

Quadra-Chek® 5000

User's Guide

Contents

Overview	1-1
Welcome to the QC-5000	1-1
About This Guide	1-3
Icons and Type Faces	1-4
Warning	1-4
Caution	1-4
Note	1-4
Italics	1-4
Starting the QC-5000	1-5
To open the QC-5000	1-5
Windows and Toolbars	1-6
QC-5000 Windows	1-8
DRO	1-8
The Results Window	1-8
Feature Specifications	1-8
To move information from the results window to the features list	1-9
Locked/unlocked features	1-10
To unlock a feature	1-10
To lock a feature	1-10
Feature type diagram /feature stamp	1-11
To open the feature stamp window	1-11
The Part View Window	1-12
Single pane part view	1-12
Four pane part view	1-13
View Rotator	1-14
To use the view rotator	1-14
Template Windows	1-15
To separate template windows	1-15
To nest template windows	1-17
Status Bar	1-18
To add items to the status bar	1-18
To delete items from the status bar	1-20
Main Menu Bar	1-22
Toolbars	1-22
Datum toolbar	1-22
Measure toolbar	1-22
Probe toolbar	1-22
View toolbar	1-22
Tolerance toolbar	1-22
Program toolbar	1-23
File toolbar	1-23
VED toolbar	1-23
Custom toolbar	1-23
To place a toolbar on the QC-5000 desktop	1-24
To remove a toolbar from the QC-5000 desktop	1-25
To add buttons to a toolbar	1-26
To remove buttons to a toolbar	1-28

Quick Start	2-1
Getting Started	2-1
General Preparation	2-1
To open the QC-5000 software	2-1
To set machine zero	2-2
To display the feature list	2-2
To display the program template	2-3
To nest the template windows	2-4
Select the Active Probe	2-5
To select the active probe	2-5
Probing Technique	2-5
Good probing techniques	2-5
Bad probing techniques	2-5
Recording the Quick Start Program	2-6
Clearance moves	2-6
To insert a clearance move	2-7
Creating the Start Point	2-8
To record the quick start program	2-8
To move the probe to the start point	2-9
Recording the Part View Window	2-10
To record the part view window display	2-10
Creating the Datum	2-11
To create the primary plane	2-11
Creating the Secondary Alignment	2-14
To create a secondary alignment	2-14
Creating the Zero Point	2-17
To activate the VED probe group	2-17
To select a magnification	2-18
To create an arc tool	2-18
To re-size a VED probe tool	2-21
To create a zero point	2-22
Save the Reference Frame	2-30
To save the reference frame	2-30
To activate the contact probe group	2-31
Touch Probe Measurement	2-32
To measure a circle	2-33
Measuring 3-D Features	2-36
To change the part view perspective	2-36
To measure a cone	2-38
To measure a cylinder	2-41
To measure a plane	2-50
2-D Measurement with VED	2-53
To change the part view perspective	2-53
To activate the VED probe group	2-55
To create a circle probe tool	2-56
To measure circle 3	2-59
To measure circle 4	2-61
To construct a bolt hole circle	2-64
To construct a nearest distance	2-66

To construct a farthest distance	2-68
To construct a center-to-center distance	2-70
Creating the Second Reference Frame	2-72
To change the part view	2-72
To measure a circle	2-74
To create the second reference frame	2-81
To save a reference frame	2-83
To create a duplicate feature	2-84
To construct an angle	2-86
To select the active probe	2-87
To measure a line	2-88
To measure a line	2-90
To construct an angle	2-92
To perform a bi-directional tolerance	2-93
To perform a true position tolerance	2-97
To perform a width tolerance	2-100
To open the all tolerance template	2-102
To modify template properties	2-104
To enter a formula	2-107
Dynamic data exchange	2-109
To DDE output to Excel	2-109
To export a tab delimited file to a spreadsheet	2-113
To export to a .csv file (comma separated value)	2-116
To export Access 2000	2-119
To complete the quick start program	2-122
To run the quick start program	2-123
Probes	3-1
Video Edge Detection (VED)	3-1
To create a new magnification	3-1
To delete a magnification	3-3
To assign a zoom position for a magnification	3-5
VED Calibrations	3-7
To perform an auto focus teach	3-7
To perform an edge teach	3-12
Pixel calibration	3-15
To perform a pixel calibration	3-15
To perform a camera calibration	3-20
Parcentricity calibration	3-27
To perform a parcentricity calibration	3-27
VED Probes	3-34
New probe tool	3-34
To access the new probe tool	3-34
Hand cursors	3-36
To move a probe tool	3-36
To re-size a probe tool	3-38
To rotate a probe tool	3-40
Simple probe	3-42
To create a simple probe	3-42
Circle probe	3-44
To create a circle probe	3-44

Contents

Buffer probe	3-46
To create a buffer probe	3-46
Average probe	3-48
Nearest probe	3-48
Farthest probe	3-49
Height probe	3-49
Width probe	3-50
Blob probe	3-50
Pattern probe	3-51
Worm probe	3-52
Video Probes	3-57
Crosshair probe	3-57
Video charts probe	3-57
Edge Teaching	3-58
To perform a simple edge teach	3-59
To perform an advanced edge teach	3-61
Probe Library	3-64
Probe Families & Groups	3-64
TouchProbe group	3-65
StarProbe group	3-65
To create a new probe group	3-66
Probe Calibration	3-68
Master probe tips	3-69
To teach (qualify) a master probe tip	3-69
To teach (qualify) a non-master probe tip	3-72
Cross Calibration of Touch Probe and Camera	3-75
To cross calibrate a touch probe to a VED camera	3-75
Using a Probe Rack	3-82
Probe Rack Setup	3-82
Probe rack orientation	3-83
+X Orientation	3-83
+Y Orientation	3-84
-X Orientation	3-85
-Y Orientation	3-86
Probe Rack Calibration	3-87
Initial clearance:	3-87
Docking distance:	3-87
Retract distance:	3-87
Dropping in Z:	3-87
Pickup in Z:	3-87
Release in Z:	3-87
Approach in Z:	3-87
Port position offset:	3-88
DATRACK part program	3-89
To check probe rack orientation	3-89
To run the DATRACK program	3-90
To edit the initial settings of the DATRACK program	3-91
To enter the datum in the DATRACK program	3-93
To load a probe	3-97
To unload a probe	3-99

Programming	4-1
Programming Overview	4-1
The Program Toolbar	4-2
Record/Edit Program	4-2
Pause Program	4-2
New Run	4-2
Run Program From Current Step	4-2
Run Just Current Step	4-2
Recording a Program	4-3
To create a program	4-3
To open a saved program	4-5
Running A Program	4-6
To run a program	4-6
Sample Program	4-7
To create a new part file	4-7
To record a program	4-8
To display the feature list	4-9
To display the program template	4-10
To record the part view window display	4-11
To insert a clearance move	4-12
To measure the primary plane	4-13
To measure the secondary line	4-16
To switch the active probe to VED	4-19
To create an arc tool	4-20
To measure the zero feature	4-23
To create a zero point	4-30
To save the reference frame	4-31
To measure a circle	4-32
To construct a distance	4-35
To save a program	4-37
To run a program	4-38
Program Properties	4-39
Fixturing tab	4-40
General tab	4-41
Initial Settings	4-42
Display part view map	4-42
Hide position indicator	4-42
Light control	4-42
Probe path data	4-42
Editing Programs	4-44
To edit a wait for point(s) step	4-44
To edit a light control statement	4-46
To change coordinate of a clearance move or goto position step	4-48
Creating User Messages	4-50
To Insert A User Message	4-50
Programming Wizards	4-51
Grids	4-51
To create a grid	4-51
Polar grids	4-55
To create a polar grid	4-55
Palletize	4-60

Contents

To palletize multiple parts	4-60
Random Placement	4-63
To insert reference steps in a part program	4-63
To create a random placement	4-65
To run a parts program with a random placement	4-66
To copy and paste special	4-67
Expanding the Program Toolbar	4-72
Program Toolbar	4-74
Toggle Break Point	4-74
Program Comment	4-74
Edit Steps	4-74
If-Goto	4-74
If-Then	4-74
Else	4-75
Else-If	4-75
Super Step	4-75
Goto Label	4-75
Offset Positions	4-75
To add buttons to a toolbar	4-76
To delete buttons from a toolbar	4-78
Conditional Statements	4-80
Test Conditions	4-80
Actions	4-80
Arithmetic Operators	4-81
If-Goto Statement	4-82
If-Then Statement	4-83
Else Statement	4-84
Else-If Statement	4-85
Tolerancing & Templates	5-1
Tolerancing	5-1
Tolerance Toolbar	5-1
To view the tolerance toolbar	5-1
Bi-directional tolerance (circles, points, arcs, spheres)	5-3
To perform a bi-directional tolerance	5-3
Pass/ Fail Displays	5-5
True position tolerance (circles, points arcs, spheres)	5-5
To perform a true position tolerance	5-5
To perform a MMC tolerance	5-8
To perform a LMC	5-11
Concentricity tolerance (circles, arcs)	5-14
To perform a concentricity tolerance	5-14
Straightness tolerance (lines)	5-16
To perform a straightness tolerance (lines)	5-16
Circularity/sphericity tolerance (circles, spheres)	5-18
To perform a circularity tolerance	5-18
To perform a sphericity tolerance	5-20
Cylindricity tolerance (cylinders)	5-22
To perform a cylindricity tolerance	5-22
Flatness tolerance (planes)	5-24
To perform a flatness tolerance	5-24

Perpendicularity tolerance (lines, cylinders, cones)	5-26
To perform a perpendicularity tolerance	5-26
Parallelism/Co-planarity tolerance (linear features)	5-28
To perform a parallelism tolerance	5-28
To perform a co-planarity tolerance	5-30
Circular runout tolerance	5-32
To perform a circular runout tolerance	5-32
Angle tolerance	5-34
To perform an angle tolerance	5-34
Width tolerance	5-36
To perform a width tolerance	5-36
Templates	5-38
Features Template	5-39
To open the features template	5-39
Adding Data to Templates	5-41
To drag & drop a results window field to the features list	5-41
To drag & drop multiple results window fields to the features list	5-42
Sorting the Features List	5-43
To sort data in the features list	5-43
Reports Template	5-44
To open the reports template	5-44
Adding Data to the Reports Template	5-46
To drag & drop a results window field to the reports template	5-46
To drag and drop multiple results window fields to the reports template	5-47
Sorting Data in the Reports Template	5-48
To sort data in the reports template	5-48
Report Headers	5-49
To show a report header	5-49
Customizing Report Headers	5-51
To place a graphic in a report header	5-51
To arrange text and graphics in a report header	5-52
Automated Text Input & Prompting	5-53
Overlays	5-54
To save a report header as an overlay	5-54
To place an overlay in a report header	5-55
Program Template	5-56
To open the program template	5-56
Template Properties	5-58
To access the template features dialog box	5-58
Template Features Dialog Box	5-59
Display tab	5-59
Filters tab	5-64
To create a filter	5-64
To modify a filter	5-70
To remove a filter	5-72
Misc tab (miscellaneous)	5-73
Column Properties	5-74
Standard column properties	5-74
Appearance tab	5-74
Formulas tab	5-74

Contents

Sample Formula	5-77
To create the sample formula	5-77
To modify a formula	5-82
To remove a formula	5-84
Runs Template	5-85
To open the runs template	5-85
To add data to the runs template	5-86
Nesting Template Windows	5-87
To nest template windows	5-87
To separate template windows	5-88
Creating New Templates	5-89
To create a new template	5-89
 User Setup Screens	6-1
Encoder setup program	6-2
Configuring analog and TTL encoders	6-2
Calibrating analog encoders	6-3
Setup Tools/Customize screens	6-6
Colors screen	6-6
Changing item colors	6-6
Color list items	6-7
Dark edge and light edge tools	6-8
DRO axis, digits and window	6-8
Feature stamp background, filtered and selected point	6-9
QC5000 window	6-9
Results text and window	6-9
Part view parents, probe indicator, selection border, window	6-10
Pattern finder failure and success	6-10
Point stake marks	6-11
Temporary stake marks	6-11
Profile background	6-11
Probe selector background, current probe, new qualification, old qualification and text	6-12
Whiskers (used to display profile form errors)	6-12
Help screen	6-12
Misc screen	6-14
Errors screen	6-15
System error messages	6-15
Statusbar screen	6-17
Toolbars screen	6-18
Displaying toolbar buttons	6-18
Adding buttons to a toolbar	6-19
Removing buttons from a toolbar	6-19
Enable/Disable raised edges for toolbar buttons	6-20
Allows/Prohibit toolbar docking	6-20
Mapping parts to a toolbar	6-20
Mapping workspaces to toolbar	6-21
Creating custom toolbars	6-22

Setup Tools/Options screens	6-23
VEDscreen	6-23
Automatic probe alignment and the high accuracy mode	6-23
Specifying the advanced teach mode	6-24
Scaling video charts to magnification	6-25
Specifying pattern search rings	6-26
Specifying search ring overlap	6-27
Calibrating the display of magnification value	6-28
Allow crosshair probes to rotate	6-30
Allowing video charts to rotate	6-30
Moving video charts with a mouse	6-31
Moving video charts with the part	6-31
Specifying video camera image type	6-31
Specifying video probe animation rate	6-32
Specifying maximum field of view for worm tool (probe)	6-32
Specifying pattern file names	6-33
FOV spherical and NLEC corrections	6-34
Specifying a larger video window	6-34
Probes screen	6-36
Specifying probe qualification sphere diameter	6-36
Debouncing the touch probe	6-36
Preventing multiple probe hits	6-37
Specifying probe re-qualification across sessions	6-37
Adding requalification to the features list	6-37
Specifying maximum form error for qualification	6-37
Specifying indexable probe type	6-37
Specifying interchangeable probes	6-38
Specifying the probe requalification interval	6-38
Specifying user prompts for probe position change	6-38
Programming screen	6-39
Starting program recording automatically	6-39
Including light adjustments in programs	6-40
Including probe qualifications in programs	6-40
Specifying vector probing	6-40
Enabling sounds during program execution	6-43
Specifying the minimum percentage of VED points	6-43
Specifying CNC movement warnings	6-43
Delaying VED tool firing after CNC moves	6-43
Showing program complete messages	6-44
Showing VED tools in the video window in max speed mode	6-44
Enabling collision avoidance for touch probes	6-44
Halting execution for failure to select features	6-44
Runs screen	6-45
Sounds screen	6-46
Locks screen	6-47
Locking Windows	6-47
Locking programs	6-47
Locking templates	6-47
Locking results	6-48
Locking the status bar	6-48
Locking the DRO	6-48

Contents

Locking the run mode	6-48
Locking part	6-48
Locking supervisor settings	6-48
Locking user settings	6-48
Locking the video window	6-48
Measure screen	6-49
Specifying feature display defaults	6-49
Specifying distance type	6-50
Starting Measure Magic automatically	6-50
Pre-selecting features for construction	6-51
Displaying distances as absolute values	6-51
Enabling magnetic planes	6-51
Automatically complete point measurements	6-51
Specifying the maximum number of measurement points	6-52
Part view screen	6-53
Specifying part view tiles	6-54
Specifying probe position indicator type	6-54
Specifying point size	6-54
Specifying feature selection zones size	6-55
Specifying automatic redraw of part view	6-55
Zooming to view whole part on measurements	6-55
Zooming to view whole part on constructions	6-56
Displaying feature numbers and names on part views	6-56
Displaying only features	6-56
Displaying features with numbers	6-57
Displaying features with numbers and names	6-58
Highlighting parents of constructed features	6-60
Saving layers with settings files	6-61
Displaying grid lines in planes	6-61
Displaying 3-D features as wireframes	6-62
Buttons screen	6-63
Level-based button functions	6-64
Button functions that are invoked only once	6-64
Feature measure functions	6-65
View from probe	6-65
Axis lock	6-65
Speed toggle	6-66
Motors off	6-66
Swap Z joystick	6-66
Swap Z digital positioner	6-66
Swap Q joystick	6-66
Go to here	6-66
Pause program	6-66
Run program	6-66
Display screen	6-67
Specifying display resolution	6-67
Formatting the display of time, date and angles	6-67
Displaying the distance to target surfaces for CNC moves	6-68
Encoder screen	6-69
Specifying encoder resolution	6-69
Specifying encoder unit of measure	6-69
Specifying encoder count direction	6-69

Specifying encoder reference marks	6-70
Reference offsets	6-70
Files screen	6-71
Specifying file locations	6-71
File types	6-72
Backups	6-72
Exports	6-72
Imports	6-72
Overlays	6-72
Parts	6-72
Templates	6-72
Patterns	6-72
Saving part files automatically	6-73
Showing full file names	6-73
Performing automatic backups	6-73
General screen	6-74
User access to settings	6-74
Sending coefficient data to the serial port	6-75
Setting machine zero	6-75
Moving the datum on alignments	6-76
Starting Datum Magic automatically	6-77
Displaying results in wide format	6-77
Opening the last part automatically	6-77
Tracking user activity	6-77
Setup Tools/CNC screens	6-79
Joystick screen	6-79
Enabling/Disabling joystick motion control	6-79
Viewing current position values	6-79
Sharing axes	6-80
Specifying a deadband	6-81
Calibrating the joystick	6-81
Viewing calibration values	6-81
Specifying axis motion direction	6-81
Specifying normal and fine velocities	6-82
Specifying the axis motion profile	6-82
Axis velocity	6-83
Joystick displacement	6-83
Motion mouse screen	6-83
Specifying X and Y axis movement sensitivity	6-83
Specifying X and Y axis movement direction	6-84
Specifying Z-axis movement sensitivity	6-84
Specifying Z-axis movement direction	6-85
Enabling/disabling the motion mouse	6-85
Probe Rack Settings screen	6-86
Probe rack installation	6-87
Probe Rack Calibration	6-88
Defining the probe rack type	6-88
Probe rack parameters	6-88
Initial clearance	6-88
Docking distance	6-88
Retract distance	6-88

Contents

Dropping in Z	6-89
Pickup in Z	6-89
Release in Z	6-89
Approach in Z	6-89
Entering port position offset	6-89
Checking the probe rack orientation	6-89
Running the DATRACK part program	6-90
Entering the datum in the DATRACK program	6-92
Appendix A Profile measurement	A-1
Operator screens and menus	A-2
The Measure Profile window	A-2
Measure profile menu and toolbar	A-3
Conducting manual profile measurements	A-4
Displaying the Measure toolbar	A-5
Initiating a profile measurement	A-5
Importing a nominal part profile	A-5
Importing for drawing file	A-6
Importing from the Features template	A-7
Measure Profile window functions	A-8
Allowing (or prohibiting) data shifts during profile fit analyses	A-8
Assigning measurement tolerances	A-8
Equal bilateral tolerances	A-9
Unequal tolerances	A-9
Entering part data from the Measure Profile window	A-10
Importing part data from the Features template	A-10
Removing the last data point entered	A-10
Initiating a fit analysis	A-11
Canceling a profile measurement	A-11
Resetting the fit results and restoring data points	A-11
Selecting data in the Measure Profile window	A-11
Displaying the form error of a single data point or whisker	A-12
Accessing the Measure Profile menu	A-12
Completing the profile measurement	A-13
Measure profile menu and toolbar functions	A-14
Printing the contents of the Measure Profile window	A-15
Zooming to display all images in the Measure Profile window	A-15
Zooming in and out to display more or less detail	A-15
Panning to reposition the image in the Measure Profile window	A-16
Showing or hiding profile fit information	A-17
Results	A-17
Filtered	A-18
Tolerance	A-18
Material	A-19
Points	A-20
Passed	A-21
Failed	A-21
Magnifying the display of form error whiskers	A-22
Fixed magnification	A-22
Automatic magnification	A-22
User-defined magnification	A-23

Driving the CNC stage to a selected point location	A-23
Sending (exploding) the profile fit data as points and distances to the Features template	A-24
Filtering selected points from the part data	A-25
Filtering the worst (form error) point from the part data	A-25
Unfiltering (restoring) filtered data points	A-25
Manually fitting part data to the nominal profile	A-26
Clicking and dragging (translating) data points	A-26
Clicking and rotating data points	A-26