torque farther up within the allowed range.

## *Max Trq*

Default: 99% of tool capacity

Range: 0 to tool capacity

Available Modes: all

This setting controls the maximum allowed torque for a valid tightening. This value must be greater than Min Trq.

## *TTAM*

Default: 10% of tool capacity

Range: 0 to Min Trq

Available Modes: T2A, TAM, PTM

This setting controls the torque threshold at which the tool starts measuring the angle.

## *Pre Min*

Default: 0

Range: 0 to Pre Max

Available Modes: PTM

This setting controls the minimum required prevailing torque for a valid tightening. This value must be less than Pre Max.

### *Pre Max*

Default: 0

Range: 0 to Min Trq

Available Modes: PTM

This setting controls the maximum allowed prevailing torque for a valid tightening. This value must be greater than Pre Min and less than or equal to Min Trq.

### *Yel Ang*

Default: 0

Range: 0 to Ang Min

Available Modes: T2A

This setting is the number of degrees before Ang Min at which the yellow light on the tool will become active.

Example: If Yel Ang is set to 10° and Min Ang is set to 90°, the yellow light will become active after 80° of turn.

### *Min Ang*

Default: 0

Range: 0 to 9999

Available Modes: T2A, TAM, PTM

This setting controls the minimum required angle for a valid tightening. This value must be less than Max Ang.

### *Max Ang*

Default: 0

Range: 0 to 9999

Available Modes: T2A, TAM, PTM

This setting controls the maximum allowed angle for a valid tightening. This value must be greater than Min Ang.

### *Autoclear Time*

Default: 1

Range: 0.3 to 25.5 seconds

Available Modes: all

This setting controls the amount of time the torque must be steady before it is reported.

### Head Length

Default: 36.50 mm

Values: 0 to 100 mm

Available Modes: all

This setting is used to tell the tool how long the head is for the parameter. *If this value is not entered correctly, torque measurements will be invalid.*

Some standard head lengths based on capacity and head type are:

- 53.96 mm for 250 ft.lb ratchets
- 98.43 mm for 400 ft.lb dovetail
- 77.80 mm for 400 ft.lb ratchets and 600 ft.lb
- 36.50 mm for other wrenches

### Direction

Default: Positive

Values: Positive, Negative, Both

Available Modes: all

This setting controls the allowed torque directions for the parameter.

## Groups

### Selecting Groups

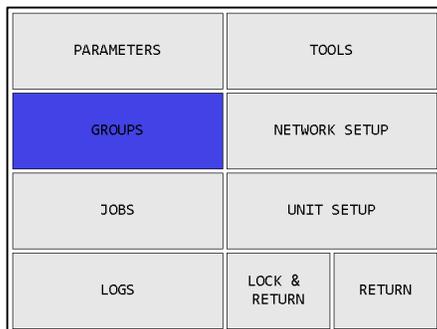


Figure 32: Main menu - Groups

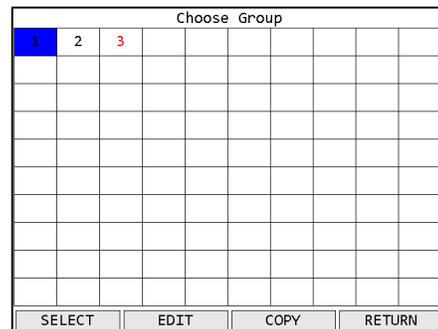


Figure 33: Choose Group screen

### Function keys

1. SELECT – Select the currently highlighted group to run. Only available for selectable groups.
2. EDIT – Edit the currently highlighted group.
3. COPY – Selects the currently highlighted group to be copied to another location.
4. RETURN [ESC] – Returns to the main menu.

The Choose Group screen shows all the groups in the unit in a 10x10 grid. Only the groups with parameters assigned will show their numbers on the grid. A selectable group will have a black number. A defined, but not selectable, group will be shown in red. A group is defined when one or more parameters are assigned to it. If an assigned parameter is unselectable, the group will become unselectable.

## Configuration Options

PARAMETER	Batch
1. 1 - PARAMETER 1	1
2. 2 - PARAMETER 2	1
3. 0 -	0
4. 0 -	0

**Figure 34: Group Edit screen**

### *Function keys*

1. DELETE – Deletes all information in the group and returns to the Choose Group screen.
2. No function
3. SAVE – Saves changes to the group and returns to the Choose Group screen
4. CANCEL [ESC] – Discards changes to the group and returns to the Choose Group screen

### *Name*

The group name can be up to 25 numbers, letters, or decimal points.

The group name is shown on screen when running the group but is not sent to the network.

### *Lock on done*

Default: no

This setting determines if the unit will lock or restart the group when the group is completed. When set to yes, the qualifier will stop when the group completes and transition to a no active parameter state. When set to no, the qualifier will restart the group when it completes.

This setting is ignored when running the group as part of a job.

### *Batch beep on*

Default: Group

Values: Group, Parameter

This setting determines if the unit will sound the batch beep for each parameter in the group or only when the entire group is completed. The UI will show the batch color for each individual parameter when it completes regardless of this setting.

## Group Parameter Selection

### *Parameter column*

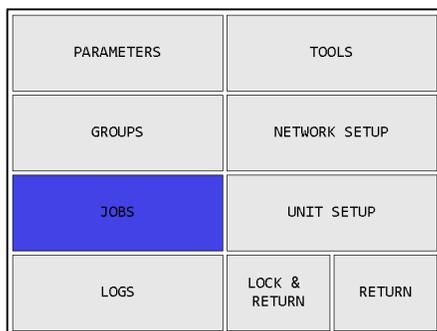
In the parameter column, you may select the parameters for the group by typing the number of the desired parameter in each row. The order on this screen determines the order they are shown on the run screen but is otherwise not important.

### *Batch column*

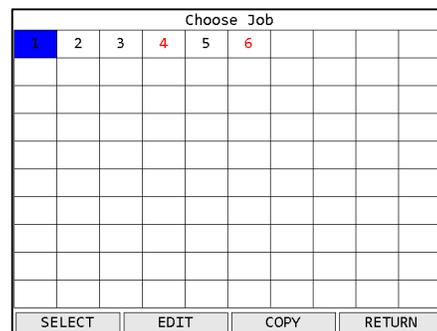
In the batch column, you may enter the batch size for the parameter when running it as part of the group. When a parameter is selected, this column will be filled with the batch currently defined in the parameter itself. Changing values in this column only affect the parameter while it is running in the group but does not change it in any other group or job or when the parameter runs on its own.

## **Jobs**

### Selecting Jobs



**Figure 35: Main menu - Jobs**



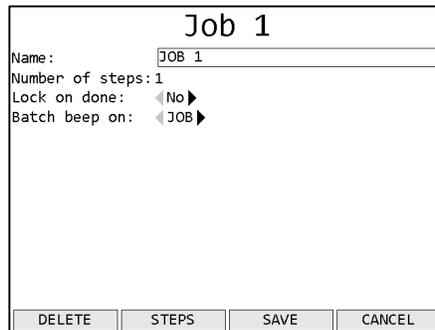
**Figure 36: Choose Job screen**

### *Function keys*

1. SELECT [ENT] – Select the currently highlighted job to run. Only available for selectable job.
2. EDIT – Edit the currently highlighted job.
3. COPY – Selects the currently highlighted job to be copied to another location.
4. RETURN [ESC] – Returns to the main menu.

The Choose Job screen shows all the jobs in the unit in a 10x10 grid. Only the jobs with parameters assigned will show their numbers on the grid. A selectable job will have a black number. A defined, but not selectable, job will be shown in red. A job is defined when one or more parameters or groups are assigned to it. If an assigned parameter or group is unselectable, the job will become unselectable.

## Configuration Options



The screenshot shows a window titled "Job 1". Inside the window, there are four rows of configuration options:

- Name: JOB 1
- Number of steps: 1
- Lock on done: No (with left and right arrow icons)
- Batch beep on: JOB (with left and right arrow icons)

At the bottom of the window, there are four buttons: DELETE, STEPS, SAVE, and CANCEL.

**Figure 37: Job Edit screen**

1. DELETE – Deletes all information in the job and returns to the Choose Job screen.
2. STEPS – Goes to the Job Step Select screen
3. SAVE – Saves changes to the job and returns to the Choose Job screen
4. CANCEL [ESC] – Discards changes to the job and returns to the Choose Job screen

### *Name*

The job name can be up to 25 numbers, letters, or decimal points.

The job name is shown on screen when running the job but is not sent to the network.

### *Number of Steps*

Shows the number of steps currently defined in the job.

### *Lock on done*

Default: no

This setting determines if the unit will lock or restart the job when the job is completed. When set to yes, the qualifier will stop when the job completes and transition to a no active parameter state. When set to no, the qualifier will restart the job when it completes.

### *Batch beep on*

Default: Job

Values: Job, Parameter

This setting determines if the unit will sound the batch beep for each parameter in the job or only when the entire job is completed. The UI will show the batch color for each individual parameter when it completes regardless of this setting.

## Job Step Selection

1 - JOB 1		
	Parameter/Group	Batch
1	P 1 - PARAMETER 1	3
2	P 2 - PARAMETER 2	1
3	G 1 - GROUP 1	
4	P 3 - PARAMETER 3	1
5	P 1 - PARAMETER 1	3
6	G 2 - GROUP 2	
7	G 1 - GROUP 1	
8	<input type="text" value="0"/> - Choose parameter or group number	
9	<input type="text" value="0"/> - Choose parameter or group number	
10	<input type="text" value="0"/> - Choose parameter or group number	

11-20    PARAMETER    GROUP    RETURN

**Figure 38: Job Step Select screen**

### *Function keys*

1. 11-20 – Shows steps 11-20 of the job. When steps 11-20 are showing, this key changes to “21-30”. When steps 21-30 are showing, this key changes to “1-10”.
2. PARAMETER – Makes the selected step in the job a parameter step
3. GROUP – Makes the selected step in the job a group step
4. RETURN [ESC] –Returns to the Job Edit screen

Changes made on this screen are saved or discarded when exiting the Job Edit screen.

### *Parameter/Group column*

In the Parameter/Group column, you may select the parameter or group to run at each step in the job by typing the number of the desired parameter in each row. The P or G to the left of this column indicates whether a parameter or group is currently selected. To switch between a parameter and a group, use the function keys. The order on this screen determines the order they are run in the job.

Parameters and groups may be used multiple times within the same job.

### *Batch column*

In the batch column, you may enter the batch size for the parameter steps when running it as part of the job. This column will be empty for group steps. When a parameter is selected, this column will be filled with the batch currently defined in the parameter itself. Changing values in this column only affect the parameter while it is running in the job but does not change it in any other group or job or when the parameter runs on its own.

# Network Setup

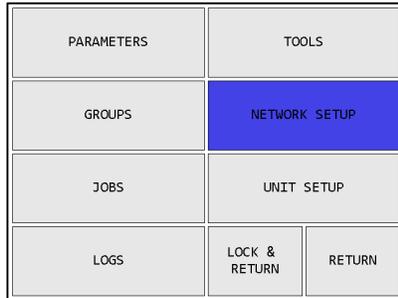


Figure 39: Main menu - Network Setup



Figure 40: Network Setup Menu - General

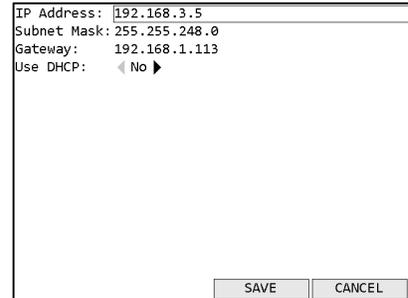


Figure 41: General Network Setup

## Function keys

1. No function
2. No function
3. SAVE – Saves changes to the general Network Setup and returns to the Network Setup menu
4. CANCEL [ESC] – Discards changes to the general Network Setup and returns to the Network Setup menu

Changes to these settings only apply after the qualifier is restarted.

See the protocol specific chapters for information about the configuration options for each protocol.

## Configuration Options

### IP Address

Default: 192.168.1.67

This setting controls the IP address of the qualifier for Ethernet networks.

### Subnet Mask

Default: 255.255.255.0

This setting controls the subnet mask for Ethernet networks.

### Gateway

Default: 192.168.1.113

This setting controls the default gateway setting for Ethernet networks.

### Use DHCP

Default: No

This setting determines if the qualifier will attempt to automatically acquire a network address or if it will use the one entered manually. When set to yes, the IP Address, Subnet Mask, and Gateway settings are ignored.

# Unit Setup

The Unit Setup screen contains the settings for the overall unit.

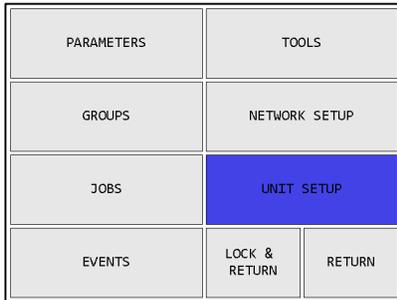


Figure 42: Main menu – Unit Setup

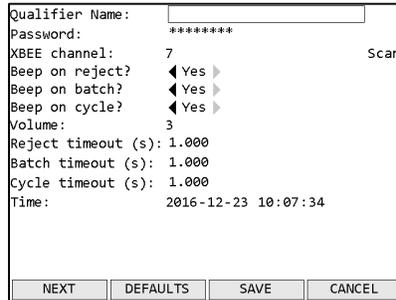


Figure 43: Unit Setup screen – page 1

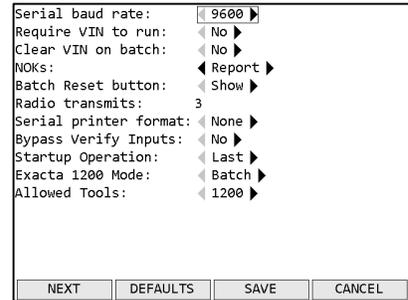


Figure 44: Unit Setup screen – page 2

## Function keys

1. NEXT – Goes to the other page of the unit setup screen.
2. DEFAULTS – Goes to the Reset Defaults screen
3. SAVE – Saves changes made to the qualifier configuration.
4. CANCEL [ESC] – Cancels changes made to the qualifier configuration.

## Page 1

### Qualifier Name

The qualifier name can be up to 25 numbers, letters, or decimal points.

The qualifier name is sent to the network in the Controller Name field of various commands.

### Password

The password can be up to 10 numbers. The “password” shown on this screen is a placeholder and does not necessarily represent the length of the actual password. To change the unit password, select the password field and press ENT, which will take you to the Enter new Password screen. If there is no password, this field will be blank.

### XBEE Channel

Default: 1

Range: 1 to 12

This setting controls which channel is used by the qualifier radio. All tools learned to the qualifier will be set to this channel automatically as part of the learn process. In general, this setting does not have to be changed, but if tool communication is not working reliably, changing this setting may improve communication. When a change to this setting is saved, the unit will go to the Channel Change screen to guide you through updating all learned tools to use the new channel.

If you want the Global 400 to suggest a channel, you can press **Scan** to go to the XBEE Channel Noise screen shown below.

The radio frequencies used by each channel can be found in *Chapter 11: Product Specifications*.

### *Beep on reject?*

Default: yes

This setting determines if the qualifier will sound the beeper when a rejected tightening is received. The reject sound is one long beep.

### *Beep on batch?*

Default: yes

This setting determines if the qualifier will sound the beeper when a batch is completed. The batch sound is four short beeps. When running a group or job, the beep controlled by this setting may be for each parameter batch or for the complete group or job. See the Groups and Jobs sections for more information about those settings.

### *Beep on cycle?*

Default: yes

This setting determines if the qualifier will sound the beeper when an accepted tightening is received that would not trigger the batch sound. The cycle sound is two short beeps.

### *Volume*

Default: 3

Range: 0 to 10

This setting controls the volume of the beeper. When set to 0, the beeper will not sound at all, regardless of the other *Beep on X* settings. A setting of 3 or below is recommended while using the qualifier in an office or other environment without much background noise.

### *Reject timeout*

Default: 1

Range: 0 to 10 seconds

This setting controls how long the on-screen indication of a rejected tightening will be shown. When set to 0, the indication will remain until another tightening is received or the qualifier changes or stops the currently running operation. Partial seconds may be entered for this setting. Rejects are indicated by shading the screen red behind the parameter that received the reject.

### *Batch timeout*

Default: 1

Range: 0 to 10 seconds

This setting controls how long the on-screen indication of a rejected tightening will be shown. When set to 0, the indication will remain until another tightening is received or the qualifier changes or stops the currently running operation. Partial seconds may be entered for this setting. Batch completions are indicated by shading the screen blue or yellow behind the parameter that received the result to complete a batch.

## *Cycle timeout*

Default: 1

Range: 0 to 10 seconds

This setting controls how long the on-screen indication of an accepted tightening that was not the last in a batch will be shown. When set to 0, the indication will remain until another tightening is received or the qualifier changes or stops the currently running operation. Partial seconds may be entered for this setting.

Cycles are indicated by shading the screen green behind the parameter that received the cycle.

## *Time*

This row allows you to set the current time used by the unit. The display order of this field is:

year-month-day hour:minute:second

Each piece of the time may be edited by using the left and right arrows to select the various pieces of the time and the number keys to set the new value.

## Page 2

## *Serial baud rate*

Default: 9600

Values: 9600, 19200, 38400, 57600, 115200

This setting should be set to match the baud rate used by a serial barcode reader or printer, if either is used. If this setting is not configured correctly, barcodes will not be correctly processed.

## *Require VIN to run*

Default: no

This setting determines if the qualifier requires a VIN to be entered before tools will be allowed to run. When set to yes, the qualifier will be automatically suspended whenever there is no currently entered VIN. When set to no, the qualifier will not check the VIN before allowing tools to run.

A VIN may be entered through either the barcode scanner or a network command. The VIN may be cleared by a network command, an external input, or the *Clear VIN on batch* setting. If the VIN is cleared while an operation is running and this setting is set to yes, the qualifier will immediately suspend until a new VIN is entered.

## *Clear VIN on batch*

Default: no

This setting determines if the qualifier automatically clears the VIN when a batch completes. When set to no, the qualifier will never automatically clear the VIN. The VIN may still be cleared by other means, such as a network command or external input.

When set to yes, the qualifier will clear the VIN when an operation completes, regardless of if the operation is set to repeat. When directly running a parameter, the VIN will be cleared when a

batch is completed. When running a standard group, the VIN will be cleared when all parameters in the group have completed. When running a job, the VIN will be cleared when the last step in the job is completed.

When using the VIN Selections feature, the selector will also be cleared with the VIN.

## **NOKs**

Default: Report

Values: Ignore, Display, Report, Count

This setting determines how the unit will handle NOK results (or rejects). The following table summarizes the behavior for the different levels:

<b>Level</b>	<b>Beep<sup>1</sup></b>	<b>Show on Screen</b>	<b>Store in Flash</b>	<b>Report to Network</b>	<b>Overall bad<sup>2</sup></b>	<b>Increment Count</b>
Ignore	No	No	No	No	No	No
Display	Yes	Yes	No	No	No	No
Report	Yes	Yes	Yes	Yes	No	No
Count	Yes	Yes	Yes	Yes	Yes	Yes

1. Unit will only beep if Beep on reject is set to yes and Volume is not 0.
2. Overall bad will be indicated by shading the operation name on the top row of the run screen yellow and will show yellow instead of blue or green in the parameter area when the parameter batch is completed.

All results from tools that are not currently running are ignored, regardless of this setting.

## ***Batch Reset button***

Default: Show

Values: Show, Hide

This setting determines if the Batch Reset button is available on the Run screen.

## ***Radio transmits***

Default: 3

This setting controls how many times a tool radio will attempt to send a result before giving up. In general, this setting does not have to be changed, but if tool communication is not working reliably, changing this setting may improve communication.

Not all tools support this setting. Only click tools with code 1.13 or later and holding tools support this setting. This setting is only sent to a tool during the learn process

## ***Serial printer format***

Default: None

Values: None, Line, CSV

This setting determines the format used for serial printing of tightenings.

## *Bypass Verify Inputs*

Default: no

This setting determines if the Verify Tool and Verify Socket inputs are ignored. See the GIM400 User Manual for more information about the inputs.

## *Startup Operation*

Default: Last

Values: Last, None

This setting what operation will be run on unit startup. If set to Last, the last running operation when the unit turned off will be restarted at the beginning of the operation when the unit turns on. If set to None, the unit will be in the No active parameter state on startup.

## *Exacta 1200 Mode*

Default: Batch

Values: Batch, Single

This setting determines how the Exacta 1200 or 1250 will behave when it loses communication with the Global 400. If set to Batch, the Exacta 1200 or 1250 will record tightenings up to the completion of a full batch before disabling. If set to Single, the Exacta 1200 or 1250 will disable after each result until it receives confirmation that the result was received by the Global 400.

## *Allowed Tools*

Default: 1200

Values: 1200, Legacy

This setting determines which type of Exacta and air tools can be used. Exacta 1200 and 1250 and PST 1200 tools can be used when set to 1200. Exacta 1100 and PST 1000/2000 tools can be used when set to Legacy.

Tools of the wrong type learned in before the Allowed Tools setting is changed will remain learned to the box, but any parameter, groups, or jobs using the tools will become invalid.

## Enter new Password



Enter new password

453695

REMOVE SAVE CANCEL

**Figure 45: Enter new Password screen**

## *Function keys*

1. REMOVE – Clears the unit password and returns to the Unit Setup screen.
2. No function
3. SAVE [ENT] – Keeps changes to the password and returns to the Unit Setup screen.
4. CANCEL [ESC] – Cancels changes made to the password and returns to the Unit Setup screen.

The Enter new Password screen allows you to change the password to a string of up to 10 digits. *Note that the password entered on this screen will be shown in clear text as it is typed.* Enter the new password by typing the desired series of digits and pressing **SAVE** or ENT. *The new password will not be saved to permanent memory until saving from the Unit Setup screen.*

If you decide not to change the password, press **CANCEL** or ESC.

You may completely remove the password from the unit by pressing **REMOVE**. Removing the password will allow unrestricted access to all functions of the unit until a new password is entered. If you only want to temporarily disable the password, use the **RETURN** button as described on the Main menu screen to return to the run screen.

## XBEE Channel Noise

The XBEE Channel Noise screen will test each of the available channels to determine how much noise is already on those channels. The channel with the lowest amount of noise will be indicated by a blue bar.

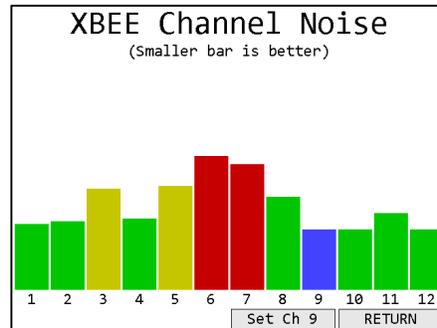


Figure 46: XBEE Channel Noise screen

### *Function keys*

1. No function
2. No function
3. Set Ch X [ENT] – Selects the best channel and returns to the Unit Setup screen.
4. RETURN [ESC] – Returns to the Unit Setup screen without selecting a channel.

The new channel will not be saved to permanent memory until saving from the Unit Setup screen. When a channel change is saved, the unit will go to the Channel Change screen to guide you through updating all learned tools to use the new channel after saving from the Unit Setup screen.

## Reset Defaults

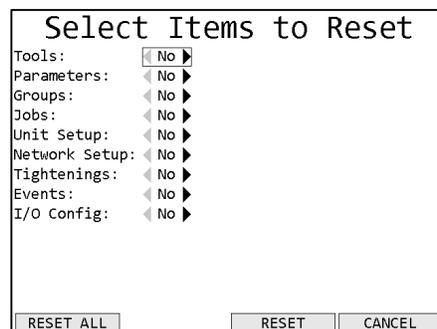


Figure 47: Reset Defaults screen

### *Function keys*

5. RESET ALL – Resets all configuration to factory defaults.
6. No function
7. RESET – Resets the selected parts of the configuration to factory defaults.
8. CANCEL [ESC] – Returns to the Unit Setup screen without resetting any configuration.

The Reset Defaults screen allows you to restore the unit to the factory defaults. You may select some or all parts of the configuration to reset.

Resetting some parts of the configuration may invalidate other parts that are not being reset.

Resetting...	May invalidate...
Tools	Parameters, Groups, Jobs, Tightenings
Parameters	Groups, Jobs, Tightenings
Groups	Jobs, Tightenings
Jobs	Tightenings
Unit Setup	Tools <sup>1</sup>
Network Setup	none
Tightenings	none
Events	none
I/O Config	none

## Channel Change

When you change the XBEE channel from the Unit Setup screen, the unit will begin the channel change process. Follow the on-screen prompts to update each tool to the new channel.



Figure 48: Channel Change screen



Figure 49: Channel Change, tool 1 complete

Click and holding tools will need to be cycled to perform the channel change. Air and digital tools only need to be on and will perform the channel change automatically. Once the last tool is updated, you will be returned to the main menu.

Once all tools have been updated, the unit will return to the main menu. If you cannot perform the update on all learned tools at this time, you may press **SKIP** to skip the tool. This will allow the unit to finish the channel change, but will leave any skipped tools on the previous channel. When you want to use the tools that were not updated, they must be updated to the correct channel. For digital and air tools, this only requires turning the tool off and back on. For holding tools and newer click wrenches, erasing the wrench and clicking it will cause it to reassociate with the unit on the correct channel. Older click wrenches will need to be forgotten and relearned. Make sure no other units are in learn mode when you do this, or the tool may learn to the other unit instead. The tool should reconnect to the unit on the new channel and return to normal function.

<sup>1</sup> If the XBEE channel was changed from the default, the unit will go to the Channel Change screen to update the tools back to the default XBEE channel when resetting the default qualifier settings.

# Events

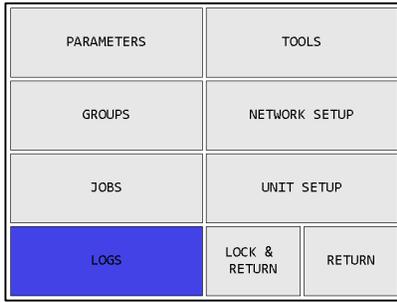


Figure 50: Main menu – Logs

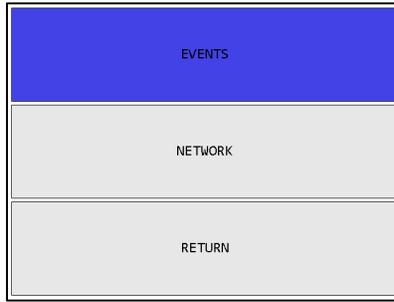


Figure 51: Logs Menu screen – Events

Time	Code	Event	Source	Status
2014-10-21				
14:03:04	2	Password entered	1	0
14:02:58	2	Password entered	1	1
14:02:51	6	Settings changed	1	0
2014-10-20				
14:01:06	6	Settings changed	1	0
14:00:10	6	Settings changed	1	0
13:51:19	2	Password entered	1	0
13:51:09	500	Operation started	0	0
13:51:09	1	Power up	0	0
13:51:02	103	Tool serviced	0	0
13:44:04	400	Job info changed	1	0
13:43:54	400	Job info changed	1	0
13:43:44	400	Job info changed	1	0
Time: 2014-10-21 14:03:20				
			NEXT	RETURN

Figure 52: Events screen

## Soft keys

1. No function
2. PREVIOUS – Go to the previous page of more recent tightenings. When on the first page, this key will be blank.
3. NEXT [ENT] – Go to the next page of older tightenings. When on the last page, this key will be blank.
4. RETURN [ESC] – Returns to the Run Screen.

The Events screen shows the log of non-tightening events that have occurred. More information is available via the PC software application. This screen shows:

- Time – The time the event occurred. The date is indicated at the top of the table and each time it changes. The current time is shown at the bottom of the screen for comparison.
- Code – The event code for this event.
- Event – The name of this event.
- Source – The source that caused the event.
- Status – The status of the event. 0 indicates success, non-zero indicates an error.

## Network Log

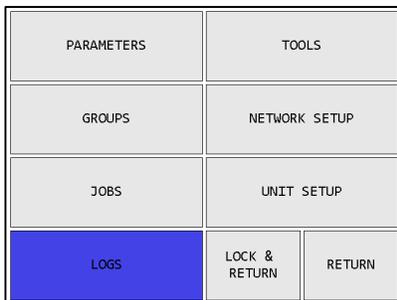


Figure 53: Main menu – Logs

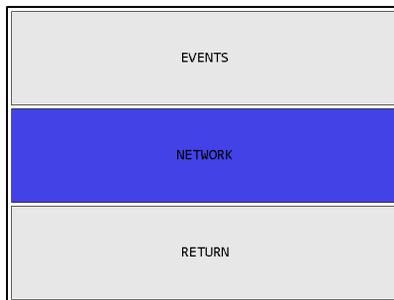


Figure 54: Logs Menu screen – Network

Time	Source	Packet
2016-06-30		
17:57:35	192.168.4.127	TX Cmd=00
17:57:35	192.168.4.127	RX Cmd=D0
17:57:32	192.168.4.127	RX MID=0062
17:57:32	192.168.4.127	TX MID=0061
17:57:31	192.168.4.127	TX MID=0005
17:57:31	192.168.4.127	RX MID=0043
17:57:30	192.168.4.127	RX MID=0016
17:57:30	192.168.4.127	TX MID=0015
17:57:30	192.168.4.127	RX MID=0018
17:57:26	192.168.4.127	TX MID=0005
17:57:26	192.168.4.127	RX MID=0042
17:57:22	192.168.4.127	RX MID=0062
Time: 2016-06-30 17:57:41		
		PREVIOUS
		NEXT
		RETURN

Figure 55: Network Log screen

## *Function keys*

1. No function
2. PREVIOUS – Go to the previous page of more recent network events. When on the first page, this key will be blank.
3. NEXT [ENT] – Go to the next page of older network events. When on the last page, this key will be blank.
4. RETURN [ESC] – Returns to the Run Screen.

The Network Log screen shows the log of network events that have occurred since the qualifier started up. This log is not maintained across reboots or power cycles. This screen shows:

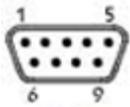
- Time – The time the event occurred. The date is indicated at the top of the table and each time it changes. The current time is shown at the bottom of the screen for comparison.
- Source – The remote IP address for this event.
- Packet – Information about the packet sent or received or network connection start/stop.

# Chapter 4: Serial Communications

---

## Introduction

The Global 400 has a DSUB-9 serial port that provides bar code reading and serial printing functionality. As the same connector is used for both functions, you will need a special Y-style cable if you want to attach both a barcode reader and a serial printer to the Global 400 at the same time.



Pin	Usage
2	Receive
3	Transmit
5	Ground

## Barcode

The bar code functionality of the Global 400 was developed and tested against the Symbol LS2208 bar code reader, which uses CODE39 bar codes. This format starts and ends all bar codes with an asterisk “\*”.

The Global 400 further specifies a format of data within the bar code. The data is grouped into sections, separated by a percent symbol “%”. If the bar code data does not start and end with a percent symbol, it will be treated as a VIN number. Starting with Global 400 version 1.2.5, a non-command barcode may also be a selector when used with the VIN Selections feature. The general structure for a command bar code is:

\*%<command>%<data>%\*

A VIN/Selector bar code is:

\*<VIN number>\*

The remainder of this chapter lists the bar code commands provided by the unit. Section headings are the command number followed by the command name.

### 1. Cell ID

This command sets the Cell ID number reported by the unit in ACOP result messages.

Data: number of up to 4 digits (0-9999)

Example:

\*%01%4305%\*

This bar code would set the Cell ID of the unit to 4305.

### 2. Channel ID

This command sets the Channel ID number reported by the unit in ACOP result messages.

Data: number of up to 2 digits (0-99)

Example:

\*%02%19%\*

This bar code would set the Channel ID of the unit to 19.

### 3. Controller Name

This command sets the Controller Name of the unit.

Data: up to 25 characters

Example:

`*%03%air - bag%*`

This bar code would set the Controller name of the unit to “air - bag”.

### 4. VIN

This command sets the VIN or Identifier part 1 (VIN characters 1-25) reported by the unit in tightening result messages, the ACOP MID 0052 Vehicle ID Number, and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

`*%04%VIN1234567%*`

As mentioned above, a bar code is assumed to be a VIN number if the data is not in the command format. As such, the same VIN could be provided as:

`*VIN1234567*`

### 5. Start Job

This command instructs the unit to select a job. Any other running parameter, group, or job will be stopped before starting the new job.

Data: number of up to 3 digits specifying the job number to run (1-100)

Example:

`*%05%32%*`

This bar code would instruct the unit to start job number 32.

### 6. Identifier part 2

This command sets the Identifier part 2 (VIN characters 26-50) reported by the unit in tightening result messages and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

`*%06%B23FJ9S3%*`

### 7. Identifier part 3

This command sets the Identifier part 3 (VIN characters 51-75) reported by the unit in tightening result messages and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

\*%07%GU49CN53%\*

## 8. Identifier part 4

This command sets the Identifier part 4 (VIN characters 76-100) reported by the unit in tightening result messages and the ACOP MID 0152 Multiple identifier and result parts notifications.

Data: up to 25 characters

Example:

\*%08%RU39CN53%\*

## 10. Reset batch count

This command resets the count of all currently running parameters on the unit.

Data: none

Example:

\*%10%\*

To reset the batch count of a single parameter when running a group with multiple parameters, use command 30. Reset parameter batch count.

## 11. Start Parameter

This command instructs the unit to start a parameter. Any other running parameter, group, or job will be stopped before starting the new parameter.

Data: number of up to 3 digits specifying the parameter number to select (1-100)

Example:

\*%11%73%\*

This bar code would select parameter 73.

## 12. Start Group

This command instructs the unit to select a group. Any other running parameter, group, or job will be stopped before starting the new group.

Data: number of up to 3 digits specifying the group number to select (1-100)

Example:

\*%12%26%\*

This bar code would select group 26.

## 13. Stop

This command instructs the unit to stop any running parameter, group, or job.

Data: none

Example:

\*%13%\*

### 30. Reset parameter batch count

This command resets the count of the specified parameter. If the specified parameter is not running, this bar code is ignored.

Data: number of up to 3 digits specifying the parameter number to reset the batch (1-100)

Example:

\*%30%35%\*

This bar code would reset the current batch count of parameter 35.

To reset all batch counts at once, use command 10. Reset batch count.

## **Serial Printer**

The Global 400 provides serial printer output in two formats, line and CSV. The Global 400 will print tightenings based on the format selected on the second page of the Unit Setup menu. Additionally, rejects may not be printed based on the Report to Network column of the NOKs setting table. Both line and CSV formats contain the following fields in the same order:

- VIN
- Controller Name
- Cell ID
- Tightening ID
- Time
- Job Number
- Job Sequence Number
- Parameter Number
- Parameter Name
- Last Parameter Write Time
- Tool Type
- Tool Number
- Tool Name
- Tool Serial Number
- OK/NOK
- Result
- Count
- Batch
- Batch Status
- Torque
- Torque Min
- Torque Max
- Torque Units
- Torque Mode

- Torque Status
- Angle
- Angle Min
- Angle Max
- Angle Status

## VIN Selections

Starting with version 1.2.5, you may configure the Global 400 to use VIN barcode scans to select a parameter, group, or job. The selections must be configured via the Global Manager program.

Both the Atlas Copco Open Protocol and Ethernet/IP™ can provide a VIN to the Global 400. VINs received from these protocols will still be placed in the VIN field, but they are ignored by the VIN selection feature. If a network is able to provide VINs, it is expected that the network will also control the selection of operations through one of the mechanisms provided in that protocol.

### Settings

#### *No match behavior*

Default: Continue

Values: Continue, Stop, Ignore

This setting determines what happens when a selector scan does not match one of the VIN selections.

When set to Continue, the Global 400 will store the scan in its Selector field, but will not stop or change the running operation for a non-matching scan.

When set to Stop, the Global 400 will discard the scan and blank both the Selector and VIN fields and will stop the running operation for a non-matching scan.

When set to Ignore, the Global 400 will ignore any selector scans that do not match one of the VIN selections and act as if the scan never occurred.

#### *Selection mode*

Default: Single Scan

Values: None, Single Scan, Dual Scan, VIN then Selector, Selector then VIN

This setting determines the mode the Global 400 uses to for the VIN Selection feature. The modes will be described in more detail in the next section.

#### *Second scan timeout*

Default: 5

Range: 0-99 seconds

This setting determines how long the Global 400 will wait for a second scan when using one of the selection modes requiring two scans. If a valid second scan is not received during the timeout, the Global 400 will discard the first scan, and if No match behavior is Stop, will also stop the running operation.

#### *VIN length*

Default: Variable

Values: Variable, Fixed (1-25 characters)

This setting determines how long a scan must be to be considered a valid VIN. When set to Variable, any scan length up to 25 characters is allowed. When running in None mode, this setting allows you to specify the length of a VIN scan without using the rest of the VIN Selections features.

### *Selector length*

Default: Variable

Values: Variable, Fixed (1-25 characters)

This setting determines how long a scan must be to be considered a valid selector. When set to Variable, any scan length up to 25 characters is allowed. When running in None or Single Scan modes, this setting is ignored.

### *Characters to match*

This setting is used to specify which characters in a scan the Global 400 should look at when comparing against the selection list. You may select some or all of the characters and are allowed to have gaps between matched characters if needed.

### *VIN Selection Matches*

Each entry in the VIN Selection Match list has a few values that you can set.

*Match* – The string of characters that must be found in the scan.

*Type* – The type of item to be selected for a matching selector. One of Parameter, Group, or Job.

*Number* – The item number to be selected for a matching selector. 1-100.

*Batch* – If selecting a batch, the batch size to use for a matching selector. 0 to use the batch size defined in the parameter, or 1-255 to override the batch size defined in the parameter.

### Match Examples

Consider the following selectors:

**1FV6HLBAXP**

**1FVPP3BX5M**

**JH2RC441X2**

To have the Global 400 look at the marked (bold/underline) characters in the scans for its match, you would select characters 2, 3, and 7 as the Characters to match. To match the first two scans, you would enter “FVB” for the Match field in the selection list. To match the third scan, you would enter “H24” for the Match field in the selection list.

## Selection Modes

The Global 400 will use one of several modes to determine how it uses the VIN to make selections:

### *None*

No selections are made based on barcode scans. The VIN length setting will still be used to validate VIN scans, but the Global 400 will not select an operation based on the scan. If you want to keep the defined list of selections, but temporarily not use them, put the Global 400 in this mode.

### *Single Scan*

All scans are treated as both VINs and selectors. The selector length setting is not used in this mode, and only scans matching the VIN length will be processed. The Global 400 will check each scan against its selection list for a match and start the appropriate operation if a match is found.

### *Dual Scan*

Scans are treated as either VINs or selectors based on their length. The VIN and selector lengths must be different to use this mode. The VIN length or selector length may be variable, but not both. Any scan that matches the VIN length (or does not match the selector length, if the VIN is variable length) will be put in the VIN field but will not cause the Global 400 to select an operation. The Global 400 will check any scan that matches the selector length (or does not match the VIN length, if the selector is variable length) against its selection list for a match and start the appropriate operation if a match is found.

### *Selector then VIN*

The Global 400 will require a selector scan first followed by a VIN scan. In this mode, the VIN and selector lengths may be the same or different. While the Global 400 is waiting for the first scan, it will ignore any scans that do not match the selector length. Once a valid length scan is found, the Global 400 will process it as a selector, checking it against the selection list for a match but not immediately starting the matching operation. If the scan is a match or the No match behavior is Continue, the Global 400 will start waiting for a VIN scan. Once a valid length scan is found, the Global 400 will start the matching operation from the selector scan.

### *VIN then Selector*

The Global 400 will require a VIN scan first followed by a selector scan. In this mode, the VIN and selector lengths may be the same or different. While the Global 400 is waiting for the first scan, it will ignore any scans that do not match the VIN length. Once a valid length scan is found, the Global 400 will store it as the VIN and start waiting for a selector scan. Once a valid length selector scan is found, the Global 400 will process it as a selector, checking it against the selection list for a match and starting the matching operation if a match is found.

# Chapter 5: Atlas Copco Open Protocol

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## Introduction

This chapter describes the support for the Atlas Copco Open Protocol in the Global 400. Command MIDs and revisions referred to in this document are from the Atlas Copco Open Protocol Specification release 1.3 revision 1.

## Using Groups with Atlas Copco Open Protocol

The group features of the Global 400 are not defined directly in the protocol specification. Instead, they are represented as jobs when using this protocol. To reference a group instead of a job in one of the job commands, add 300 to the group number. To represent groups, you must use a revision that uses 4 characters for the job number.

For example, sending MID 0038 Select Job with a job number of 7 will select Job 7 in the unit. Sending MID 0038 with “job number” of 306 will select Group 6 in the unit. If groups 1, 2, and 3 and jobs 10, 11, and 12 are defined in the unit, MID 0030 Job ID Upload request would return “jobs” 10, 11, 12, 301, 302, and 303 in the reply. Similarly, the MID 0034 Job Info subscription will give a message with “job number” 305 when group 5 is selected in the unit.

## Configuration Options

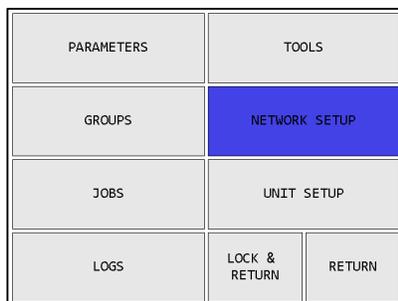


Figure 56: Main menu - Network Setup

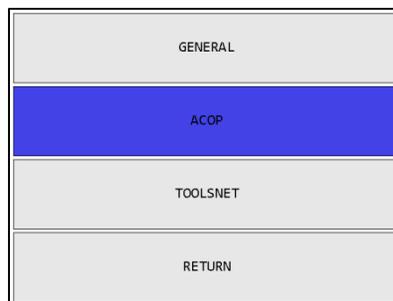


Figure 57: Network Setup Menu - ACOP

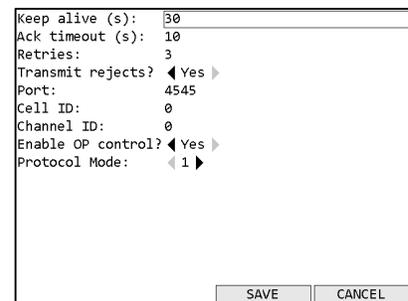


Figure 58: ACOP Settings

### Keep Alive

Range: 0 to 3600 seconds

Default: 30 seconds

This setting controls how long in seconds the unit will keep a connection open without any commands. This value is recommended to be more than twice the rate at which the client will send keep alive packets to ensure the connection is not closed due to a single missed keep alive packet. For example, if the client is configured to send keep alive packets at a 20 second interval, the keep alive setting on the unit should be more than 40 seconds.

The keep alive function can be disabled by setting the keep alive to 0. When set keep alive is set to 0, the unit will not close an Open Protocol connection due to inactivity.

### Ack Timeout

Range: 0 to 3600 seconds

Default: 10 seconds

This setting controls how long the qualifier will wait for a response from the client when sending a subscription notification packet, such as MID 0015 or MID 0061. If no response is received within the specified ack timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ACOP connection is considered broken and will have to be re-established. This will terminate all subscriptions that were established on that connection, regardless of which one did not receive a response.

### *Retries*

Range: 0 to 10

Default: 3

This setting controls how many times the qualifier will resend a subscription notification packet, such as MID 0015 or MID 0061, to the client. If no response is received within the specified ack timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ACOP connection is considered broken and will have to be re-established. This will terminate all subscriptions that were established on that connection, regardless of which one did not receive a response.

### *Transmit Rejects*

Default: yes

This setting determines if reject tightenings are sent to the Open Protocol network. If set to yes, all tightenings will be sent to the network. If set to no, only accepts will be sent to the network, both cycles and batch completes. This setting does not affect if rejects are logged to the unit storage and has no effect if the qualifier NOKs setting is not set to Report or Count.

### *Port*

Range: 0 to 65535

Default: 4545

This setting controls the network port on which the unit listens for Open Protocol connections.

### *Cell ID*

Range: 0 to 9999

Default: 0

This setting controls the value put in the Cell ID field of Open Protocol commands such as MID 0001 and 0061.

### *Channel ID*

Range: 0 to 99

Default: 0

This setting controls the value put in the Channel ID field of Open Protocol commands such as MID 0001 and 0061.

## *Enable OP Control*

Default: yes

This setting determines if the unit will respond to “Open Protocol control” commands. These commands are generally the ones that control unit operation or modify configuration. When this setting is set to yes, all supported commands listed below are handled. When set to no, the following MID commands will return an error:

- 0018 Parameter Select
- 0019 Parameter Batch Size
- 0020 Parameter Reset Batch
- 0038 Job Select
- 0039 Job Restart
- 0042 Tool Disable
- 0043 Tool Enable
- 0050 VIN Download
- 0082 Write Time
- 0127 Job Abort
- 0130 Job Off
- 0150 Multi ID Download
- 0156 Reset Latest Identifier
- 0157 Reset All Identifiers

## *Protocol Mode*

Default: 1

This setting determines the mode used by the qualifier for Open Protocol connections. This setting should be left on the default unless specifically advised otherwise by the factory.

## Supported Commands

Revision lists with a '\*' indicate that one or more revisions of the MID is not supported. Otherwise, the listed supported revisions are all revisions in the specification version mentioned above.

MID	Revisions	Command
0001,0002	1-4	Communication start (acknowledge)
0003	1	Communication stop
0004	1	Command error
0005	1	Command accepted
0010,0011	1	Parameter set ID upload request/reply
0012,0013	1-2*	Parameter set data upload request/reply
0014-0017	1	Parameter set selected (subscribe/acknowledge/unsubscribe)
0018	1	Select Parameter set
0019	1	Set Parameter set batch size
0020	1	Reset Parameter set batch counter
0030,0031	1-2	Job ID upload request/reply
0032,0033	1-3	Job data upload request/reply
0034-0037	1-4	Job info (subscribe/acknowledge/unsubscribe)
0038	1-2	Select Job
0039	1-2	Job restart
0040,0041	1-4	Tool data upload request/reply
0042	1	Disable tool
0043	1	Enable tool
0050	1	Vehicle ID Number download request
0051-0054	1-2	Vehicle ID Number (subscribe/acknowledge/unsubscribe)
0060-0063	1-4*	Last tightening result data (subscribe/acknowledge/unsubscribe)
0064,0065	1-4*	Old tightening result upload request/reply
0070-0073	1	Alarm (subscribe/acknowledge/unsubscribe)
0080,0081	1	Read time upload request/reply
0082	1	Set Time
0127	1	Abort Job
0130	1	Job off
0150	1	Identifier download request
0151-0154	1	Multiple identifier and result parts (subscribe/acknowledge/unsubscribe)
0156	1	Reset latest Identifier
0157	1	Reset all Identifiers
0270	1	Controller reboot request
0420-0423	1	Open Protocol commands disabled (subscribe/acknowledge/unsubscribe)
9999	1	Keep alive message

## Unsupported Commands

If revisions are listed for a MID, there are other revisions for that MID that are supported. Otherwise, the entire command is unsupported.

MID	Revisions	Command
0012,0013	3	Parameter set data upload request/reply
0021-0024		Lock at batch done (subscribe/acknowledge/unsubscribe)
0025		Parameter user set download request
0044		Disconnect tool request
0045		Set calibration value request
0046		Set primary tool request
0060-0063	5-6,998,999	Last tightening result data (subscribe/acknowledge/unsubscribe)
0064,0065	5-6	Old tightening result upload request/reply
0074,0075	1	Alarm acknowledged on controller (acknowledge)
0076,0077	1	Alarm status (acknowledge)
0078	1	Acknowledge alarm remotely on controller
0090-0093		Multi-spindle status (subscribe/acknowledge/unsubscribe)
0100-0103		Multi-spindle result (subscribe/acknowledge/unsubscribe)
0105		Last PowerMACS tightening result data subscribe
0106		Last PowerMACS tightening result Station data
0107		Last PowerMACS tightening result Bold data
0108		Last PowerMACS tightening result data acknowledge
0109		Last PowerMACS tightening result data unsubscribe
0110		Display user text on compact
0111		Display user text on graph
0113		Flash green light on tool
0120		Job line control info subscribe
0121		Job line control started
0122		Job line control alert 1
0123		Job line control alert 2
0124		Job line control done
0125		Job line control info acknowledge
0126		Job line control info unsubscribe
0128		Job batch increment
0129		Job batch decrement
0131		Set Job line control start
0132		Set Job line alert 1
0133		Set Job line alert 2
0140		Execute dynamic Job request
0155		Bypass Identifier
0200		Set externally controlled relays
0210-0213		Status externally monitored inputs (subscribe/acknowledge/unsubscribe)
0214,0215		IO device status request/reply
0216-0219		Relay function (subscribe/acknowledge/unsubscribe)
0220-0223		Digital input function (subscribe/acknowledge/unsubscribe)
0224		Set digital input function
0225		Reset digital input function
0240		User data download
0241-0244		User data (subscribe/acknowledge/unsubscribe)
0250-0253		Selector socket info (subscribe/acknowledge/unsubscribe)
0254		Selector control green lights
0255		Selector control red lights
0260		Tool tag ID request

<b>MID</b>	<b>Revisions</b>	<b>Command</b>
0300,0301		Histogram upload request/reply
0261-0264		Tool tag ID (subscribe/acknowledge/unsubscribe)
0400-0403		Automatic/Manual mode (subscribe/acknowledge/unsubscribe)
0410,0411		AutoDisable settings request/reply

# Chapter 6: ToolsNet

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## Introduction

This chapter describes the support for the ToolsNet Open Protocol in the Global 400. Implementation of the protocol is according to ToolsNet Open Protocol version 3.2.

The Global 400 reports System Type as 29 and System Name as “Global 400”.

## Configuration Options

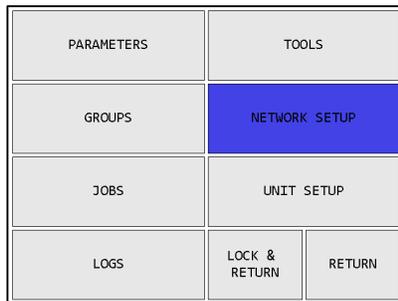


Figure 59: Main menu - Network Setup

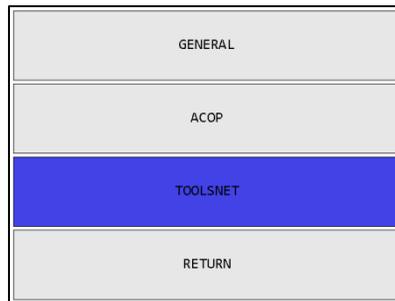


Figure 60: Network Setup Menu – ToolsNet

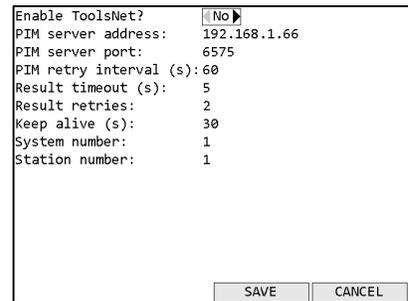


Figure 61: ToolsNet Settings

### *Enable ToolsNet?*

Default: no

This setting determines if the qualifier will attempt to establish a ToolsNet connection. Unlike the other network protocols supported by the qualifier, ToolsNet requires the controller to establish connections. Since the qualifier will repeatedly make network requests to attempt to establish a network connection to the ToolsNet server, you should only enable ToolsNet if you have a server set up in the network.

### *PIM server address*

Default: 192.168.1.66

This setting controls the IP address the qualifier will use to establish a ToolsNet connection.

### *PIM server port*

Default: 6575

Range: 0 to 65535

This setting controls the port the qualifier will use to establish a ToolsNet connection at the PIM server address.

### *PIM retry interval*

Default: 60 seconds

Range: 0 to 3600 seconds

This setting controls how long the qualifier will wait after a failed attempt to establish a ToolsNet connection before it tries again.

### *Result timeout*

Default: 5 seconds

Range: 0 to 60 seconds

This setting controls how long the qualifier will wait for a response from the ToolsNet server when sending a tightening or keep alive packet. If no response is received within the specified result timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ToolsNet connection is considered broken and will have to be re-established.

### *Result retries*

Default: 2

Range: 0 to 10

This setting controls how many times the qualifier will resend a tightening or keep alive packet to the ToolsNet server before considering the connection broken. If no response is received within the specified result timeout, the qualifier will try again, up to the specified number of retries. If no response is received after all retries, the ToolsNet connection is considered broken and will have to be re-established.

### *Keep alive*

Default: 30 seconds

Range: 0 to 3600 seconds

This setting controls how often the qualifier will send a keep alive packet to the ToolsNet server if no other packets are being sent. When set to 0, the qualifier does not send keep alive packets.

This value is recommended to be less than half the inactivity timeout of the server to ensure the connection is not closed due to a single missed keep alive packet. For example, if the server is configured to timeout after 30 seconds of inactivity, the keep alive setting on the unit should be less than 15 seconds.

### *System number*

Default: 1

Range: 0 to 9999

This setting controls the system number the qualifier reports to the ToolsNet server in identification and tightening packets.

### *Station number*

Default: 1

Range: 0 to 9999

This setting controls the station number the qualifier reports to the ToolsNet server in identification and tightening packets.

# Chapter 7: EtherNet/IP™

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This chapter describes the assembly object connection points and vendor-specific objects provided by the Global 400. Implementation was done against EtherNet/IP™ specification edition 1.16 (April 2014) and the associated CIP specification edition 3.16 (April 2014)

## Vendor-Specific Objects

The objects described in this section are vendor-specific objects created by C.E. Electronics (vendor ID: 1321) to manage the configuration of the Global 400 that does not map to existing open objects.

### Tool Object

#### **Class Code: 64 Hex**

The Tool Object represents a tool learned into a Global 400 device. A tool may be associated with one or more C.E. Parameter objects.

#### *Class Attributes*

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Revision	UINT	Revision of this object	1
2	Get	Max Instance	UINT	Maximum instance number of a tool object in the device.	The maximum number of tools as specified for the product.

#### *Instance Attributes*

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Set	Name	SHORT_STRING	Name of the tool displayed on screen	Maximum length is 25 characters
2	Get	Last Modified	DT	Last time the tool attributes were modified	
3	Get	Type	USINT	Type of tool	0 = none 1 = air 2 = click 3 = digital 7 = holding
4	Set	Last Calibration Date	DT	Date of last calibration reported by tool	
5	Set	Next Calibration Date	DT	Recommended date of next calibration	
6	Get	Torque Rating	UINT	Maximum capacity of a digital tool.	Specified in lbf * ft
7	Set	Serial Number	SHORT_STRING	Serial number of the tool	Maximum length is 14 characters.
8	Get	Cycle Count	UDINT	Total number of cycles performed by the tool.	
9	Set	Cycles between Preventative Maintenance	UDINT	Number of cycles permitted between preventative maintenance.	
10	Set	Last PM Cycle Count	UDINT	Cycle count at time of last preventative maintenance	
11	Get	Maintenance Reject Options	BYTE	Causes all results from a tool to be rejected when one or more of the specified maintenance operations are	Bit 0 – Calibration Bit 1 – Cycles

				required.	
12	Get	Required Maintenance	BYTE	Indicates what maintenance is currently required.	Bit 0 – Calibration Bit 1 – Cycles

### Services

Service Code	Available in		Service Name	Description of Service
	Class	Instance		
0x05	No	Yes	Reset	Resets the tool slot to factory defaults. (No actual action is taken with the tool. The tool is only forgotten by the qualifier.)
0x0E	Yes	Yes	Get Attribute Single	Returns the contents of the specified attribute
0x10	No	Yes	Set Attribute Single	Modifies a single attribute

## C.E. Parameter Object

### Class Code: 65 Hex

The C.E. Parameter Object refers to a parameter that describes the required operation for a batch of tightenings. This should not be confused with the Parameter Object (class code 10 hex) defined in the open portion of the Ethernet/IP™ protocol, which has a different use and is not implemented in this product line.

### Class Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Revision	UINT	Revision of this object	1
2	Get	Max Instance	UINT	Maximum instance number of a parameter set object in the device.	The maximum number of parameters as specified for the product.

### Instance Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Set	Name	SHORT_STRING	Name of the parameter displayed on screen and reported in results	Maximum length is 25 characters
2	Get	Last Modified	DT	Last time the parameter attributes were modified	
3	Set	Tool	UINT	Instance number of tool used for this parameter	
4	Set	Holding Tool	UINT	Instance number of holding tool used for this parameter	
5	Set	Batch	USINT	Batch size	
6	Get	Number of Batches	UINT	Number of batches run in this parameter	This value resets on powerup.
7	Set <sup>1</sup>	Timer Min	ITIME	Minimum hold time for a valid click.	Range T#0s000ms – 2s550ms
8	Set <sup>1</sup>	Timer Max	ITIME	Maximum hold time for a valid click	Range T#0s000ms – 2s550ms
9	Set <sup>1</sup>	Time Between Cycles	UDINT	Minimum amount of time required between results	Range T#0s000ms – 65s536ms
10	Set <sup>1</sup>	Time Between Batches	UDINT	Minimum amount of time required between the last result of a batch and the first result of the next batch	Range T#0s000ms – 65s536ms
11	Set <sup>2</sup>	Torque Unit	ENGUNIT	Unit of measurement for torques	
12	Set <sup>2</sup>	Torque Min	REAL	Minimum torque for a valid tightening.	
13	Set <sup>2</sup>	Torque Max	REAL	Maximum torque for a valid tightening.	
14	Set <sup>2</sup>	Torque Direction	USINT	Allowed torque direction for a valid tightening.	One of: 0 = positive 1 = negative 2 = both
15	Set <sup>2</sup>	Torque Mode	USINT	Mode used to measure torque.	One of: 0 = peak 1 = residual
16	Set <sup>2</sup>	Angle Min	UDINT	Minimum angle for a valid	Reserved for future use

				tightening.	
17	Set <sup>2</sup>	Angle Max	UDINT	Maximum angle for a valid tightening.	Reserved for future use
18	Set <sup>2</sup>	Head Length	REAL	Length of the head in mm.	
19	Set <sup>2</sup>	Autoclear time	USINT	Minimum amount of seconds a torque must be steady before it is reported.	Measured in 0.1s.

- 1 Only available for parameters using tools of type 2 (click wrench)
- 2 Only available for parameters using tools of type 3 (digital torque wrench)

### Services

Service Code	Available in		Service Name	Description of Service
	Class	Instance		
0x05	No	Yes	Reset	Resets the parameter to factory defaults.
0x0E	Yes	Yes	Get_Attribute_Single	Returns the contents of the specified attribute.
0x10	No	Yes	Set_Attribute_Single	Modifies a single attribute.

## C.E. Group Object

### Class Code: 66 Hex

The C.E. Group Object refers to a group of parameters that may be run simultaneously, but must all run to complete an operation. This should not be confused with the Group Object (class code 12 hex) defined in the open portion of the EtherNet/IP™ protocol, which has a different use and is not implemented in this product line.

### Class Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Revision	UINT	Revision of this object	1
2	Get	Max Instance	UINT	Maximum instance number of a parameter set object in the device.	The maximum number of groups as specified for the product.

### Instance Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Set	Name	SHORT_STRING	Name of the group.	Maximum length is 25 characters
2	Get	Last Modified	DT	Last time the group attributes were modified	
3	Get	Number of Parameters	USINT	Number of parameters in Parameters array	Maximum 16
4	Set	Parameters	ARRAY of STRUCT of:	Parameters in group.	
			UINT	Instance number of the parameter	
			USINT	Batch size	Temporarily overrides, but does not modify, batch size in parameter

### Services

Service Code	Available in		Service Name	Description of Service
	Class	Instance		
0x05	No	Yes	Reset	Resets the group to factory defaults.
0x0E	Yes	Yes	Get Attribute Single	Returns the contents of the specified attribute.
0x10	No	Yes	Set Attribute Single	Modifies a single attribute.

## Job Object

### Class Code: 67 Hex

The Job Object represents a set of one or more parameter sets that must be performed as a group. Depending on the device configuration, the parameter sets may or may not be required to run in sequence.

### Class Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Revision	UINT	Revision of this object	1
2	Get	Max Instance	UINT	Maximum instance number of a job object in the device.	The maximum number of jobs as specified for the product.

### Instance Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Set	Name	SHORT_STRING	Name of the tool displayed on screen	Maximum length is 25 characters
2	Get	Last Modified	DT	Last time the job attributes were modified	
3	Get	Number of Steps	USINT	Number of parameters in Parameters array	
4	Set	Steps	ARRAY of STRUCT of:	Structure list containing the parameters to run for the job	Maximum length is 30.
		Item number	UINT	Instance number of the item in the step	Parameter or group number.
		Item type	USINT	Item type	0 – Parameter 1 – Group
		Batch	USINT	Batch size	Temporarily overrides, but does not modify, batch size in parameter. Ignored for Group steps.

### Services

Service Code	Available in		Service Name	Description of Service
	Class	Instance		
0x05	No	Yes	Reset	Resets the job to factory defaults.
0x0E	Yes	Yes	Get_Attribute_Single	Returns the contents of the specified attribute
0x10	No	Yes	Set_Attribute_Single	Modifies a single attribute

## Controller Settings Object

### Class Code: 68 Hex

The Controller Settings Object represents the qualifier level settings for the Global 400.

### Class Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Revision	UINT	Revision of this object	1

### Instance Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Radio Address	UINT	The radio address of the device	
2	Set	Radio Channel	USINT	The radio channel on which the device is operating.	Range: 1-12 Changing this value will require all tools to be reassociated.
3	Set	Beeper Setting	BYTE	Controls when the unit will sound the beeper	Bit 0 – Beep on batch Bit 1 – Beep on reject Bit 2 – Beep on cycle
4	Set	Beeper Volume	USINT	Volume level of the beeper	Range: 0-10 0 disables the beeper
5	Set	Batch Timeout	ITIME	Duration to show the batch indicator on screen.	If 0, the indicator does not clear timeout. Cannot be negative
6	Set	Cycle Timeout	ITIME	Duration to show the cycle indicator on screen.	If 0, the indicator does not clear timeout. Cannot be negative
7	Set	Reject Timeout	ITIME	Duration to show the reject indicator on screen.	If 0, the indicator does not clear timeout. Cannot be negative
8	Set	NOKs	USINT	How the system handles NOK results or rejects.	0 – Ignore 1 – Display 2 – Report 3 – Count
9	Set	Time	DT	The current system time of the device.	
10	Set	Name	SHORT_STRING	The name of the device	Maximum length: 25

### Services

Service Code	Available in		Service Name	Description of Service
	Class	Instance		
0x0E	Yes	Yes	Get_Attribute_Single	Returns the contents of the specified attribute
0x10	No	Yes	Set_Attribute_Single	Modifies a single attribute

## VIN Object

### Class Code: 69 Hex

The VIN Object manages the current VIN and VIN-related settings.

### Class Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Get	Revision	UINT	Revision of this object	1

### Instance Attributes

ID	Access	Name	Data Type	Description of Attribute	Semantics of Value
1	Set	Require to start	BOOL	Indicates if a VIN is required to run an operation.	
2	Set	Clear on complete	BOOL	Indicates if the VIN is automatically cleared when an operation completes.	
3	Set	VIN	SHORT_STRING		Max Length: 100

### Services

Service Code	Available in		Service Name	Description of Service
	Class	Instance		
0x0E	Yes	Yes	Get_Attribute_Single	Returns the contents of the specified attribute
0x10	No	Yes	Set_Attribute_Single	Modifies a single attribute

## Assembly Object Connection Points

This section defines the assembly object connection points provided by the Global 400 product line. As per the EtherNet/IP™ specification for the Assembly Object, instance number and connection point are equivalent. This document will refer to them as connection point throughout.

### Output (O->T) Connection Points

The following connection points are used by the Global 400 to take input data from the network. These connection points allow you to control the running operation of the qualifier. Other setting parameters may be configured through the vendor-specific objects.

160

Name	Data Type	Description
Item Number	UINT	Instance number of item to run. Deactivate any running parameter, job, or group if 0.
Item Type	USINT	Type of item to run: 0 - Parameter 1 - Group 2 - Job Ignored if Item Number is 0.
Batch Reset	USINT	When this value changes, the batch counts of the currently running parameter or group is reset.
Suspend	BOOL	When set, suspends the unit without stopping a running parameter, group, or job.
VIN	SHORT_STRING	Max length 100

Total size: 6-106 bytes

161

Name	Data Type	Description
Item Number	UINT	Instance number of item to run. Deactivate any running parameter, job, or group if 0.
Item Type	USINT	Type of item to run: 0 - Parameter 1 - Group 2 - Job Ignored if Item Number is 0.
Batch Reset	USINT	When this value changes, the batch counts of the currently running parameter or group is reset.
Suspend	BOOL	When set, suspends the unit without stopping a running parameter, group, or job.
Reserved	USINT	Padding byte for devices requiring even connection point sizes.

Total size: 5-6 bytes

162

Name	Data Type	Description
Item Number	UINT	Instance number of item to run. Deactivate any running parameter, job, or group if 0.
Item Type	USINT	Type of item to run: 0 - Parameter 1 - Group

		2 – Job Ignored if Item Number is 0.
Batch Reset	USINT	When this value changes, the batch counts of the currently running parameter or group is reset.
Suspend	BOOL	When set, suspends the unit without stopping a running parameter, group, or job.
Batch	USINT	Sets the batch size for the selected parameter. If Item Type is not 0 (Parameter), this value is ignored. If this value is 0, the parameter size stored in the Global 400 will be used.
VIN	SHORT_STRING	Max length 100

Total size: 7-107 bytes

### 163

Name	Data Type	Description
Item Number	UINT	Instance number of item to run. Deactivate any running parameter, job, or group if 0.
Item Type	USINT	Type of item to run: 0 - Parameter 1 – Group 2 – Job Ignored if Item Number is 0.
Batch Reset	USINT	When this value changes, the batch counts of the currently running parameter or group is reset.
Suspend	BOOL	When set, suspends the unit without stopping a running parameter, group, or job.
Batch	USINT	Sets the batch size for the selected parameter. If Item Type is not 0 (Parameter), this value is ignored. If this value is 0, the parameter size stored in the Global 400 will be used.

Total size: 6 bytes

### 170

Name	Data Type	Description
Item Number	UINT	Instance number of item to run. Deactivate any running parameter, job, or group if 0.
Item Type	USINT	Type of item to run: 0 - Parameter 1 – Group 2 – Job Ignored if Item Number is 0.
Batch Reset	USINT	When this value changes, the batch counts of the currently running parameter or group is reset.
Suspend	BOOL	When set, suspends the unit without stopping a running parameter, group, or job.
VIN	USINT[100]	
Reserved	USINT	Padding byte for devices requiring even connection point sizes.

Total size: 106 bytes

Name	Data Type	Description
Item Number	UINT	Instance number of item to run. Deactivate any running parameter, job, or group if 0.
Item Type	USINT	Type of item to run: 0 - Parameter 1 - Group 2 - Job Ignored if Item Number is 0.
Batch Reset	USINT	When this value changes, the batch counts of the currently running parameter or group is reset.
Suspend	BOOL	When set, suspends the unit without stopping a running parameter, group, or job.
Batch	USINT	Sets the batch size for the selected parameter. If Item Type is not 0 (Parameter), this value is ignored. If this value is 0, the parameter size stored in the Global 400 will be used.
VIN	USINT[100]	

Total size: 106 bytes

### Input (T->O) Connection Points

This section defines the connection points are used by Global 400 to send output data to the network. The connection points are in the range 100-129 and are grouped by their content.

- 10x: Connection points provided for backwards compatibility with the Global 8. (Detailed in the *Input Connection Points for Backwards Compatibility* section later in this chapter)
- 11x: Last tightening data
- 12x: Current qualifier status
- 13x: Last tightening data with fixed length string fields

### Input Connection Points for Last Tightening Data

The connection points in this group will contain data about the last tightening. As such, they are not updated after a parameter, group, or job selection until a tightening occurs.

Name	Data Type	Description
Tightening ID	UDINT	ID number of the last tightening
Time	DT	Timestamp of the last tightening
Multi Sequence Number	UINT	Sequence number of the running multi-parameter operation.
Multi Number	UINT	Instance number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 - Group 2 - Job Ignored if Multi-Number is 0.
Parameter	UINT	Instance number of the parameter that produced the tightening
Parameter Name	SHORT_STRING	Name of the parameter. Max length 25
Parameter Timestamp	DT	Timestamp of the last change to the parameter
Tool Serial Number	SHORT_STRING	Serial number of the tool that produced the tightening. Max length 14

Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	USINT	Number of results performed in the current batch for the parameter.
Batch	USINT	Number of results required for a batch in the parameter.
Torque Unit	ENGUNIT	Unit used for torque fields
Torque	REAL	Torque of the tightening just performed.
Min Torque	REAL	Minimum torque required for a tightening in the parameter.
Max Torque	REAL	Maximum torque required for a tightening in the parameter.
Angle	UDINT	Angle of the tightening just performed.
Min Angle	UDINT	Minimum angle required for a tightening in the parameter.
Max Angle	UDINT	Maximum angle required for a tightening in the parameter.
VIN	SHORT_STRING	Max length 100

Total size: 55-194 bytes

### 111

Name	Data Type	Description
Tightening ID	UDINT	ID number of the last tightening
Time	DT	Timestamp of the last tightening
Multi Sequence Number	UINT	Sequence number of the running multi-parameter operation.
Multi Number	UINT	Instance number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 – Group 2 – Job Ignored if Multi-Number is 0.
Parameter	UINT	Number of the parameter that produced the tightening
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	USINT	Number of results performed in the current batch for the parameter.
Batch	USINT	Number of results required for a batch in the parameter.
Torque Unit	ENGUNIT	Unit used for torque fields
Torque	REAL	Torque of the tightening just performed.
Angle	UDINT	Angle of the tightening just performed.
VIN	SHORT_STRING	Max length 100
Reserved	USINT	Padding byte for devices requiring even connection point sizes and max VIN length.

Total size: 31-132 bytes

## 112

Name	Data Type	Description
Tightening ID	UDINT	ID number of the last tightening
Time	DT	Timestamp of the last tightening
Multi Sequence Number	UINT	Sequence number of the running multi-parameter operation.
Multi Number	UINT	Instance number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 – Group 2 – Job Ignored if Multi-Number is 0.
Parameter	UINT	Number of the parameter that produced the tightening
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	USINT	Number of results performed in the current batch for the parameter.
Batch	USINT	Number of results required for a batch in the parameter.

Total size: 20 bytes

## 113

Name	Data Type	Description
Tightening ID	UDINT	ID number of the last tightening
Time	DT	Timestamp of the last tightening
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Reserved	USINT	Padding byte for devices requiring even connection point sizes.

Total size: 11-12 bytes

## Input Connection Points for Current Qualifier Status

The connection points in this group provide a view of the current qualifier status and do not provide any information about tightenings.

## 120

Name	Data Type	Description
Parameters	ARRAY of STRUCT of:	Status of up to 16 parameters currently running.
- Parameter Number	UINT	Parameter number (0 means parameter not running.)
- Count	USINT	Number of results performed in the current batch for the parameter.
- Batch	USINT	Number of results required for a batch in the parameter.
Multi Number	UINT	Number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 – Group 2 – Job Ignored if Multi-Number is 0.
Suspend	BOOL	

Total size: 68 bytes

## 121

Name	Data Type	Description
Parameters	ARRAY of STRUCT of:	Status of up to 4 parameters currently running.

- Parameter Number	UINT	Parameter number (0 means parameter not running.)
- Count	USINT	Number of results performed in the current batch for the parameter.
- Batch	USINT	Number of results required for a batch in the parameter.
- Status	USINT	Status of parameter 0 – None 1 – Cycle 2 – Batch 3 – Reject 4 – Batch NOK (batch complete with a counted reject)
- Torque Unit	ENGUNIT	Unit of torque for the last tightening performed by the parameter.
- Torque	REAL	Torque of the last tightening performed by the parameter.
- Angle	UDINT	Angle of the last tightening performed by the parameter.
Multi Number	UINT	Number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 – Group 2 – Job Ignored if Multi-Number is 0.
Suspend	BOOL	Indicates if the qualifier is suspended.
Operation Status	USINT	0 – None/In Progress 1 – Complete When running an individual Parameter (Multi Number = 0), Complete will correspond to a batch completion. When running a Group (Multi Number non-zero, Multi Type = 1), Complete will happen when the last parameter in the group to completes its batch. When running a Job (Multi Number non-zero, Multi Type = 2), Complete will happen when the last step (parameter or group) in the job is completed.
Reserved		Padding byte for devices requiring even connection point sizes.

Total size: 65-66 bytes

## Input Connection Points for Last Tightening Data (fixed length)

The connection points in this group will contain data about the last tightening. As such, they are not updated after a parameter, group, or job selection until a tightening occurs. These points are similar to the points in the 11x range, except that the SHORT\_STRING fields are now fixed-length character arrays. Strings shorter than the field length are left-aligned in the field and null-padded.

130

Name	Data Type	Description
Tightening ID	UDINT	ID number of the last tightening
Time	DT	Timestamp of the last tightening
Multi Sequence Number	UINT	Sequence number of the running multi-parameter operation.
Multi Number	UINT	Instance number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 – Group 2 – Job Ignored if Multi-Number is 0.
Parameter	UINT	Instance number of the parameter that produced the tightening
Parameter Name	USINT[25]	Name of the parameter
Parameter Timestamp	DT	Timestamp of the last change to the parameter
Tool Serial Number	USINT[14]	Serial number of the tool that produced the tightening.
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	USINT	Number of results performed in the current batch for the parameter.
Batch	USINT	Number of results required for a batch in the parameter.
Torque Unit	ENGUNIT	Unit used for torque fields
Torque	REAL	Torque of the tightening just performed.
Min Torque	REAL	Minimum torque required for a tightening in the parameter.
Max Torque	REAL	Maximum torque required for a tightening in the parameter.
Angle	UDINT	Angle of the tightening just performed.
Min Angle	UDINT	Minimum angle required for a tightening in the parameter.
Max Angle	UDINT	Maximum angle required for a tightening in the parameter.
VIN	USINT[100]	
Reserved	USINT	Padding byte for devices requiring even connection point sizes.

Total size: 192 bytes

Name	Data Type	Description
Tightening ID	UDINT	ID number of the last tightening
Time	DT	Timestamp of the last tightening
Multi Sequence Number	UINT	Sequence number of the running multi-parameter operation.
Multi Number	UINT	Instance number of multi-parameter operation (job or group) currently running. Ignored if 0.
Multi Type	USINT	Type of multi-parameter operation currently running: 1 – Group 2 – Job Ignored if Multi-Number is 0.
Parameter	UINT	Number of the parameter that produced the tightening
Tightening Status	BOOL	Indicates if the last tightening was accepted as valid.
Count	USINT	Number of results performed in the current batch for the parameter.
Batch	USINT	Number of results required for a batch in the parameter.
Torque Unit	ENGUNIT	Unit used for torque fields
Torque	REAL	Torque of the tightening just performed.
Angle	UDINT	Angle of the tightening just performed.
VIN	USINT[100]	

Total size: 130 bytes

## Backwards Compatibility Assembly Object Connection Points

The Global 400 provides some connection points designed to match the connection points of the Global 8. These points are not recommended for new installations.

In the Global 8, the parameters were represented primarily as ‘A’ – ‘H’, but allowed 0 – 7 and ‘0’ – ‘7’. Since the Global 400 starts at parameter 1 and does not have a parameter 0, an offset will be applied to the parameter value in the compatibility points. A value of ‘A’, ‘0’, or 0 in these connections will select parameter 1, a value of ‘B’, ‘1’, or 1 will select parameter 2; and so on in the Global 400. For T->O compatibility connection points, ‘A’ will be output if parameter 1 is running, ‘B’ if parameter 2 is running and so on.

### Data Types

Most data types used correspond to the data types in the EtherNet/IP™ specification and IEC 1131-3. One additional data type is defined for backwards compatibility points:

Name	Size (bytes)	Description
CHAR	1	Character in the ASCII range. Used to indicate fields that should be interpreted as characters rather than numeric values, where USINT would be used instead. When used in an array, indicates a fixed-length string instead of the length prefixed strings defined by the specification.

Fixed-length arrays are represented as TYPE[n] where TYPE is the element type and n is the number of elements.

### Output (O->T) Connection Points

Connection points in the 15x range correspond to the masks used with the Global 8, which used only 150 as the output connection point. These connection points are provided for backwards

compatibility and are not recommended for new installations. New data configurations start at connection point 160.

## 150

This connection point corresponds to the default mask of the EIP network card for the Global 8.

Name	Data Type	Description
Parameter	USINT	Selects a parameter for the Global 400 to run. May be any value in the ranges 0-7, '0'-'7', 'A'-'H' (see above for details). Values outside these ranges will cause the current parameter to be stopped and leave no parameter running.
Batch Reset	USINT	When this value changes, the batch will be reset.
Suspend	BOOL	When true, suspends the Global 400.
Batch	USINT	The number of tightenings to run per batch for the selected parameter. Ignored if 0.
Time	CHAR[6]	ASCII digits of qualifier time in HHMMSS format. Ignored if Date field does not represent a valid date.
Date	CHAR[6]	ASCII digits of qualifier date in MMDDYY format. Ignored if Time field does not represent a valid time.
Min Torque	CHAR[6]	ASCII digits and decimal point ('.') representing the value. Not used by the Global 400.
Max Torque	CHAR[6]	ASCII digits and decimal point ('.') representing the value. Not used by the Global 400.
Min Angle	CHAR[5]	ASCII digits representing the value. Not used by the Global 400.
Max Angle	CHAR[5]	ASCII digits representing the value. Not used by the Global 400.
Units	CHAR	Character representing the units of the torque. Not used by the Global 400.
Reserved	USINT	

Total size: 40 bytes

## 151

This connection point corresponds to the mask 1 of the EIP network card for the Global 8.

Name	Data Type	Description
Parameter	USINT	Selects a parameter for the Global 400 to run. May be any value in the ranges 0-7, '0'-'7', 'A'-'H' (see above for details). Values outside these ranges will cause the current parameter to be stopped and leave no parameter running.
Batch Reset	USINT	When this value changes, the batch will be reset.
Suspend	BOOL	When true, suspends the Global 400.
Batch	USINT	The number of tightenings to run per batch for the selected parameter. Ignored if 0.

Total size: 4 bytes

### Input Connection Points for Backwards Compatibility

The connection points in this group correspond to the default masks provided in the EtherNet/IP<sup>TM</sup> network card for the Global 8 and are provided to make the Global 400 easier to drop into existing installations. These connection points are not recommended for new installations.

This connection point corresponds to the default mask of the EIP network card for the Global 8.

Name	Data Type	Description
Parameter	CHAR	'A'-'H'
Tool Type	CHAR[3]	Type of the tool for the current parameter. One of: "AIR" – Pneumatic air tools "BAT" – Battery operated tool "CLK" – Click wrench "DIG" – Digital torque wrench " " – No parameter running
Parameter Name	CHAR[8]	Name of the parameter
Tightening Status	CHAR	Status of the last tightening. One of: 'O' – Good tightening 'N' – Bad tightening or no tightening performed since the last parameter change
Tightening Type	CHAR	Type of the last tightening. One of: 'B' – Good tightening that finished a batch 'C' – Good tightening that did not finish a batch 'R' – Bad tightening 'N' – No tightening performed since the last parameter change
Count	USINT	The count of the last tightening.
Batch	USINT	The batch size of the last tightening
Rolling Count	UINT	Number of tightenings that have occurred.
Total	UINT	Number of batches completed in the parameter.
Time	CHAR[6]	ASCII digits of time of last tightening in HHMMSS format.
Date	CHAR[6]	ASCII digits of date of last tightening in MMDDYY format.
EE Time	CHAR[6]	ASCII digits of time of last EEPROM write in HHMMSS format.
EE Date	CHAR[6]	ASCII digits of date of last EEPROM write in MMDDYY format.
Torque	CHAR[6]	ASCII digits and decimal point ('.') representing the value. Not used by the Global 400.
Min Torque	CHAR[6]	ASCII digits and decimal point ('.') representing the value. Not used by the Global 400.
Max Torque	CHAR[6]	ASCII digits and decimal point ('.') representing the value. Not used by the Global 400.
Units	USINT	Character representing the units of the torque. Not used by the Global 400.
Angle	CHAR[5]	ASCII digits representing the value. Not used by the Global 400.
Min Angle	CHAR[5]	ASCII digits representing the value. Not used by the Global 400.
Max Angle	CHAR[5]	ASCII digits representing the value. Not used by the Global 400.
Tool Type 1	CHAR[3]	Type of tool in parameter 1. See Tool Type for values.
Tool Type 2	CHAR[3]	Type of tool in parameter 2. See Tool Type for values.
Tool Type 3	CHAR[3]	Type of tool in parameter 3. See Tool Type for values.
Tool Type 4	CHAR[3]	Type of tool in parameter 4. See Tool Type for values.
Tool Type 5	CHAR[3]	Type of tool in parameter 5. See Tool Type for values.
Tool Type 6	CHAR[3]	Type of tool in parameter 6. See Tool Type for values.
Tool Type 7	CHAR[3]	Type of tool in parameter 7. See Tool Type for values.
Tool Type 8	CHAR[3]	Type of tool in parameter 8. See Tool Type for values.

Total size: 102 bytes

## 101

This connection point corresponds to the mask 1 of the EIP network card for the Global 8.

Name	Data Type	Description
Parameter	CHAR	'A'-'H'
Tightening Status	CHAR	Status of the last tightening. One of: 'O' – Good tightening 'N' – Bad tightening or no tightening performed since the last parameter change.
Tightening Type	CHAR	Type of the last tightening. One of: 'B' – Good tightening that finished a batch 'C' – Good tightening that did not finish a batch 'R' – Bad tightening 'N' – No tightening performed since the last parameter change
Count	USINT	The count of the last tightening.
Batch	USINT	The batch size of the last tightening
Rolling Count	UINT	Number of tightenings that have occurred.
Total	UINT	Number of batches completed in the parameter.
Reserved	USINT	

Total size: 10 bytes

## 102

This connection point corresponds to the mask 2 of the EIP network card for the Global 8.

Name	Data Type	Description
Tightening status	CHAR	Status of the last tightening. One of: 'O' – Good tightening 'N' – Bad tightening or no tightening performed since the last parameter change.
Rolling Count	UINT	Number of tightenings that have occurred.
Reserved	USINT	

Total size: 4 bytes

# Chapter 8: Discrete I/O

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## Introduction

The Global 400 comes with a limited amount of discrete I/O that can be configured for various control and status reporting purposes. If more discrete I/O is needed than is provided internally, a GIM 400 module should be purchased. (Older units did not have internal discrete I/O, but may have been updated to the software version described in this manual and will still work with the GIM 400 expansion module.)

## Electrical Specifications

### Opto-Isolated Inputs

Item	Value			Unit
	min	typ	max	
Voltage	3.3	24	24	V DC
Current		20	60	mA
Impedance		1.5		K $\Omega$

### Relay Outputs

Item		Value	Unit
Dry contact	Voltage	24	V DC
	Current (each)	2	A
Wet contact	Voltage	24	V DC (fixed)
	Current (each)	2	A
	Current (total)	2	A (fused)

### Pinout

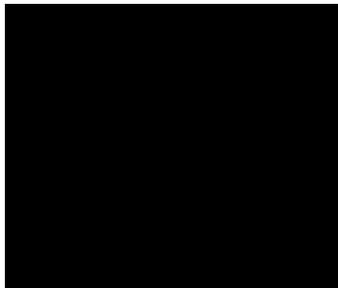


Figure 62: I/O Connector Pinout

Number	Type	Wire color	Function
1	Input	Red	Opto 1
2	Input	Green	Opto 2
3	Input	White	Opto 3
4	Power	Orange	+24 VDC
5	Power	Blue	Relay common
6	Power	Black	Opto common
7	Output	Yellow	Relay 1
8	Output	Brown	Relay 2
9	Output	Purple	Relay 3
10	Output	Grey	Relay 4

Because the opto inputs and relay outputs may be assigned to a variety of functions, this table can only show the location of the relays and optos.



While the connector is the same, the pinout of the discrete I/O in the Global 400 is not the same as the pinout of the discrete I/O in the Global 8. You will need to rewire the connections if changing from a Global 8 to a Global 400.

### Common Points

All inputs share a single common, which is tied to the Global 400 ground.

All relays share a common point. By default, the relays are configured in a dry contact configuration. To convert the unit to wet contacts, connect +24 VDC (pin 4) to Relay common (pin 5) on the I/O connector. This makes all outputs wet contacts; the unit does not support configurations with some wet and some dry contacts.

### **Assigning I/O Functions**

The inputs and outputs must be configured before use. By default, the Global 400 does not ship with any relay configuration. To configure the inputs and outputs, you will need to use the Global Manager PC software application. See the GIM 400 User Manual for the full list of available input and output options.

# Chapter 9: Data Management

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The Global 400 can download configuration data, results and event logs to and upload configuration data and firmware from a USB drive. When a USB drive is plugged into the unit, it will switch from whatever screen it is on to the USB Menu.

## Download data to USB

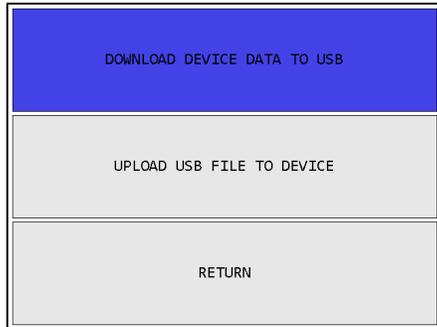


Figure 63: USB Menu - Download

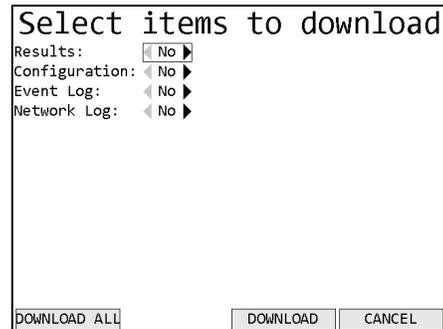


Figure 64: USB Download screen

### Soft keys

1. DOWNLOAD ALL – Downloads all files to the USB drive.
2. No function
3. DOWNLOAD – Downloads the selected files to the USB drive.
4. CANCEL [ESC] – Returns to the USB Menu screen.

### Available Files

#### Results

The results file will be saved to the USB drive as “#####res.csv” where the ##### is the last four digits of the unit serial number. This file contains all tightening results saved in the unit’s memory in a CSV format.

#### Configuration

The configuration file will be saved to the USB drive as “#####conf.g4d” where the ##### is the last four digits of the unit serial number. This file contains all the configuration settings for the unit, including tools, parameters, groups, jobs, qualifier and network settings, and I/O settings. This file can be loaded into the PC application for viewing or editing.

#### Event Log

The event log file will be saved to the USB drive as “#####evt.csv” where the ##### is the last four digits of the unit serial number. This file contains all non-tightening events saved in the unit’s memory in a CSV format.

#### Network Log

The network log file will be saved to the USB drive as “#####net.g4n” where the ##### is the last four digits of the unit serial number. This file contains the network log data in a binary format.

## Upload USB file to device

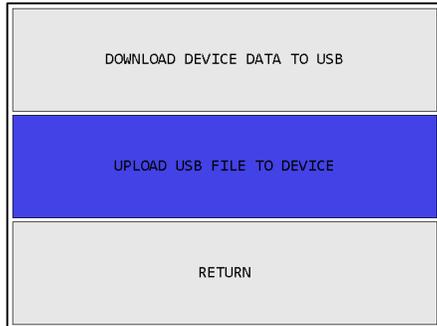


Figure 65: USB Menu - Upload

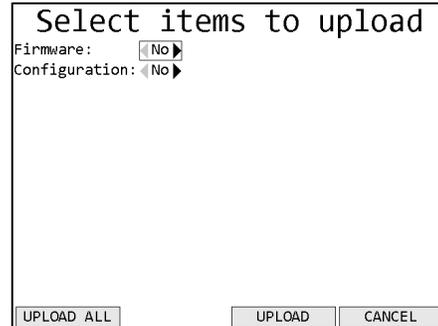


Figure 66: USB Upload screen

When entering the USB Upload screen, the unit will look in the root folder to find any available files to upload. Make sure you have no more than one file of a given type on the USB drive, as the unit does not provide a way to select between multiple files of a given type.

### *Soft keys*

1. **UPLOAD ALL** – Uploads all files from the USB drive.
2. No function
3. **UPLOAD** – Uploads the selected files from the USB drive.
4. **CANCEL [ESC]** – Returns to the USB Menu screen.

### Available Files

#### *Firmware*

Firmware files have the extension “.bec”. If a file is found, the unit will validate the file before uploading it. If a firmware file is uploaded, the unit will reprogram itself with the new firmware and reboot.

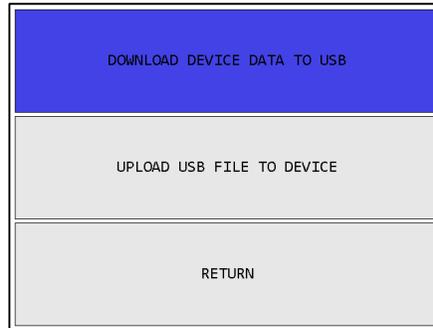
#### *Configuration*

Configuration files have the extension “.g4d”. If a file is found, the unit must validate the file before uploading it. These files can be created by downloading from a qualifier or by saving a configuration file from the PC application. This file contains all the configuration settings for the unit, including tools, parameters, groups, jobs, and qualifier and network settings. When uploading the configuration, all existing settings will be overwritten with the new values. New tools referenced in the configuration file will need to be associated with the qualifier, as if learning them to the unit.

# Chapter 10: Firmware Updates

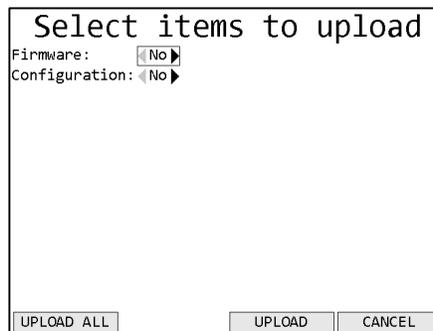
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1. If the firmware update file was emailed to you, put it on a USB drive, in the root folder of the drive. If you received the firmware update already on a USB drive, proceed to step 2.
2. Turn on power to the unit and let it go through the startup process.
3. Insert the USB drive into the connector on the unit.
4. Wait for the unit to detect the USB drive. (This may take several seconds.) When the drive is detected, you should see the USB menu.



If the unit does not detect the drive, contact support. If the update was emailed to you, you may also try another USB drive.

5. To upload the update to the unit, press the down arrow followed by ENT to go to the USB Upload screen.



6. When the unit changes to the upload screen, it will search the root folder of the drive for the firmware update. If no valid update file is found, the screen will show an error. Otherwise, press the right arrow to select the firmware update and then **UPLOAD** to start the upload.
7. When the upload is complete, the unit will restart. At this point, you may remove the USB drive.

# Chapter 11: Product Specifications

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## Dimensions

	English		Metric	
	Value	Unit	Value	Unit
Height	14.625	in	37.1	cm
Width	9.5	in	24.1	cm
Depth	4.25	in	10.8	cm

## Radio Information

Item	Value
Indoor/Urban range	300 ft. / 100 m
Outdoor line-of-sight range	1 mile / 1500 m
Transmit power	60 mW (18 dBm) conducted 100 mW (20 dBm) EIRP
Receiver sensitivity	-100 dBm (1% packet error)
FCC Part 15.247	OUR-XBEEPRO
Industry Canada	4214A XBEEPRO
Europe(CE)	ETSI

## FCC Statement

### **Contains FCC ID: OUR-XBEE/OUR-XBEEPRO**

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

## Channel Frequencies

Channel	Frequency (GHz)
1	2.410
2	2.415
3	2.420
4	2.425
5	2.430
6	2.435
7	2.440
8	2.445
9	2.450
10	2.455
11	2.460
12	2.465