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Quick Start Guide:

1. Turn on the Assembly Qualifier
2. Turn the key-switch to “PROG”
3. While pressing the “MODE” button, press the “SET” button. The Assembly Qualifier will display “CLBR” followed by “TOOL” when the buttons are released. Press the “SET” button, and “00” will appear on the display.

4. Run the tool forward in the air to insure that the first two digits on the display change. Then, run several fasteners into place allowing the clutch to shut the tool off each time. Press the SET button.

5. The display will now show “TH10” (10% is the default threshold value). This value is a percentage of the calibrated current measured in the previous step. To change the value, press the “SET” button momentarily and the one’s column will begin to flash. Use the “DOWN” and “UP” buttons to adjust the value. Pressing the “SET” button again will select the ten’s column. Press the “SET” button to accept the threshold value. To accept the default value of 10% press the “MODE” button.

6. The next two screens are the Assembly Qualifier’s timers:

The first timer to appear is the TX-timer. The display will read “TX10” (10x10ms is the default). This value is the minimum amount of time the tool must rundown the fastener. To accept the default value of “10” (100ms) press the “MODE” button. Follow the procedure outlined in step 5 to change the value.

The second timer, timer TY, appears after adjusting timer TX. “TY05” (05x10ms is the default) appears on the display. This value is the minimum amount of time the operator must hold the trigger after the tool shuts off. To accept the default value of “05” (50ms) press the “MODE” button. Follow the procedure outlined in step 5 in order to change the value.

7. The Assembly Qualifier will then display “Y N” with one of the letters blinking (the blinking character is the current selection). This value sets the users ability to view “Y” or not view “N” the total number of completed assemblies while the key-switch is in the “LOCK” position. Use the “UP” and “DOWN” buttons to select “Y” or “N”, press the “SET” button to accept the desired setting. At this point a review of the settings will be displayed.

8. Now that the tool is set up, select how many fasteners are in the assembly and a desired counting direction. Press the “MODE” button once and the Assembly Qualifier will display “S^V04”. The “04” or whatever number is displayed is the current number of fasteners in the assembly. This value may be adjusted by pressing the “SET” button until the characters flash four times. After adjusting the count value, the arrow will begin to flash. To select a direction, press the “UP” and “DOWN” buttons. Press the “SET” button to accept the desired count direction.

9. Turn the key to the “LOCK” position and press the “MODE” button to scroll through the possible operator views. The possible views are count up/down and the total mode if “Y” was chosen during step 7.

10. The Assembly Qualifier is now ready to run the tool with the application. If any settings need to be revised, repeat steps 1, 2, and 3. Adjust settings as desired. Settings may be skipped by pressing the MODE button.

Version E Qualifier Overview:

The Version E Qualifier is a powerful tool that is intended to be used with electric tools containing a mechanical shut-off clutch. When calibrated properly, a Qualifier has the ability to distinguish the difference between a fastener being correctly tightened to torque, an already tightened fastener being re-tightened and a fastener not being completely tightened.

The Front Panel:

A key-switch is provided in the front panel so that the unit may be locked. When a Qualifier is locked calibration information may not be altered from the front panel of the unit.

The face of the Qualifier has a four digit alpha-numeric display that provides feedback to the tool operator. LEDs on either side of the display inform the user about the present mode and the status of the last run.

Buttons on the face of the Qualifier are used to accept input during set-up and calibration. The button functions include:

- **MODE** – Used to change modes or move through the programming menu.
- **SET** – Allows user to enter calibration modes or alter data.
- **UP** – Adjusts tunable features.
- **DOWN** – Adjusts tunable features.

A Peizo buzzer provides audible feed back when a process is completed incorrectly. A double beep may also be provided to indicate batch completion.

Single Accept, Batch Accept, and Reject:

While the unit is in operation three different signals provide feedback on the status of the fasteners.

- **SINGLE ACCEPT** – Every time an individual fastener is completed successfully, the single accept signal is generated. This signal causes three things to happen: the batch count is incremented or decremented, the single accept relay fires, and the single accept NPN is turned on.
- **BATCH ACCEPT** – When the final fastener in an assembly is completed the single accept and the batch accept signals are generated. When this happens the batch count resets, the total is incremented, the batch accept relay fires and the batch accept NPN is turned on. (All of the SINGLE ACCEPT events occur as well.)
- **REJECT** – Every time a fastener is not completely tightened or is re-tightened, the reject signal is generated. The peizo buzzer will beep, the reject relay will fire and the reject NPN will be turned ON when this event occurs.

Parameter Sets:

Qualifiers that come with a parameter switch or 19-pin connector have the ability to access four different parameter sets. These parameter sets allow the user to compensate for differences between assemblies. Joint hardness, fastener length, fastener count and user preferences can be accommodated for on a parameter by parameter basis.

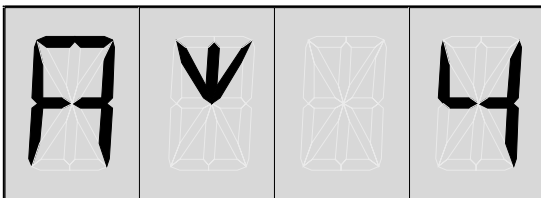
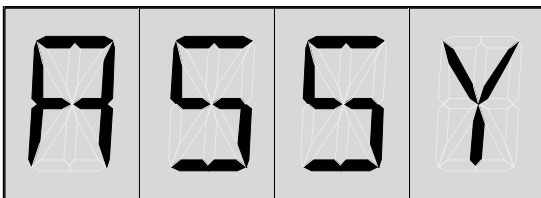
RS-232 Communications:

Every Qualifier comes with a 9-pin serial port built into the side of the unit. Torque Analyzer software is available and provides an automatic means of calibrating Qualifiers.

Assembly Mode:

When the unit first powers up, it enters assembly mode. If the unit is “locked”, the assembly function is the only mode the user is allowed to access. When the unit is unlocked, the mode button allows the user to page through different features including the assembly mode.

When entering the assembly mode, **ASSY** is displayed while the mode button is depressed. When the mode button is released the user will see an **A** (signifying the parameter being used), and up or down **arrow** (informing the user which direction the unit is counting), and a two digit number. Units featuring the parameter selection switch will display an **A, B, C,** or **D** depending upon which parameter has been selected by the switch.



If the unit is counting upward, every successful cycle will increment the counter on the display by one. Once the preset number of screws in the assembly is reached, the count is reset to zero. If the unit is counting down, the preset will appear as the two-digit number. Every successful cycle will decrement the count by one. Once zero is reached the unit will reset the display to the preset. Every screw that is successfully completed lights the **ACCEPT** LED and fires the **CYCLE ACCEPT** relay.

Upon completion of an assembly cycle, a double beep will occur (this is dip-switch selectable) and the **BATCH ACCEPT** relay will fire.

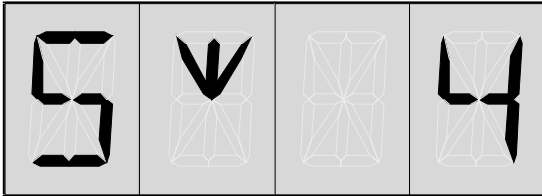
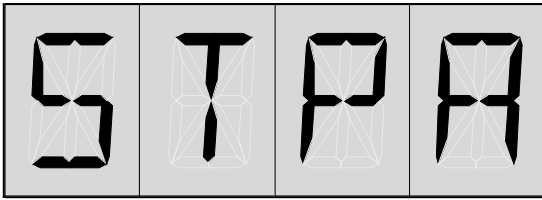
The operation of the relays is dip-switch selectable. The relays may either be normally open or normally closed based on a dip switch setting. Relays may also be latching or momentary based upon a dip-switch setting.

The counter ignores double hits on the same screw. If the tool does not complete a cycle by tightening a screw, or performs a double hit, the **REJECT** LED is lit and the sonalert lets out one beep. When the **REJECT** LED comes on, the **REJECT** relay fires. The **REJECT** relay may also be made to be normally open or normally closed and may be latching or momentary in operation.

The user may press the **SET** button to clear the present count. Once the user presses the **SET** button, the display will begin to flash. If the button is held long enough (approximately three seconds) the count will be reset to zero if the unit is counting up or the preset if the unit is counting down.

Setpoint Mode:

If the unit is unlocked, the **MODE** button will allow the user to access the setpoint mode. Upon entering the setpoint mode, the display will read **STPA** (if parameter A is in use) until the mode button is released. Units that feature the parameter selection switch will have varying messages when entering this mode. **STPA, STPB, STPC,** or **STPD** may be displayed in order to alert the user which parameter’s setpoint is being viewed. Once the mode button is released, the display will read **S** (signifying setpoint mode), an up or down **arrow** (informing the user which direction the unit is counting), and a two digit number.



The two digit number is the preset number of screws in an assembly. This preset and the direction the unit counts is programmable in this state. If one or more of these parameters needs changed, the user may press the SET button. The entire display will begin flashing. If the SET button is held long enough, the display will stop flashing and only first digit of the preset will continue to flash. Using the UP or DOWN button the user can change the digits value. Once the desired value is reached, pressing the SET button will accept that digit and the second digit in the preset will begin flashing. The second digit can be adjusted in the same manner as the first.

After adjusting the MSD and pressing the SET button, the direction arrow will begin flashing. Pressing the UP key will display an up arrow. Pressing the DOWN key will cause the unit to display a down arrow. Pressing the SET button will store the new value in memory.

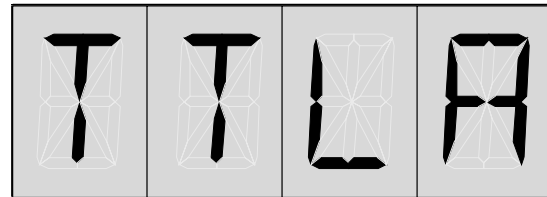
At any point during the previously described process, the user may press the MODE button. Pressing the MODE button will allow the user to exit without saving a new preset.

If the unit contains a selector switch, changing the setpoint only effects the

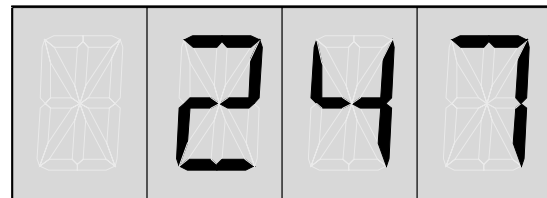
current parameter setting. Therefore, the user may create up to four different count scenarios.

Total Mode:

Pressing the MODE button in setpoint mode will send the user to total mode. While the MODE button is still depressed TTLA will be displayed (if parameter A is selected). If the unit contains a parameter selection switch the message could vary as follows: **TTLA, TTLB, TTLC or TTLD** depending on the position of the switch.



After the MODE button is released, the display will show a number that represents the total number of units completed. For example, if the preset were four, it would take four screws to increment the total by one. Units that have a selector switch can keep track of four separate totals. Changing the selector switch at this point will allow the user to view all four of the totals.



When the total is incremented, a short double beep occurs. The user may choose to turn off this double beep function by changing a dip-switch setting.

The total may be reset to zero by pressing the SET button. The display will flash for approximately three seconds while the user holds the SET button. At the end of the

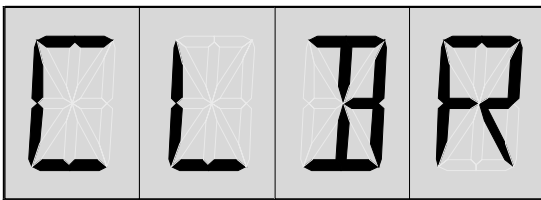
three seconds, if the SET button is still held the total will then be reset to zero. Only the total being viewed will be cleared on units that have a parameter selector switch. Other totals will remain intact unless cleared in a similar fashion.

Any time the total changes, the value is stored in the units memory. Therefore, powering the unit down does not cause the unit to 'forget' the total.

CALIBRATION MODES:

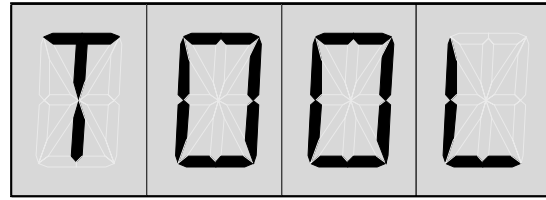
The calibration modes are not intended to be accessed on a day to day basis. But an occasion may arise that the end user would need to have access to these modes. If a different tool is used or if the counter would stop counting properly, the calibration modes could help diagnose and correct problems.

To enter the calibration mode, the unit must be unlocked and in assembly mode if the user wishes to enter calibration mode. If the MODE button is pressed and held followed by the SET button being pressed, the display will show "CLBR" followed by "TOOL" when the buttons are released.

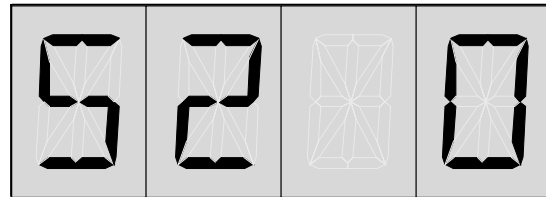


Tool Calibration Mode:

The first stage in the calibration mode is the tool calibration. While "TOOL" is displayed, pressing the SET button will cause the unit to display live current readings. The current is displayed as a percentage of the full scale reading.



The first two digits on the display represent the current when the tool is running forward. The second two digits on the display represents current flowing while the tool is running in reverse.



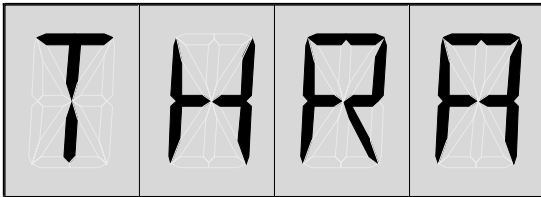
This mode may be used to diagnose if the tool and circuit are working properly. If, while running the tool forward, the user does not see the first two digits rise and fall, the user should investigate the problem. Similarly, while running in reverse, the second two digits should be active. A faulty current transducer, a poor connection, or a faulty tool could cause this to happen.

The unit monitors current usage from the tool in this mode. To calibrate the unit, run several fasteners into place. Press the SET button to complete this calibration procedure.

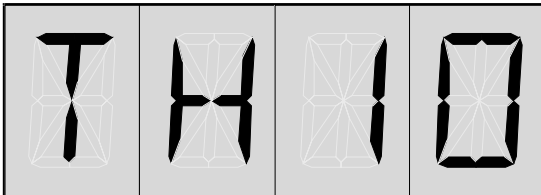
On units featuring a parameter selector switch, different calibrations can be created for each switch setting. This allows the user to set up one unit for use with multiple assemblies.

Threshold Percentage:

Once the user exits the tool calibration mode, the unit enters the threshold percentage mode. Upon entering this mode the unit will display "THRA" until the MODE button is released. Units featuring the parameter selection switch will have varying messages based upon the setting of the switch. THRA, THRB, THRC, and THRD are all messages that may occur in this mode.



After the MODE button is released, the unit will display TH and a two digit number. The two-digit number represents the percentage of the calibration current that will be subtracted from both the forward and reverse current channel's maximum in order to create calibration windows.



For example, if the forward current during calibration was 60, the reverse current went to 70, and the threshold was set to 10 percent, the forward calibration level would be set at 54 and the reverse calibration level would be set at 63.

This percentage is adjustable from 2 to 69 percent.

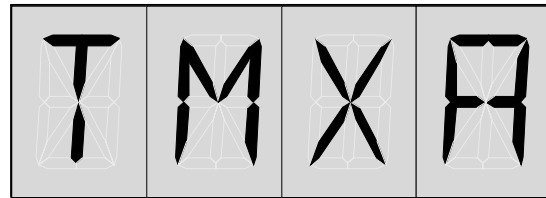
Pressing the SET button will allow the user to adjust this value. Both digits of the threshold may be adjusted using the UP and

DOWN buttons. If the user presses the SET button after adjusting this value, the new value will be stored. If the user presses the MODE button, the new value is ignored and the user is allowed to exit gracefully.

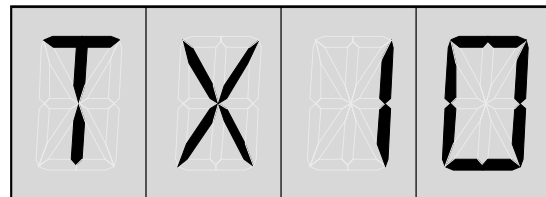
The new threshold only effects the current parameter setting.

Timer X Setpoint:

After leaving the threshold mode, the display will read TMXA until the MODE button is released (the display may read TMXA, TMXB, TMXC, or TMXD based on the parameter switch setting).



When the mode button is released, TX will be displayed along with a two digit number. The two digit number represents the amount of time the tool must run forward before the clutch shuts the tool off, for a legitimate count.



This number is adjustable from 00 to 99 (or 0.00 seconds to 0.99 seconds).

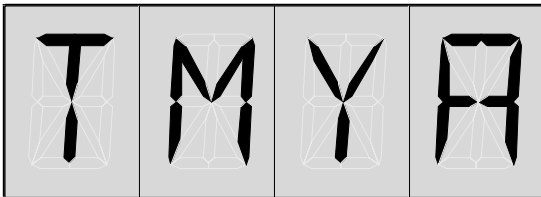
If TX is made to be zero or too small, the counter may be fooled by double hits on a fastener that has already been tightened.

If TX is made to be too large, short screws may be ignored as double hits.

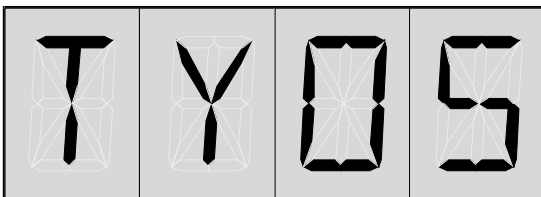
Pressing the MODE button will allow the user to exit this mode. Pressing the SET button will allow the user to adjust this value. If the unit contains a parameter switch, the switch setting will determine the parameter set for which TX is being adjusted.

Timer Y Setpoint:

Upon entering the timer Y set up mode, the display will read TMYA (if the parameter switch is in the A position or the unit does not have a parameter switch).



Once the MODE button is released, TY, and a two digit number will be displayed. The two digit number represents the amount of time within which an inductive kick must appear on the reverse channel after the tool has shut of in order for a legitimate count to occur.



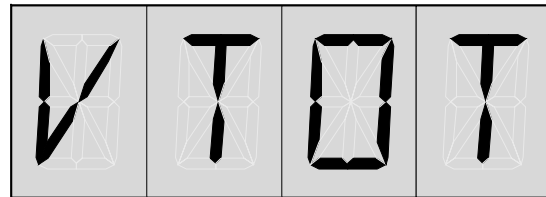
This number is adjustable from 0.00 to 0.99 seconds. If TY is made to be zero or too small, the counter may miss the inductive kick and ignore properly fastened screws. If TY is made to be too large, the counter may be fooled by the tool running in reverse after running forward.

Pressing the MODE button will allow the user to exit this mode. Pressing the SET button will allow the user to adjust this

value. Adjusting TY only effects the currently selected parameter.

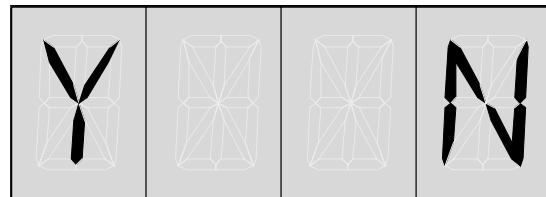
View Total:

The view total mode has two options, yes or no. If the user chooses yes, the unit will be allowed to toggle between assembly and total mode when locked. If the user chooses no, only the assembly mode will be visible when the unit is locked.



VTOT will be on the display until the display until the user releases the MODE button. Then “Y N” will be on the display.

To switch between yes and no states, the user must press the UP and DOWN buttons. Once the unit is in the desired state, pressing SET will save the VTOT information.



Once again, the VTOT state only applies to the current parameter setting on units that contain a parameter selection switch.

Counting Function:

The counting function is independent of the current mode. This means that the user may perform adjustments and calibrations ‘on the fly’ without losing track of which assembly or screw has been completed. Pressing the ‘SUSPEND’ button will cause the unit to ignore counting during rework or calibrations.

Electric Tools:

Electric tools have two different analog current phases during the tightening of a typical fastener. The run-down phase in FIG 1 shows the forward current phase lasting approximately 0.4 seconds. When the tool's clutch engages, and inductive spike (indicated by the dotted line in FIG 1) occurs.

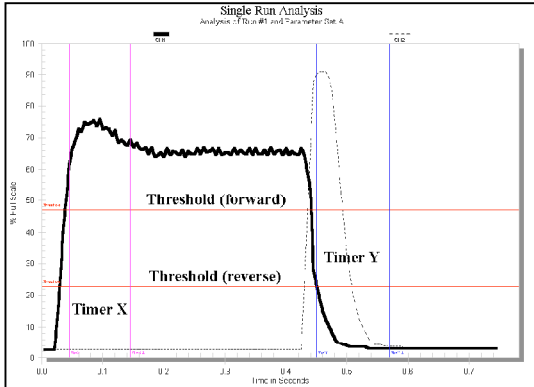


FIG 1

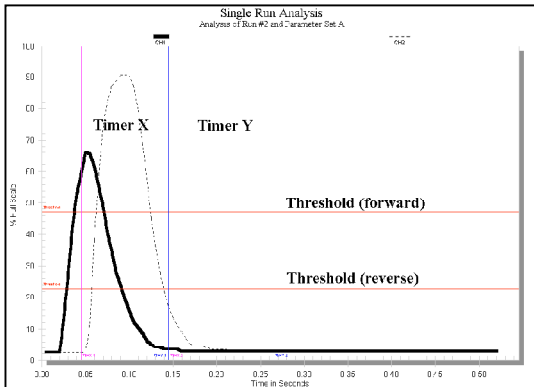


FIG 2

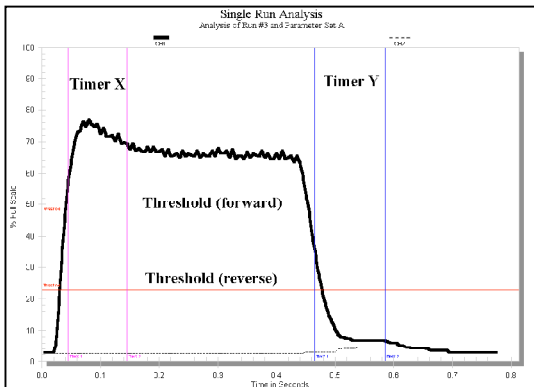


FIG 3

Approved Tightening:

FIG 1 demonstrates a tightening cycle that would be accepted by a Qualifier. The forward current level rises above the forward threshold and remains above it for a time greater than Timer X. When the clutch shuts off the forward current drops off rapidly and current can be witnessed on the reverse channel. This inductive spike rises above the reverse threshold within the constraints of Timer Y.

Not Approved Tightening:

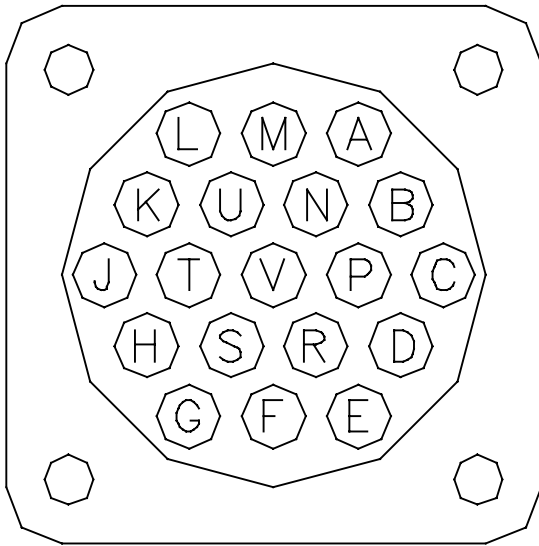
(Double Hit or Cross Thread)

Attempting to re-tighten a fastener that has already been tightened with an electric tool creates a current signature similar to the one in FIG 2. The forward current rises very rapidly and then disappears very quickly when the clutch shuts the tool off. Since the clutch turns the tool off almost instantly, the forward current is present only briefly and violates Timer X.

Not Approved Tightening:

(Incomplete Cycle)

The current curve shown in FIG 3 displays a typical incomplete cycle. In this case, the forward current lasts long enough to satisfy Timer X. However, the tool's clutch never engages and therefore the reverse current spike never occurs. Timer Y is violated and this fastener would be rejected.

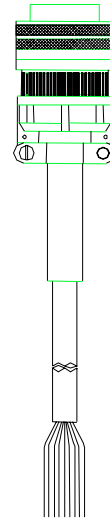
**Standard 19 Pin Connector I/O:**

| PIN | FUNCTION |
|-----|---------------------------|
| A | Reserved For Factory Use |
| B | Reserved For Factory Use |
| C | Reserved For Factory Use |
| D | Remote Extra |
| E | Remote Total Reset |
| F | Remote Batch Reset |
| G | Remote Suspend |
| H | Remote Parameter Select B |
| J | Remote Parameter Select C |
| K | Remote Parameter Select D |
| L | Cycle Accept (Relay) |
| M | Batch Accept (Relay) |
| N | Reject (Relay) |
| P | +24VDC (1 amp) |
| R | GND (24VDC Return) |
| S | Cycle Accept (NPN) |
| T | Batch Accept (NPN) |
| U | Reject (NPN) |
| V | Suspend (NPN) |

(Relay) - All relay signals provide +24VDC on their output pin by default.

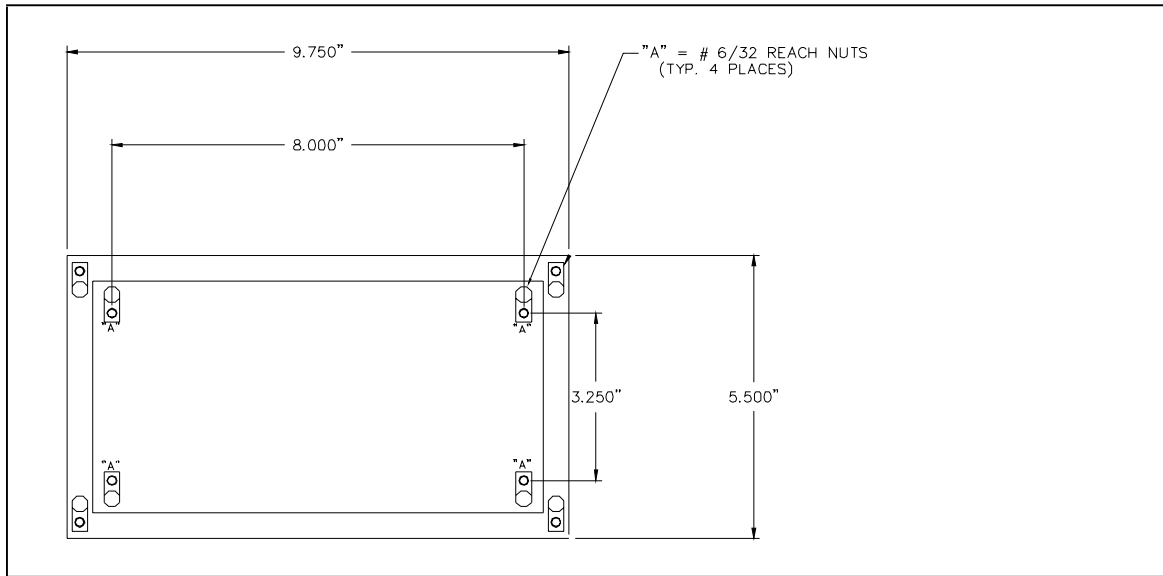
(NPN) - All NPN outputs conduct to GND.

All other signals are 24VDC inputs.

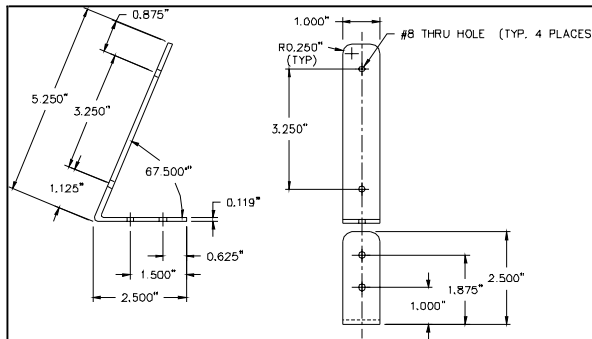
**OPTIONAL Cable Assembly Color Code:**

| Wire Color | Function |
|--------------|---------------------------|
| Black | Reserved For Factory Use |
| White | Reserved For Factory Use |
| Red | Reserved For Factory Use |
| Green | Remote Extra |
| Orange | Remote Total Reset |
| Blue | Remote Batch Reset |
| White/Black | Remote Suspend |
| Red/Black | Remote Parameter Select B |
| Green/Black | Remote Parameter Select C |
| Orange/Black | Remote Parameter Select D |
| Blue/Black | Cycle Accept (Relay) |
| Black/White | Batch Accept (Relay) |
| Red/White | Reject (Relay) |
| Green/White | +24VDC (1 amp) |
| Blue/White | GND (24VDC Return) |
| Black/Red | Cycle Accept (NPN) |
| White/Red | Batch Accept (NPN) |
| Orange/Red | Reject (NPN) |
| Blue/Red | Suspend (NPN) |

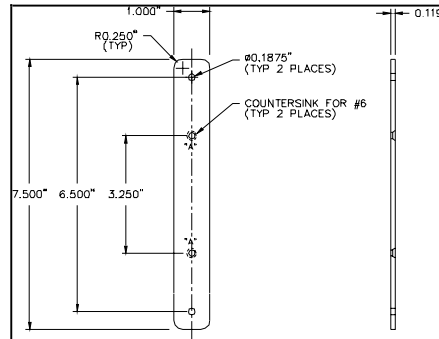
Mounting Diagram:



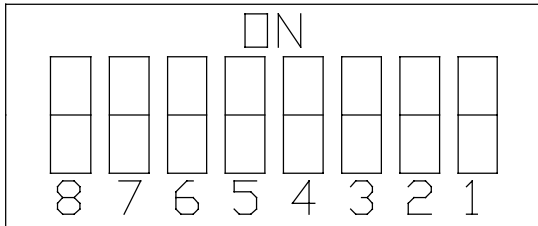
Optional Mounting Brackets: 'L' Brackets



'Straight' Brackets

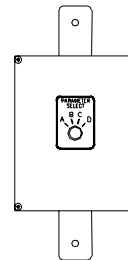
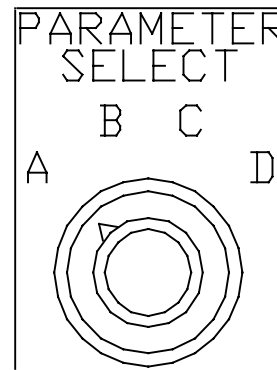


Optional Mounting Brackets:



Dip Switch Functions:

1. Relays - Normally Open - off
Normally Closed - on
2. Relays - Momentary - off
Latching - on
3. Double Beep Enabled - off
Disabled - on
4. Send Analog Data SHOULD BE OFF
FOR NORMAL OPERATION
5. Over-ride suspend - on
Suspend in use - off
6. Reserved for Factory Use
7. Reserved for Factory Use
8. Reserved for Factory Use



Parameter Selection Switch:

Units that feature the parameter selection switch have the ability to hold different values for each parameter setting. Parameters may be accessed by changing the setting on the parameter selection switch on the side of the qualifier, or by using a parameter selection box connected to the 19-pin connector.

Parameters may be used to help compensate for variances between assemblies such as joint hardness, fastener count, and user preference.

The values that change with the parameter setting are:

- Count Setpoint
- Count Direction
- Total
- Calibration Pressures
- Threshold Percentage
- Timer X
- Timer Y
- View Total Function

Frequently Asked Questions:

Q. My qualifier face reads ^EE^ when I power up. What is the problem?

A. The EEPROM in the unit has corrupt data in it. Try to cycle the power off and on again. This may take care of the problem. Hold the MODE button down and then press SET if cycling the power does not work. This will write a new set of data to the EEPROM. You will need to re-calibrate the unit with the tool that is being used. If this problem persists, consult the factory.

Q. Can I hook my Qualifier up to a PLC?

A. Yes, if you have a 19-pin connector on the side of your Qualifier the Relay outputs are ideal for connecting to a PLC. You may need to change the relay dip-switch setting to latching.

Q. The relay outputs only come on momentarily, can I change this?

A. Yes, there is a dip-switch that controls whether or not the relays latch. Refer to the dip-switch settings earlier in the manual.

Q. How do I use the 19 pin connector to switch parameters?

A. Be sure you ground is common with pin R on the 19 pin connector. Then, supply +24VDC to pin H, J or K in order to switch to parameter set B, C or D.

Q. How long are the relays on if my dip-switch is set to momentary?

A. 100ms.

Q. What is the maximum timer setting for Timer X and Timer Y?

A. 990ms.

Q. How much current does the Qualifier draw?

A. The Qualifier draws a maximum of two amperes at start up. Steady-state current usage is much less than that.

Q. Can I purchase a Qualifier that sources something other than 24VDC on the relays?

A. Yes, the Qualifier can very easily be changed to have dry contacts or to source AC. Consult the factory.

Q. What do the NPN outputs do?

A. The NPN outputs are always latching. They are turned on at the same time as the relays but would be used in a different manner. The NPN outputs are really just the collector of an NPN transistor with the emitter tied to ground. These outputs can sink ¼ ampere. The NPN outputs can be used to turn on DC lights or if you use a pull-up resistor the NPNs can send signals to a PLC.

Q. Can I simultaneously run more than one tool on a single Qualifier?

A. No. But units containing multiples can be manufactured on request.

Q. What is the largest number I can program as my BATCH count?

A. 99

Q. How high does the TOTAL count?

A. 9999

Q. What is the 9-pin port on the side of the Qualifier used for?

A. The 9-pin port is a serial port that can connect a Qualifier to a PC. Windows software is available to aid in the Qualifier calibration process.

