

Quadra-Chek® 10

User's Guide



Quadra-Chek® 10

User's Guide

Metronics, Inc.
Bedford, New Hampshire, USA



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Safety and Maintenance Considerations

General safety precautions must be followed when operating the system. Failure to observe these precautions could result in damage to the equipment, or injury to personnel. It is understood that safety rules within individual companies vary. If a conflict exists between the material contained in this guide and the rules of a company using this system, the more stringent rules should take precedence.

Although Metronics strongly recommends that you read all parts of this guide, it is essential for reliable and safe operation to read the first portions up to and including Chapter 2: Operation, prior to operating the QC10.

Location and Mounting

The QC10 must be placed or mounted on a stable, reliable surface. If the QC10 should fall, it could become seriously damaged and more importantly could cause injuries to the user. For mounting instructions, refer to the Chapter 2: Operation.

Cleaning

Use only a cloth dampened with water and a mild detergent for cleaning the exterior surfaces. Never use abrasive cleaners, and never use strong detergents or solvents. Only dampen the cloth, do not use a cleaning cloth that is dripping wet.

Electrical

Do not allow the power cord or other cables to create tripping hazards.



WARNINGS

Unplug the QC10 from the electrical outlet before cleaning.

The QC10 is equipped with a 3-wire power plug that includes a separate ground connection. Always connect the power plug to a 3-wire grounded outlet. The use of 2-wire power plug adapters or any other connection accessories that remove the third grounded connection create a safety hazard and should not be permitted. If a 3-wire grounded outlet is not available, ask your electrician to provide one.

General maintenance

Unplug the QC10 from the wall outlet and seek the assistance of a qualified service technician if:

- The power cord is frayed or damaged or the power plug is damaged
- Liquid is spilled or splashed onto the enclosure
- The QC10 has been dropped or the exterior has been damaged
- The QC10 exhibits degraded performance or indicates a need for service some other way

Backup battery charging

The QC10 utilizes an internal battery to maintain system configuration settings during power interruptions. A battery circuit charges this backup battery during periods of normal operation.

When the QC10 is used on a daily basis, the backup battery will be adequately charged to maintain configuration settings during power outages. However, over extended periods of nonuse, the battery might lose the charge necessary to maintain configuration settings. To keep the backup battery charged over extended periods of nonuse, apply power to the QC10 and leave it turned on for a minimum of 2 days each month.

FCC compliance statement

FCC Rule NP15R Rev. 23, June, 1989

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this guide, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits. The connection of a unshielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. Do not leave cables connected to unused interfaces. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

For Canadian Users:

This Class "A" digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe "A" respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Guide Part Number: 11A10541

Revision History: Revision 1.0 January, 2004

Software Version: 1.15

Printed in the USA

Preface

The material in this guide is divided into 4 chapters ranging from introductory material and basic operation to more advanced topics including system configuration. If you are an advanced user of digital readouts, feel free to skim the material contained in the first two chapters of this guide, but do not begin to operate the readout unless you're confident that you understand the essential information contained in these chapters.

After an initial review, this guide will become an invaluable reference source that should be used routinely to answer questions and ensure smooth continued operation of the readout. The comprehensive table of contents and index facilitate rapid access to specific information contained within the guide.

Who should read this guide

This user's guide is intended for operators, technicians, supervisors, Metronics distributors and OEM representatives.



NOTE

While system configuration and set up instructions are provided in Chapter 4: System Setup, this information is intended only for technically qualified supervisors, Metronics distributors and OEM representatives. Operators should not attempt to alter the setup configuration of the QC10.

What this guide covers

Chapter 1: Overview

An overview of QC10 system including specifications

Chapter 2: Operation

Detailed descriptions of controls and indicators, and instructions for conducting measurements

Chapter 3: Communications

Serial (RS-232) communication with printers and personal computers

Chapter 4: System setup

System configuration instructions for technically qualified supervisors, Metronics distributors and OEM representatives.

Conventions

Basic terms

The terms **Quadra-Chek 10**, **QC10**, **instrument** and **system** refer to the Quadra-Chek 10 digital readout.

Measurement polarity

It is assumed in all discussions of measurements that:

- **Moving to the right** or up causes measure counts to increase in a **positive direction**; 1 to 2 to 3 and so on.
- **Rotating counterclockwise** causes measure counts to increase in a **positive direction**; 1 degree to 2 degrees to 3 degrees and so on.
- Count directions can easily be reversed if necessary. Reversing the count direction is discussed later in Chapter 4: System Setup.

Measurement resolution in the guide

In most cases the display resolution shown on screens in this guide will be one ten-thousandths of an inch (0.0001) or two microns metric (0.002). The display resolutions shown are not meant to suggest resolutions that should be set on your system, they are only examples.

Icons



WARNING

The raised hand icon indicates a warning regarding a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the warning message. Warning messages are shown in bold type.



CAUTION

The exclamation point icon indicates a caution regarding a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and fully understand the caution message. Caution messages are shown in bold type.



NOTE

The arrow icon indicates a note containing additional or supplementary information about an activity or concept. Notes are shown in bold type.

Type styles

Warnings, cautions and notes are shown in bold type.

Accuracy and precision

The QC10 is capable of great accuracy and precision and generally surpasses the measurement capabilities of human operators.



NOTE

The QC10 display resolution is configured in the Display Setup screen, discussed in Chapter 4: Setup.

The system is also capable of displaying higher resolution and more significant figures than is often needed, so it's recommended that the QC10 display be set to only the required resolution.

The accuracy and precision of the QC10 is limited by its encoder input; the QC10 can never be more accurate or precise than its input device. Never set the QC10 display to resolutions higher than the encoder input.

System configuration and setup

Metronics, Incorporated assumes that all QC10 systems will be configured and setup for the end-user by a Metronics distributor or OEM representative. This setup includes calibration according to the user's measuring device, and configuration of error compensation if necessary.

When the end-user installs a new measuring device, it will be necessary to perform configuration and setup again. In that case, technically qualified personnel can refer to Chapter 4: System Setup, or can contact their Metronics distributor or OEM representative for assistance.



WARNING

There is never any reason to open the QC10 enclosure. There are no user-serviceable components or assemblies inside. As with any electronic instrument, there is a danger of electrical shock and damage to the instrument if the enclosure is opened.

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Chapter 1

Overview

The QC10 is an advanced digital readout system for performing single axis measurements at very high levels of precision and accuracy. The QC10 can be used with a wide variety of measurement systems to perform precision measurements as part of in-line production activities or final quality inspection.

The intuitive interface will be familiar to users of the QC100, QC200 and other Metronics products. Operators will find the QC10 easy to understand and use thanks to a large LCD display, clearly marked front panel keys and softkeys labeled across the bottom of the LCD.

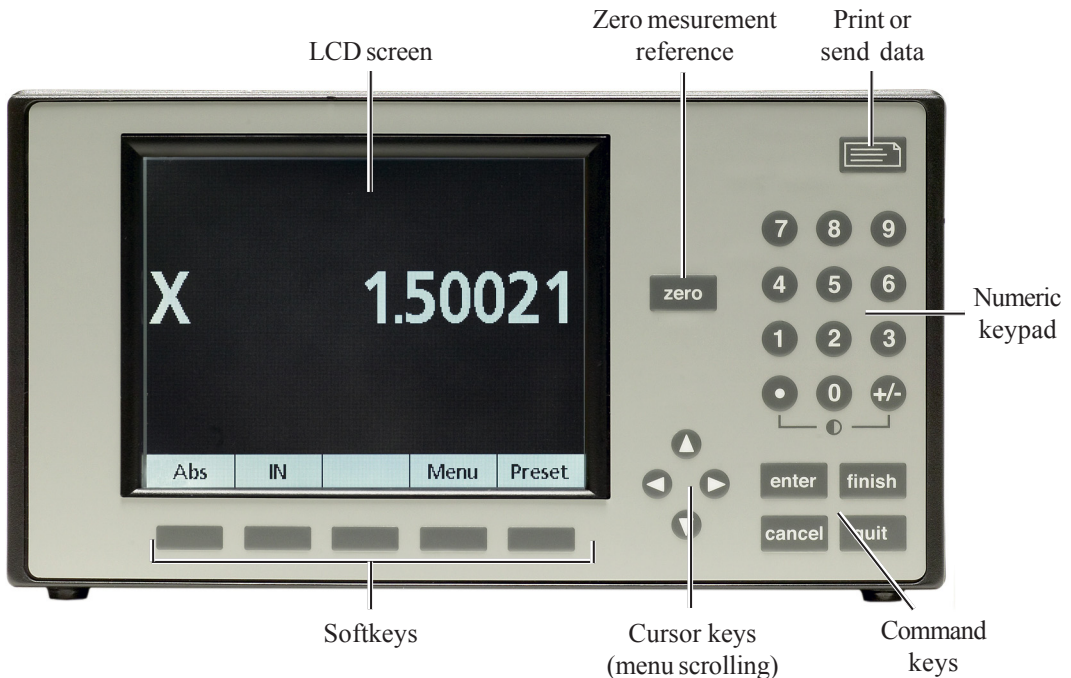
The large LCD displays alphanumeric and graphic information for the current measurement and softkeys for adjusting the measurement datum, changing the unit of measure, and accessing setup and measurement function menus.

Panel keys are provided for entering numeric data, zeroing a measurement reference and sending data to a serial printer or computer.



Most keys on the front panel can be programmed as hotkeys to initiate commonly used functions. Keys on the optional footswitch can also be programmed as hotkeys.

All front panel keys provide tactile sensory feedback, and most key-press operations generate an audible sound.



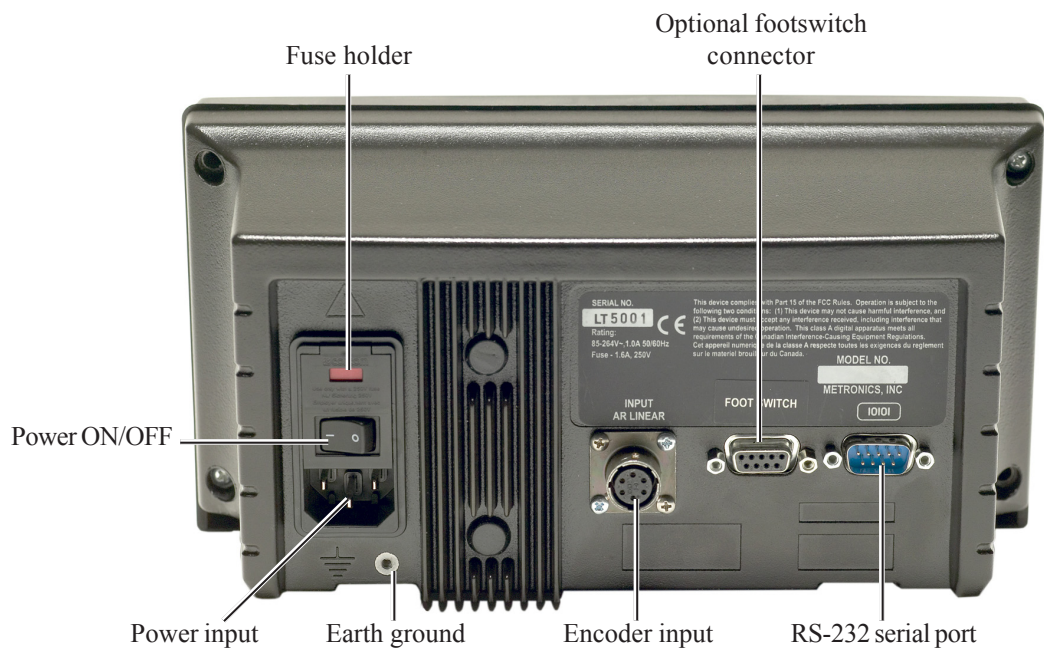
The compact ergonomic design of the QC10 allows users to locate and mount the instrument in a wide variety of environments to accommodate nearly any viewing requirement. Optional mounting brackets can be adjusted to secure the QC10 in any convenient position. Rubber feet on the bottom prevent slipping when the system is not permanently bolted to a bracket or worksurface. Threaded holes are provided in the base of the QC10 for ($\frac{1}{4}$ - 20) mounting screws.

A threaded (8 - 32) hole is provided on the rear panel for connecting the frames or chassis of associated *ungrounded* measuring components to (earth) ground.



CAUTION

Do not connect grounded components to the QC10 earth ground. The connection of unnecessary equipment grounds can cause *ground loops* that might result in increased sensitivity to electrical line noise.



Measurements viewed on the LCD can be transmitted to a personal computer or to a serial printer over a standard serial port connection.

Available options and software version

An optional foot switch is available for control and data entry when the user is not close to the front panel. Optional mounting brackets are also available.

Your system's available options and the software version are listed at the bottom of the *About* setup screen. Refer to Chapter 4: Setup for details.



About		
About	English	Yes
Display	Français	No
Encoders	Deutsch	No
Hot Keys	Español	No
Port	Italiano	No
Supervisor	Português	No
LEC	Version 1.14	
SLEC	Foot	
Scale Factor		
Screen		

Footswitch option Software version

Specifications



Input Voltage Range: 85 VAC to 264 VAC. 1.0 Amp maximum (Auto switchable)
Fuse: 1.6 Amp 250V Slow Blow 5X20mm
Input Frequency: 43Hz to 63Hz

CAUTION
For continued protection against fire, replace only with a fuse of the specified voltage and current ratings.

Environmental Conditions:
Temperature: 0°C to 45°C non-condensing (32°F TO 113°F)
Humidity: 90%rh
Altitude: 2000 meters (6,562 ft)
Pollution Degree: 2
Installation Category: II

Dimensions:
Enclosure (WxHxD): 25.1cm X 13.65cm X 11.4cm (9.875" X 5.375" X 4.5")
Enclosure weight: 1.8kg (3.8) lbs.

LCD:
Size/color: 15.24cm black and white (6.0")
Display digit size: 1.27cm (0.5")

ENC tests:
EN61326:1998
EMC for electrical equipment for measurement, control and laboratory use
EN61010
Safety requirements for electrical equipment for measurement, control and laboratory use



WARNING:
To reduce the risk of electrical shock, never open the enclosure. There are no user-servicable parts inside. Refer all service requirements to qualified service personnel.

Chapter 2

Operation

This chapter describes how to operate the QC10. Instructions will show typical LCD screen contents. This chapter includes:

Topic	Page
• Measuring with the QC10	2-2
• Reference datums	2-2
• Probing points	2-2
• Front panel controls and softkey menus	2-3
• Softkeys	2-3
• Front panel keys	2-4
• Software menus	2-6
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The contents of LCD screens will reflect a system configured with factory default settings. Your system might have slightly different defaults and operating parameters, however the instructions in this chapter are generic and will apply equally well to all systems.



Introduction

The QC10 performs very precise dimensional measurements on a single linear or rotary axis. Part measurement is a simple process that includes positioning and securing a part for measurement, establishing a reference datum and probing or targeting a point. The results are displayed on the DRO screen and can be printed on a serial printer or sent over the serial RS-232 port to a computer.



NOTE

This guide often refers to the process of measuring a point (or displacement) as *targeting a point* or *probing a point* independent of the method and measurement hardware used.

Reference datums

The locations of probed or targeted points are always referred to a datum point or origin. The absolute datum coordinates are 0,0. The absolute datum can be set to any physical point on or off the part being measured by pressing the **Zero key** on the front panel. Setting the absolute datum establishes a reference frame within which a second (incremental) datum can be defined for incremental measurements.

The absolute and incremental datums can be zeroed using the **Zero key** or can be set to nonzero values that are entered from the numeric keypad using the **Preset function**.

Presetting a datum is useful when measurements need to be made from a nonzero part coordinate, such as a point specified by a part drawing.

Probing points

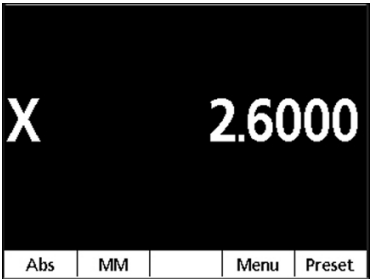
Once a datum has been established, physical points can be probed and measured using crosshairs, or any of a number of other measurement tools. In any case, current displacement information is displayed continuously on the DRO screen.

Front panel controls and softkey menus

The QC10 front panel controls are explained in detail in the following pages. Explanations include the typical LCD screen images associated with each control. Please read this portion of the guide carefully as subsequent operating instructions depend on a familiarity with user controls and LCD screen content.

Softkeys

The softkeys initiate functions that appear above the keys at the bottom of the LCD screen. As different system functions are used, softkey selections change in support.

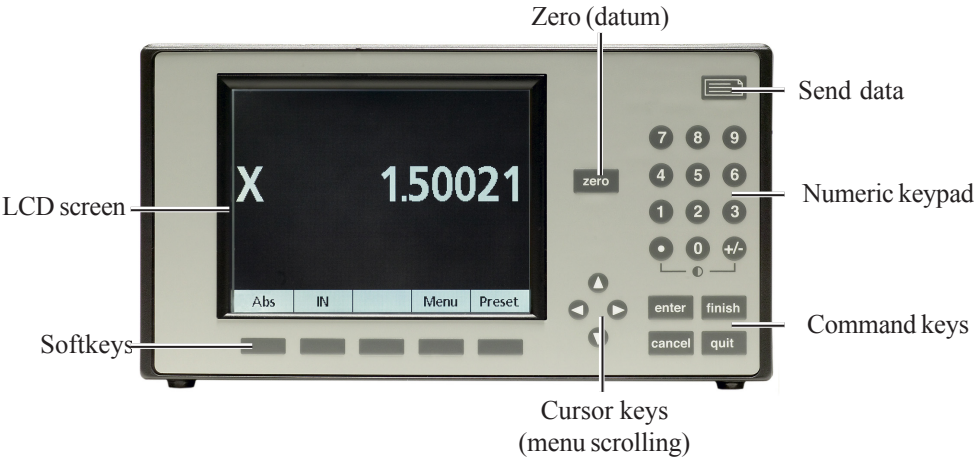


Pressing the Menu softkey...



Causes new softkeys to appear in support of Menu functions

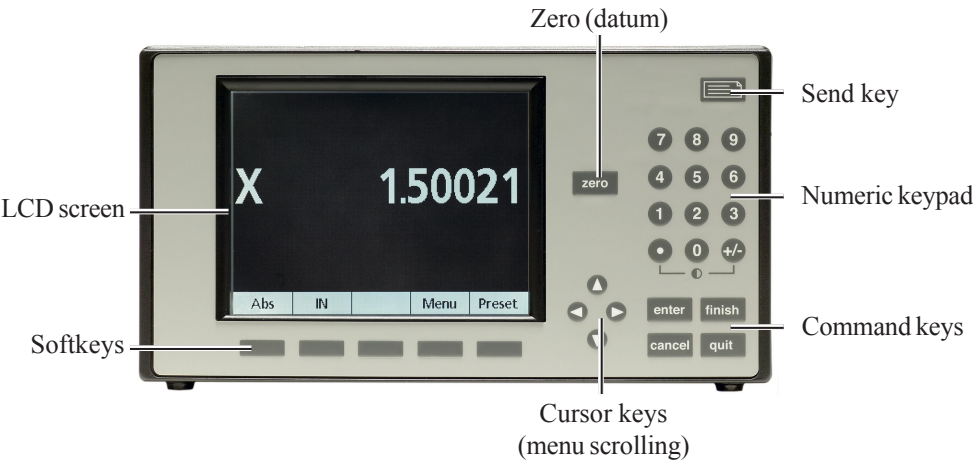
Softkey selections presented at the bottom of LCD screens provide alternative viewing, measurement and configuration functions that are unique to specific screens. Softkeys can be config-



used as **hotkeys** to provide a variety of commonly used functions.

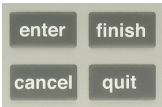
Front panel keys

Front panel keys include command keys, cursor keys, the zero key, the numeric keypad and the send key.



Command keys

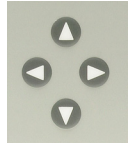
The command keys are used to enter configuration settings, finish a configuration session, cancel (or delete) the last entry, or quit the current activity and return to the DRO screen.



- Enter** Enters data or information highlighted on the LCD as configuration data, or initiates an Extra menu function.
- Finish** Completes the data entry process for a setup configuration session, or initiates an Extra menu function.
- Cancel** Erases the last data value entered into the system from part probing or from the numeric keypad.
- Quit** Aborts the current task and returns to the DRO screen.

Cursor keys

The 4 cursor keys (also referred to as cursor arrows) are used to scroll lists, and to navigate menus.



Zero (datum) key

The **zero key** is used to zero the absolute or incremental datum.

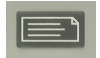
Numeric keypad

The **numeric keypad** is used for numeric data entry. The decimal point key and +/- key can also be used to reduce or increase the LCD screen contrast if a decimal point or +/- input are not expected by the system as part of a data entry process. The screen contrast setting will be saved when the system is powered down and used as the default contrast setting the next time the system is turned on.



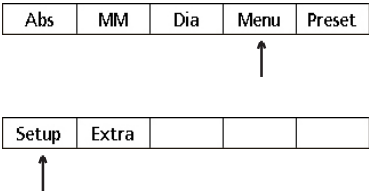
Send key

The **Send key** transmits measurement results to a computer or a serial printer over the RS-232 serial port.

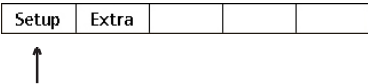


Softkey menus

The **Softkey Menu** functions access configuration, measurement and display functions. These functions are contained in the **Setup** and **Extra** menus and are displayed by pressing the **Menu** softkey.



Setup menu

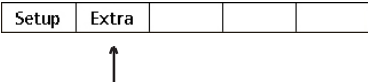


The **Setup** menu should be used only by supervisors, Metronics distributors and OEM representatives to configure the advanced measurement, display and communication parameters of the QC10 system. Use of the Setup menu is discussed later in Chapter 4: Setup.

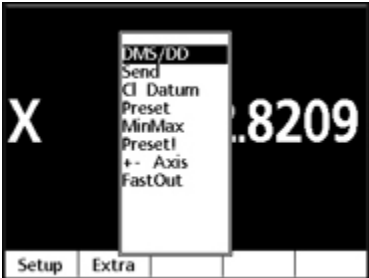
NOTE

Operators should not attempt to use the Setup menu to change system configurations.

Extra menu



The **Extra** menu provides access to functions that control measurement, communication and display parameters. The **Extra** menu is displayed by pressing the **Extra** softkey.



DMS/DD

Toggles the display of angles between degrees, minutes and seconds and decimal degrees.

Send

Sends the current axis data displayed on the DRO screen to a printer or computer.

CI datum

Resets the absolute or incremental datum to machine zero.

Preset

Initiates the Preset function, which displays the Preset Axis screen and allows the user to enter the current datum value.



Min Max

Displays the MinMax screen and accumulates the minimum, maximum and range of values until the Finish key is pressed. This is useful for applications such as measurements of runout.



Preset!

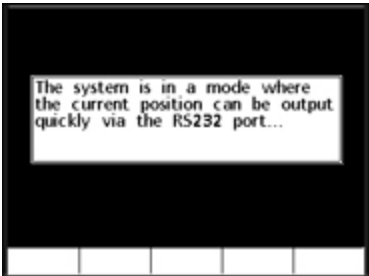
Applies the last preset value to the current datum.

+ - Axis

Toggles the axis between normal polarity and reversed. The axis polarity is configured initially in the Encoders setup screen discussed in [Chapter 4: Setup](#).

FastOut

Initiates the transmission of real-time position values over the RS-232 port. Position values will be sent to the RS-232 port while the FastOut message appears on the screen. Pressing the Finish key disables the FastOut function and begins displaying position values again.



During FastOut data transmission, the normal DRO screen view is disabled to commit the maximum processor resources to the data transmission function. Data is sent as values separated by CR/LF characters at the sample rate of the QC10. The CR/LF line terminators can be changed in the Port setup screen discussed in [Chapter 4: Setup](#).

LCD screens

A variety of LCD screens are displayed during the course of normal operation. These screens are nearly self-explanatory and use similar presentations of information and data.

Power-up screen

The power-up (or startup) screen is presented each time the system is turned on. Pressing the Finish or Quit key advances to the DRO screen. If no key is pressed, the DRO will automatically be displayed after approximately 8 seconds.



DRO screen

The DRO screen shows the current linear or angular position, the current unit of measure (**MM, Inch or degree**) and the datum point reference for measurements (**Abs** for absolute, **Inc** for incremental).



Pressing the **MM/Inch** softkey

toggles the unit of linear measure between metric and English. Pressing the **Abs/Inc** softkey toggles between absolute and incremental datums.

When the **Dia/Rad** softkey function is activated for an axis in the Encoder setup screen, pressing it toggles the displayed value for that axis between a radius (by halving a diameter) and a diameter (by doubling a radius).

Softkeys are also provided for accessing the **menu** functions and **presetting** the axis datum to nonzero values.

Safety and other reminders

First-time users should thoroughly understand the preceding portions of this chapter before operating the QC10. The operating instructions assume a basic familiarity with the process of measuring displacements, QC10 controls and indicators and the information presented on LCD screens.



Location and mounting

Verify that the QC10 is mounted on a stable reliable surface. If it should fall, it could become seriously damaged or cause injuries to the user.



Power cord and plug

The power cord should not be located where it can be walked on or create a tripping hazard. Always connect the 3-wire power plug to a 3-wire grounded outlet. Use of a 2-wire power plug adapter or any other connection accessory that removes the third grounded connection creates a safety hazard and should not be permitted.



Power surge suppressor

A high-quality power surge suppressor should be used to limit the amplitude of potentially damaging power line transients caused by the operation of heavy electrical machinery or lightning.



Liquids

Do not spill or splash liquids on the QC10 enclosure.



Configuration and system setup

System configuration and setup should be performed only by technically qualified supervisors, Metronics distributors or OEM representatives. Operators should not attempt to alter the configuration of the QC10.

Preparing for operation

Very little preparation is required before operating the QC10. Connections to the system should be checked and power applied.

Checking connections

Perform a routine inspection of all connections to the digital readout system. Connections should be clean and tight. Cables should be located away from moving objects and should not create tripping hazards.

Cables connected to the serial (RS-232) output port should be shielded and should be terminated and firmly connected on both ends.



CAUTION

Never connect electrical cables to the system when the power is on.

Applying power

To apply power, press the power switch located at the back of the enclosure to ON (1). The system will initialize and display the power-up screen.



Press the Finish or Quit key to complete the system initialization. The DRO screen will be displayed showing the current position of the axis encoder.



NOTE

If the encoder used with your system includes reference marks, you may be instructed to cross the reference marks on the axis before the DRO screen is displayed.

Performing measurements

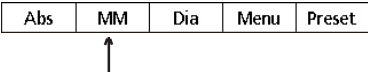
The first steps in any measurement session will include adjusting the LCD view, setting measurement and display parameters, and setting the datums.

Adjusting LCD contrast

The LCD contrast can be adjusted for optimum viewing from the DRO screen. Press the decimal point key of the numeric keypad to decrease contrast or the +/- key to increase contrast.

Setting measurement and display parameters

The measure and display parameters that you establish prior to a measurement session will depend on the measurement that you are making and the way you would like to have data displayed on the LCD screen.

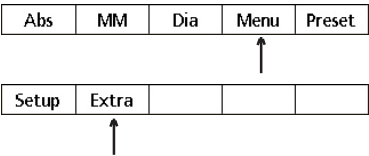


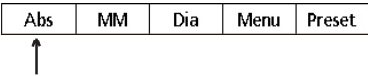
Unit of linear measure

Linear measurements can be displayed in mm or inches. Select the desired unit of measure if necessary by pressing the **MM/Inch softkey**. The unit of measure will be displayed at the lower left corner of the LCD. This selection can be changed at any time.

Unit of angular measure

Angular measurements can be displayed in degrees, minutes and seconds (**DMS**) or in decimal degrees (**DD**). Select the desired unit of measure if necessary by pressing the **Menu softkey**, the **Extra softkey**, then selecting **DMS/DD**. Press the **Finish key** to toggle between **DMS** and **DD**. The result will be displayed on the DRO screen. This selection can be changed at any time.





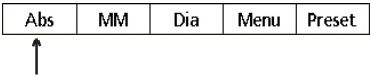
Select a datum
Select the absolute datum (Abs) if necessary by pressing the **Abs/Inc softkey**. The selected datum will be displayed at the lower left corner of the LCD. This selection can be changed at any time.

Zeroing datums

The system simultaneously uses 2 reference datums for measurements. One is fixed (absolute), while the other can be redefined (incremental) during the measurement session to make incremental measurements. Reference points for absolute and incremental measurements can be set by zeroing the **Abs** (absolute) and **Inc** (incremental) datums.

Absolute datum
Absolute measurements are those referred to the absolute datum. The absolute datum is defined as the origin (0,0), and should be set at the beginning of each measurement session. To set the absolute datum:

Step 1
Move to the point you wish to define as the origin, or absolute datum point, and press the **Abs/Inc softkey** if necessary to select **Abs** in the lower left corner of the LCD screen.



Step 2
Press the **Zero key** to zero-out the measurement axis on the DRO screen.



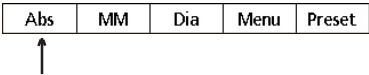
Incremental datum
An incremental measurement is one that is made between any reference point and some other point. Incremental measurements are facilitated in the QC10 by the incremental datum which can be zeroed at any point on or off the part without changing the absolute datum.

Datums can be preset to nonzero values that match known part coordinates using the numeric keypad and **Preset** function.

Presetting datums

Presetting datums is useful when measurements must be made from a part coordinate specified on a part drawing. To preset datums to a known part coordinate:

Step 1
Select the datums you wish to preset (**Abs** or **Inc**).



Step 2
Move to the part coordinate that you wish to use as a measurement datum and press the **Preset** softkey.



Step 3
Enter the preset coordinate for the datum using the numeric keypad (1.125 in this example), then press the **Finish** key.



Measurement types

The QC10 can perform simple linear or angular displacement measurements such as a distance between points or an angle of rotation, or can store values to measure cumulative minimum and maximum displacements for measurements such as shaft runout.

Linear and angular measurements

To perform linear or angular measurements:

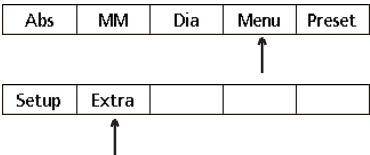
- Step 1
Move to the start point for the measurement and zero or preset the axis datum using the **Zero key** or **Preset softkey**.
- Step 2
Move to the point to be measured or rotate to the angle to be measured. The results will be displayed on the DRO screen and can be printed or sent to a computer by pressing the **Send key**.

Min/Max measurements

To perform minimum and maximum measurements:

- Step 1
Move the stage to target the start point and zero or preset the axes datums using the **Zero axis keys** or **Preset softkey**.

- Step 2
Press the **Menu softkey**, then press the **Extra softkey**. The **Extra menu** will be displayed.



- Step 3
Scroll to highlight **MinMax** using the cursor arrow keys, and press the **Finish key**.



Step 4
Press the **Zero softkey** to zero the axis.



Step 5
Perform the required measurement. The minimum, maximum and range values will be accumulated.



The measurement result displayed on the **MinMax** screen can be printed or sent to a computer by pressing the **Send key**. Press the **Finish** key to end the Min Max session and return to the DRO screen.

Chapter 3

Communications

This chapter explains how to send data to a serial printer, to Windows programs including WinWedge and Hyperterminal, and to control the QC10 remotely over the serial port.

Topic	Page
• Sending data to a serial printer	3-1
• Using WinWedge	3-2
• Using Hyperterminal	3-7
• Controlling the QC10 from a remote computer	3-11

Sending data to a serial printer

Serial printers and the required serial cables are provided by many manufacturers. Most of these printers are compatible with the QC10.



NOTE

It is the users responsibility to check printer compatibility, cabling and system configuration accordingly.

It is only necessary to configure the QC10 RS-232 port to communicate with your printer. Refer to the discussion of Port screen settings in Chapter 4: Setup to change the default settings to match your printer's requirements.

Using WinWedge

Communication with a computer running the WinWedge program relies on a serial RS-232 connection using a standard straight-through cable (no crossed connections). These cables are available at most retail electronics stores.

WinWedge sends data to a user defined application. In the following example, WinWedge is used to send data to Microsoft Excel.

Connecting to a computer



Step 1

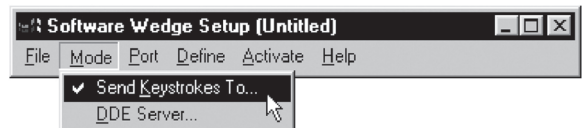
Double-click on the WinWedge icon to launch the WinWedge application.

NOTE

Use the Windows Start menu to open WinWedge if there is no shortcut icon on the desktop.

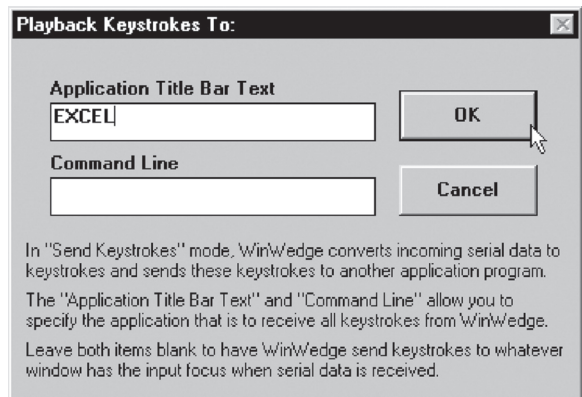
Step 2

Click on the Mode menu and choose Send Keystrokes To.



Step 3

Type EXCEL in the application title bar text box.



NOTE

Type the name of the application that will receive the QC10 data. This example uses a Microsoft Excel spreadsheet. Type the application name in all upper case characters as shown.



NOTE

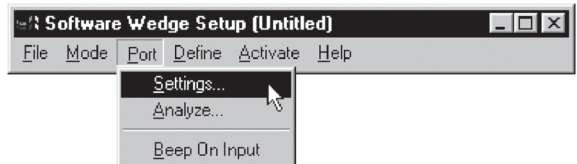
Leave the Command Line box blank.

Step 4

Click OK.

Step 5

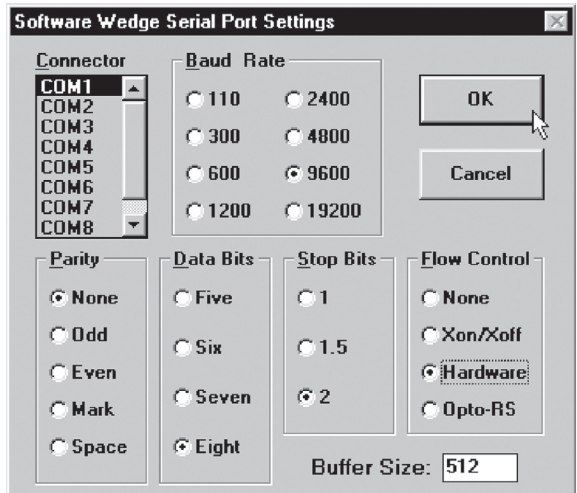
Click on the Port menu and choose Settings.



Step 6

Enter the following settings:

- Connector: COM 1 or COM2 (as connected)
- Baud rate: 9600
- Parity: None
- Data bits: 8
- Stop bits: 2
- Flow control: Hardware
- Buffer size: 512

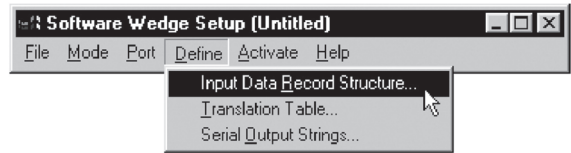


Step 7

Click OK.

Step 8

Click on the Define menu and choose Input Data Record Structure.

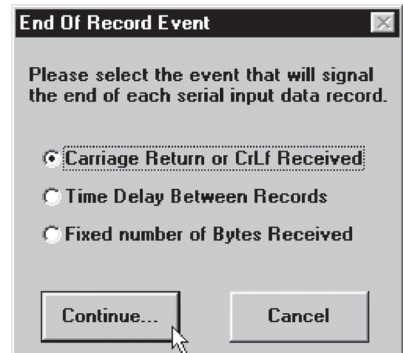


Step 9

Select Carriage Return or Cr Lf Received.

Step 10

Click on Continue.

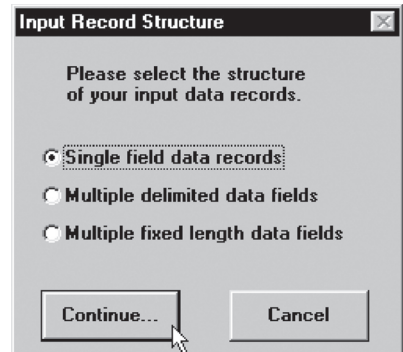


Step 11

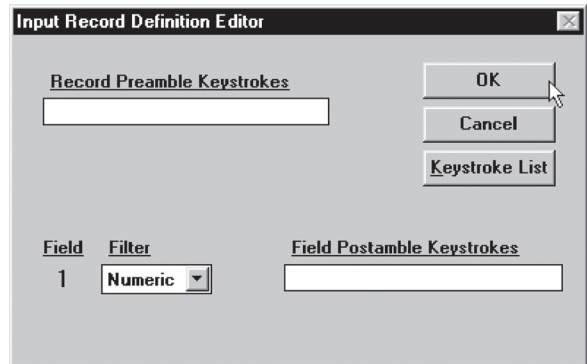
Select Single field data records.

Step 12

Click on continue.



Step 13
Select numeric from the filter list.



Input Record Definition Editor

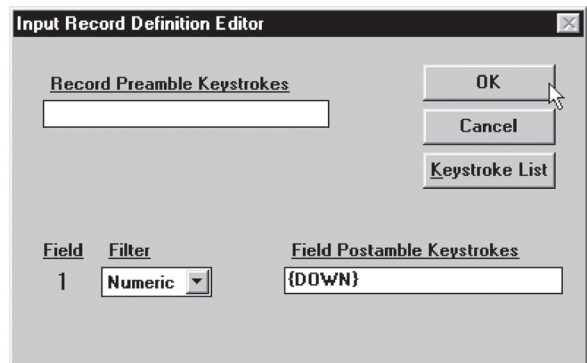
Record Preamble Keystrokes

Field Filter Field Postamble Keystrokes

1 Numeric

OK
Cancel
Keystroke List

Step 14
Type {DOWN} in the Field Postamble Keystrokes textbox.



Input Record Definition Editor

Record Preamble Keystrokes

Field Filter Field Postamble Keystrokes

1 Numeric {DOWN}

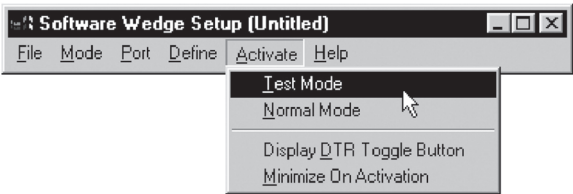
OK
Cancel
Keystroke List



NOTE
Leave the Record Preamble Keystrokes field blank.

Step 15
Click OK.

Step 16
Click on the Activate menu and choose Test Mode.

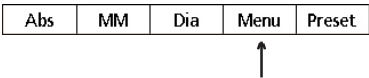


The WinWedge connection window will appear.

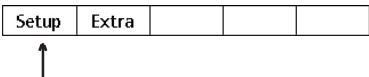
Preparing to send data

Steps 16 through 20 describe how to set up the QC10 to send data to WinWedge.

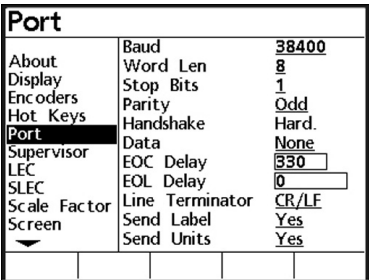
Step 16
Press the Menu softkey.



Step 17
Press the Setup softkey.

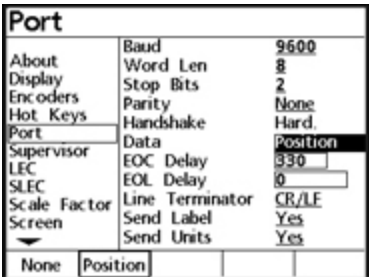


Step 18
Highlight Port.



Step 19
Enter the following RS-232 port settings:

Baud: 9600
Word length: 8
Stop bits: 2
Parity: None
Data: Position



Step 20
Press the finish key twice.
The QC10 is now set up to send data to the WinWedge application.

Sending data

Step 1
Press the Send key.

Using Hyperterminal

Hyperterminal can easily be configured to transfer data between the QC10 and your Windows computer using the RS-232 serial port.

Communication with a computer running Hyperterminal relies on a serial RS-232 connection using a standard straight-through cable (no crossed connections). These cables are available at most retail electronics stores.

Connecting to a computer

Step 1

Launch the Hyperterminal application by double-clicking the Hyperterminal icon or by clicking the following sequence:

- Start button
- Programs
- Accessories
- Communications
- Hyperterminal

Step 2

Enter the desired connection name into the Connection Description dialog box and click OK.



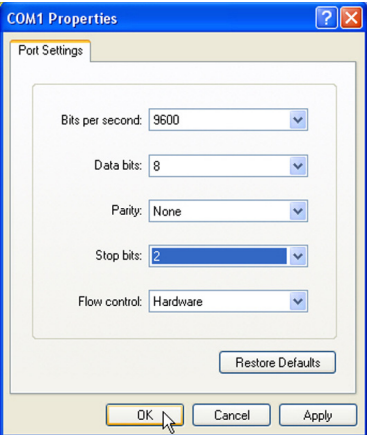
Step 3

Select the desired serial port and click OK.

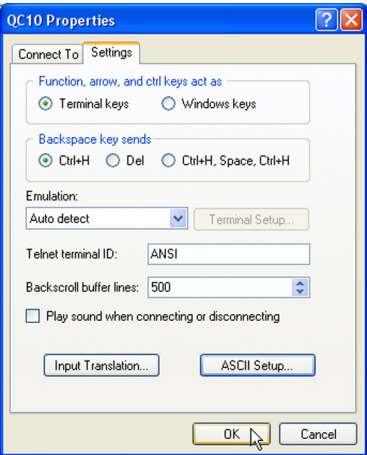


Step 4
Enter the port settings shown below and click OK.

Bits/second: 9600
Data bits: 8
Parity: None
Stop bits: 2
Flow control: Hardware

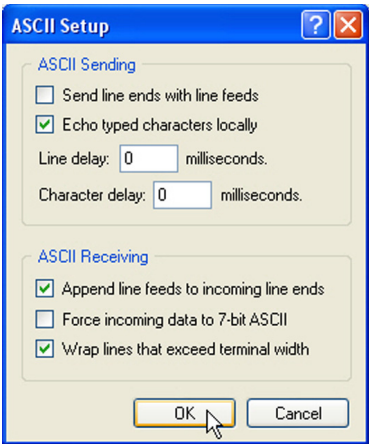


Step 5
Click on the File menu and then click Properties to display the Properties dialog box. Click on the Settings tab and configure the settings as shown below.



Function, arrow and cut keys act as:	Terminal
Backspace key sends:	Ctrl + H
Emulation:	Auto detect
Telnet terminal ID:	ANSI
Backscroll buffer lines:	500

Step 6
Click on the ASCII button and configure the ASCII setup as shown below and click OK.



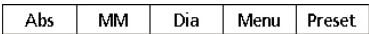
- Check only the following boxes:
- Echo typed characters locally
 - Append line feeds to incoming line ends
 - Wrap lines that exceed terminal width

Step 7
Click OK in the Properties dialog box to return to the main Hyperterminal screen.

Step 8
Click the File menu and then click Save. The Hyperterminal program is now ready to exchange data with the QC10.

Preparing the to exchange serial data

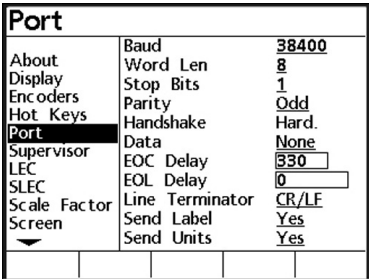
Step 9
Press the Menu softkey.



Step 10
Press the Setup softkey.



Step 11
Highlight Port.



Step 12
Enter the following RS-232 port settings.

Baud: 9600
Word length: 8
Stop bits: 2
Parity: None
Data: Position

Port		
About	Baud	9600
Display	Word Len	8
Encoders	Stop Bits	2
Hot Keys	Parity	None
Port	Handshake	Hard
Supervisor	Data	Position
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
	None	Position

Step 20
Press the Finish key twice. The QC10 is now setup to send data to and receive data from the Hyperterminal application.

Controlling the QC10 from a remote computer

Nearly all QC10 functions can be controlled over an RS-232 connection using the command codes shown in the table below.

Command code	QC10 function
@33	Enter
@34	Finish
@35	Cancel
@36	Quit
@8	Up Arrow
@10	Down Arrow
@7	Left Arrow
@9	Right Arrow
@16	Send
@11	Soft key #1
@12	Soft key #2
@13	Soft key #3
@14	Soft key #4
@15	Soft key #5
@3	Zero
@21	Numeric key 0
@22	Numeric key 1
@23	Numeric key 2
@24	Numeric key 3
@25	Numeric key 4
@26	Numeric key 5
@27	Numeric key 6
@28	Numeric key 7
@29	Numeric key 8
@30	Numeric key 9
@31	.
@32	+/-
@44	Power ON/OFF

Commands can be transmitted from a file, or keyed in manually using Windows Hyperterminal or equivalent communications software. The use of Hyperterminal is explained earlier in this section.

Use a carriage return or line feed to separate commands included in command strings.

Chapter 4

Setup

The operating parameters of the QC10 must be configured prior to using the system the first time, or any time part measurement, reporting, or data communication requirements change. System configurations are entered using a few navigation and selection keys located on the front panel. The process is facilitated by a simple Setup menu structure of configuration functions shown on the large LCD display.

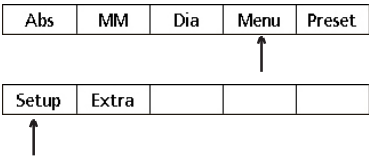
All operating parameters of the QC10 can be configured using functions in the Setup menu. These parameters include:

Topic	Page
• The setup menu	4 - 2
• Language shown on the LCD display	4 - 5
• Display format of measurement data	4 - 6
• Encoder configuration	4 - 8
• Hotkey configuration	4 - 12
• Ports configuration - serial communication	4 - 17
• Supervisor password and startup zero	4 - 20
• LEC (Linear Error Correction)	4 - 21
• SLEC (Segmented Linear Error Correction)	4 - 22
• Scale factor	4 - 25
• Screen (screen saver)	4 - 26
• Misc (Miscellaneous) parameters	4 - 28

Parameter configurations will be retained by the system until they are changed again in the Setup menu.

The Setup menu

The **Setup** menu can be displayed from the DRO screen by pressing the **Menu** softkey and then the **Setup** softkey at the bottom left of the LCD.



Pressing the **Setup** softkey will display the contents of the **Setup** menu on the left portion of the screen with the **Language** selection highlighted.

About		
About	English	Yes
Display	Français	No
Encoders	Deutsch	No
Hot Keys	Español	No
Port	Italiano	No
Supervisor	Português	No
LEC	Version 1.14	
SLEC	Foot	
Scale Factor		
Screen		

Using the Setup menu

Selecting functions in the Setup menu is a straightforward process of scrolling through and highlighting setup functions using the **cursor keys**. Once a setup function is highlighted, associated operating parameters displayed on the right portion of the screen and can be configured or changed using the **cursor keys**, **softkeys** or the **numeric keypad**. The following example of configuring a Display parameter demonstrates using the **Setup** menu.

Example of configuring display parameters

In this example the **Display** parameters will be configured to start in **DD** (decimal degrees) units of angular measure.

Step 1

Press the **Menu** softkey, then press the **Setup** softkey to display the **Setup** menu.

Step 3

Press the **down cursor** key to access the **Display Setup** menu function.

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		

Step 4
Press the **right cursor key** to highlight parameter values on the right side of the screen, then press the **down cursor key** to highlight the **Startup Angular** parameter.

Display			
About	Startup Linear	MM	
Display	Startup Angular	DMS	
Encoders	Radix	Decimal	
Hot Keys	Current Angular	DMS	
Port	MM Disp Res	0.0001	
Supervisor	Inch Disp Res	0.0001	
LEC	DMS Disp Res	0.00.01	
SLEC	DD Disp Res	0.001	
Scale Factor			
Screen			
▼			
DD	DMS	Last	

Alternative selections for the highlighted parameter will become available over the softkeys at the bottom of the screen. Pressing the softkey under the desired selection will change the highlighted parameter.

Step 5
To set the **Startup Angular parameter** to decimal degrees, press the **DD softkey** at the bottom of the LCD screen. The **Startup Angular parameter** will be changed to **DD** on the LCD display.

Display			
About	Startup Linear	MM	
Display	Startup Angular	DD	
Encoders	Radix	Decimal	
Hot Keys	Current Angular	DMS	
Port	MM Disp Res	0.0001	
Supervisor	Inch Disp Res	0.0001	
LEC	DMS Disp Res	0.00.01	
SLEC	DD Disp Res	0.001	
Scale Factor			
Screen			
▼			
DD	DMS	Last	

In this manner, any setup menu function can be selected, and any configurable parameter changed to one of the alternatives presented over softkeys across the bottom of the LCD screen. Configurable parameters on the right portion of the screen can be scrolled by pressing the **up or down cursor arrow**, or by repeatedly pressing the **Enter key**.

Once the highlighted parameter has been changed, pressing the **left cursor key** or the **Finish key** will save a new setting and return to the list of **Setup menu functions** on the left portion of the screen. Pressing the **Finish key** a second time will exit the **Setup menu** and return to display the **DRO screen**.



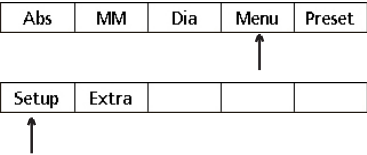
NOTE
A limited collection of setup functions are available under normal conditions. The password must be entered into the Supervisor setup screen to make all setup functions available for configuration. Entering the password for configuration is explained in the *Supervisor* portion of the Setup Instructions that follow.

Setup instructions

The methods of selecting and configuring system parameters are explained previously in the *Using the Setup menu* and are demonstrated in *Example of configuring Display parameters*. All of the selections available in the **Setup menu** should be evaluated and changed if necessary the first time the QC10 system is used. After the first use, system parameters should be changed as necessary whenever part measurement, or data communication requirements change.

Accessing the Setup Menu

Access the **Setup menu** by pressing the **Menu softkey** at the bottom right of the LCD, and then pressing the **Setup softkey** at the bottom left of the LCD.



The **setup menu** contents will be displayed on the left portion of the screen with the **About** selection highlighted.

About		
About	English	Yes
Display	Français	No
Encoders	Deutsch	No
Hot Keys	Español	No
Port	Italiano	No
Supervisor	Português	No
LEC	Version 1.14	
SLEC	Foot	
Scale Factor		
Screen		

Use of control keys

Enter key



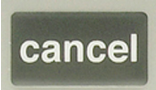
Pressing the **Enter key** stores the highlighted value or selection and advances to the next setup parameter. Pressing the **Enter key** at the bottom of a list advances to the top of the list.

Finish key



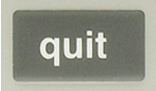
Pressing the **Finish key** stores all parameters for the current setup category and returns to the **Setup menu** on the left portion of the screen.

Cancel key



Pressing the **Cancel key** is only active when entering numeric data from the front panel keypad. Pressing the **Cancel key** erases the last (left most) digit in a highlighted data field. Pressing the **Cancel key** in an alpha field, or a field changed by softkey selections has no effect.

Quit key



Pressing the **Quit key** returns to the **Setup menu** or **DRO**.

Entering the Supervisor Password

Only a limited subset of setup functions will be available until the supervisor password is entered. To enter the **supervisor password**, scroll through the **Setup** menu to **Supervisor**.

Press the **right cursor arrow** to highlight the **password entry field**.

Use the **numeric keyboard** on the front panel to enter the **supervisor password**, then press the **Enter** key.

Supervisor	
About	Password
Display	Startup Zero No
Encoders	
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Supervisor	
About	Password XXXXXX
Display	Startup Zero No
Encoders	
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Language

Scroll through the **Setup** menu with the **up or down cursor key** to highlight the **About** selection.

Press the **right cursor key** to select items in the right portion of the screen. Press the **up or down cursor key** to scroll through the list of languages available for selection. Highlight the desired language and press the **Yes softkey** to select the language. Press the **left cursor arrow** or **Finish button** to save the language selection and return to the **Setup** menu.

About	
About	English Yes
Display	Français No
Encoders	Deutsch No
Hot Keys	Español No
Port	Italiano No
Supervisor	Português No
LEC	Version 1.14
SLEC	Foot
Scale Factor	
Screen	

About	
About	English Yes
Display	Français No
Encoders	Deutsch No
Hot Keys	Español No
Port	Italiano No
Supervisor	Português No
LEC	Version 1.14 Beta 013
SLEC	Foot
Scale Factor	
Screen	
Yes	

Software version and available options

Your system's **software version** and **available options** are listed in the **About** screen.

Display

Scroll through the **Setup** menu to highlight the **Display** function.

Press the **right cursor key** to select items in the right portion of the screen.

Display parameters are divided into measurement display parameters and measure resolution. Set the measurement display parameters as required. Highlighting a parameter causes selection alternatives to be displayed over the softkeys across the bottom of the screen.

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		
▼		

Startup Linear/Angular

Startup Linear and **Startup Angular** settings define the default display of linear and angular measurements. Linear measure-

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		
▼		
MM	Inch	Last

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		
▼		
DD	DMS	Last

ments can be displayed in English or metric units of measure, and angular measurements can be displayed in degrees, minutes and seconds or in decimal degrees. Enter the desired settings and scroll to highlight **Radix**.

Radix

Radix settings are available for English (a dot: 1.000) or European (a comma: 1,000) presentations. Enter the desired parameter setting and scroll to **Current Angular**.

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		
▼		
Decimal	Comma	

Current Angular

Current Angular displays of measured angles can be set to degrees, minutes and seconds or to decimal degrees. This setting defines the presentation of measured angles until power to the system is turned off. When power is reapplied to the system the **Startup Angular** setting will be used to define the display of measured angles. Enter the desired parameter setting and scroll to **MM Disp Res**.

Display Resolution (Disp Res)

Set the numeric values of the display resolution parameters to match the encoder being used by scrolling to a parameter and entering numeric values using the front panel keypad. Press the **Enter** key to complete the entry of each new value. Press the **left cursor arrow** or **Finish** button to save the **Display** parameters and return to the **Setup** menu.

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		
▼		
DD	DMS	

Display		
About	Startup Linear	MM
Display	Startup Angular	DMS
Encoders	Radix	Decimal
Hot Keys	Current Angular	DMS
Port	MM Disp Res	0.0001
Supervisor	Inch Disp Res	0.0001
LEC	DMS Disp Res	0.00.01
SLEC	DD Disp Res	0.001
Scale Factor		
Screen		
▼		

Encoders

Scroll through the **Setup** menu to highlight the **Encoder** selection.

Press the **right cursor key** to select items in the right portion of the screen.

Encoder parameters include the selection of Rad/Dia presentation, encoder resolution, Teach (resolution) function, type of encoder, reference marks, machine zero offset, reversed state, interpolation value, units of measure and axis label. Most encoder inputs are metric and the Units will be set to MM.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	12738
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		

Rad/Dia Type

Press the **Yes softkey** to allow the user to present a measurement as either a radius or diameter. When the **Rad/Dia** function is active, a **Rad** or **Dia** softkey will be added to the bottom of the **DRO** screen.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	12738
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		
No	Yes	

Resolution (Res)

Enter the resolution of the encoder using the **numeric keypad** on the front panel. Press the **Enter button** to store the data and advance the display to highlight **Teach Amt**.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	12738
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		

Teach amount/Scale Cnts

If the encoder resolution is unknown, it can be determined using the **Teach Amt** function and a measurement standard.

To determine the encoder resolution:

Step 1
Mount the standard into the stage and move the stage to target the first side of the known distance (or angle).

Step 2
Set the **Units** data field to the encoder's units of measure if necessary.

Step 3
Enter the standard's known distance (or angle) into the **Teach Amt** data field and press the **Enter** key.

Step 4
Press the **Reset** softkey to zero the **Scale cnts** if necessary.

Step 5
Press the **Teach** softkey to start the count for the standard distance.

Step 6
Move the stage to target the other side of the standard's known distance (or angle), then press the **Teach** softkey again or press the **Finish** key to complete the Teach process and advance to **Ref Marks**.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	0
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	12738
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		
Teach	Reset	Calc

Ref Marks

Encoder reference marks are used by the system for Segmented Linear Error Correction (SLEC) to establish the machine coordinate system. Upon system startup the QC10 may be configured to prompt the user to move the axis encoder across a reference mark or to perform a (manual) hard stop zero prior to measurement activities.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	0
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		
	None	Ref
	Abs AC	Abs HH
		Manual

Press the **softkey** for the type of reference mark used by the encoder and press the **down cursor arrow** or **Enter key** to advance the display and highlight **Mach 0 offset**.

Mach 0 offset

Enter the machine zero offset for the highlighted encoder into the **M.Z. Cnts** data field and press the **down cursor arrow** or the **Enter button** to advance the display and highlight **Reversed**.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	0
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		

Reversed

The normal convention for the display of the polarity of measurements is:

- Motion to the right is positive
- Motion up is positive
- Clockwise rotation is positive

The settings for the axis can be reversed to accommodate the encoder requirements of the measuring system being used. Press the **No softkey** to retain the polarity for the axis, or the **Yes softkey** to reverse the polarity of the encoder input. Press the **down cursor arrow** or **Enter key** to advance the display and highlight **Units**.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	0
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		
	No	Yes

Units

Press the softkey Units type that corresponds to the encoder unit of measure being used.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	0
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		
	In	MM
	Deg	

Label

Press the Dec or Inc softkey to decrement or increment the single-character label designation from A to Z and 0 to 9. Once the encoder has been configured, press the **left cursor arrow** or **Finish** key to return to the **Setup** menu.

Encoders		
About	Rad/Dia	No
Display	Res	0.0015700000
Encoders	Teach Amt	20.000000
Hot Keys	Scale Cnts	0
Port	Ref Marks	None
Supervisor	M.Z. Cnts	0
LEC	Reversed	No
SLEC	Units	MM
Scale Factor	Label	X
Screen		
	Dec	Inc

Hot Keys

Front panel keys and foot switch keys can be defined as **Hot Keys** that are used to activate QC10 display and measurement functions. Front panel keys and foot switch keys are mapped to system functions in the **Hot Keys** portion of the **Setup** menu. Keys that can be mapped to functions or other system keys include:

- **Unit keys**
The 10 number keys (0-9) of the front panel numeric keypad
- **Foot switch**
The 2 switches on the optional foot switch assembly



NOTE
Once a key is mapped to a function or another key and becomes an active Hot Key, it will invoke the designated function when pressed only within the correct context. For example, if the system is being used to measure a dimension and expects the Enter key to be used for data input, it will only interpret the Enter key for data input and will not invoke any Hot Key function that may have been mapped to it.

Using the Cursor arrows, scroll through the **Setup** menu to highlight the **Hot Keys** function.

Press the **right cursor arrow key** to select items in the right portion of the screen.

Defining Hot Key functions

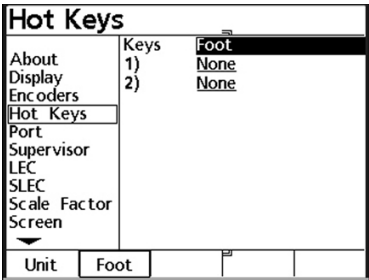
The method used to define hot key functions is identical for Unit and Footswitch keys. A key type is selected using a softkey at the bottom of the LCD, then a key type is selected from the list by scrolling with the **cursor arrows**.

Unit: Key 0 to key 9

Hot Keys		
About	Keys	Unit
Display	0)	None
Encoders	1)	None
Hot Keys	2)	None
Port	3)	None
Supervisor	4)	None
LEC	5)	None
SLEC	6)	None
Scale Factor	7)	None
Screen	8)	None
▼	9)	None

Hot Keys		
About	Keys	Unit
Display	0)	None
Encoders	1)	None
Hot Keys	2)	None
Port	3)	None
Supervisor	4)	None
LEC	5)	None
SLEC	6)	None
Scale Factor	7)	None
Screen	8)	None
▼	9)	None
Unit	Foot	

Foot: Key 1 or key 2



After the specific key is selected, one of the following key types is assigned using a softkey at the bottom of the LCD:

None

No assignment will be made, this will not be a hot key.

Key

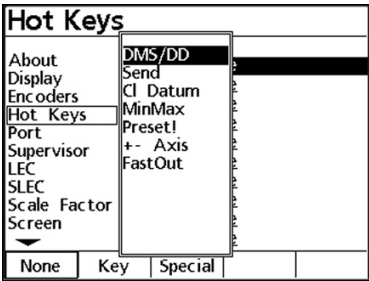
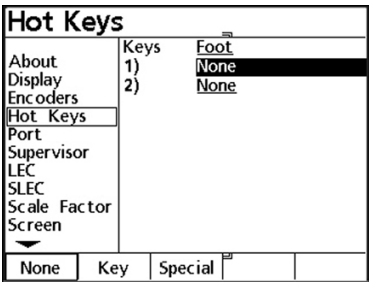
A front panel key function will be assigned by pressing one of the front panel keys.

Special

A QC10 system function will be assigned by scrolling and selecting from the Special list. Functions in the special list include:

DMS/DD

Toggles the display of angles between degrees, minutes and seconds and decimal degrees.



Send

Sends the current axis data displayed on the DRO screen to a printer or computer.

Cl datum

Resets the absolute or incremental datum to machine zero.

Preset

Initiates the Preset function, which displays the Preset Axis screen and allows the user to enter the current datum value.



Min Max

Displays the MinMax screen and accumulates the minimum, maximum and range of values until the Finish key is pressed. This is useful for applications such as measurements of runout.



Preset!

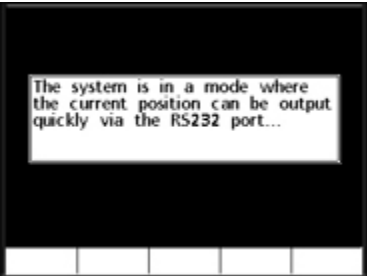
Applies the last preset value to the current datum.

+ - Axis

Toggles the axis between normal polarity and reversed. The axis polarity is configured initially in the Encoders setup screen discussed earlier in this chapter.

FastOut

Initiates the transmission of real-time position values over the RS-232 port. Position values will be sent to the RS-232 port while the FastOut message appears on the screen. Pressing the Finish key disables the FastOut function and begins displaying position values again.



During FastOut data transmission, the normal DRO screen view is disabled to commit the maximum processor resources to the data transmission function. Data is sent as values separated by CR/LF characters at the sample rate of the QC10. The CR/LF line terminators can be changed in the Port setup screen discussed earlier in this chapter.

Example of assigning hot keys

An example of assigning hot keys is provided below and demonstrates how to make two different types of hot key assignments to keys of the numeric keypad. The methods illustrated in this example can be applied directly to the assignment of Hot Keys to any of the Unit and Foot keys.

Press the **right cursor arrow** key to select items in the right portion of the Hot Keys screen and press the **Unit softkey** at the bottom of the LCD if necessary.

Hot Keys		
About	Keys	Unit
Display	0)	None
Encoders	1)	None
Hot Keys	2)	None
Port	3)	None
Supervisor	4)	None
LEC	5)	None
SLEC	6)	None
Scale Factor	7)	None
Screen	8)	None
	9)	None
Unit	Foot	

Assigning Cancel to key 9
Use the **up or down cursor arrow** to scroll the list of 10 Unit Keys and highlight the desired key. **Unit key number 9** is used in this example.

Hot Keys		
About	Keys	Unit
Display	0)	None
Encoders	1)	None
Hot Keys	2)	None
Port	3)	None
Supervisor	4)	None
LEC	5)	None
SLEC	6)	None
Scale Factor	7)	None
Screen	8)	None
	9)	None
None	Key	Special

Press the **Key softkey** at the bottom of the LCD to assign a front panel key. You will be instructed to press the key that you wish to assign.

Hot Keys		
About	Keys	Unit
Display	0)	None
Encoders	1)	None
Hot Keys	2)	None
Port	3)	None
Supervisor	4)	None
LEC	5)	None
SLEC	6)	None
Scale Factor	7)	None
Screen	8)	None
	9)	None
Press the key that you wish to assign...		
None	Key	Special

Press the desired front panel key (**Cancel** in this example). The new assignment will appear in the key list.

Hot Keys		
About	Keys	Unit
Display	0)	None
Encoders	1)	None
Hot Keys	2)	None
Port	3)	None
Supervisor	4)	None
LEC	5)	None
SLEC	6)	None
Scale Factor	7)	None
Screen	8)	None
	9)	Cancel
None	Key	Special

Assigning Min/Max to key 5
Use the **up or down cursor arrow** to scroll the list of 10 Unit Keys and highlight the desired key. **Unit key number 5** is used in this example.

Hot Keys		
	Keys	Unit
About	0)	None
Display	1)	None
Encoders	2)	None
Hot Keys	3)	None
Port	4)	None
Supervisor	5)	None
LEC	6)	None
SLEC	7)	None
Scale Factor	8)	None
Screen	9)	None
None Key Special		

Press the **Special softkey** at the bottom of the LCD to assign a QC10 function. The Special list of QC10 functions will be displayed.

Hot Keys		
About	DMS/DD	
Display	Send	
Encoders	CI Datum	
Hot Keys	MinMax	
Port	Preset!	
Supervisor	+- Axis	
LEC	FastOut	
SLEC		
Scale Factor		
Screen		
None Key Special		

Use the **up or down cursor arrow** to scroll the list of functions and highlight the desired function (Min/Max in this example).

Hot Keys		
About	DMS/DD	
Display	Send	
Encoders	CI Datum	
Hot Keys	MinMax	
Port	Preset!	
Supervisor	+- Axis	
LEC	FastOut	
SLEC		
Scale Factor		
Screen		
None Key Special		

Press the **Enter key** to assign the function. The new assignment will appear in the key list.

Hot Keys		
	Keys	Unit
About	0)	None
Display	1)	None
Encoders	2)	None
Hot Keys	3)	None
Port	4)	None
Supervisor	5)	MinMax
LEC	6)	None
SLEC	7)	None
Scale Factor	8)	None
Screen	9)	None
None Key Special		

Port

Scroll through the **Setup** menu to highlight the **Port selection**. Serial (RS-232) communications are configured in the screen.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes

Press the **right cursor arrow** to select items in the right portion of the screen.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
Dec	Inc	

Baud rate

The RS-232 baud rate can be decremented or incremented to the desired value by pressing the **Dec or Inc softkeys**.

The available baud rates are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

Press the **Dec or Inc softkeys** to select the required baud rate and press the **down cursor arrow** or **Enter key** advance the display and highlight **Word Len**.

Word Length (Word Len)

Select the required number of bits per word by pressing the desired **softkey** and press the **down cursor arrow** or the **Enter key** to advance the display and highlight **Stop Bits**.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
7	8	

Stop Bits

Select the required number of stop bits by pressing the desired **softkey** and press the **down cursor arrow** or the **Enter** key to advance the display and highlight **Parity**.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
1	2	

Parity

Select the required parity format by pressing the desired **softkey** and press the **down cursor arrow** or the **Enter** key to advance the display and highlight **Handshake**.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
None	Odd	Even

Handshaking

The Handshake field shows the type of synchronous signaling used by the system to prevent data collisions on the serial port. This is set to hardware and cannot be changed.

Data

Measurement data can be sent to the serial port for printing or transmission to a computer. Press the **None softkey** if no printing or data transmission is desired. Press the **Position softkey** to print or transmit the data displayed on the LCD.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
None	Position	

EOC Delay

The EOC (**End of Character**) delay field is used to specify the delay inserted after each character is transmitted. This delay can be increased or decreased to accommodate various serial devices. Use the numeric keypad to specify delays (in milliseconds) from 0 to 10 seconds between characters.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes

EOL Delay

The EOL (End of Line) delay field is used to specify the delay inserted after each line is transmitted. This delay can be increased or decreased to accommodate various serial devices. Use the numeric keypad to specify delays (in milliseconds) from 0 to 10 seconds between lines.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes

Line terminator

Press the CR or CR/LF softkey to select the delimiting character(s) appended to each transmission of DRO data.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
CR	CR/LF	

Send label

Press the Yes softkey to include the axis label designator with each transmission of the DRO value.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
No	Yes	

Send units

Press the Yes softkey to include the axis unit of measure with each transmission of the DRO value.

Press the left cursor arrow or Finish key to return to the Setup menu.

Port		
About	Baud	38400
Display	Word Len	8
Encoders	Stop Bits	1
Hot Keys	Parity	Odd
Port	Handshake	Hard.
Supervisor	Data	None
LEC	EOC Delay	330
SLEC	EOL Delay	0
Scale Factor	Line Terminator	CR/LF
Screen	Send Label	Yes
	Send Units	Yes
No	Yes	

Supervisor

Scroll through the **Setup** menu to highlight the **Supervisor** selection. The **Supervisor password** can be entered into the **Password data field** to enable setup functions, and a startup encoder zero requirement can be specified.

Password

Press the **right cursor arrow** and enter the **Supervisor password** using the **numeric keypad**. Press the **Enter** or **Finish** key when the password is complete. Press the **down cursor arrow** or **Enter** key to advance to **Startup zero**.

Startup zero

Press the **Yes** softkey to require encoder reference mark crossings or a manual hard stop upon system startup. Press the **left cursor arrow** or **Finish** button to return to the **Setup** menu.

Supervisor	
About Display Encoders Hot Keys Port Supervisor LEC SLEC Scale Factor Screen	Password Startup Zero <u>No</u>

Supervisor	
About Display Encoders Hot Keys Port Supervisor LEC SLEC Scale Factor Screen	Password <u>XXXXXX</u> Startup Zero <u>No</u>

Supervisor	
About Display Encoders Hot Keys Port Supervisor LEC SLEC Scale Factor Screen	Password <u>XXXXXX</u> Startup Zero <u>No</u>
No	Yes

Error Correction

Linear and segmented linear error correction methods can be used with the QC10 and are provided with every QC10 system. Each method compensates for encoder and machine travel variations using error correction coefficients developed by comparing actual measurements of a standard to the standard’s nominal values.

Linear error correction (LEC) uses one correction coefficient for the entire axis to compensate for variations along the axis. A standard is measured and the standard’s nominal and measured values are specified during the setup process. The resulting correction coefficient is then applied to measured displacements. For example, a linear error correction coefficient of 0.0002 "/inch applied to a 6" measurement along the X axis would produce a measurement result of 6.0012".

Segmented linear error correction (SLEC) divides each axis into up to 60 segments. Each segment uses one error correction coefficient to compensate for variations within the segment. The correction also includes a machine zero offset to refer the position of the standard’s datum to the machine zero reference. The standard’s nominal and measured segment values are specified during the setup process. The machine zero offset for the axis is also specified. When SLEC is used, the stage must be moved to cross a reference mark, or a hard-stop zero must be performed upon system startup to create a repeatable machine zero for the SLEC error correction data.

Linear error correction (LEC)

Scroll through the Setup menu to highlight **Linear Error Correction (LEC)**. Linear error correction coefficients are used to compensate for overall encoder and machine travel variations. A standard is measured, and the measured value is compared to the known value of the standard to generate the correction coefficient. Correction coefficients are generated and used in subsequent measurements to provide linear compensation for encoder variations.

LEC	
About	Linear Error Correction
Display	Standard 1.000
Encoders	Observed 1.000
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Press the **right cursor arrow** to select items in the right portion of the screen.

Enter the nominal value of the standard into the **Standard data field** using the **numeric keypad** on the front panel.

Measure the standard and enter the measured value into the **Observed data field** using the **numeric keypad** on the front panel.

When the nominal and observed data is entered, press the **left cursor arrow** or **Finish button** to return to the **Setup menu**.

LEC	
About	Linear Error Correction
Display	Standard 10.00003
Encoders	Observed 1.000
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
⏮	

LEC	
About	Linear Error Correction
Display	Standard 10.00003
Encoders	Observed 9.997
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
⏮	

Segmented Linear Error Correction (SLEC)

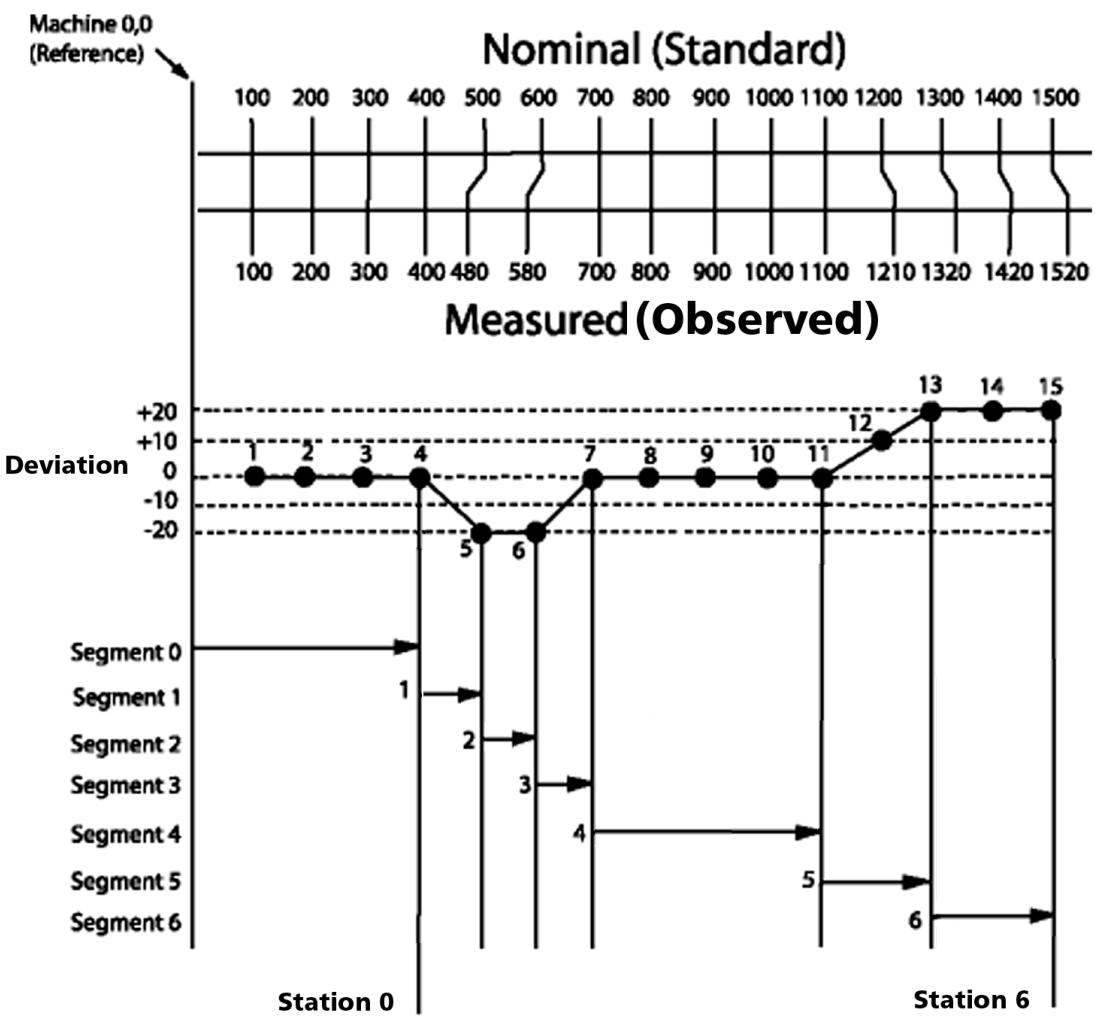
Scroll through the **Setup menu** to highlight **Segmented Linear Error Correction (SLEC)**. Linear error correction coefficients are applied to segments of the axis to compensate for encoder and machine travel variations. The standard is measured and the measured values are compared to the nominal values to generate a table of correction coefficients. Correction coefficients are generated for each segment that deviates from the nominal value. The correction coefficients are then used to provide linear compensation for only the segments requiring it.

SLEC	
About	Enabled <u>Off</u>
Display	Station 0
Encoders	Standard
Hot Keys	Observed
Port	
Supervisor	MZ Offset 0.00000
LEC	
SLEC	
Scale Factor	
Screen	
⏮	

Mount the standard on the stage and zero the measurement axis on the datum of the standard. Measure and graph the *nominal* and *actual* segment values as shown.

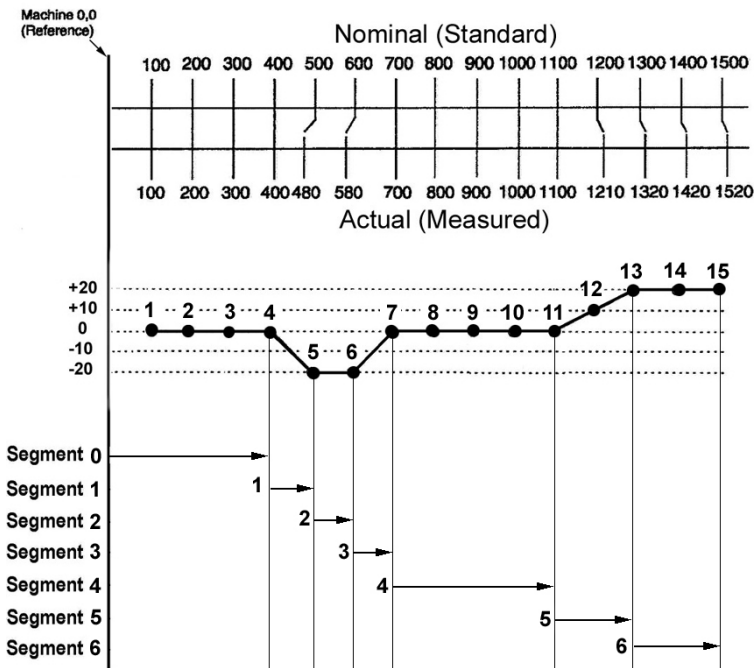


NOTE
A segment is any group of points that combine to form a straight line. The numbers used in this example are only meant to illustrate the process and are not intended to suggest actual values.



Enter the nominal and actual end points of each segment into the SLEC **Standard** and **Observed** data fields as shown below. A maximum of 60 segments (0-59) can be entered.

SLEC	
Enabled	Off
About Display Encoders	Station 0
Hot Keys Port	Standard 400.00000
Supervisor LEC	Observed 400.00000
SLEC	MZ Offset 0.002
Scale Factor	
Screen	
Teach	



Press the **ON** softkey to enable SLEC compensation.

Press the **left cursor arrow** or **Finish** button to return to the Setup menu.

Enter the offset from the Machine zero to the standard's datum into the **MZ Offset** data field.

SLEC	
About	Enabled Off
Display	Station 0
Encoders	Standard 400.00000
Hot Keys	Observed 400.00000
Port	MZ Offset 0.002
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
Teach	

Continue entering Station data until all segments are described.

SLEC	
About	Enabled Off
Display	Station 6
Encoders	Standard 1500.00000
Hot Keys	Observed 1520.00000
Port	MZ Offset 0.00200
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
Teach	

Scale factor

Scroll through the **Setup** menu to highlight the **Scale factor** function.

Values measured can be scaled by a user-defined multiplier when the **Scale factor** function is active. This function is useful when measuring parts that shrink or expand under actual-use conditions.

Press the **Yes** softkey to activate the **Scale factor** function.

Press the **down cursor arrow** or **Enter** key to highlight the **Multiplier data field**. Enter the **Scale factor** value into the **Multiplier data field** using the numeric **keypad**. All measurements will be multiplied by this value before they are displayed on the DRO screen.

Press the **Yes** softkey to allow the user to enter the **Setup menu** and set a new **Multiplier** value for the **Scale factor** without entering the Supervisor password.

Press the **left cursor arrow** or **Finish button** to return to the **Setup** menu.

Scale Factor	
About	Active
Display	Multiplier
Encoders	User Settable
Hot Keys	No
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Scale Factor	
About	Active
Display	Multiplier
Encoders	User Settable
Hot Keys	No
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Scale Factor	
About	Active
Display	Multiplier
Encoders	User Settable
Hot Keys	No
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Scale Factor	
About	Active
Display	Multiplier
Encoders	User Settable
Hot Keys	No
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	

Screen

Scroll through the **Setup** menu to highlight the **Screen** function.

LCD screen functions such as LCD contrast and backlighting, screen saver delay and startup parameters are configured in the Screen setup screen.

Screen	
About	Contrast 350
Display	Backlight 145
Encoders	Scr Saver Min 10
Hot Keys	Startup Delay 2
Port	Startup Delay2 1
Supervisor	Startup Cycles 1
LEC	
SLEC	
Scale Factor	
Screen	
▼	

Contrast

The Contrast field is used to adjust the default LCD display contrast used when power is applied to the system. The factory default contrast value is 350. This provides sharp contrast and excellent readability in most lighting situations.

Screen	
About	Contrast 350
Display	Backlight 145
Encoders	Scr Saver Min 10
Hot Keys	Startup Delay 2
Port	Startup Delay2 1
Supervisor	Startup Cycles 1
LEC	
SLEC	
Scale Factor	
Screen	
▼	

Increased values of Contrast increase the contrast of displayed text and images. Highlight the Contrast field and use the numeric keypad to enter the desired value.



NOTE

LCD screen contrast can be adjusted temporarily when displaying screens other than setup menu screens by pressing the numeric keypad decimal point or +/- keys. These temporary adjustments will be retained until the QC10 power is cycled off and on again.

Backlight

The Backlight field is used to adjust the default LCD backlighting used when power is applied to the system. The factory default LCD backlighting value is 145. This provides adequate backlighting for most lighting situations.

Screen	
About	Contrast 350
Display	Backlight 145
Encoders	Scr Saver Min 10
Hot Keys	Startup Delay 2
Port	Startup Delay2 1
Supervisor	Startup Cycles 1
LEC	
SLEC	
Scale Factor	
Screen	
▼	

Increased values of Backlight decrease the backlighting of the LCD. Highlight the Backlight field and use the numeric keypad to enter the desired value.

Screen saver minutes

The Scr Saver Min field is used to specify the minutes of QC10 inactivity before the LCD screen saver is displayed.

Highlight the Start Scr Saver field and use the numeric keypad to enter the desired value.

Screen		
About	Contrast	350
Display	Backlight	145
Encoders	Scr Saver Min	10
Hot Keys	Startup Delay	2
Port	Startup Delay2	1
Supervisor	Startup Cycles	1
LEC		
SLEC		
Scale Factor		
Screen		

Startup delay

Startup delay is a factory parameter used during final test activities, and should not be adjusted in the field.

Startup delay 2

Startup delay 2 is a factory parameter used during final test activities, and should not be adjusted in the field.

Startup cycles

Startup cycles is a factory parameter used during final test activities, and should not be adjusted in the field.

Misc

Scroll through the **Setup** menu to highlight the **Misc** function. The auto-repeat interval for certain keys that repeat when they are pressed and held and the volume of the speaker deep can be configured. The QC10 can also be configured to zero the current datum remotely from a Boeckeler rotary encoder.

Key delay

When certain front panel keys (such as number keys) are pressed and held, they will repeat automatically. Enter small values into the **Key delay data field** for rapid repeating or large values for slow repeating.

External zero

Press the Yes softkey to zero the current datum remotely from a Boeckeler rotary encoder.

Misc.	
Display	Key Delay 6
Encoders	External 0 No
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
Misc.	

Misc.	
Display	Key Delay 6
Encoders	External 0 No
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
Misc.	

Misc.	
Display	Key Delay 6
Encoders	External 0 No
Hot Keys	
Port	
Supervisor	
LEC	
SLEC	
Scale Factor	
Screen	
Misc.	
No	Yes

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