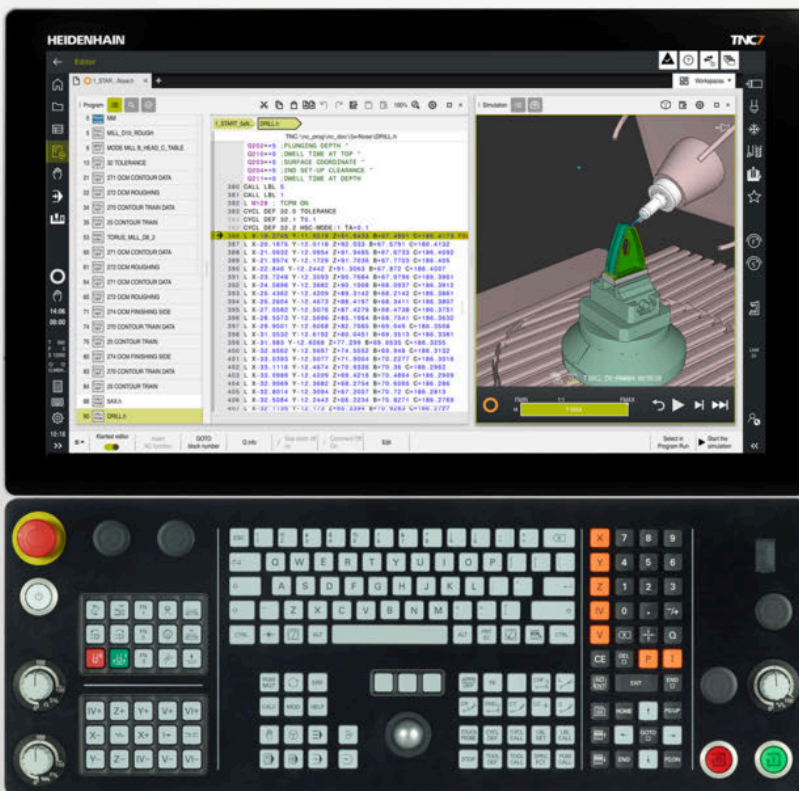




## TNC7

Overview of New and Modified Software Functions

NC Software  
81762x-17 to 81762x-18



## About this document

This document describes the new and modified software functions of the TNC7. Each software version is covered in a separate chapter.

The chapters are structured as follows:

- New software options
- New functions
- Modified or extended functions

The contents of the subchapters are subdivided and sorted according to the chapters of the User's Manual. This makes it easier for you to find the desired information in the User's Manuals.

If a content is part of a software option, then the option number is indicated in parentheses.



### User's Manual Complete Edition

All of the control's functions that are available to the user are described in the **Complete Edition** of the User's Manual.

The **Complete Edition** is available as a PDF for every software version.

ID: 136999-xx

**TNCguide**

### Have you found any errors or would you like to suggest changes?

We continuously strive to improve our documentation for you. Please help us by sending your suggestions to the following e-mail address:

**[tnc-userdoc@heidenhain.de](mailto:tnc-userdoc@heidenhain.de)**

## Table of contents

|          |                                |           |
|----------|--------------------------------|-----------|
| <b>1</b> | <b>Software 81762x-17.....</b> | <b>9</b>  |
| <b>2</b> | <b>Software 81762x-18.....</b> | <b>23</b> |



|            |   |           |
|------------|---|-----------|
| <b>1</b>   | <b>Software 81762x-17</b>                                 | <b>9</b>  |
| <b>1.1</b> | <b>New software options</b>                               | <b>10</b> |
| 1.1.1      | Model Aided Setup (option 159)                            | 10        |
| <b>1.2</b> | <b>New functions</b>                                      | <b>10</b> |
| 1.2.1      | Programming fundamentals                                  | 10        |
| 1.2.2      | Tools   | 11        |
| 1.2.3      | Path Functions  | 11        |
| 1.2.4      | Programming Techniques                                    | 11        |
| 1.2.5      | Files   | 11        |
| 1.2.6      | Variable Programming                                      | 12        |
| 1.2.7      | ISO   | 12        |
| 1.2.8      | User Aids   | 12        |
| 1.2.9      | <b>Simulation</b> Workspace                               | 12        |
| 1.2.10     | Programmable Touch Probe Cycles                           | 13        |
| 1.2.11     | Program Run   | 13        |
| 1.2.12     | Tables  | 13        |
| 1.2.13     | <b>Settings</b> Application                               | 14        |
| 1.2.14     | Machine parameters  | 14        |
| <b>1.3</b> | <b>Modified or extended functions</b>                     | <b>14</b> |
| 1.3.1      | Operation   | 14        |
| 1.3.2      | Accessories   | 14        |
| 1.3.3      | Status Displays   | 15        |
| 1.3.4      | Powering On and Off                                       | 15        |
| 1.3.5      | Programming fundamentals                                  | 16        |
| 1.3.6      | Tools   | 16        |
| 1.3.7      | Path Functions  | 17        |
| 1.3.8      | Machining Cycles  | 17        |
| 1.3.9      | Coordinate Transformation                                 | 17        |
| 1.3.10     | Compensations   | 17        |
| 1.3.11     | Files   | 18        |
| 1.3.12     | Variable Programming                                      | 18        |
| 1.3.13     | Graphical Programming                                     | 18        |
| 1.3.14     | CAD-Viewer  | 19        |
| 1.3.15     | User Aids   | 19        |
| 1.3.16     | <b>Simulation</b> Workspace                               | 20        |
| 1.3.17     | Touch Probe Functions in the <b>Manual</b> Operating Mode | 20        |
| 1.3.18     | Programmable Touch Probe Cycles                           | 20        |
| 1.3.19     | Pallet Machining and Job Lists                            | 21        |
| 1.3.20     | Program Run   | 21        |
| 1.3.21     | Tables  | 21        |
| 1.3.22     | <b>Settings</b> Application                               | 21        |
| 1.3.23     | Machine parameters  | 22        |

|            |   |           |
|------------|---|-----------|
| <b>2</b>   | <b>Software 81762x-18</b>                                 | <b>23</b> |
| <b>2.1</b> | <b>New functions</b>                                      | <b>24</b> |
| 2.1.1      | User's Manual as integrated product aid: <b>TNCguide</b>  | 24        |
| 2.1.2      | Operation   | 24        |
| 2.1.3      | Status displays   | 24        |
| 2.1.4      | Manual operation  | 24        |
| 2.1.5      | Tools   | 25        |
| 2.1.6      | Milling cycles  | 25        |
| 2.1.7      | Coordinate transformation                                 | 26        |
| 2.1.8      | Files   | 26        |
| 2.1.9      | Collision monitoring                                      | 26        |
| 2.1.10     | Variable programming                                      | 26        |
| 2.1.11     | Graphical Programming                                     | 27        |
| 2.1.12     | ISO   | 27        |
| 2.1.13     | User aids   | 27        |
| 2.1.14     | The Simulation workspace                                  | 27        |
| 2.1.15     | Touch probe functions in the <b>Manual</b> operating mode | 27        |
| 2.1.16     | Program run   | 27        |
| 2.1.17     | Tables  | 28        |
| 2.1.18     | Override controller                                       | 28        |
| 2.1.19     | Integrated functional safety (FS)                         | 28        |
| 2.1.20     | HEROS operating system                                    | 29        |

|            |  |           |
|------------|--|-----------|
| <b>2.2</b> | <b>Modified or extended functions.....</b>                     | <b>29</b> |
| 2.2.1      | Operation.....   | 29        |
| 2.2.2      | Status displays.....   | 29        |
| 2.2.3      | Manual operation.....  | 30        |
| 2.2.4      | Programming fundamentals.....                                  | 30        |
| 2.2.5      | Tools.....   | 31        |
| 2.2.6      | Programming techniques.....                                    | 31        |
| 2.2.7      | Contour and point definitions.....                             | 31        |
| 2.2.8      | Milling cycles.....  | 32        |
| 2.2.9      | Mill-turning cycles (#50 / #4-03-1).....                       | 32        |
| 2.2.10     | Files.....   | 33        |
| 2.2.11     | Monitoring.....  | 33        |
| 2.2.12     | Miscellaneous functions.....                                   | 34        |
| 2.2.13     | Variable programming.....                                      | 34        |
| 2.2.14     | Graphical Programming.....                                     | 34        |
| 2.2.15     | CAD Viewer.....  | 34        |
| 2.2.16     | ISO.....   | 35        |
| 2.2.17     | User Aids.....   | 35        |
| 2.2.18     | The <b>Simulation</b> workspace.....                           | 35        |
| 2.2.19     | Touch probe functions in the <b>Manual</b> operating mode..... | 36        |
| 2.2.20     | Touch-probe cycles for the workpiece.....                      | 36        |
| 2.2.21     | Touch-probe cycles for the tool.....                           | 37        |
| 2.2.22     | Touch-probe cycles for kinematics measuring.....               | 37        |
| 2.2.23     | Program Run.....   | 37        |
| 2.2.24     | Tables.....  | 38        |
| 2.2.25     | The <b>Settings</b> application.....                           | 39        |
| 2.2.26     | User administration.....                                       | 39        |
| 2.2.27     | Machine parameters.....  | 39        |





1

**Software 81762x-17**

## 1.1 New software options

### 1.1.1 Model Aided Setup (option 159)

| Topic                                  | Description   |
|--|---|
| Software option 159: Model Aided Setup | <p>This software option is used to determine the position and misalignment of a workpiece with only one touch-probe function. You can probe complex workpieces with, for example, free-form surfaces or undercuts, which is not possible with all of the other touch-probe functions.</p> <p>The software option includes the <b>Set up the workpiece</b> touch probe function.</p> |

## 1.2 New functions

### 1.2.1 Programming fundamentals

| Topic                              | Description   |
|------------------------------------|---|
| Text editor                        | <p>In the text editor mode, the control provides an auto-complete function when programming. The control suggests syntax elements matching your entries which you can apply to the NC program.</p> <p>If an NC block contains a syntax error, the control displays a symbol in front of the block number. When you select the symbol, the control displays the corresponding error description.</p> |
| Depiction of the NC program        | <p>If the control does not process or simulate the miscellaneous function <b>M1</b> or NC blocks hidden with <b>/</b>, it then grays out the miscellaneous function or NC blocks.</p>   |
| The <b>Program settings</b> window | <p>In the <b>Klartext</b> area of the <b>Program settings</b> window, you select whether the control skips the offered optional syntax elements of an NC block during input.</p> <p>If the toggle switches in the <b>Klartext</b> area are active, the control skips the syntax elements Comment, Tool index and Linear superimposition.</p>  |

## 1.2.2 Tools

| Topic                            | Description   |
|----------------------------------|---|
| Tool types                       | The following tool types have been added: <ul style="list-style-type: none"> <li>■ <b>Face mill (MILL_FACE)</b></li> <li>■ <b>Chamfer cutter (MILL_CHAMFER)</b></li> </ul>  |
| Tool table                       | You define a database ID for the tool in the <b>DB_ID</b> column of the tool table. In a tool database for all machines, you can identify tools with unique database IDs (e.g., within a workshop). This allows you to coordinate the tools of multiple machines more easily.<br><br>You define a radius at the tip of the tool in the <b>R_TIP</b> column of the tool table.   |
| Touch probe table                | You define the shape of the stylus in the <b>STYLUS</b> column of the touch probe table. You define an L-shaped stylus with the <b>L-TYPE</b> selection.  |
| Grinding tool table (option 156) | You define the compensation method for dressing in the <b>COR_TYPE</b> input parameter for grinding tools (option 156): <ul style="list-style-type: none"> <li>■ <b>Grinding wheel with compensation, COR_TYPE_GRINDTOOL</b><br/>Stock removal on the grinding tool</li> <li>■ <b>Dressing tool with wear, COR_TYPE_DRESSTOOL</b><br/>Stock removal on dressing tool</li> </ul> |

## 1.2.3 Path Functions

| Topic                                | Description  |
|--------------------------------------|--|
| Superimpositioning on circular paths | When programming circular paths with <b>C</b> , <b>CR</b> and <b>CT</b> , the <b>LIN_</b> syntax element is now available in order to superimpose a linear motion over the circular motion of an axis. This allows you to program a helix in a simple way.<br><br>In ISO programs, you can define a third axis in conjunction with the <b>G02</b> , <b>G03</b> , and <b>G05</b> functions. |

## 1.2.4 Programming Techniques

| Topic        | Description  |
|--------------|--|
| NC sequences | You can save up to 200 successive NC blocks as NC sequences and insert them during programming using the <b>Insert NC function</b> window. In contrast to the called NC programs, you can adapt the NC sequences after insertion without changing the actual sequence. |

## 1.2.5 Files

| Topic                     | Description  |
|---------------------------|--|
| <b>Document</b> workspace | The <b>Document</b> workspace has been added. In the <b>Document</b> workspace, you can open files in order to view them, such as a technical drawing. |

## 1.2.6 Variable Programming

| Topic                            | Description  |
|----------------------------------|--|
| <b>FN 18: SYSREAD (ISO: D18)</b> | <p>The <b>FN 18: SYSREAD (ISO: D18)</b> functions have been enhanced:</p> <ul style="list-style-type: none"> <li>■ <b>FN 18: SYSREAD (D18) ID610 NR49</b>: Mode of filter reduction of one axis (<b>IDX</b>) for <b>M120</b></li> <li>■ <b>FN 18: SYSREAD (D18) ID780</b>: Information on the current grinding tool <ul style="list-style-type: none"> <li>■ <b>NR60</b>: Active compensation method in <b>COR_TYPE</b> column</li> <li>■ <b>NR61</b>: Inclination angle of dressing tool</li> </ul> </li> <li>■ <b>FN 18: SYSREAD (D18) ID950 NR48</b>: Value in column <b>R_TIP</b> in the tool table for the current tool</li> <li>■ <b>FN 18: SYSREAD (D18) ID11031 NR101</b>: File name of the log file of Cycle <b>238 MEASURE MACHINE STATUS</b></li> </ul> |

## 1.2.7 ISO

| Topic        | Description                        |
|--------------|------------------------------------|
| ISO programs | You can run and edit ISO programs. |

## 1.2.8 User Aids

| Topic        | Description   |
|--------------|---|
| Context menu | In the context menu of the <b>Editor</b> operating mode and the <b>MDI</b> application, the control offers the <b>Insert last NC block</b> function. With this function you can insert the last deleted or edited NC block in any NC program. |

## 1.2.9 Simulation Workspace

| Topic              | Description   |
|--------------------|---|
| Clamping situation | In the <b>Visualization options</b> column of the <b>Simulation</b> workspace, you can show the worktable and, if necessary, the fixtures, in <b>Workpiece</b> mode and with the <b>Clamping situation</b> toggle switch. |

### 1.2.10 Programmable Touch Probe Cycles

| Topic   | Description  |
|---|--|
| Cycle <b>1416 INTERSECTION PROBING</b> (ISO: <b>G1416</b> )       | This cycle allows you to determine the intersection of two edges. The cycle requires a total of four touch points and two positions per edge. You can use the cycle in the three object planes <b>XY</b> , <b>XZ</b> and <b>YZ</b> . |
| Cycle <b>1404 PROBE SLOT/RIDGE</b> (ISO: <b>G1404</b> )           | This cycle determines the center and the width of a slot or ridge. The control probes two opposing touch points. You can also define a rotation for the slot or the ridge.   |
| Cycle <b>1430 PROBE POSITION OF UNDERCUT</b> (ISO: <b>G1430</b> ) | This cycle determines a single position with an L-shaped stylus. The control can probe undercuts due to the shape of the stylus.   |
| Cycle <b>1434 PROBE SLOT/RIDGE UNDERCUT</b> (ISO: <b>G1434</b> )  | This cycle determines the center and the width of a slot or ridge with an L-shaped stylus. The control can probe undercuts due to the shape of the stylus. The control probes two opposing touch points.                             |

### 1.2.11 Program Run

| Topic           | Description  |
|-----------------|--|
| Navigation path | If you execute an NC program or a pallet table or if you test it in the opened <b>Simulation</b> workspace, the control displays a navigation path in the file information bar of the <b>Program</b> workspace. The control displays the names of all the NC programs used in the navigation path and opens the contents of all NC programs in the workspace. This makes it easier to keep an overview of the execution when calling programs and allows navigating between the NC programs when the program run is interrupted. |

### 1.2.12 Tables

| Topic            | Description   |
|------------------|---|
| Form workspace   | The control displays an icon of the selected tool type in the <b>Tool Icon</b> area. For the turning tools the icons also take into account the tool orientation and show where the relevant tool data will apply.<br><br>Use the up and down arrows in the title bar to select the previous or next table row. |
| Filtering tables | You can create user-defined filters for the tool tables and pocket table. To do this, define a search condition in the <b>Search</b> column which you save as a filter.   |
| Importing tables | You can transfer tables from earlier control models to the TNC7. If columns are missing in the table, the control opens the <b>Incomplete table layout</b> window.  |

### 1.2.13 Settings Application

| Topic   | Description   |
|---|---|
| <b>Update documentation</b>                   | You can use the <b>Update documentation</b> function to install or update, for example, the <b>TNCguide</b> integrated product aid.   |
| Configurations                                | Each user can create and activate configurations in which the control's user interface is individually adapted.<br><br>You can save and activate individual modifications to the control's user interface as a configuration, e.g. for each operator. The configuration contains, for example, favorites and the arrangement of the workspaces. |
| <b>OPC UA NC Server</b><br>(options 56 to 61) | The <b>OPC UA NC Server</b> enables client applications to access the tool data of the control. You can read and write tool data.<br><br>The <b>OPC UA NC Server</b> does not provide access to the grinding and dressing tool tables (option 156).   |

### 1.2.14 Machine parameters

| Topic   | Description   |
|---|---|
| Help graphics                                       | Use the machine parameter <b>stdTNCHELP</b> (no. 105405) to define whether the control displays help graphics as pop-up windows in the <b>Program</b> workspace.      |
| The <b>Handwheel superimp.</b> function (option 44) | The optional machine parameter <b>CfgGlobalSettings</b> (no. 128700) allows you to define whether the control offers the parallel axes for <b>Handwheel superimp.</b> |

## 1.3 Modified or extended functions

### 1.3.1 Operation

| Topic        | Description   |
|--------------|---|
| Window       | You can change the size of windows. The control remembers the size until it is shut down.   |
| Applications | In the <b>Files</b> , <b>Tables</b> and <b>Editor</b> operating modes, a maximum of ten tabs can be open at the same time. If you try to open additional tabs, the control shows a message. |

### 1.3.2 Accessories

| Topic                        | Description  |
|------------------------------|--|
| Additional operating station | The control no longer supports the ITC 750 additional operating station. |

### 1.3.3 Status Displays

| Topic                          | Description  |
|--------------------------------|--|
| Status overview on the TNC bar | <p>In the status overview, the control displays the run time of the NC program in mm:ss format. As soon as the run time of the NC program exceeds 59:59, the control shows the run time in hh:mm format.</p> <p>If a tool usage file is available, the control calculates for the <b>Program Run</b> operating mode how long the execution of the active NC program will take. During program run the control updates the remaining run time. The control shows the remaining run time in the status overview on the TNC bar.</p> <p>If more than eight axes are defined, the control shows the axes in two columns in the position display of the status overview. With more than 16 axes, the control shows the axes in three columns.</p> |
| Feed rate limitation           | <p>If a feed rate limit is active, the control highlights the <b>FMAX</b> button in color and displays the defined value. In the <b>Positions</b> and <b>Status</b> workspaces, the control shows the feed rate in orange.</p> <p>If the feed rate is limited using the <b>FMAX</b> button, the control displays <b>MAX</b> in square brackets.</p> <p>If the feed rate is limited using the <b>F limited</b> button, the control displays the active safety function in square brackets.</p>  |
| <b>Status</b> workspace        | <p>The <b>TRANS</b> tab of the <b>Status</b> workspace indicates the active shift in the working plane coordinate system <b>WPL-CS</b>. If the shift comes from a compensation table (<b>*.WCO</b>), the control shows the path to the compensation table as well as the number and, if applicable, the comment of the active row.</p> <p>In the <b>Tool</b> tab of the <b>Status</b> workspace, the control displays the values of the <b>Tool geometry</b> and <b>Tool allowances</b> areas with four instead of three decimal places.</p>   |
| Handwheel                      | <p>If a handwheel is active, the control shows the contouring feed rate in the display during program run. If only the currently selected axis is moving, the control shows the axis feed rate.</p>  |

### 1.3.4 Powering On and Off

| Topic     | Description  |
|-----------|--|
| Shut down | <p>If you shut down the control with still unsaved changes in NC programs and contours, the control displays the <b>Close the program</b> window. You can save the changes, discard them or cancel the shutdown.</p> |

### 1.3.5 Programming fundamentals

| Topic                                | Description  |
|--------------------------------------|--|
| Input                                | <p>When you save an input value, the control removes superfluous zeros at the beginning of the input and at the end of the decimal places. The input range must not be exceeded for this.</p> <p>The control no longer interprets tab characters as syntax errors. In comments and structure items, the control displays a tab character as a space. In syntax elements, the control removes a tab character.</p> <p>If you edit a value and press the backspace key, the control deletes only the last character and not the complete input.</p>                |
| The <b>Insert NC function</b> window | <p>If software options are not enabled, the control shows unavailable contents in the <b>Insert NC function</b> window grayed out.</p> <p>In the areas <b>Search result</b>, <b>Favorites</b> and <b>Last functions</b>, the control shows the path of the NC functions.</p> <p>If you select an NC function and swipe to the right, the control displays the following file functions:</p> <ul style="list-style-type: none"> <li>■ Add to or remove from favorites</li> <li>■ Open containing folder</li> </ul> <p>Only when you search for an NC function</p> |
| Text editor                          | You can delete an empty line with the backspace key in text editor mode.   |

### 1.3.6 Tools

| Topic             | Description  |
|-------------------|--|
| Tool call         | If you select the tool with the selection window when calling the tool with <b>TOOL CALL</b> , you can switch via an icon to the <b>Tables</b> operating mode. In this case, the control displays the selected tool in the <b>Tool management</b> application.   |
| Touch probe table | The minimum input value of the <b>FMAX</b> column in the touch probe table has been changed from -9999 to +10.   |
| Tool table        | <p>The maximum input range of the <b>LTOL</b> and <b>RTOL</b> columns of the tool table has been increased. It was from 0 to 0.9999 mm, and is now from 0.0000 to 5.0000 mm.</p> <p>The maximum input range of the <b>LBREAK</b> and <b>RBREAK</b> columns of the tool table has been increased. It was from 0 to 3.2767 mm, and is now from 0.0000 to 9.0000 mm.</p> <p>You can import tool tables of the TNC 640 as CSV files.</p> |
| Tool test         | If you double tap or click a tool in the <b>Tool check</b> column of the <b>Program</b> workspace, the control switches to the <b>Tables</b> operating mode. In this case, the control displays the selected tool in the <b>Tool management</b> application.   |



### 1.3.7 Path Functions

| Topic         | Description  |
|---------------|--|
| Line <b>L</b> | If you press the <b>actual position capture</b> key in the <b>Editor</b> operating mode or the <b>MDI</b> application, the control creates a straight line <b>L</b> with the current position of all axes. |

### 1.3.8 Machining Cycles

| Topic   | Description  |
|---|--|
| Cycle <b>19 WORKING PLANE</b><br>(ISO: <b>G80</b> , option 8)           | You can edit and execute Cycle <b>19 WORKING PLANE</b> (ISO: <b>G80</b> , option 8), but you cannot insert it into an NC program as a new element.   |
| Cycle <b>277 OCM CHAMFERING</b><br>(ISO: <b>G277</b> , option 167)      | Cycle <b>277 OCM CHAMFERING</b> (ISO: <b>G277</b> , option 167) monitors contour damage on the floor caused by the tool tip. This tool tip results from the radius <b>R</b> , the radius at the tool tip <b>R_TIP</b> , and the point angle <b>T-ANGLE</b> .   |
| Cycle <b>292 CONTOUR.TURNG.INTRP.</b><br>(ISO: <b>G292</b> , option 96) | The parameter <b>Q592 TYPE OF DIMENSION</b> has been added to Cycle <b>292 CONTOUR.TURNG.INTRP.</b> (ISO: <b>G292</b> , option 96). This parameter is used to define whether the contour is programmed with radius dimensions or diameter dimensions.  |
| <b>M109</b> and <b>M110</b>   | The following cycles consider the miscellaneous functions <b>M109</b> and <b>M110</b> : <ul style="list-style-type: none"> <li>■ Cycle <b>22 ROUGH-OUT</b> (ISO: G122)</li> <li>■ Cycle <b>23 FLOOR FINISHING</b> (ISO: G123)</li> <li>■ Cycle <b>24 SIDE FINISHING</b> (ISO: G124)</li> <li>■ Cycle <b>25 CONTOUR TRAIN</b> (ISO: G125)</li> <li>■ Cycle <b>275 TROCHOIDAL SLOT</b> (ISO: G275)</li> <li>■ Cycle <b>276 THREE-D CONT. TRAIN</b> (ISO: G276)</li> <li>■ Cycle <b>274 OCM FINISHING SIDE</b> (ISO: G274, option 167)</li> <li>■ Cycle <b>277 OCM CHAMFERING</b> (ISO: G277, option 167)</li> <li>■ Cycle <b>1025 GRINDING CONTOUR</b> (ISO: G1025, option 156)</li> </ul> |

### 1.3.9 Coordinate Transformation

| Topic                                     | Description  |
|---|--|
| The <b>3-D rotation</b> window (option 8) | In the <b>3-D rotation</b> window (option 8), if you enable a function in the <b>Manual Operation</b> or <b>Program run</b> areas, the control highlights the area in green. |

### 1.3.10 Compensations

| Topic                                   | Description   |
|---|---|
| <b>FUNCTION PROG PATH</b><br>(option 9) | If you define a grinding tool (option 156) with orientation <b>9</b> or <b>10</b> , the control supports circumferential milling in conjunction with <b>FUNCTION PROG PATH IS CONTOUR</b> (option 9). |

### 1.3.11 Files

| Topic                     | Description  |
|---------------------------|--|
| File management           | <p>The control shows the occupied memory and total memory of the drives in the navigation bar of the file management.</p> <p>The control shows STEP files in the preview area.</p> <p>When you cut a file or folder in the file management, the control grays out the icon of the file or folder.</p> <p>When you add a favorite or lock a file in the file management, the control displays an icon next to the file or folder.</p> |
| Quick selection workspace | <p>Tables for execution and simulation can be opened in the <b>Quick selection</b> workspace in the <b>Tables</b> operating mode.</p> <p>In the <b>Quick selection</b> workspace in the <b>Editor</b> operating mode, you can create NC programs with mm or inch units of measurement as well as ISO programs.</p>   |

### 1.3.12 Variable Programming

| Topic                                    | Description  |
|--|--|
| <b>FN 16: F-PRINT</b> (ISO: <b>D16</b> ) | For a screen output with <b>FN 16: F-PRINT</b> (ISO: <b>D16</b> ), the control displays a pop-up window.   |
| The <b>Q parameter list</b> window       | The window <b>Q parameter list</b> contains an input field that allows you to navigate to a unique variable number. If you press the <b>GOTO</b> key, the control selects the input field. |

### 1.3.13 Graphical Programming

| Topic                    | Description  |
|--------------------------|--|
| Elements                 | If you select the face of a closed contour, you can insert a radius or chamfer at each corner of the contour.                                |
| Element information area | In the Element Information area, the control shows a rounding arc as <b>RND</b> contour element and a chamfer as <b>CHF</b> contour element. |

### 1.3.14 CAD-Viewer

| Topic                                | Description  |
|--------------------------------------|--|
| Unit of measure                      | Internally, <b>CAD-Viewer</b> always uses mm for its calculations. If you select inches as the unit of measure, <b>CAD-Viewer</b> will convert all values to inches.   |
| Display                              | The <b>Show sidebar</b> icon enlarges the Sidebar window to half the size of the screen.<br><br>The control always shows the <b>X, Y</b> and <b>Z</b> coordinates in the Element Information window. In 2D mode, the control grays out the Z coordinate. |
| Transferring machining positions     | <b>CAD-Viewer</b> also recognizes circles that consist of two semi-circles as machining positions.   |
| Workpiece preset and workpiece datum | You can save the information on the workpiece preset and workpiece datum to a file or to the clipboard without having to resort to CAD Import (software option 42).  |

### 1.3.15 User Aids

| Topic   | Description   |
|---|---|
| The <b>Structure</b> column in the <b>Program</b> workspace | The structure contains the NC functions <b>APPR</b> and <b>DEP</b> as structure elements.<br><br>The control shows comments in the structure inserted within structure elements.<br><br>If you mark structuring items in the <b>Structure</b> column, the control propagates the marking to the corresponding NC blocks in the NC program. Use the <b>CTRL+SPACE</b> key shortcut to stop marking. If you press <b>CTRL+SPACE</b> again, the control restores the marked selection. |
| The <b>Search</b> column in the <b>Program</b> workspace    | The <b>Match whole words only</b> checkbox determines that the control shows only exact matches. If, for example, you search for <b>Z+10</b> , the control ignores <b>Z+100</b> .<br><br>If in the <b>Search and replace</b> function you use <b>Find next</b> , the control highlights the first result in purple.<br><br>If you do not enter a value for <b>Replace with:</b> , the control deletes the value searched for and to be replaced.                                    |
| Program comparison  | If you select several NC blocks during the program comparison, you can load all NC blocks simultaneously.   |
| Keyboard shortcuts  | The control provides additional keyboard shortcuts to mark NC blocks and files.   |
| Context menu  | When you open or save a file in a selection window, the control displays the context menu.<br><br>You can perform file functions in the <b>Save as</b> window using the context menu.   |
| Cutting data calculator                                     | You can load the tool name from the cutting data calculator.<br><br>If you press the enter key in the cutting data calculator, the control selects the next element.  |
| Message menu  | In the expanded notification menu, the control displays information about the NC program in a separate area outside of the <b>Details</b> .   |

### 1.3.16 Simulation Workspace

| Topic                                | Description   |
|--------------------------------------|---|
| The <b>Workpiece position</b> window | You can use a button to select a workpiece preset from the preset table.<br><br>The control displays the input fields below each other instead of next to each other.   |
| Finished part                        | The control can display a finished part in the <b>Machine</b> mode of the <b>Simulation</b> workspace.  |
| Depiction of tools                   | The control takes into account the following columns of the tool table for the simulation: <ul style="list-style-type: none"> <li>■ <b>R_TIP</b></li> <li>■ <b>LU</b></li> <li>■ <b>RN</b></li> </ul>             |
| Dwell time                           | In the Simulation function of the <b>Editor</b> operating mode, the control takes dwell times into account. The control does not dwell during the program test, but adds the dwell times to the program run time. |
| NC functions                         | The NC functions <b>FUNCTION FILE</b> and <b>FN 27: TABWRITE</b> (ISO: <b>D27</b> ) are active in the <b>Simulation</b> workspace.  |

### 1.3.17 Touch Probe Functions in the Manual Operating Mode

| Topic                     | Description  |
|---------------------------|--|
| Aligning the rotary table | If you align the rotary table after a manual touch probe function, the control remembers the selected type of rotary axis positioning and the feed rate. |
| Applying values           | If you correct the preset or datum after a manual touch probe function, the control shows a symbol behind the adopted value.                             |

### 1.3.18 Programmable Touch Probe Cycles

| Topic   | Description   |
|---|---|
| Cycle <b>451 MEASURE KINEMATICS</b> (ISO: <b>G451</b> , option 48)  | If KinematicsComp (software option 52) is active, the log of Cycle <b>451 MEASURE KINEMATICS</b> (ISO: <b>G451</b> , option 48) shows the active compensations of the angular position errors ( <b>locErrA/locErrB/locErrC</b> ).     |
| Cycle <b>451 MEASURE KINEMATICS</b> (ISO: <b>G451</b> ) and Cycle <b>452 PRESET COMPENSATION</b> (ISO: <b>G452</b> , option 48) | The log of Cycles <b>451 MEASURE KINEMATICS</b> (ISO: <b>G451</b> ) and <b>452 PRESET COMPENSATION</b> (ISO: <b>G452</b> , option 48) contains diagrams with the measured and optimized errors of the individual measuring positions. |
| Cycle <b>453 KINEMATICS GRID</b> (ISO: <b>G453</b> , option 48)   | Cycle <b>453 KINEMATICS GRID</b> (ISO: <b>G453</b> , option 48) allows you to use the mode <b>Q406=0</b> even without KinematicsComp (software option 52).  |
| Cycle <b>460 CALIBRATION OF TS ON A SPHERE</b> (ISO: <b>G460</b> )  | Cycle <b>460 CALIBRATION OF TS ON A SPHERE</b> (ISO: <b>G460</b> ) determines the radius and, if required, the length, the center offset and the spindle angle of an L-shaped stylus.   |
| L-shaped stylus   | Cycles <b>444 PROBING IN 3-D</b> (ISO: <b>G444</b> ) and <b>14xx</b> support probing with an L-shaped stylus.   |

### 1.3.19 Pallet Machining and Job Lists

| Topic                              | Description   |
|------------------------------------|---|
| Batch Process Manager (option 154) | If you check the pallet table in Batch Process Manager (option 154) with Dynamic Collision Monitoring (DCM, option 40), the control takes the software limit switches into account. |

### 1.3.20 Program Run

| Topic                                | Description  |
|--------------------------------------|--|
| The <b>Open in the editor</b> button | The <b>Open in the editor</b> button in the <b>Program Run</b> operating mode opens the currently displayed NC program, including called NC programs.          |
| Returning to the contour             | In the machine parameter <b>restoreAxis</b> (no. 200305), the machine manufacturer defines in which sequence of axes the control approaches the contour again. |

### 1.3.21 Tables

| Topic                        | Description  |
|------------------------------|--|
| <b>Tables</b> operating mode | <p>The <b>M</b> and <b>S</b> statuses are highlighted in color only for the active application, and gray for the other applications.</p> <p>You can close all applications except for <b>Tool management</b>.</p> <p>The <b>Mark row</b> button has been added.</p> <p>In the <b>Presets</b> application, the <b>Lock record</b> toggle switch has been added.</p> |
| <b>Table</b> workspace       | <p>You can change the column width using an icon.</p> <p>In the settings of the <b>Table</b> workspace you can enable or disable all table columns and restore the default format.</p>   |
| <b>Form</b> workspace        | If a table column offers two input options, the control shows the options in the <b>Form</b> workspace as toggle switches.   |
| <b>TABDATA</b>               | You can use the <b>TABDATA</b> functions for read- and write-access to the preset table.   |

### 1.3.22 Settings Application

| Topic              | Description   |
|--------------------|---|
| Code number        | When you enter a code number in the <b>Settings</b> application, the control displays a load icon.  |
| Network            | You can export and import existing network configurations in the <b>Network settings</b> window.  |
| Secure connections | <p>In the <b>DNC</b> menu item of the <b>Settings</b> application, the <b>Secure connections for users</b> area has been added. These functions can be used to define settings for secure connections via SSH.</p> <p>In the <b>Certificate and keys</b> window you can select a file with additional public SSH keys in the <b>Externally administered SSH key file</b> area. This allows you to use SSH keys without needing to transmit them to the control.</p> |

### 1.3.23 Machine parameters

| Topic              | Description   |
|--------------------|---|
| Secure connections | The machine manufacturer uses the machine parameters <b>allowUnsecureLsv2</b> (no. 135401) and <b>allowUnsecureRpc</b> (no. 135402) to define whether the control disables non-secure LSV2 or RPC connections even if user administration is not active. These machine parameters are included in the data object <b>CfgDncAllowUnsecur</b> (135400). |
| Clear NC blocks    | The optional machine parameter <b>warningAtDEL</b> (no. 105407) is used to define whether the control shows a confirmation request in a pop-up window when deleting an NC block.  |

# 2

**Software 81762x-18**

## 2.1 New functions

### 2.1.1 User's Manual as integrated product aid: TNCguide

| Topic    | Description   |
|----------|---|
| TNCguide | <p>You can open <b>TNCguide</b> for the current context. Context-sensitive help means that the relevant information is displayed directly (e.g., for the selected item or the current NC function).</p> <p>Using the <b>Help</b> icon, you can select an item for which to display information. When you press the <b>HELP</b> key, the control will display information on the selected NC function.</p> |

### 2.1.2 Operation

| Topic                                      | Description  |
|--|--|
| Hardware requirements                      | To install or update software version 18, a control with a hard disk size of at least 30 GB is required.   |
| Announcement:<br><b>SIK2</b> plug-in board | <p>Software version 18 SP1 introduces the <b>SIK2</b> plug-in board. For controls with <b>SIK2</b>, the software options are identified by new four-digit numbers.</p> <p>As long as both <b>SIK1</b> and <b>SIK2</b> are available, both software option numbers will be indicated in the User's Manual, for example (#18 / #3-03-1).</p> |

### 2.1.3 Status displays

| Topic                       | Description  |
|-----------------------------|--|
| The <b>Status</b> workspace | Using the <b>Configure the layout</b> icon in the <b>Status</b> workspace, you can add or remove columns and arrange the areas in columns. |

### 2.1.4 Manual operation

| Topic                                  | Description   |
|--|---|
| Unbalance functions<br>(#50 / #4-03-1) | The control provides manual cycles that allow you to determine the unbalance in the current fixture. The control suggests the mass and position of the compensation weight. |



## Programming fundamentals

| Topic                                    | Description  |
|--|--|
| The <b>Text editor</b> workspace         | In the <b>Programming</b> operating mode, the <b>Text editor</b> workspace is available.<br>In the <b>Text editor</b> you can create and edit data of the following types: <ul style="list-style-type: none"> <li>■ Text files, such as *.txt</li> <li>■ Format files, such as *.a</li> </ul>  |
| Settings in the <b>Program</b> workspace | You can deactivate the auto-complete function in Text editor mode.<br>You can select whether the control is to display help graphics as pop-up windows or in the <b>Help</b> workspace only.<br>You can select whether the control is to add an informational comment to an NC sequence, such as the name of the NC sequence.<br>You can select whether the control will dim unavailable NC functions in the <b>Insert NC function</b> window or hide them (e.g., for software options that are not enabled).<br>You can select whether the control will enclose path information in quotation marks by default for the following NC functions: <ul style="list-style-type: none"> <li>■ <b>CALL PGM</b> (ISO: %)</li> <li>■ Cycle <b>12 PGM CALL</b> (ISO: <b>G39</b>)</li> <li>■ <b>FN 16: F-PRINT</b> (ISO: <b>D16</b>)</li> <li>■ <b>FN 26: TABOPEN</b> (ISO: <b>D26</b>)</li> </ul> If a touchscreen is used, the control will display a context-sensitive virtual keyboard. A selection menu allows you to select the position of the virtual keyboard in the workspace or to hide the virtual keyboard. |
| Display of the NC program                | In the machine parameter <b>lineBreak</b> (no. 105404), you define whether the control will display multi-line NC functions without or with line breaks.   |

### 2.1.5 Tools

| Topic                       | Description  |
|-----------------------------|--|
| Tool type                   | The tool type <b>Side milling cutter (MILL_SIDE)</b> has been added.   |
| Tool model (#140 / #5-03-2) | You can add 3D models for drilling or milling tools as well as workpiece touch probes. The control can display tool models in simulation and take them into account in calculations, for example when performing Dynamic Collision Monitoring (DCM (#40 / #5-03-1)). |

### 2.1.6 Milling cycles

| Topic   | Description  |
|---|--|
| Cycle <b>1274 OCM CIRCULAR SLOT</b> (ISO: <b>G1274</b> ) (#167 / #1-02-1) | This cycle allows you to define a circular slot that is then used as a pocket or boundary for face milling in conjunction with other OCM cycles. |

## 2.1.7 Coordinate transformation

| Topic              | Description   |
|--------------------|---|
| <b>TRANS RESET</b> | Use the NC function <b>TRANS RESET</b> to reset all simple coordinate transformations simultaneously. |

## 2.1.8 Files

| Topic                           | Description  |
|---------------------------------|--|
| The <b>Files</b> operating mode | With the settings of the <b>Files</b> operating mode, you can define whether the control will display hidden and dependent files, such as the tool-usage file <b>*.t.dep</b> . |

## 2.1.9 Collision monitoring

| Topic  | Description   |
|--|---|
| Combining fixtures                           | The <b>New Fixture</b> window allows combining several fixtures and saving them as a new fixture. This enables realizing and monitoring complex clamping situations.        |
| <b>FUNCTION DCM DIST</b><br>(#140 / #5-03-2) | With the <b>FUNCTION DCM DIST</b> NC function, you can reduce the minimum distance between the tool and the fixture for Dynamic Collision Monitoring (DCM (#40 / #5-03-1)). |

## 2.1.10 Variable programming

| Topic                                    | Description  |
|--|--|
| <b>FN 18: SYSREAD</b> (ISO: <b>D18</b> ) | <p>The <b>FN 18: SYSREAD</b> (ISO: <b>D18</b>) functions have been extended:</p> <ul style="list-style-type: none"> <li>■ <b>FN 18: SYSREAD (D18) ID10 NR10</b>: Counts the number of executions of the current program section</li> <li>■ <b>FN 18: SYSREAD (D18) ID245 NR1</b>: Current nominal position of an axis (<b>IDX</b>) in the REF system</li> <li>■ <b>FN 18: SYSREAD (D18) ID370 NR7</b>: Reaction of the control if a probing point is not reached during a programmable touch-probe cycle <b>14xx</b></li> <li>■ <b>FN 18: SYSREAD (D18) ID610</b>: Values of various machine parameters for <b>M120</b> <ul style="list-style-type: none"> <li>■ <b>NR53</b>: Radial jerk at normal feed rate</li> <li>■ <b>NR54</b>: Radial jerk at high feed rate</li> </ul> </li> <li>■ <b>FN 18: SYSREAD (D18) ID630</b>: SIK information of the control <ul style="list-style-type: none"> <li>■ <b>NR3</b>: SIK generation <b>SIK1</b> or <b>SIK2</b></li> <li>■ <b>NR4</b>: Specifies whether and how often a software option (<b>IDX</b>) has been enabled on controls with <b>SIK2</b></li> </ul> </li> <li>■ <b>FN 18: SYSREAD (D18) ID990 NR28</b>: Current tool spindle angle</li> <li>■ <b>FN 18: SYSREAD (D18) ID10950 NR6</b>: Selected file in the <b>TSHAPE</b> column of the tool table for the current tool (#140 / #5-03-2)</li> </ul> |

### 2.1.11 Graphical Programming

| Topic   | Description  |
|---|--|
| Importing contours into graphical programming | It is possible to import NC blocks that contain NC functions for coordinate transformation into the graphical programming environment. |

### 2.1.12 ISO

| Topic                                | Description   |
|--------------------------------------|---|
| The <b>Insert NC function</b> window | The <b>Insert NC function</b> window allows you add ISO syntax, too.<br>Using the NC function keys, you can insert the corresponding ISO syntax (e.g., by pressing the <b>L</b> key for <b>G01</b> ). |

### 2.1.13 User aids

| Topic        | Description   |
|--------------|---|
| Context menu | The <b>Insert NC function</b> window features a context menu. |

### 2.1.14 The Simulation workspace

| Topic                                 | Description  |
|---------------------------------------|--|
| The <b>Simulation settings</b> window | The <b>Optimized saving of STL</b> (#152 / #1-04-1) toggle switch allows you to output a simplified STL file. These STL files have been adapted to the <b>BLK FORM FILE</b> function; for example, they contain a maximum of 20,000 triangles. |

### 2.1.15 Touch probe functions in the Manual operating mode

| Topic                               | Description   |
|-------------------------------------|---|
| The <b>Change the preset</b> window | In the <b>Change the preset</b> window, you can discard the previous probing position and activate a new preset with the <b>Apply changes and delete existing probe objects</b> button. |

### 2.1.16 Program run

| Topic              | Description   |
|--------------------|---|
| Retracting the tap | If the NC program stops during tapping, the control will display the <b>Tool Retract</b> button.<br>When you select that button and press the <b>NC start</b> key, the control will automatically retract the tool. |

### 2.1.17 Tables

| Topic                         | Description   |
|-------------------------------|---|
| The <b>Form</b> workspace     | Using the <b>Configure the layout</b> icon in the <b>Form</b> workspace, you can add or remove columns and arrange the areas in columns.  |
| Tool table                    | You can use the <b>TSHAPE</b> column of the tool table to select a 3D file as the tool model (#140 / #5-03-2). This allows the control to display complex tools in simulation and take them into account for Dynamic Collision Monitoring (DCM (#40 / #5-03-1)).  |
| Freely definable tables       | The <b>Edit table characteristics</b> icon allows you to, for example, insert new columns into freely definable tables.   |
| Machine manufacturer settings | <p>The machine manufacturer uses the machine parameter <b>CfgTableCellLock</b> (no. 135600) to define whether and in which cases individual table cells are locked or write-protected. On some machines, you cannot change the tool type once a tool has been inserted into the machine.</p> <p>Using the optional machine parameter <b>CfgTableCellCheck</b> (no. 141300), the machine manufacturer can define rules for table columns. This machine parameter allows to define columns as required fields or to reset them automatically to a default value. If a rule is violated, the control displays a note icon.</p> |

### 2.1.18 Override controller

| Topic               | Description  |
|---------------------|--|
| Override controller | <p>With the hardware extension Override Controller OC 310, the control allows the following:</p> <ul style="list-style-type: none"> <li>■ Use the dial to manipulate the feed rate and/or rapid traverse</li> <li>■ Start NC programs with the integrated <b>NC start</b> button</li> <li>■ Receive tactile responses through vibrations</li> <li>■ Use breakpoints to define conditional stops</li> <li>■ Resume the NC program by increasing the override</li> </ul> |

### 2.1.19 Integrated functional safety (FS)

| Topic  | Description   |
|--|---|
| <b>SLP</b> safety function (safely limited position) | <p>In machine parameter <b>safeAbsPosition</b> (no. 403130), the machine manufacturer defines whether the <b>SLP</b> safety function is activated for an axis.</p> <p>If the <b>SLP</b> safety function is inactive, the axis is monitored by functional safety (FS) without a check after startup. The axis is identified by means of a gray warning triangle.</p> |

## 2.1.20 HEROS operating system

| Topic      | Description   |
|------------|---|
| HEROS menu | <p>In the HEROS settings, you can adjust the screen brightness of the control.</p> <p>In the <b>Screenshot settings</b> window, you can define under which path and file name the control saves screenshots. The file name can contain a placeholder (e.g., %N for sequential numbering).</p> <p>The HEROS tool <b>Diffuse</b> has been added. You can compare and merge text files.</p> <p>This tool is provided as an addition to the <b>program comparison</b> function for NC programs.</p> |

## 2.2 Modified or extended functions

### 2.2.1 Operation

| Topic                       | Description  |
|-----------------------------|--|
| Dark Mode                   | In the machine parameter <b>darkModeEnable</b> (no. 135501), the machine manufacturer defines whether <b>Dark Mode</b> is available for selection. |
| Title bar of the workspaces | The control groups the icons of the title bar depending on the size of the workspace in a selection menu.  |

### 2.2.2 Status displays

| Topic                          | Description   |
|--------------------------------|---|
| The <b>Positions</b> workspace | <p>If the handwheel is active, the control shows a symbol next to the selected axis in the <b>Positions</b> workspace. The symbol indicates whether you can move the axis with the handwheel.</p> <p>When you move the axes while <b>M136</b> is active, the control will display the feed rate in mm/rev in the <b>Positions</b> workspace and on the <b>POS</b> tab of the <b>Status</b> workspace.</p> <p>When a pallet preset is active, the control displays an icon with the number of the active pallet preset in the <b>Positions</b> workspace.</p>  |
| Status overview on the TNC bar | You can select the position display mode in the status overview on the TNC bar independently of the <b>Positions</b> workspace (e.g., <b>Actual pos. (ACT)</b> ).   |
| The <b>Status</b> workspace    | <p>On the <b>FN 16</b> tab of the <b>Status</b> workspace, you can select the <b>Clear</b> button to clear the <b>Output</b> area.</p> <p>The <b>QPARA</b> tab can show 22 instead of 10 variables for each area.</p> <p>On the <b>MON</b> tab of the <b>Status</b> workspace, the histogram shows the entire signal range, using the colors of the relative display (#155 / #5-02-1).</p> <p>If the optional columns <b>WPL-DX-DIAM</b> and <b>WPL-DZL</b> of the turning-tool table exist, the control shows the values of these columns on the <b>Tool</b> tab of the <b>Status</b> workspace (#50 / #4-03-1).</p> |

### 2.2.3 Manual operation

| Topic     | Description  |
|-----------|--|
| Handwheel | If you select <b>Manual</b> operating mode, the control deactivates the handwheel. |

### 2.2.4 Programming fundamentals

| Topic                                | Description  |
|--------------------------------------|--|
| The <b>Editor</b> operating mode     | You can change the tab order in the <b>Editor</b> operating mode.  |
| The <b>Program</b> workspace         | On the title bar of the <b>Program</b> workspace, the control shows icons for the <b>Cut</b> , <b>Copy</b> and <b>Paste</b> functions.<br>While editing an NC block, you can undo individual changes made to syntax elements by selecting <b>Undo</b> .  |
| The <b>Insert NC function</b> window | During searches, the control also displays search results in the <b>Insert NC function</b> window that contain the search term, and replacement functions as well as related or equivalent functions.  |
| Help graphic                         | When you are editing an NC block, the control shows for some NC functions a help graphic in a pop-up window that illustrates the current syntax element.<br>From this pop-up window, you can open the <b>Help</b> workspace or TNCguide.   |
| Text editor mode                     | When you enter any character in Text editor mode, the control will insert a new line.<br>When you program a cycle using the active auto-complete function, you can select the <b>Only downwardly-compatible cycle parameters</b> or <b>With optional cycle parameters</b> option. Optional cycle parameters can also be added later.<br>In the selection menu of the Text editor mode, the control displays possible values in addition to the available syntax element (e.g., for the letter <b>M</b> ).<br>The control displays a help graphic in Text editor mode, too.<br>In Text editor mode, you can insert line breaks. |

## 2.2.5 Tools

| Topic           | Description   |
|-----------------|---|
| Tool data       | The <b>thread-turning tool</b> turning tool type includes the parameter <b>SPB-Insert</b> (#50 / #4-03-1).  |
| Indexed tools   | <p>In the <b>Insert tool</b> window, the <b>Index</b> checkbox was added. When you enable this checkbox, the control will add the next free index number.</p> <p>When you create an indexed tool, the control will copy the tool data from the previous table row. The previous table row may be the main tool or an existing indexed tool.</p> <p>If you delete a main tool, the control will delete all associated indexed tools as well.</p> |
| Tool-usage test | The control displays the <b>Refresh</b> icon in the <b>Tool usage</b> and <b>Tool check</b> areas of the <b>Tool check</b> column. You can create a tool-usage file and run a tool-usage test.  |

## 2.2.6 Programming techniques

| Topic        | Description   |
|--------------|---|
| NC sequences | You can activate or deactivate write protection for NC sequences. |

## 2.2.7 Contour and point definitions

| Topic  | Description   |
|--|---|
| <b>SEL CONTOUR</b>   | You can also define subcontours as <b>LBL</b> subprograms within the complex <b>SEL CONTOUR</b> contour formula.  |
| <b>PATTERN DEF</b>   | The <b>Insert NC function</b> window shows every pattern definition of the <b>PATTERN DEF</b> function separately.  |
| Cycle <b>220 POLAR PATTERN</b> (ISO: <b>G220</b> ) and<br>Cycle <b>221 CARTESIAN PATTERN</b> (ISO: <b>G221</b> ) | The machine manufacturer can hide the cycles <b>220 POLAR PATTERN</b> (ISO: <b>G220</b> ) and <b>221 CARTESIAN PATTERN</b> (ISO: <b>G221</b> ). We recommend using the <b>PATTERN DEF</b> function. |

## 2.2.8 Milling cycles

| Topic  | Description  |
|--|--|
| Cycle <b>225 ENGRAVING</b> (ISO: <b>G225</b> )   | The input value <b>1</b> has been added to parameter <b>Q515 FONT</b> in Cycle <b>225 ENGRAVING</b> (ISO: <b>G225</b> ). Use this input value to select the <b>LiberationSans-Regular</b> font.  |
| Cycle <b>208 BORE MILLING</b> (ISO: <b>G208</b> ) and<br>Cycles <b>127x</b> OCM standard figure cycles (#167 / #1-02-1)                      | You can enter symmetric tolerances for nominal dimensions, such as <b>10+-0.5</b> .  |
| Cycle <b>287 GEAR SKIVING</b> (ISO: <b>G287</b> ) (#157 / #4-05-1)   | Cycle <b>287 GEAR SKIVING</b> (ISO: <b>G287</b> ) (#157 / #4-05-1) has been extended: <ul style="list-style-type: none"> <li>■ When you program the optional parameter <b>Q466 OVERRUN PATH</b>, the control will optimize the approach and idle travel paths automatically. This will reduce machining times.</li> <li>■ Two columns have been added to the prototype of the technology table: <ul style="list-style-type: none"> <li>■ <b>dk</b>: Angular offset of the workpiece in order to machine one side of the tooth flank only. This can be used to increase the surface quality.</li> <li>■ <b>PGM</b>: Profile program for a custom tooth flank line, for example to realize crowning of the tooth flank.</li> </ul> </li> <li>■ After each step, the control displays the number of the current cut and the number of remaining cuts in a pop-up window.</li> </ul> |
| Cycle <b>286 GEAR HOBBING</b> (ISO: <b>G286</b> ) (#157 / #4-05-1) and<br>Cycle <b>287 GEAR SKIVING</b> (ISO: <b>G287</b> ) (#157 / #4-05-1) | The machine manufacturer can configure a deviating automatic <b>LIFTOFF</b> for Cycles <b>286 GEAR HOBBING</b> (ISO: <b>G286</b> ) (#157 / #4-05-1) and <b>287 GEAR SKIVING</b> (ISO: <b>G287</b> ) (#157 / #4-05-1).  |

## 2.2.9 Mill-turning cycles (#50 / #4-03-1)

| Topic   | Description  |
|---|--|
| Cycle <b>800 ADJUST XZ SYSTEM</b> (ISO: <b>G800</b> ) (#50 / #4-03-1) | Cycle <b>800 ADJUST XZ SYSTEM</b> (ISO: <b>G800</b> ) (#50 / #4-03-1) has been extended: <ul style="list-style-type: none"> <li>■ The input range of the parameter <b>Q497 PRECESSION ANGLE</b> has been extended from four to five decimal places.</li> <li>■ The input range of the parameter <b>Q531 ANGLE OF INCIDENCE</b> has been extended from three to five decimal places.</li> </ul> |



## 2.2.10 Files

| Topic                             | Description   |
|-----------------------------------|---|
| File functions                    | <p>If file functions are available for a selected folder or file, the control will display three dots below the icon.</p> <p>If you copy a file and then paste it to the same folder, the control adds the suffix <b>_1</b> to the file name. The control increments the number sequentially for each consecutive copy.</p>   |
| File preview                      | The control indicates by means of symbols in the file preview whether the entire file or only a part of it is displayed.  |
| The <b>Document</b> workspace     | <p>The <b>Document</b> workspace includes a file information bar where the file path is shown.</p> <p>For PDF files, additional functions, such as searching or scaling, are available in the <b>Document</b> workspace.</p> <p>In the <b>Internet</b> window, you can mark URLs as bookmarks.</p>  |
| <b>Quick selection</b> workspaces | <p>The <b>Quick selection</b> workspace in the <b>Editor</b> operating mode is subdivided into the following areas:</p> <ul style="list-style-type: none"> <li>■ <b>NC programs</b></li> <li>■ <b>New graphical programming</b></li> <li>■ <b>New text file</b></li> <li>■ <b>Jobs</b></li> </ul> <p>The <b>Create new table</b> function of the <b>Quick selection new table</b> workspace was revised. Now, you can, for example, search for table types and add favorites.</p> |

## 2.2.11 Monitoring

| Topic                                 | Description  |
|---------------------------------------|--|
| Component monitoring (#155 / #5-02-1) | If a component has not been configured or cannot be monitored, the control displays the corresponding machining operation in gray in the heatmap.  |
| Process monitoring                    | <p>The predefined HEIDENHAIN monitoring tasks have been updated and extended, for example by signals and processes.</p> <p>The machine manufacturer can configure additional monitoring tasks.</p> <p>It is no longer necessary to select reference machining explicitly. You can classify recordings as good or bad parts. The control will automatically use the first ten "good" recordings as reference machining.</p> <p>Recordings of machining operations can be exported manually or automatically to a log file.</p> <p>Recordings and settings of prior software versions are not compatible with software version 18.</p> |

## 2.2.12 Miscellaneous functions

| Topic                                   | Description  |
|---|--|
| Miscellaneous functions for the spindle | In turning mode, miscellaneous functions for the turning spindle must be programmed using different numbers (e.g., <b>M303</b> instead of <b>M3</b> (#50 / #4-03-1)). The machine manufacturer defines the numbers to be used.<br><br>Using the optional machine parameter <b>CfgSpindleDisplay</b> (no. 139700), the machine manufacturer defines the miscellaneous function numbers to be displayed in the status display. |
| The <b>Manual operation</b> application | The machine manufacturer uses the optional machine parameter <b>forbidManual</b> (no. 103917) to define which miscellaneous functions are allowed in the <b>Manual operation</b> application and are available in the selection menu.  |

## 2.2.13 Variable programming

| Topic    | Description  |
|----------|--|
| Formulas | If you press the spacebar while using the <b>Formula</b> , <b>String formula</b> and <b>Contour formula</b> NC functions, the control displays all currently usable syntax elements in the action bar.<br><br>Press the <b>-/+</b> key to change the algebraic sign in formulas. |

## 2.2.14 Graphical Programming

| Topic                              | Description   |
|------------------------------------|---|
| The <b>Contour settings</b> window | The control will save the settings made in the <b>Contour settings</b> window permanently.<br><br>Only the <b>Plane</b> and <b>Diameter programming</b> settings are not saved. |

## 2.2.15 CAD Viewer

| Topic                      | Description   |
|----------------------------|---|
| CAD Import (#42 / #1-03-1) | When you select contours and positions in <b>CAD Viewer</b> , you can rotate the workpiece using touch gestures. While you are using touch gestures, the control will not display any element information.<br><br>CAD Import (#42 / #1-03-1) subdivides contours that are not located in the working plane, into individual sections. <b>CAD Viewer</b> creates straight lines <b>L</b> and circular arcs that are as long as possible.<br><br>The resulting NC programs are often much shorter and clearer than NC programs generated by CAM. Thus, the contours are better suited for cycles, such as the OCM cycles (#167 / #1-02-1).<br><br>CAD Import outputs the radii of the circular arcs as comments. At the end of the generated NC blocks, CAD Import displays the smallest radius to help you select the most suitable tool.<br><br>In the <b>Find circle centers by diameter range</b> window, you can filter the data by position depth values. |

## 2.2.16 ISO

| Topic           | Description   |
|-----------------|---|
| ISO programming | In connection with ISO programming, the control provides the following functions: <ul style="list-style-type: none"> <li>■ Auto-complete</li> <li>■ Color highlighting of syntax elements</li> <li>■ Structure</li> </ul> |

## 2.2.17 User Aids

| Topic  | Description   |
|--|---|
| Comments and structuring items                       | You can insert line breaks within comments or structuring items.  |
| The <b>Structure</b> column                          | You can use the context menu to mark structuring items in the <b>Structure</b> column. The control will also mark all corresponding NC blocks.  |
| <b>Search</b> column in the <b>Program</b> workspace | If you use <b>Search and replace</b> while NC programs are open, the control will close them.<br><br>The limit of the <b>Replace all</b> function was extended from 10,000 to 100,000.  |
| Calculator   | You can use the calculator to convert mm values to inch values and vice versa.<br><br>The calculator features separate buttons for the arcsin, arccos and arctan trigonometric functions.   |
| Message menu   | In the message menu, you can use the <b>Setting for autosave</b> button to specify up to five error numbers. The control will automatically create a service file if one of these errors occurs.<br><br>Using a toggle switch, you can define whether the control will save data from process monitoring (#168 / #5-01-1) for the current NC program in the service file. |

## 2.2.18 The Simulation workspace

| Topic                                 | Description  |
|---------------------------------------|--|
| The <b>Simulation settings</b> window | In the <b>Editor</b> operating mode, the <b>Simulation</b> workspace can be open for only one NC program at a time. If you want to open the workspace on a different tab, the control prompts you for confirmation. The query depends on the simulation settings and the status of the active simulation.                    |
| Preset                                | Before acknowledging a power interruption, you can select a preset for the <b>Simulation</b> workspace.  |
| <b>Advanced checks</b>                | Within the <b>Advanced checks</b> function, you can activate the following checks individually: <ul style="list-style-type: none"> <li>■ Material removal at rapid traverse</li> <li>■ Collisions between the tool carrier or tool shank and the workpiece</li> <li>■ Collisions between the tool and the fixture</li> </ul> |

### 2.2.19 Touch probe functions in the Manual operating mode

| Topic   | Description   |
|---|---|
| Probe process   | <p>When you select a manual touch-probe function, the control automatically suggests the probing direction last used for this function.</p> <p>After probing, the control will always display the axis probed in the <b>Measuring</b> area.</p> <p>If a probing point could not be reached, you can continue probing by pressing the <b>NC start</b> key.</p> |
| Automatic probing method                              | When you select automatic probing within a touch-probe function, the control will use the sum of the value in the <b>SET_UP</b> column and the stylus tip radius as the set-up clearance. The set-up clearance cannot be less than the value in the <b>SET_UP</b> column of the touch-probe table.  |
| <b>Plane over cylinder (PLC)</b> touch-probe function | For the <b>Plane over cylinder (PLC)</b> touch-probe function, the second measurement is by default in the inverse direction of the first measurement. Thus, pre-positioning in the probing plane is not necessary because the control will use the current angle as the start angle.   |
| Calibrating the touch probe                           | If you have used a calibration sphere to calibrate the radius of a touch probe, the control will automatically select the 3D Calibration function (#92 / #2-02-1).  |
| The <b>Change the preset</b> window                   | In the <b>Change the preset</b> window, you can enter a different preset.   |

### 2.2.20 Touch-probe cycles for the workpiece

| Topic  | Description  |
|--|--|
| Touch-probe cycles <b>14xx</b> for determining a workpiece misalignment and for acquiring the preset | You can enter symmetric tolerances for nominal dimensions, such as <b>10+-0.5</b> .  |
| Cycle <b>441 FAST PROBING</b> (ISO: <b>G441</b> )  | <p>Cycle <b>441 FAST PROBING</b> (ISO: <b>G441</b>) now features the parameter <b>Q371 TOUCH POINT REACTION</b>. This parameter defines the reaction of the control in cases where the stylus is not deflected.</p> <p>Using the parameter <b>Q400 INTERRUPTION</b> in Cycle <b>441 FAST PROBING</b> (ISO: <b>G441</b>), you can define whether the control will interrupt program run and display a measuring log. The parameter is effective in conjunction with the following cycles:</p> <ul style="list-style-type: none"> <li>■ Cycle <b>444 PROBING IN 3-D</b> (ISO: <b>G444</b>)</li> <li>■ Touch-probe cycles <b>45x</b> for kinematics measuring</li> <li>■ Touch-probe cycles <b>46x</b> for calibrating the workpiece touch probe</li> <li>■ Touch-probe cycles <b>14xx</b> for determining a workpiece misalignment and for acquiring the preset</li> </ul> |

### 2.2.21 Touch-probe cycles for the tool

| Topic                                 | Description   |
|---------------------------------------|---|
| Tool measurement cycles<br><b>48x</b> | <p>Using the optional machine parameter <b>maxToolLengthTT</b> (no. 122607), the machine manufacturer defines a maximum tool length for tool touch probe cycles.</p> <p>If a tool has been defined in the tool table with a length of <b>L = 0</b>, the control will use the value of the machine parameter as the starting point for a rough length measurement. Then, a fine measurement will be performed.</p> |
|                                       | <p>Using the optional machine parameter <b>calPosType</b> (no. 122606), the machine manufacturer defines whether the position of parallel axes and changes in the kinematics should be considered for calibration and measuring. A change in kinematics might for example be a head change.</p>   |

### 2.2.22 Touch-probe cycles for kinematics measuring

| Topic   | Description   |
|---|---|
| Cycle <b>451 MEASURE KINEMATICS</b> (ISO: <b>G451</b> ) (#48 / #2-01-1) and <b>452 PRESET COMPENSATION</b> (ISO: <b>452</b> ) (#48 / #2-01-1) | Cycles <b>451 MEASURE KINEMATICS</b> (ISO: <b>G451</b> ) (#48 / #2-01-1) and <b>452 PRESET COMPENSATION</b> (ISO: <b>452</b> ) (#48 / #2-01-1) save the measured position errors of the rotary axes in the QS parameters <b>QS144</b> to <b>QS146</b> . |

### 2.2.23 Program Run

| Topic                | Description   |
|----------------------|---|
| Feed-rate limitation | The button for feed-rate limitation and the associated functions (previously <b>FMAX</b> ) were renamed to <b>F LIMIT</b> .   |
| Execution cursor     | The execution cursor is always displayed in the foreground. The execution cursor may cover or hide other icons.   |
| Presets              | When running an NC program in the <b>Single Block</b> mode, you can edit the preset table. Before editing, the control displays a prompt where you must confirm that you want to abort program run. |

## 2.2.24 Tables

| Topic                      | Description  |
|----------------------------|--|
| Creating a new table       | <p>When you create a new table in the file manager, the table does not contain information on the required columns yet. When you open the table for the first time, the <b>Incomplete table layout</b> window will open in the <b>Tables</b> operating mode.</p> <p>In the <b>Incomplete table layout</b> window, a selection menu allows you to select a table template. The control shows which table columns are added or removed, if applicable.</p>   |
| Editing a table            | <p>To edit the contents of a table, you can also double-tap or double-click the table cell. The control displays the <b>Editing disabled. Enable?</b> window. You can enable the values for editing or abort the process.</p> <p>If you copy or cut a table row in the <b>Tables</b> operating mode, the control provides the <b>Overwrite</b> or <b>Append</b> function for pasting.</p> <p>If you select the contents of a cell in a selection window, the control displays the <b>Delete entry</b> button.</p>  |
| The <b>Table</b> workspace | The <b>Change column width</b> function remains active if you select a different column.   |
| The <b>Form</b> workspace  | In the <b>Form</b> workspace for tables, the control displays help graphics that show the effect of the selected grinding tool parameters.   |
| Accessing table values     | In the <b>TABDATA WRITE</b> , <b>TABDATA ADD</b> and <b>FN 27: TABWRITE</b> (ISO: <b>D27</b> ) NC functions, you can enter values directly.  |
| Tool management            | <p>You cannot delete any tools that have been entered into the pocket table. The button is dimmed.</p> <p>The selection window for 3D files includes a search function.</p> <p>If you insert a new table row in tool management using the <b>Insert tool</b> button, the control will suggest the next free row number.</p> <p>The control displays icons for the <b>TO</b> orientations of the dressing tools (#156 / #4-04-1).</p> <p>In some operating modes and applications, you can use the <b>Tools</b> button to switch to <b>Tool management</b>.</p> |

## 2.2.25 The Settings application

| Topic  | Description  |
|--|--|
| <b>OPC UA NC Server</b><br>(#56-61 / #3-02-1*) | <p>Within the <b>OPC UA</b> menu item, a button is available to manually start or restart the <b>OPC UA NC Server</b>.</p> <p>The <b>OPC UA NC Server</b> allows you to create service files.</p> <p>You can validate 3D models for tools or tool carriers (#140 / #5-03-2).</p> <p>The <b>OPC UA NC Server</b> supports the <b>Aes128Sha256RsaOaep</b> and <b>Aes256Sha256RsaPss</b> security policies.</p>   |
| <b>PKI Admin</b>                               | <p>If an attempt to connect to the <b>OPC UA NC Server</b> (#56-61 / #3-02-1*) fails, the control will store the client certificate on the <b>Rejected</b> tab. You can transfer the certificate directly to the <b>Trusted</b> tab without the need to transfer the certificates manually to the control.</p> <p>You can open <b>PKI Admin</b> from the <b>OPC UA</b> menu item.</p> <p><b>PKI Admin</b> now includes the <b>Advanced settings</b> tab.</p> <p>You can define whether the server certificate should contain static IP addresses and allow connections without an associated CRL file.</p> |
| Secure connections                             | <p>The control uses an icon to indicate whether a connection configuration is secure or non-secure.</p> <p>In future software versions, the control will no longer support LSV2 protocols.</p>   |
| Configuration of the control's user interface  | <p>The following buttons have been added to the <b>Configurations</b> menu item:</p> <ul style="list-style-type: none"> <li>■ <b>Save current settings</b></li> <li>■ <b>Restore last configuration</b></li> </ul>   |

## 2.2.26 User administration

| Topic                          | Description   |
|--------------------------------|---|
| Login as a function user       | Your IT administrator can set up a function user to facilitate connectivity to the Windows domain.                      |
| Connecting to a Windows domain | If you have connected the control to the Windows domain, you can export the required configurations for other controls. |

## 2.2.27 Machine parameters

| Topic                             | Description  |
|-----------------------------------|--|
| Display of the machine parameters | In the <b>List</b> workspace, you can toggle between a structure and a table view of the configuration editor. |
| StretchFilter                     | Machine parameter <b>CfgStretchFilter</b> (no. 201100) has been removed.                                       |

# HEIDENHAIN

## DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5

83301 Traunreut, Germany

☎ +49 8669 31-0

☎ +49 8669 32-5061

info@heidenhain.de

**Technical support** ☎ +49 8669 32-1000

**Measuring systems** ☎ +49 8669 31-3104

service.ms-support@heidenhain.de

**NC support** ☎ +49 8669 31-3101

service.nc-support@heidenhain.de

**NC programming** ☎ +49 8669 31-3103

service.nc-pgm@heidenhain.de

**PLC programming** ☎ +49 8669 31-3102

service.plc@heidenhain.de

**APP programming** ☎ +49 8669 31-3106

service.app@heidenhain.de

[www.heidenhain.com](http://www.heidenhain.com)

