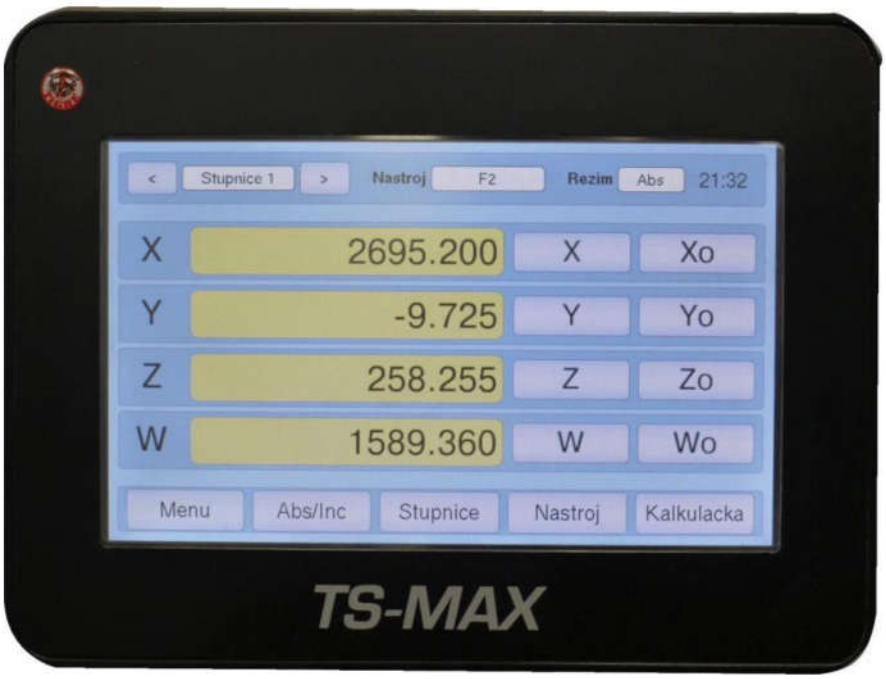
Digital readout

TSMAX



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Contents

Specification readout

Technical Parameters

Supply voltage	24 V DC
Input MAX	24 kW
Operating environment humidity	Max. 85 % at 45 °C, without condensation
Temperature of operating environment	10 °C to 50 °C
Device case	200 x 150 x 40 mm
Weight	1.8 kg
Definition	According to used sensor
Display	Colour, touch, diagonal 7“

Description and connection of connector type D-SUB 9 socket

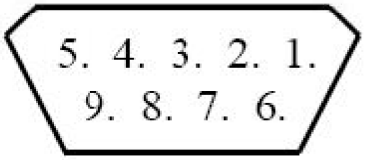

Fig. 1: D-SUB socket

Contact number	Signal
1	-A
2	0V
3	-B
4	Not connected
5	-Z
6	A
7	+5V
8	B
9	Z

Electric specification of sensor signals: signal TTL 5 V

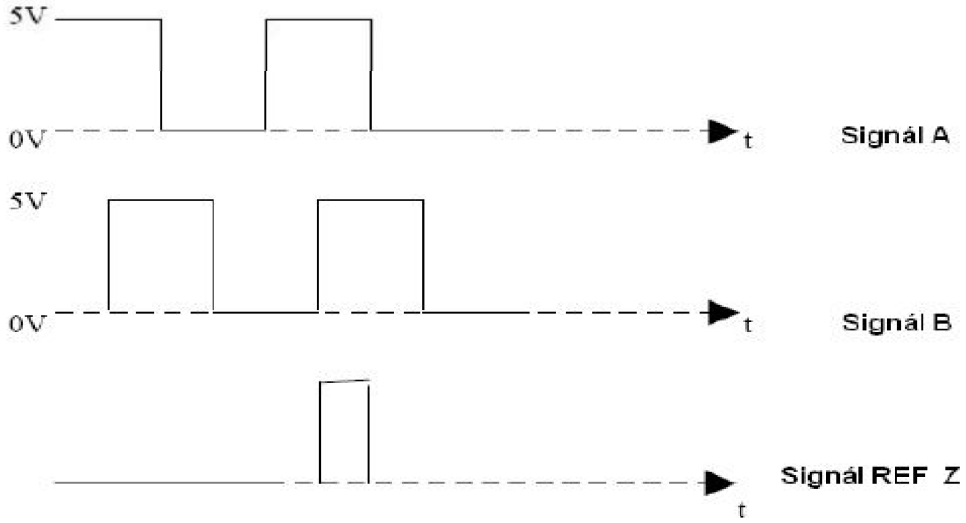

Fig. 2: Electric specification of sensor signals

Digital readout scheme

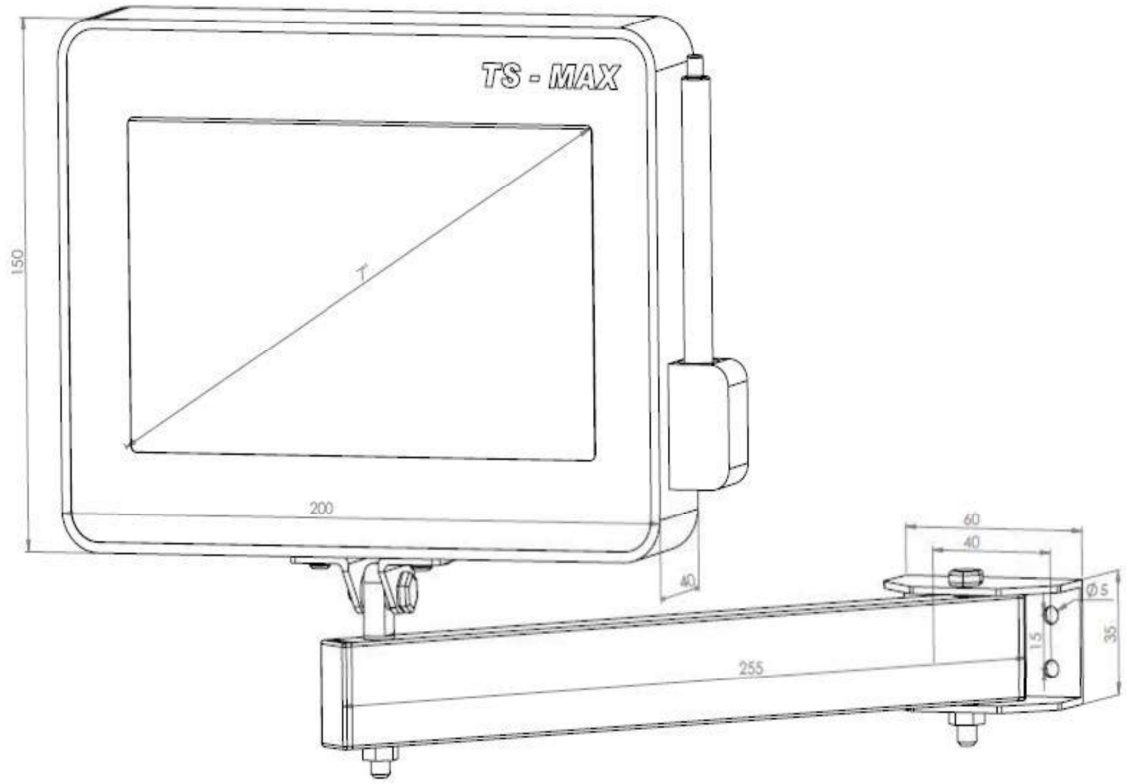

Fig. 3: Digital readout scheme

Initial screen

➓ The first screen is displayed after starting the whole system and program TSMAX.

➓ Description fig. 4: Initial screen

1) Actually selected scale and switching between the saved scales.

✦ The user can create own scales with set offsets and then just press buttons on the main screen (see chapter **Chyba! Záložka není definována.**).

✦ It also includes the switching between absolute and incremental mode – button „**Abs/Inc**“.

2) Display of actual tool.

✦ The miller is marked „**F**“, lathe „**S**“ and grinder „**B**“ followed by the order number from the list of created tools (for more see chapters **Chyba! Záložka není definována.**).

3) The mode display – Absolute/Incremental (Abs/Inc).

✦ It is switched by button „**Abs/Inc**“ on the lower screen side.

✦ In case of selecting the incremental mode, the displayed values from the encoder are displayed with red letter identically to the scales (see chapter **Chyba! Záložka není definována.**).

4) Shift speed.

✦ It is possible to set different display speed for every axis or switch off the speed indicator – do not display (for more see chapter **Chyba! Záložka není definována.**).

5) Display of values from the encoders.

6) The buttons for setting or resetting the value.

➓ The initial screen for the miller and grinder is identical. The lathe includes the display of button for the selection of value display from the sensors as radius (**Rad**) or diameter (**Dia**). Setting the device type is performed in basic setting (see chapter **Chyba! Záložka není definována.**).

➓ The last three buttons (in this case „**Scale**“, „**Tools**“, „**Calculator**“) are programmable and they can include another selection (see chapter **Chyba! Záložka není definována.**).

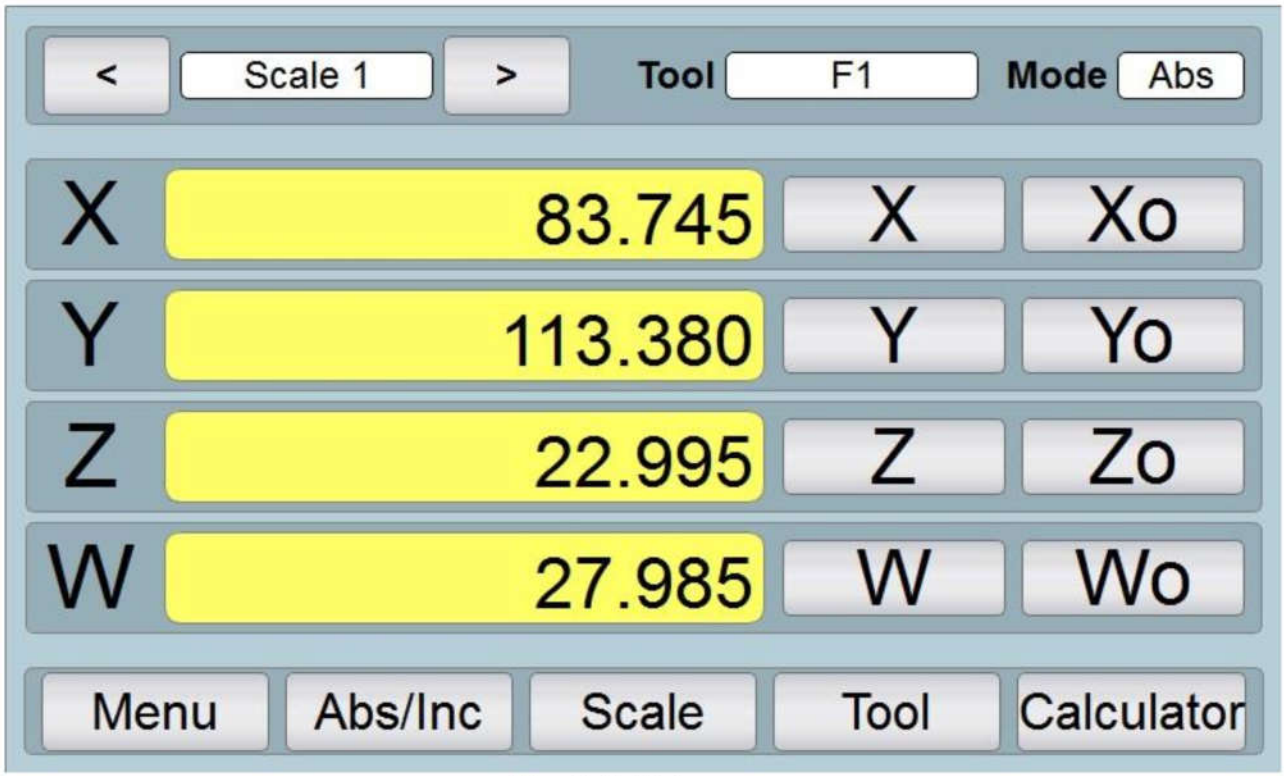

Fig. 4: Initial screen

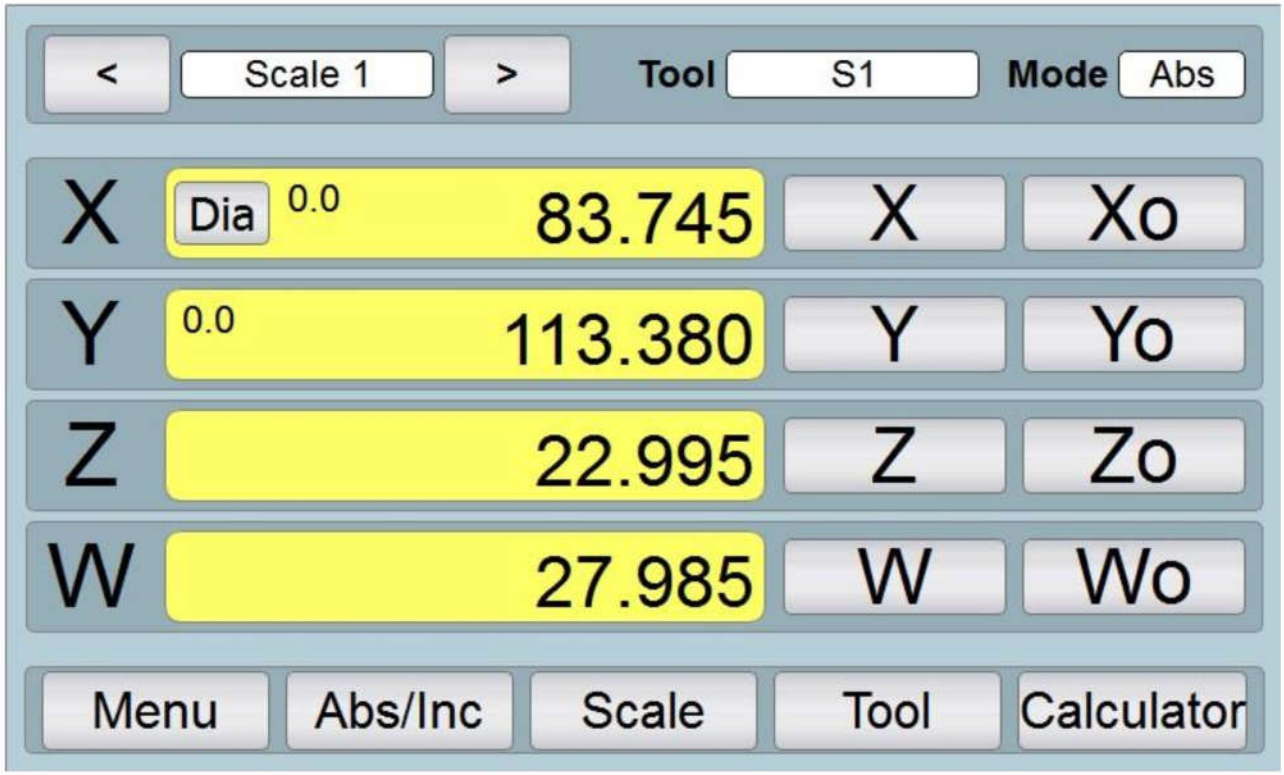

Fig. 5: Initial screen – switching diameter/ radius for the device type lathe

1. Menu

❿ Pressing the button „**Menu**“ displays the option with functions and setting. If in the mode for the grinder or the lathe, the buttons are not displayed „**<**“ a „**>**“ for other functions.

❿ If in the mode for the miller and the buttons are used for the selection of other functions („**<**“ and „**>**“), the extension functions are displayed (see fig. 7: The extension menu functions for the device type miller).

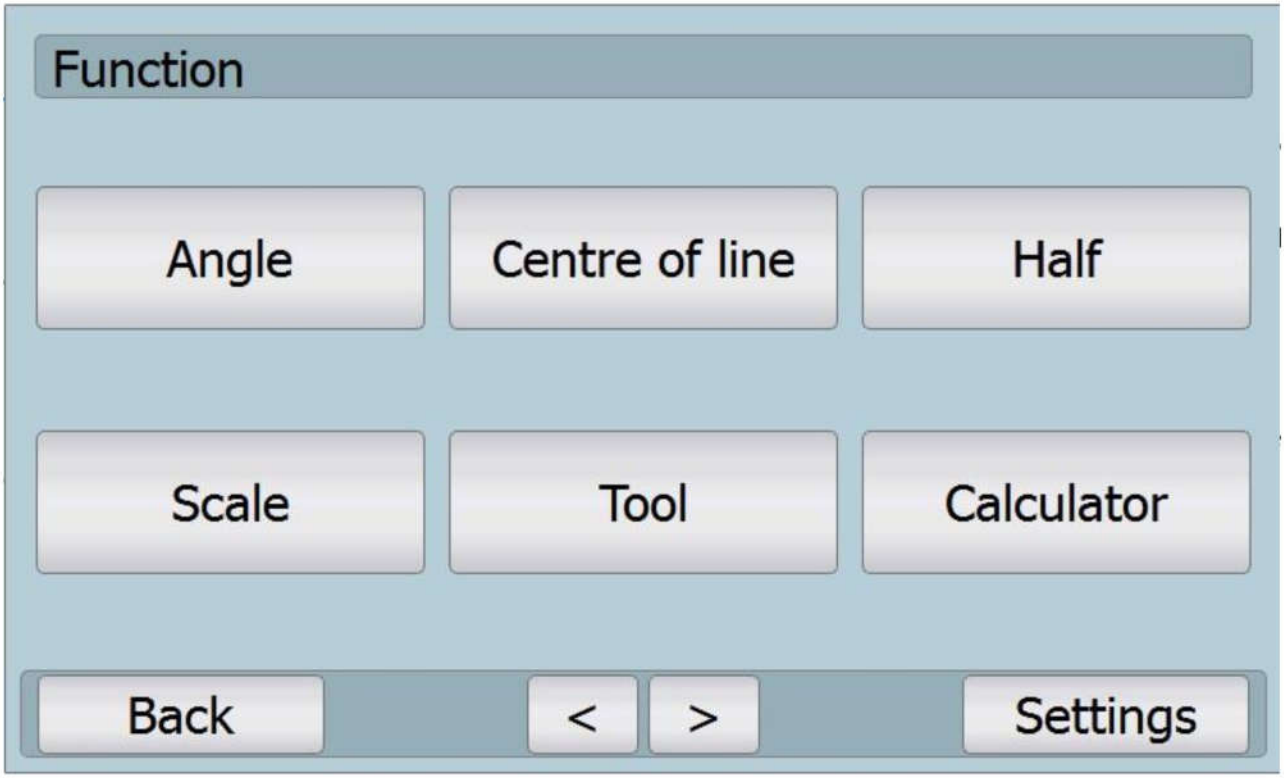

Fig. 6: Function menu

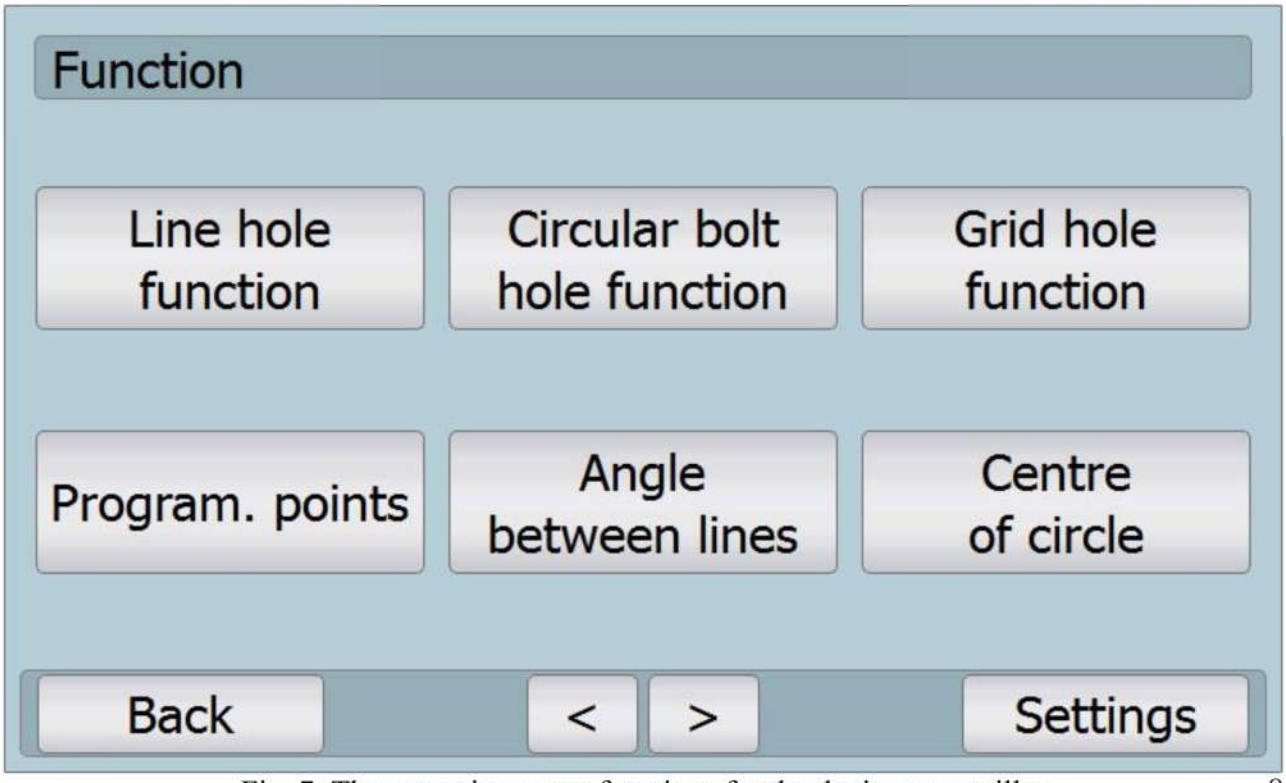

Fig. 7: The extension menu functions for the device type miller

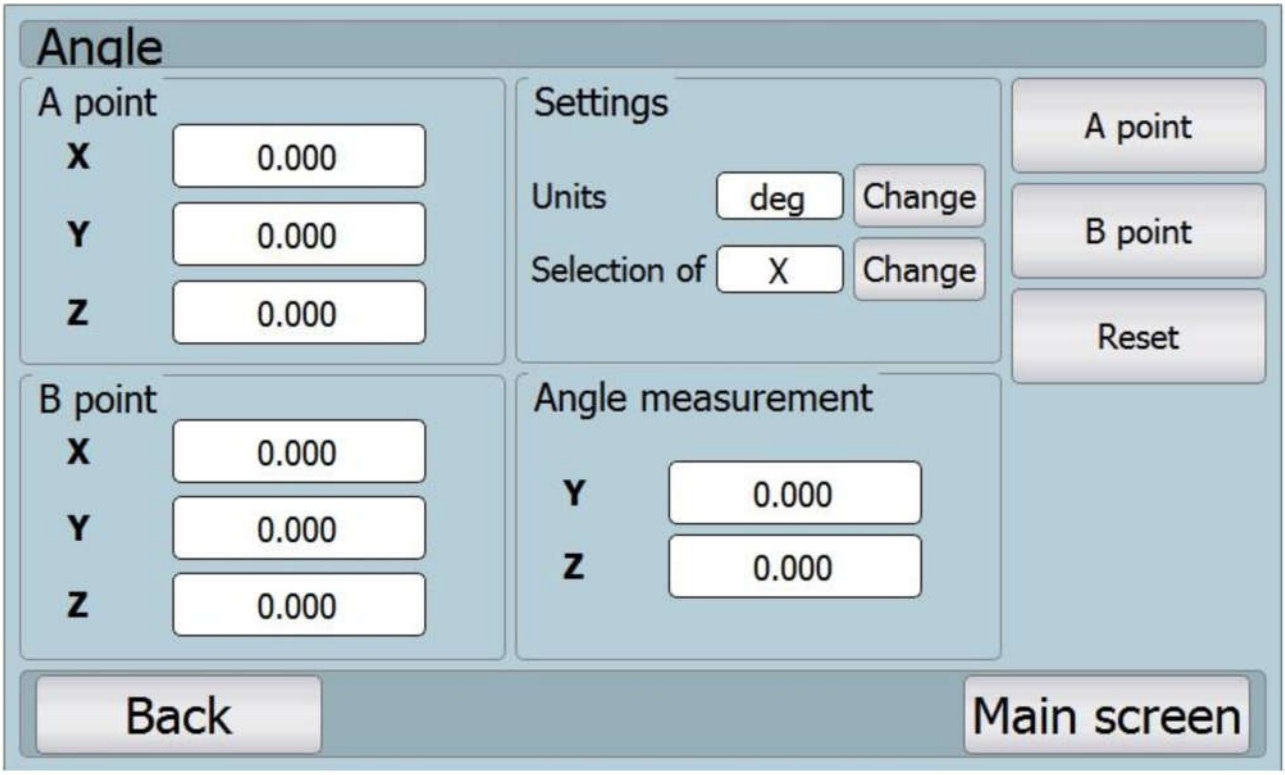

Fig. 8: Function for searching the angle between the line (abscissa) and the selected level

Centre of abscissa

- The function searches for the abscissa centre which is defined by two points.
- At first it is necessary to move to required coordinates and pressing buttons „**Point A**“, the actual coordinate is used for point A for calculation.
- It is also performed for point B.
- It is automatically used for the calculation of the centre coordinate.
- Button „**Reset**“ returns everything into the initial setting.

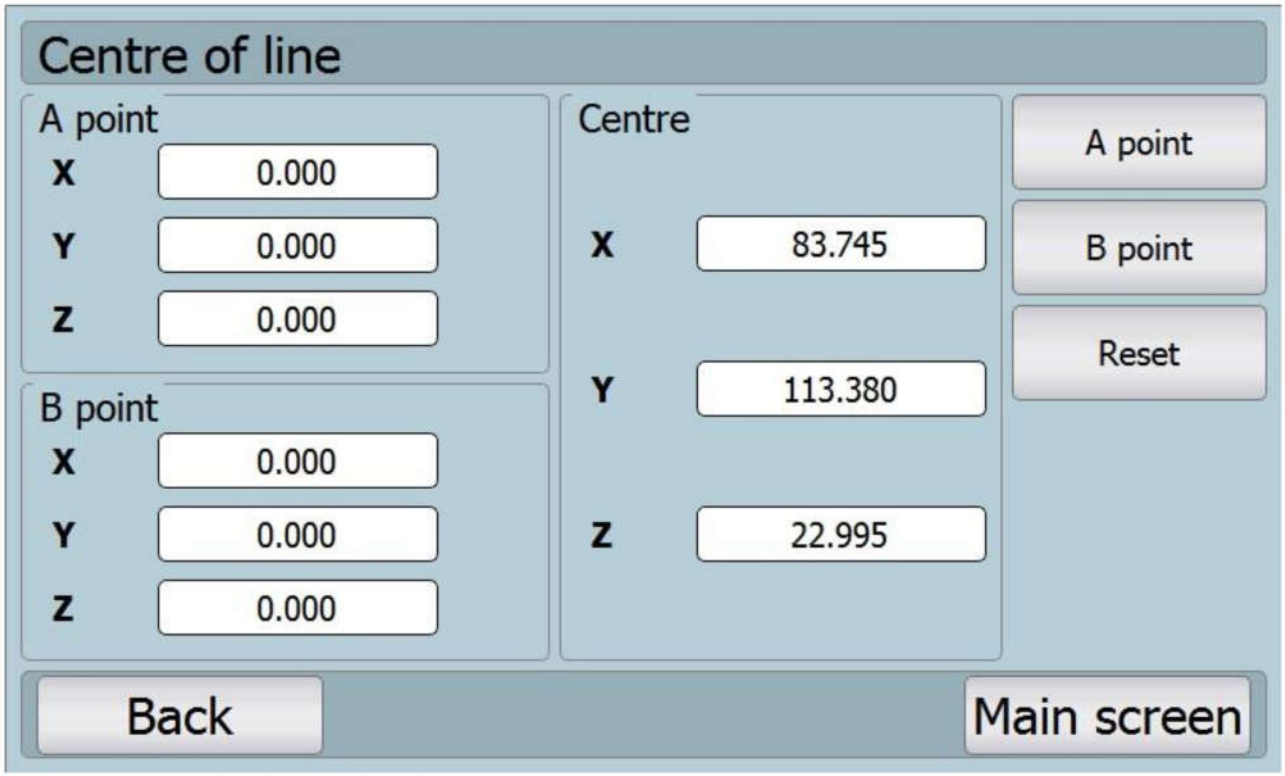

Fig. 9: Function for searching the abscissa centre between two points

Half

- The function which sets the half in individual axes from the actual value.
- Half can be set separately for every axis.
- Click on button „**Polovina**“ (half) for the defined axis and value for the axis reduce by one half.

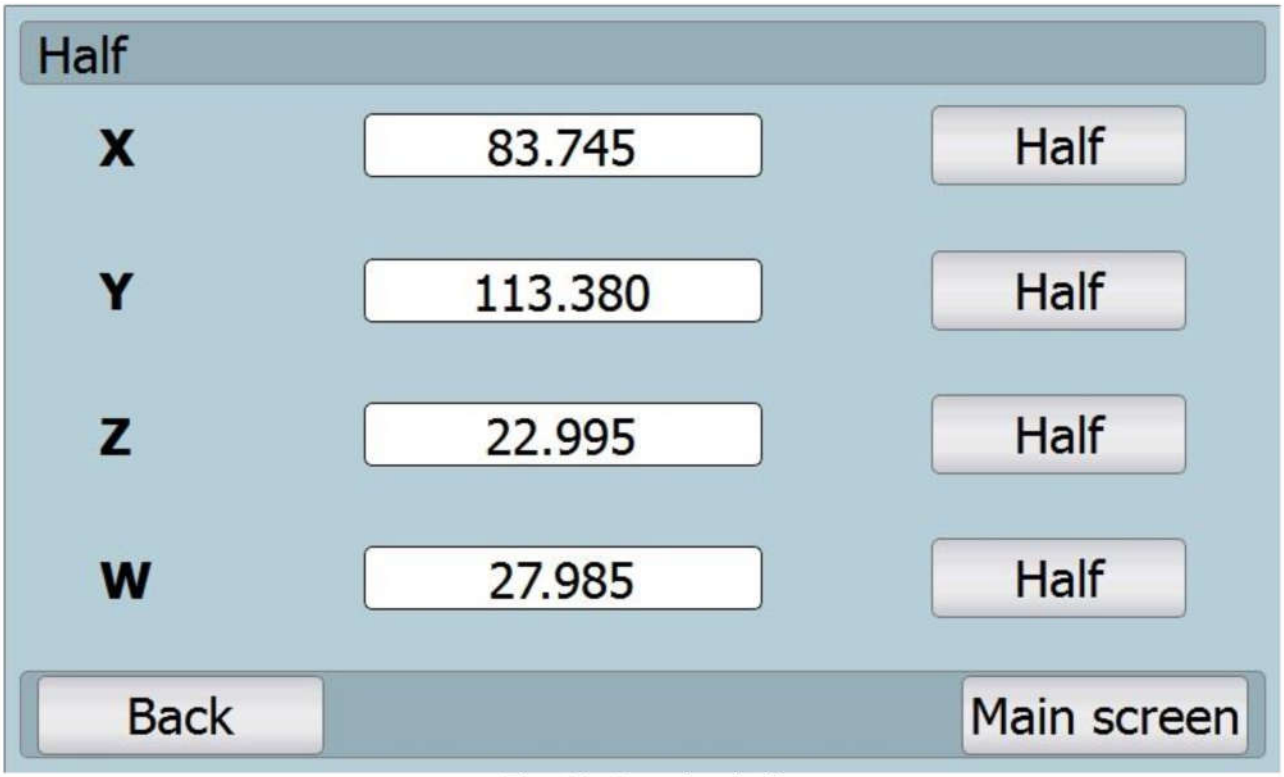

Fig. 10: Function half

- This change is reflected in all program functions where the axis is displayed.

Scale

- Scale is used for entering individual axes values.
- It adds the calculated offset to the value from the encoder so the result is the defined value
- In the review screen (see fig. 11: The scale – the review screen of the scales indicates which scale is active (top right), which scale is actually displayed, and how many scales are created.
- It is possible to set a note and value for every axis for every scale.
- Use buttons „**Predchozi**“ (former) and „**Dalsi**“ (next) to switch between individual scales for the display.
- Button „**Aktivovat**“ (activate) activates the defined scale. This includes the set offset in the calculation for the actual values from the encoders. Switching and activation of scales is also on the main screen by means of buttons „**<**“ and „**>**“ (see chapter **Chyba! Záložka není definována.** - point 1).
- Buttons „**Novy**“(new) and „**Upravit**“ (edit) start new or edit the existing scale.
- Button „**Smazat**“ (delete) deletes the selected scale „**Smazat vse**“ (delete all) removes all saved scales.
- Button „**Seznam ABS**“ (List ABS) displays all absolute scales and their values (see fig. 12: Scale – list of saved scales). This list enables to activate the selected scale by means of button „**Zvolit**“ (select).
- If we select incremental mode (button „**Abs/Inc**“), on the initial screen, the values will be red. This mode is for every scale. It is possible to set values for absolute and incremental mode and after activating the scale it is possible to switch between them.

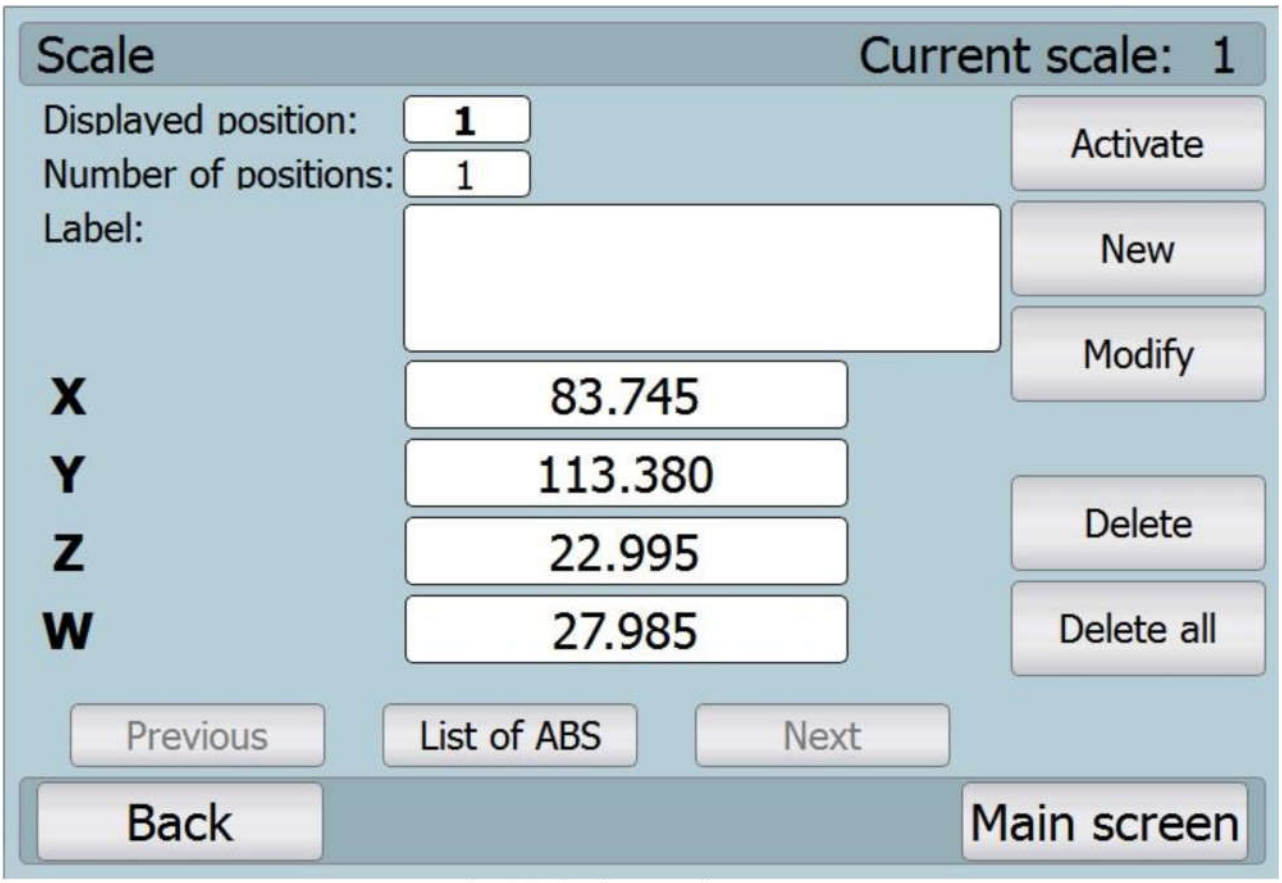

Fig. 11: Scale - Review screen

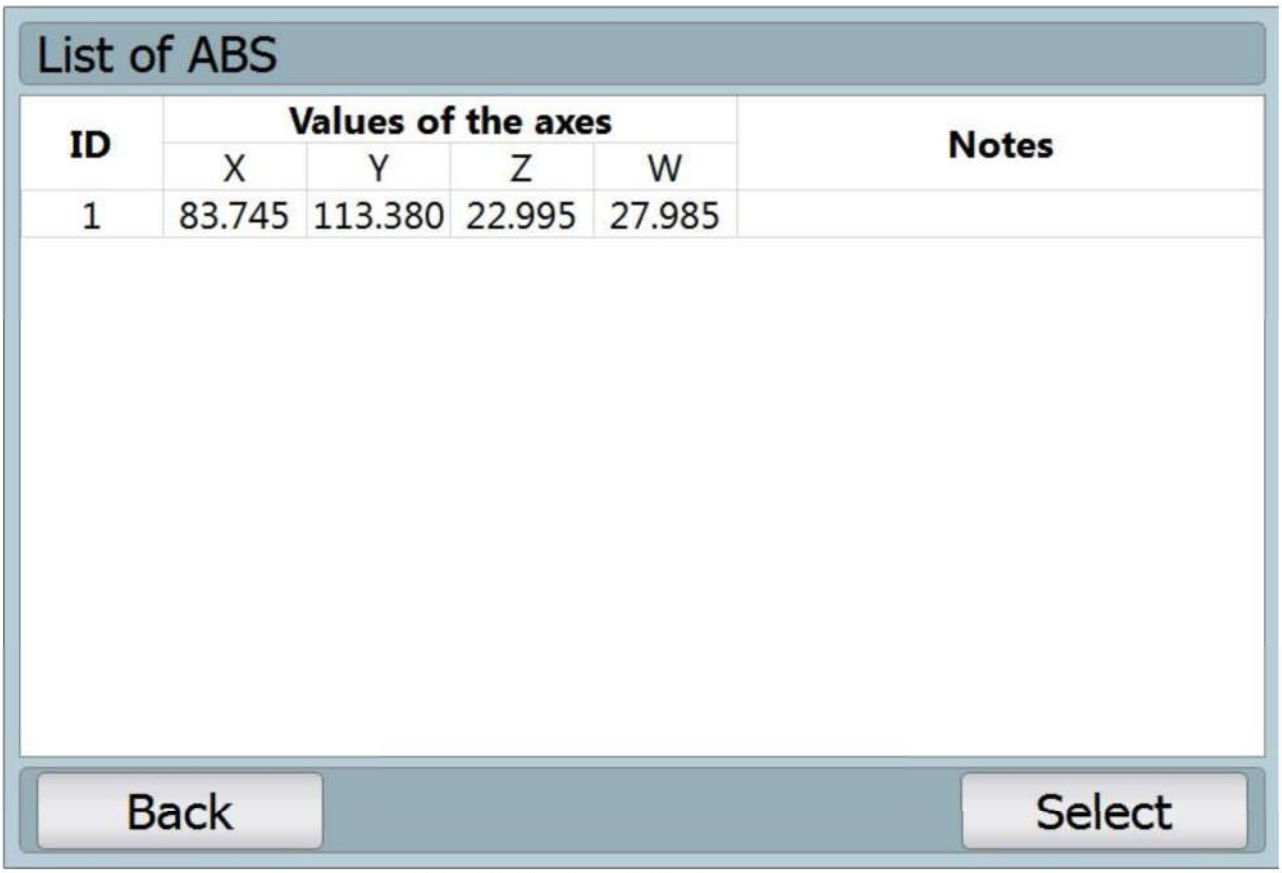

Fig. 12: Scale – list of saved scales

Tool

- Setting the parameters for selected tool (see chapter **Chyba! Záložka není definována.**).
- The selected tool can be the miller, lathe or grinder in basic setting (see chapter**Chyba! Záložka není definována.**).
- It is possible to load new, edit, or read the existing.
- Use buttons „**Predchozi**“ (former) and „**Nasledujici**“ (next) to switch individually located tools for the display.
- The list of all created tools can be seen after pressing button „**Seznam**“ (list). It is possible to activate the selected tool (see chapter **Chyba! Záložka není definována.**) using button „**Zvolit**“ (select) identically to the scales.
- Button „**Smazat**“ (delete) deletes the actually displayed tool and button „**Smazat vse**“ (delete all) removes all saved tools of the defined type.
- The top right displays the active tool identically to the initial screen see chapter **Chyba! Záložka není definována.**).
- It also displays a number of saved tools, the actually displayed tool, the tool type, and description.
- Other parameters differ according to the set type of tool.

Milling machine

⓾ Miller parameter setting

↘ Tool diameter

↘ Measuring as diameter/radius

↘ Selected plane

↘ Machining direction – according to the former parameters, it adds or deducts the value of the diameter/ radius to the elected axis (axes).

↘ In this type of device, the menu displays functions for drilling holes, angle search between the lines or searching for the circle centre (see fig. 7: The extension menu functions for the device type miller).

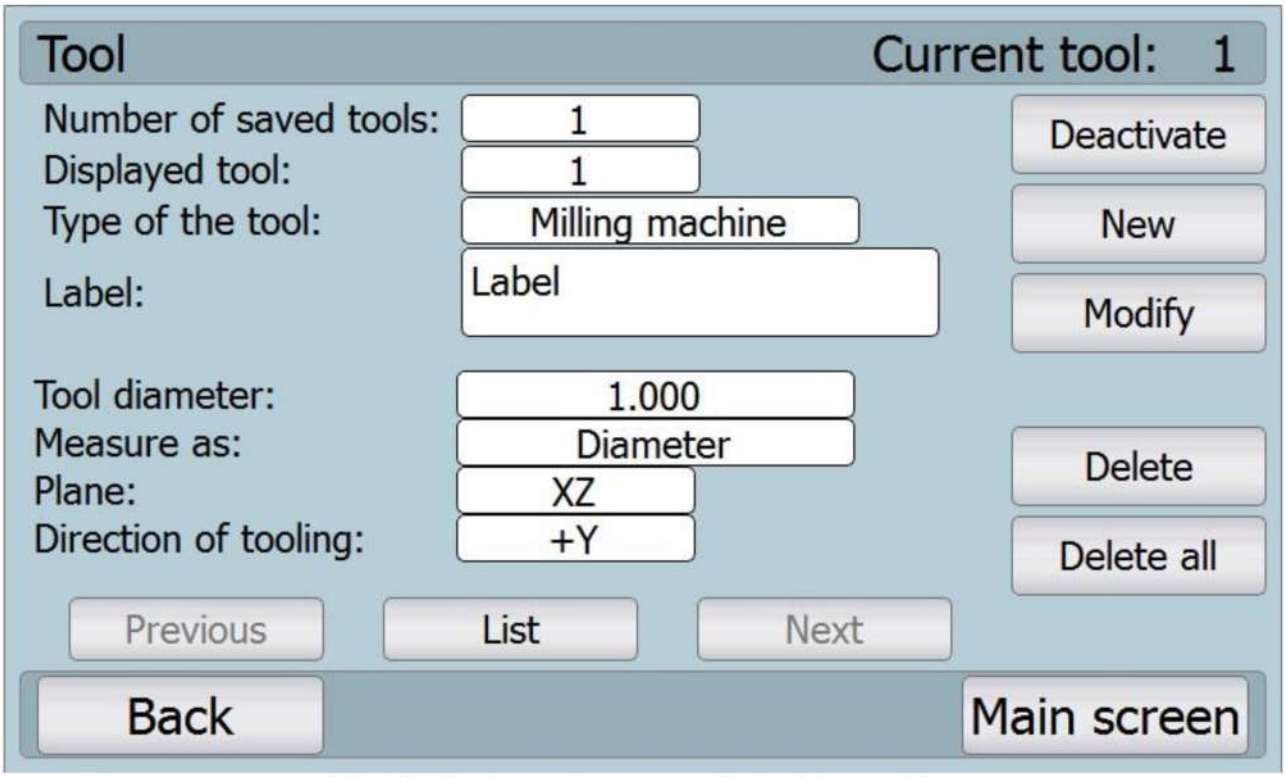

Fig. 13: Tool – review screen for tool type miller

Lathe

- It is possible to set the machine shift for individual axes.
- The values can be changed for every axis separately.
- In case of selecting the device type lathe or grinder cannot use the extending functions (see fig. 7: The extension menu functions for the device type miller).

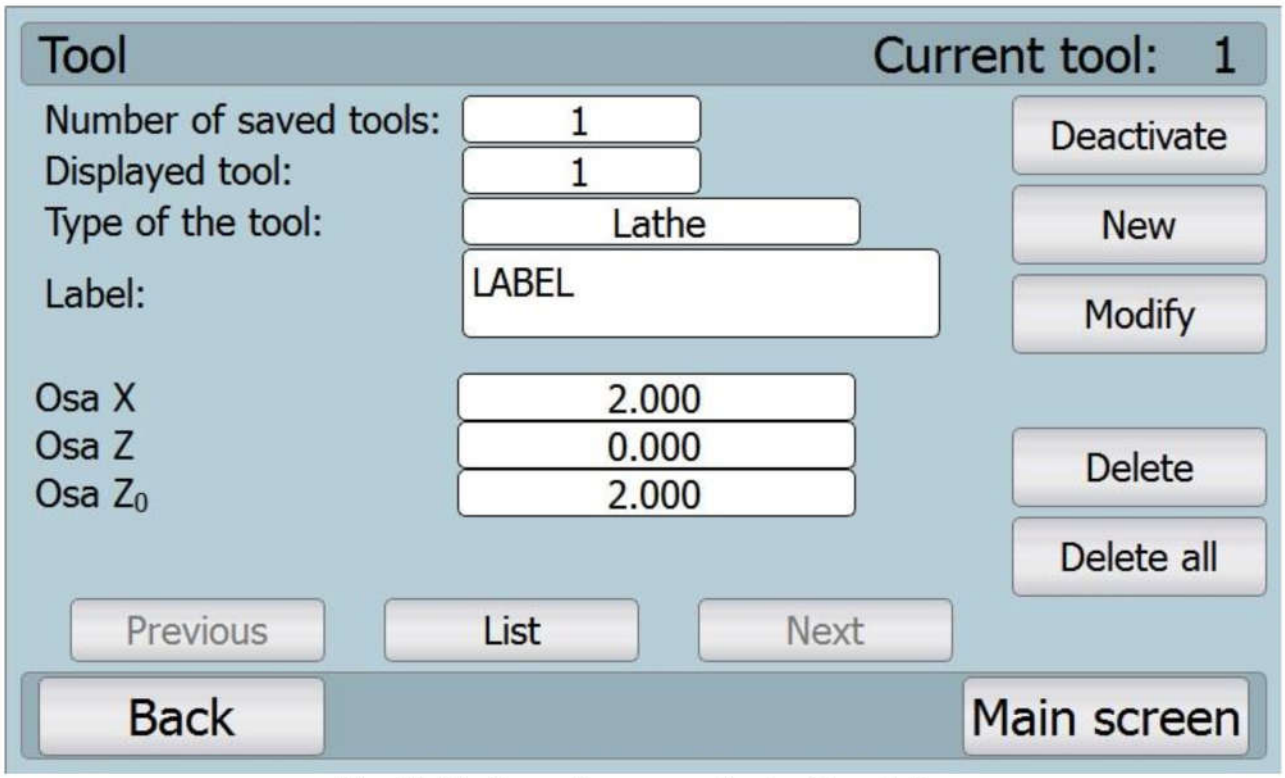

Fig. 14: Tool – review screen for tool type lathe

Grinder

- The same setting as for the lathe.

Calculator

- Calculator for individual calculators (see fig. 15: Calculator).
- It contains goniometric functions.
- Top panel (yellow) is used for the display of entry history and the panel below is used for the display of the results, inter-results, and entering the actual value.
- Button „**Prenest**“ (transfer) is used for transferring the values from individual axes to the calculator or vice versa from the calculator to individual axes (see fig. 16: Calculator – value transfer).

1) If I calculate something on the calculator, it is possible to use buttons „X“ to „W“ to transfer the result on the selected axis.
2) It displays the selected values from the encoder, which can be transferred to the calculator, and used for calculation.

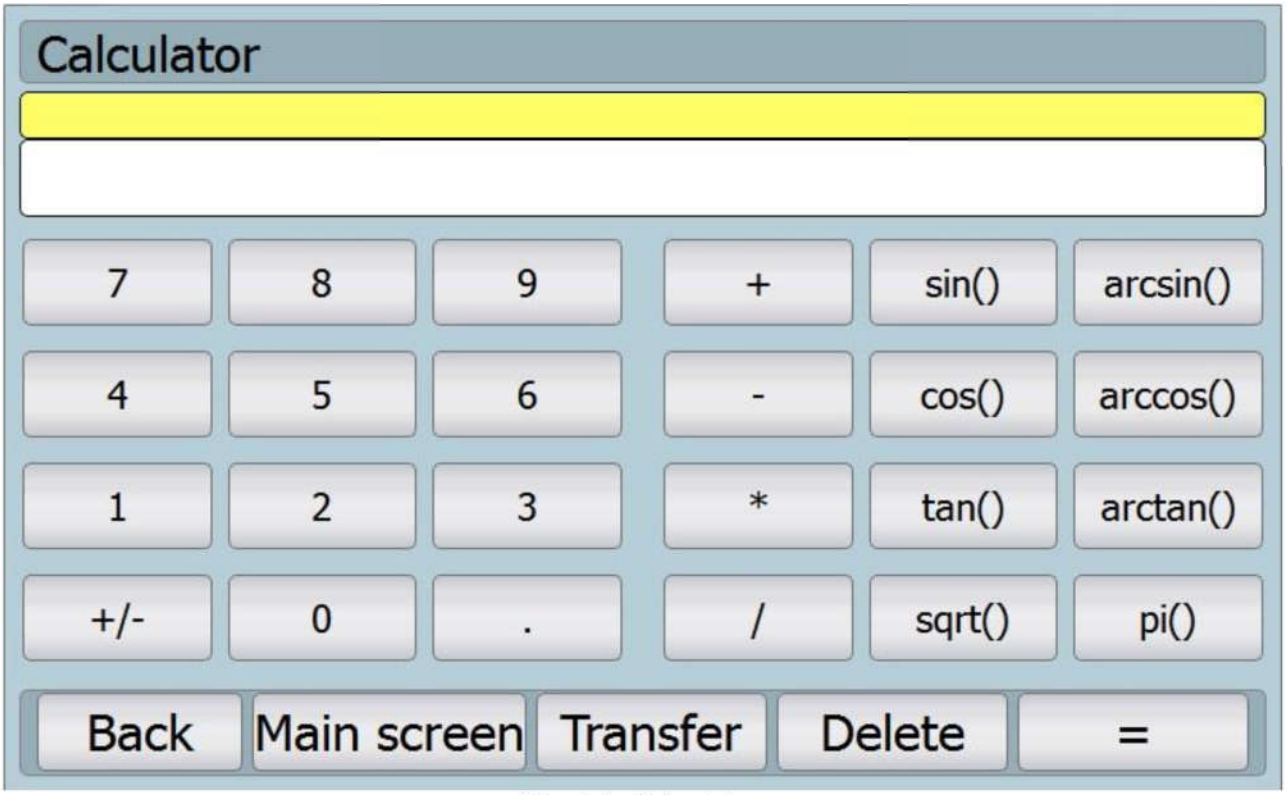

Fig. 15: Calculator

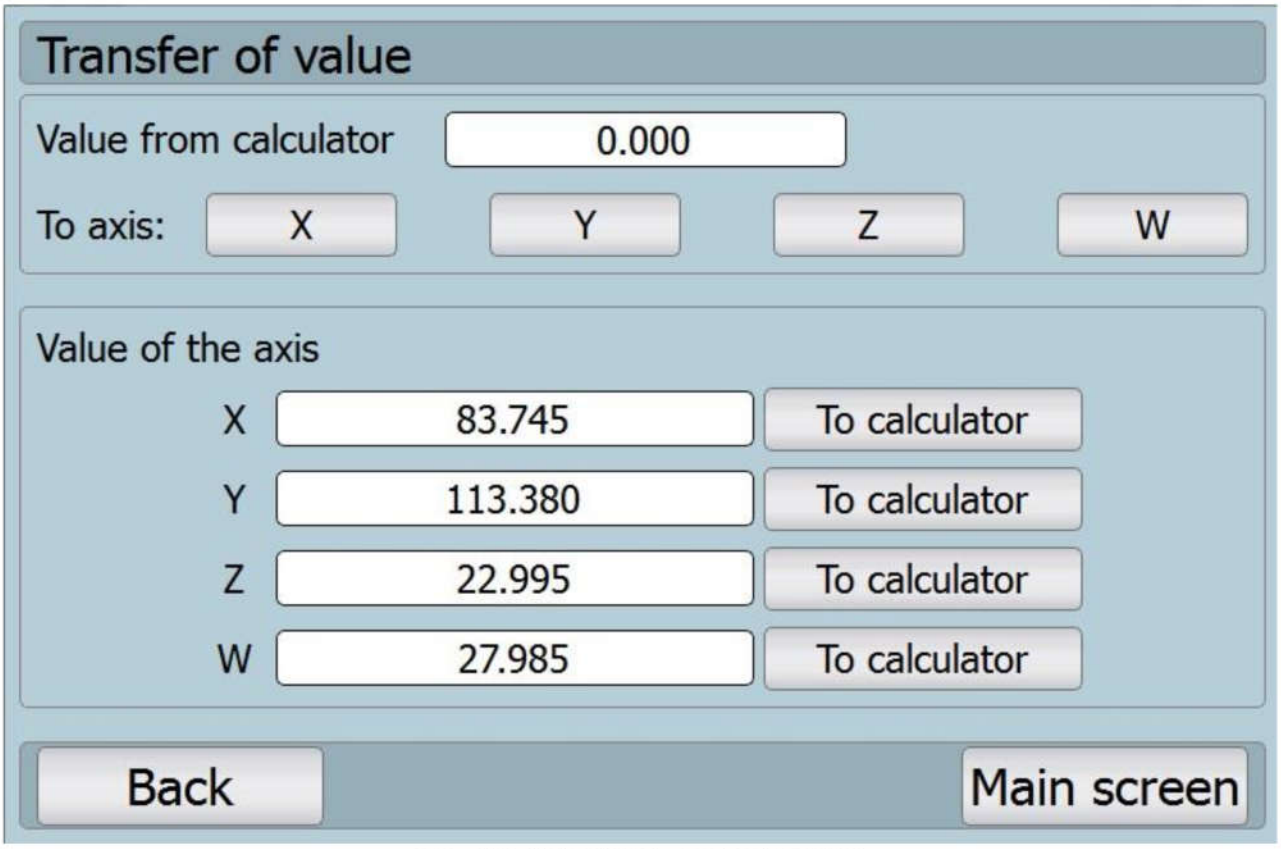

Fig. 16: Calculator – value transfer

Holes on the line

- It is used for drilling holes on the line.
- At first, select the plane where individual holes shall be drilled.
- Set the centre coordinates for drilling. It is possible to set any coordinates or the actual coordinates using button „**Nastavit aktualni stred**“ (set actual centre) (see fig. 18: Hole drilling on line – edit one point from the scene).
- Select the number of holes for drilling
- Set the spacing of the holes and their turning.

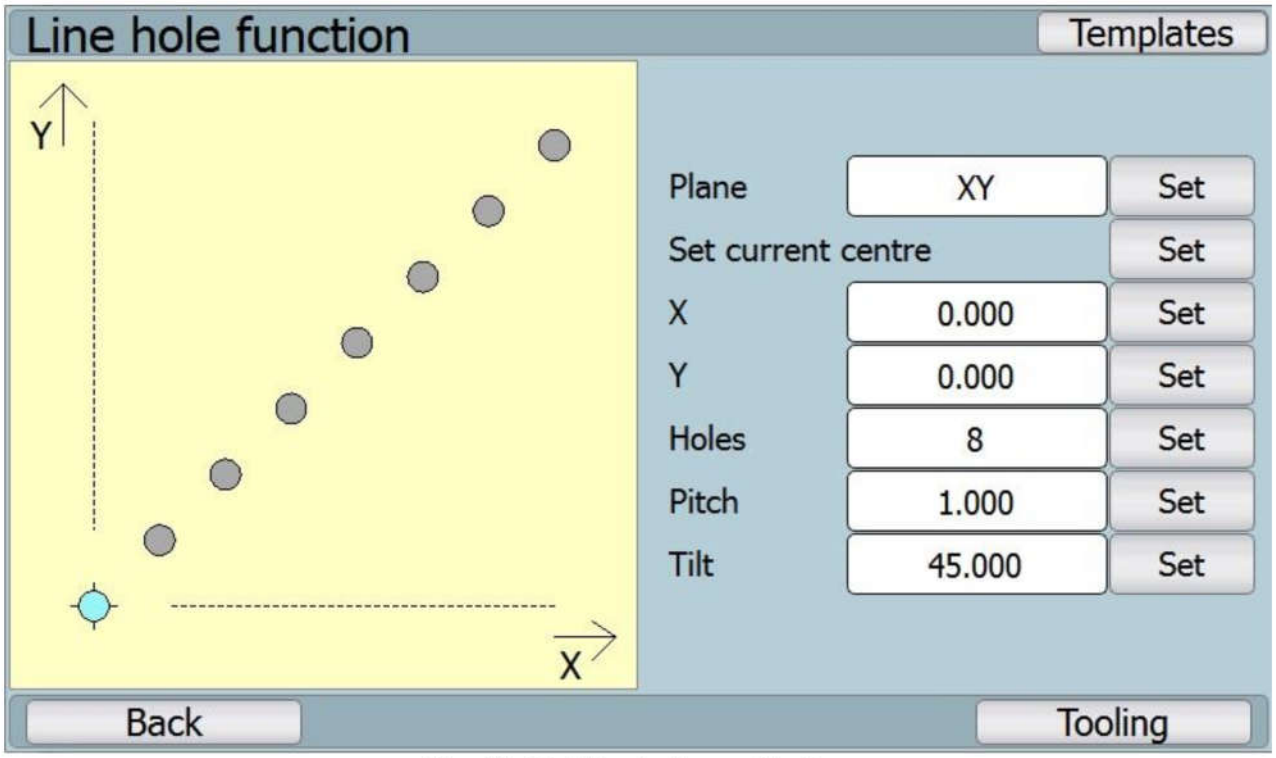

Fig. 17: Drilling holes on the line

- Automatically re-draws the scene with the display how the task shall look like.

- Every entered hole can be edited independently – shift in defined plane axes, set the distance from the centre or the turning angle. This option is achieved by marking the hole in the scene (finger or stylus). Marked hole is green (see fig. 18: Hole drilling on line – edit one point from the scene).
- Caution during every change of the setting the scene is re-drawn. If for example one hole is shifted to other than defined entry (manually, see point) and than the setting changes, it is automatically re-drawn!
- The hole can be deleted from the scene using button „**Odstranit**“ (delete).
- After returning to the initial setting, it is possible to use button „**Zpet**“ (back) on the right or mark a location where no hole is drawn in the scene.
- As soon as all parts are entered, press button „**Obrabeni**“ (machining) to get back to the machining mode where individual holes can be drilled.

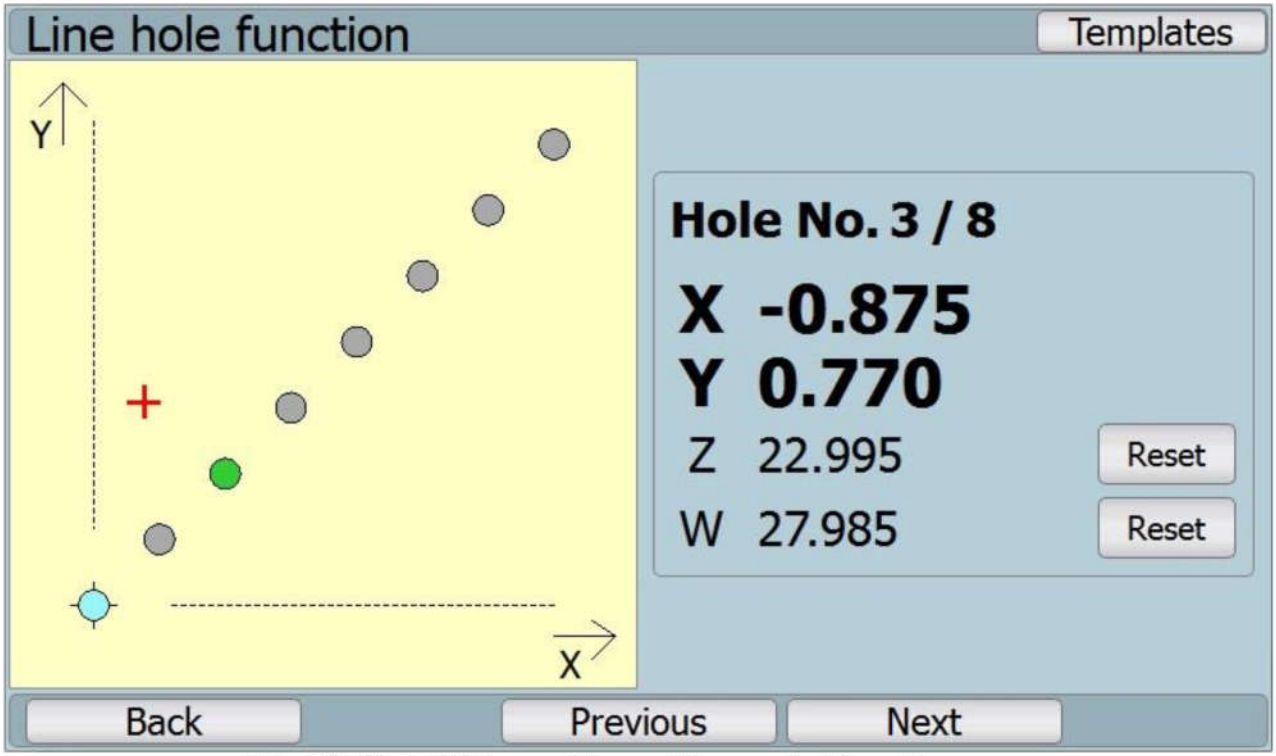

Fig. 18: Hole drilling on line – edit one point from the scene

Machining

- Use buttons „**Predchozi**“ (former) and „**Dalsi**“ (next) to switch between individual holes (see fig. 19: Hole drilling on line – machining mode).
- The right side displays the coordinates between the tool (red cross) and marked hole (green).
- According to the selected plane (in this case XY) it is necessary to load in such way the coordinates X and Y displayed zero. It indicates that the tool is placed exactly above the hole.
- Axes Z and W are for orientation purposes and can be reset (set to zero), for better depth designation.

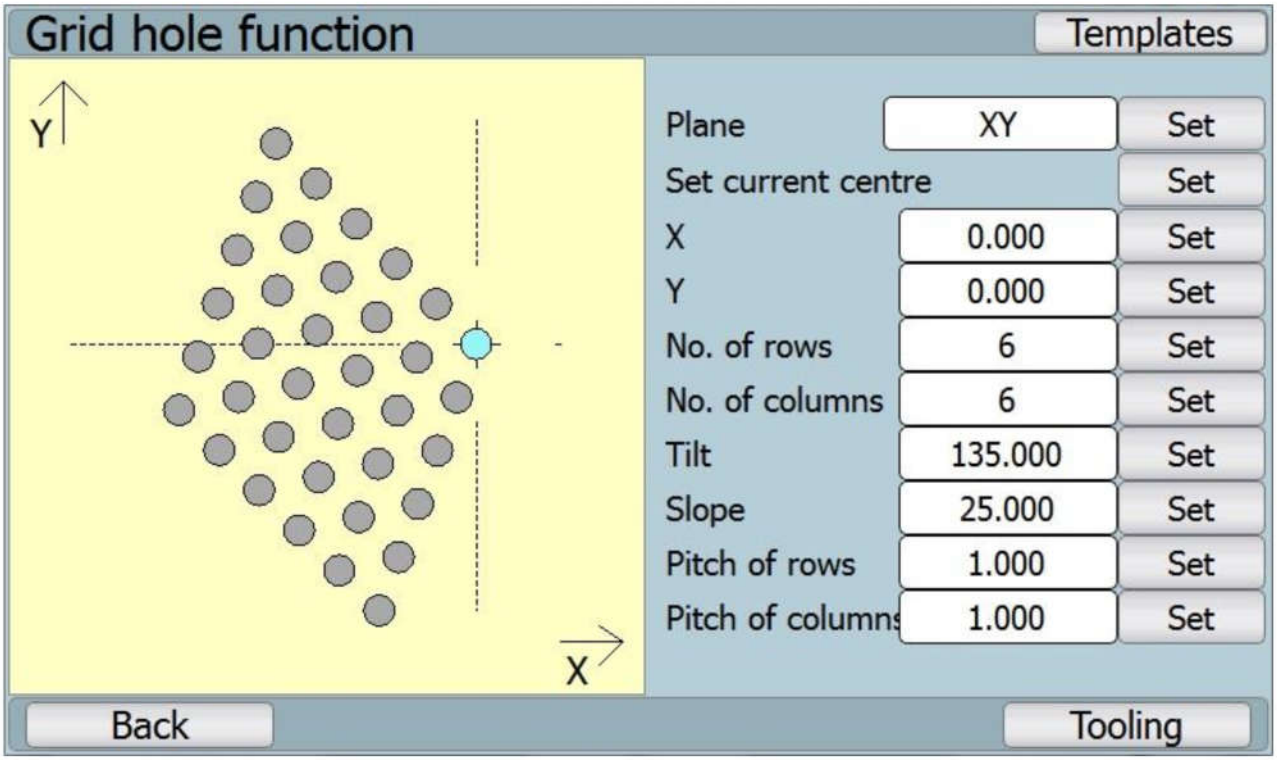

Fig. 19: Hole drilling on line – machining mode

Templates

- It includes a function for the administration of individual settings which can be reached by button „**Sablony**“ (template) in top right.
- The template administration opens (see fig. 20: Hole drilling on line – templates).
- As soon as all parameters are set and they will be used repeatedly, after opening the templates enter „**Ulozit**“ (safe) for rewriting the actual template (active) with new set values or it is possible to use „**Ulozit jako**“ (safe as) to create new template.
- After the line marking with the respective template, it can be loaded, renamed or deleted
- Saving by means of templates considers also individual setting of individual holes (via manual adjustment).

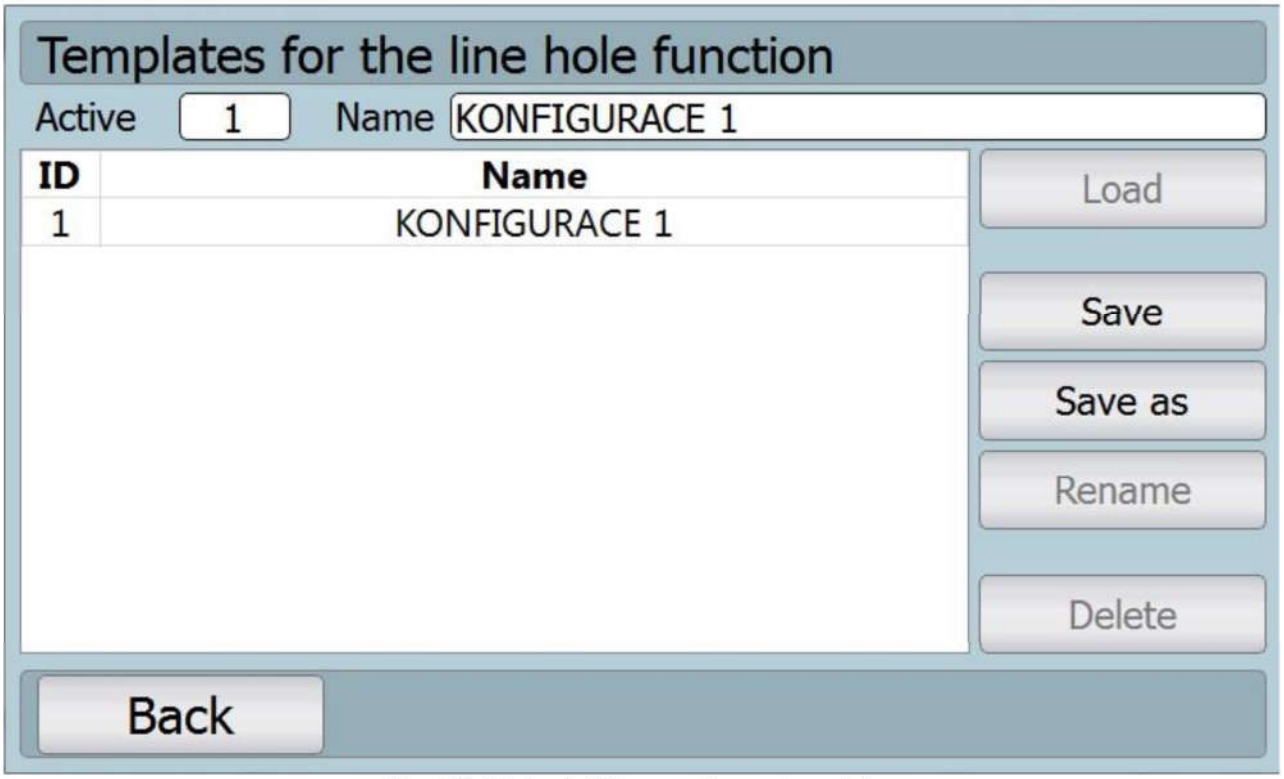

Fig. 20: Hole drilling on line – templates

Holes on the circle

- It is used for drilling holes on the circle circumference.
- At first, select the plane for drilling
- Set the centre coordinates for drilling. It is possible to set any coordinates or the actual coordinates using button „**Nastavit aktualni stred**“ (set actual centre) (see fig. 21: Drilling holes on circle).
- Select the number of required holes, circle diameter, initial and final angle.
- Automatically re-draws the scene with the display how the task shall look like.
- Every entered hole can be edited independently – shift in defined plane axes, set the distance from the centre or the turning angle. This option is achieved by marking the hole in the scene (finger or stylus). Marked hole is green (see fig. 18: Hole drilling on line – edit one point from the scene).
- Caution during every change of the setting the scene is re-drawn. If for example one hole is shifted to other than defined entry (manually, see point) and than the setting changes, it is automatically re-drawn!
- The hole can be deleted from the scene using button „**Odstranit**“ (delete).
- After returning to the initial setting, it is possible to use button „**Zpet**“ (back) on the right or mark a location where no hole is drawn in the scene.
- As soon as all parts are entered, press button „**Obrabeni**“ (machining) to get back to the machining mode where individual holes can be drilled.

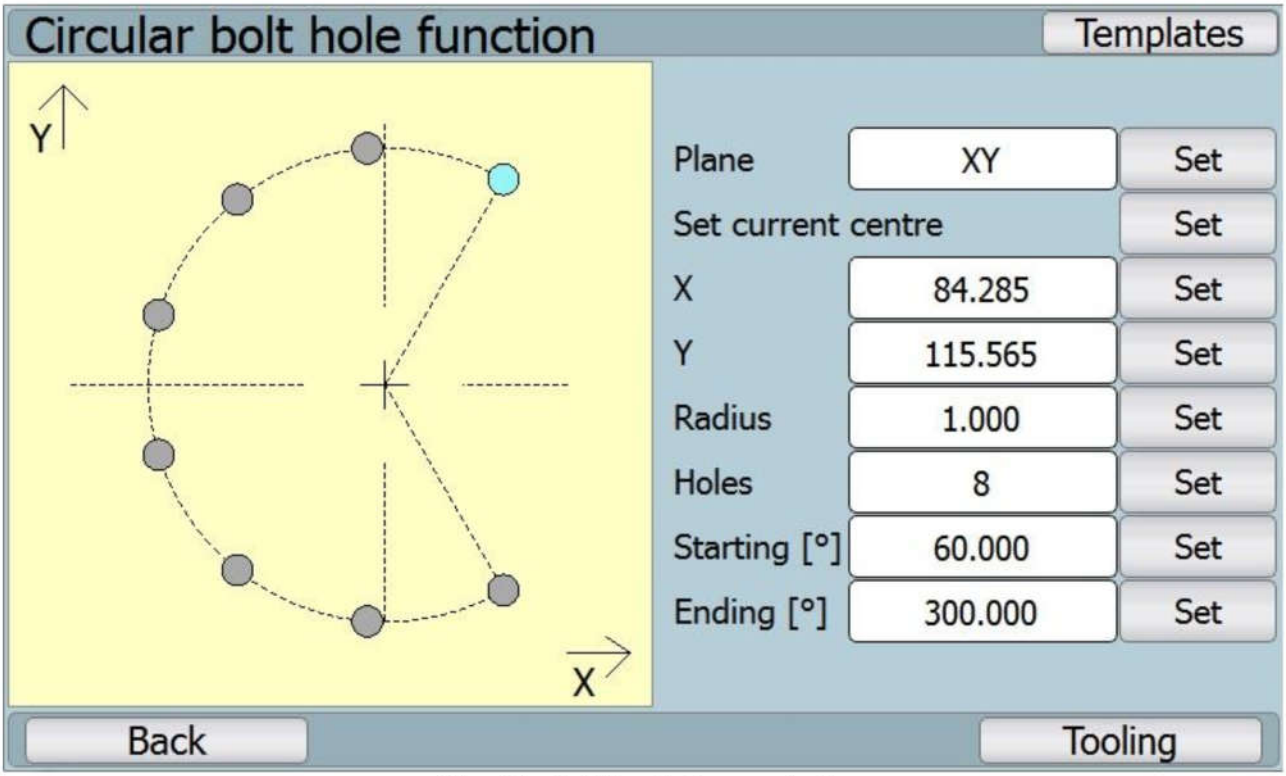

Fig. 21: Drilling holes on circle

Machining

⓾ The same principle as in the hole drilling on the line (see chapter **Chyba! Záložka není definována.**).

Templates

⓾ The same principle as in the hole drilling on the line (see chapter **Chyba! Záložka není definována.**).

Holes on the nut

- It is used for drilling holes on the nut.
- At first, select the plane for drilling
- Set the centre coordinates for drilling. It is possible to set any coordinates or the actual coordinates using button „**Nastavit aktualni stred**“ (set actual centre) (see fig. 22: Drilling holes on the nut).
- Select the number of required holes, number of lines and nut columns, turning, bevelling, spacing of lines and columns.
- Automatically re-draws the scene with the display how the task shall look like.
- Every entered hole can be edited independently – shift in defined plane axes, set the distance from the centre or the turning angle. This option is achieved by marking the hole in the scene (finger or stylus). Marked hole is green (see fig. 18: Hole drilling on line – edit one point from the scene).
- Caution during every change of the setting the scene is re-drawn. If for example one hole is shifted to other than defined entry (manually, see point) and than the setting changes, it is automatically re-drawn!
- The hole can be deleted from the scene using button „**Odstranit**“ (delete).
- After returning to the initial setting, it is possible to use button „**Zpet**“ (back) on the right or mark a location where no hole is drawn in the scene.
- As soon as all parts are entered, press button „**Obrabeni**“ (machining) to get back to the machining mode where individual holes can be drilled.

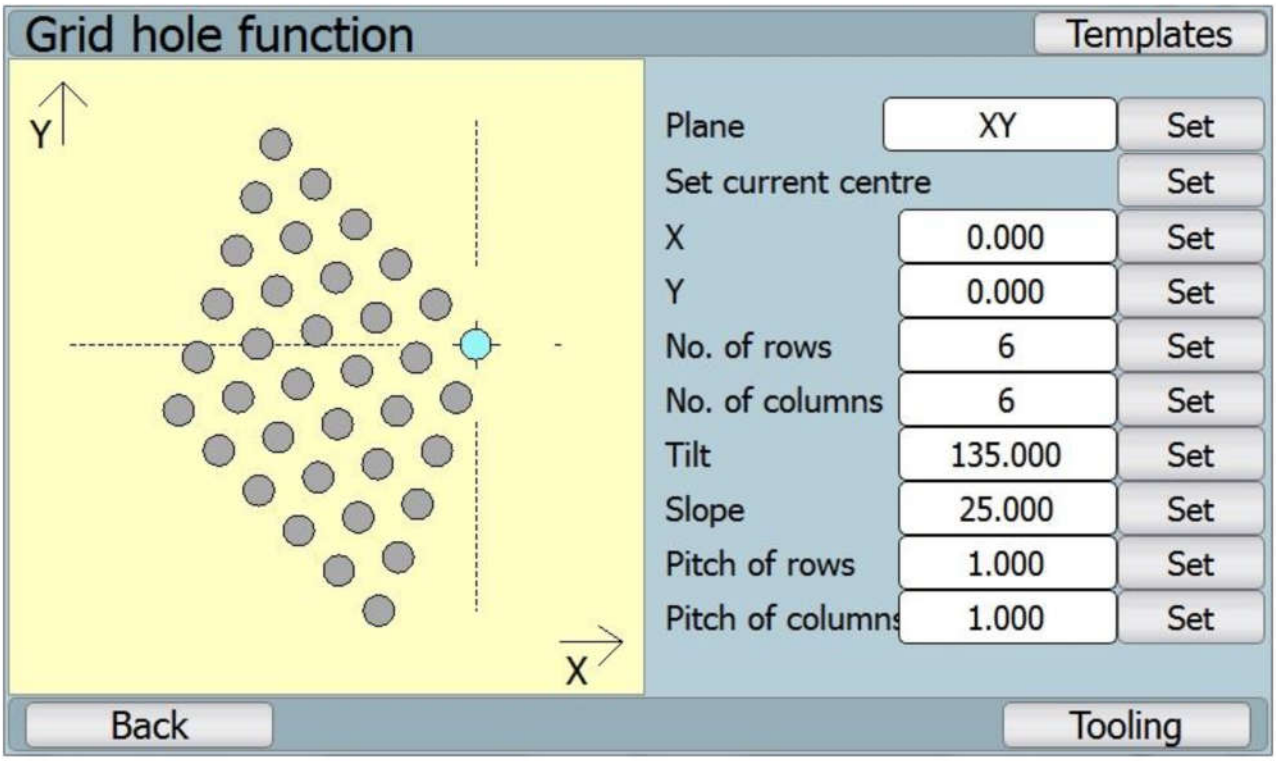

Fig. 22: Drilling holes on the nut

Machining

- The same principle as in the hole drilling on the line (see chapter **Chyba! Záložka není definována.**).

Templates

- The same principle as in the hole drilling on the line (see chapter **Chyba! Záložka není definována.**).

Programmable points

- It is used for entering individual whole to be drilled.
- At first, select the plane for drilling
- There are two ways of entering the holes for drilling:

1. It displays the actual tool coordinates and using button „**Pridat bod**“ (add point) to insert the hole in the scene for the actual coordinates (see fig. 23: Programmable points).
2. It is possible to manually enter the points coordinates by means of buttons „**Nastavit**“ (set) and press „**Pridat bod**“ (add point) at manual entry to insert the hole in the scene.

- Every entered hole can be edited independently – shift in defined plane axes. This option is achieved by marking the hole in the scene (finger or stylus). Marked hole is green.
- The hole can be deleted from the scene using button „**Odstranit**“ (delete).
- After returning to the initial setting, it is possible to use button „**Zpet**“ (back) on the right or mark a location where no hole is drawn in the scene.
- As soon as all parts are entered, press button „**Obrabeni**“ (machining) to get back to the machining mode where individual holes can be drilled.
- Button „**Reset**“ returns everything into the initial setting

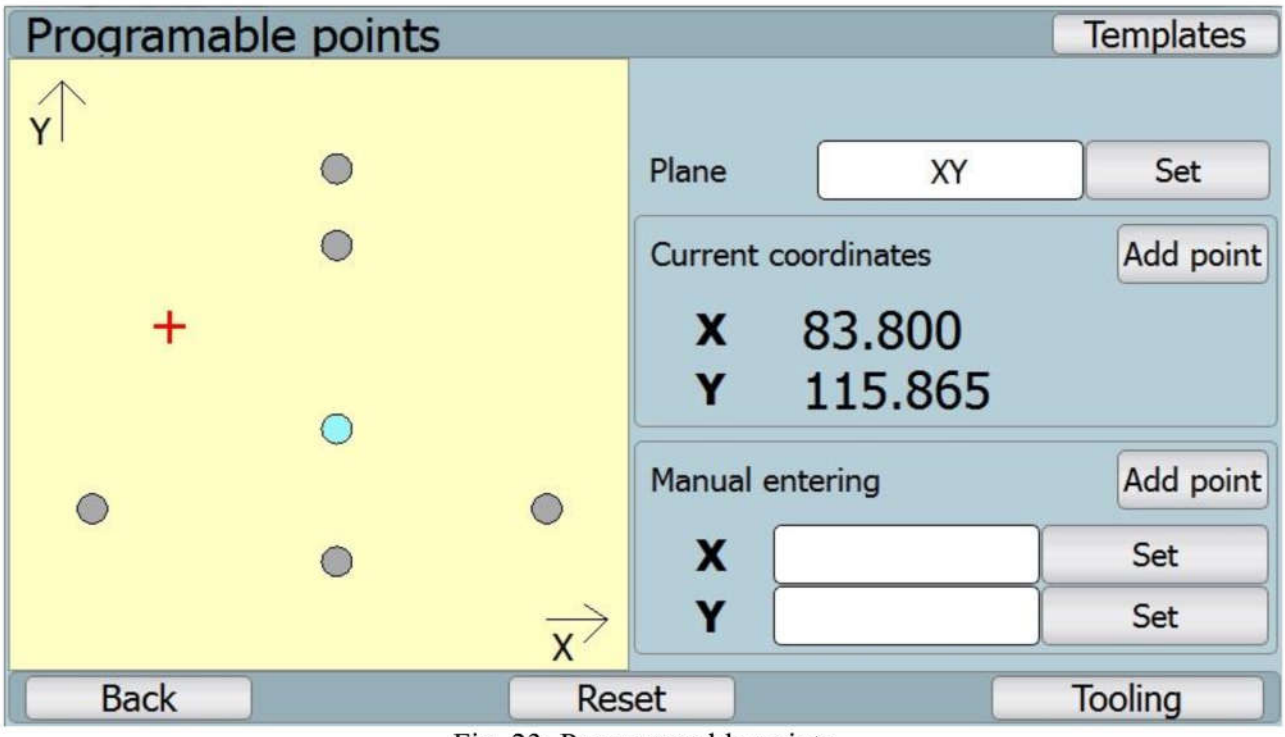

Fig. 23: Programmable points

Machining

- The same principle as in the hole drilling on the line (see chapter **Chyba! Záložka není definována.**).

Templates

- The same principle as in the hole drilling on the line (see chapter **Chyba! Záložka není definována.**).

Angle of lines

- To find out the angle between two lines entered by means of individual points.
- At first, select the plane for entering the points for the lines.
- Move the tool to the required coordinates which are displayed in positions X and Y in this case.
- As soon as the required coordinates are ok, press the button for entering the point for the define line for saving. At first enter points for line A - „**Add point – line A**“ and then points for line B - „**Add point – line B**“.
- The angle is automatically counted for every entered point.
- It is necessary to enter at least two points for every line for correct result.
- Individual points are displayed in the table and after marking one point it can be deleted with button „**Smazat bod**“ (delete point).

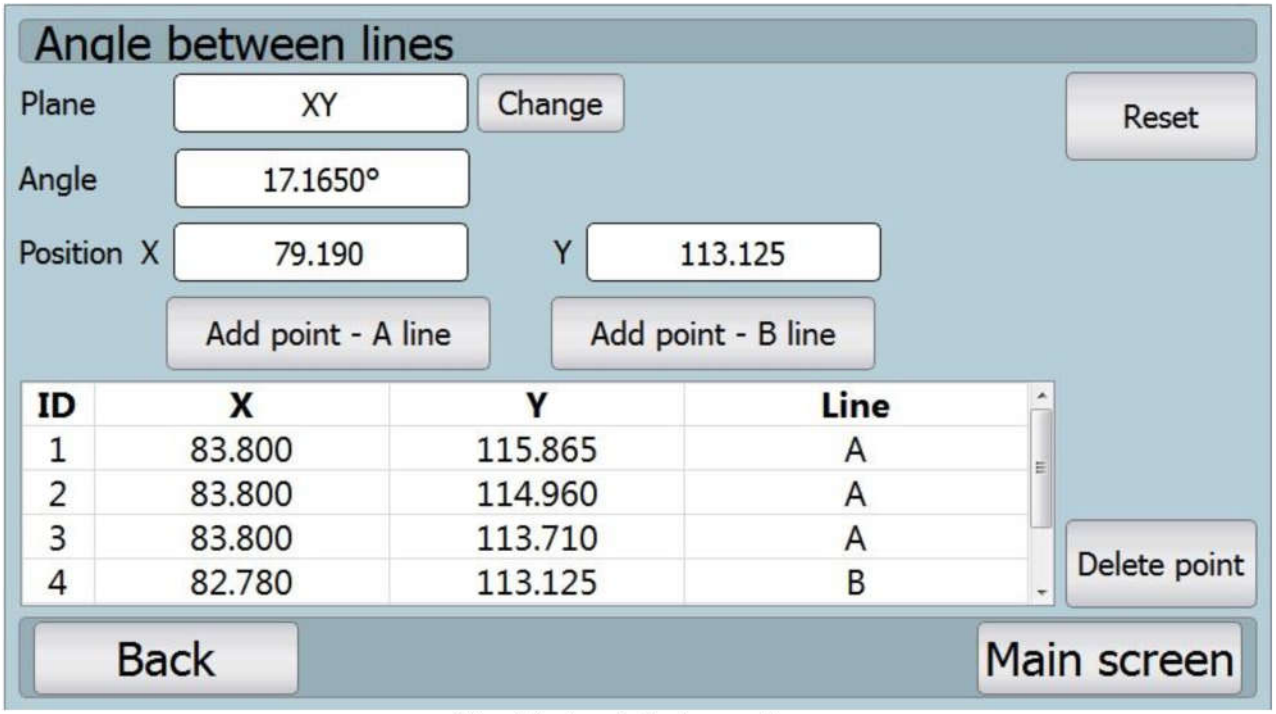

Fig. 24: Angle between lines

- Button „**Reset**“ sets the data in the initial state.

Circle centre

- It is used for finding the circle centre entered by means of individual points on the circle circumference.
- At first, select the plane for searching the centre.
- Use button „**Pridat bod**“ (add point) to add individual points with the actual coordinates (coordinates from encoders) displayed (see fig. 25: Searching for the circle centre).

➓ After entering at least three points, automatically searches for the circle centre and draws in the scene.

➓ It is possible to enter any amount (at least three).

➓ After finding the centre, the circle diameter and centre coordinates are shown.

➓ Button „**Reset**“ sets everything in the initial state.

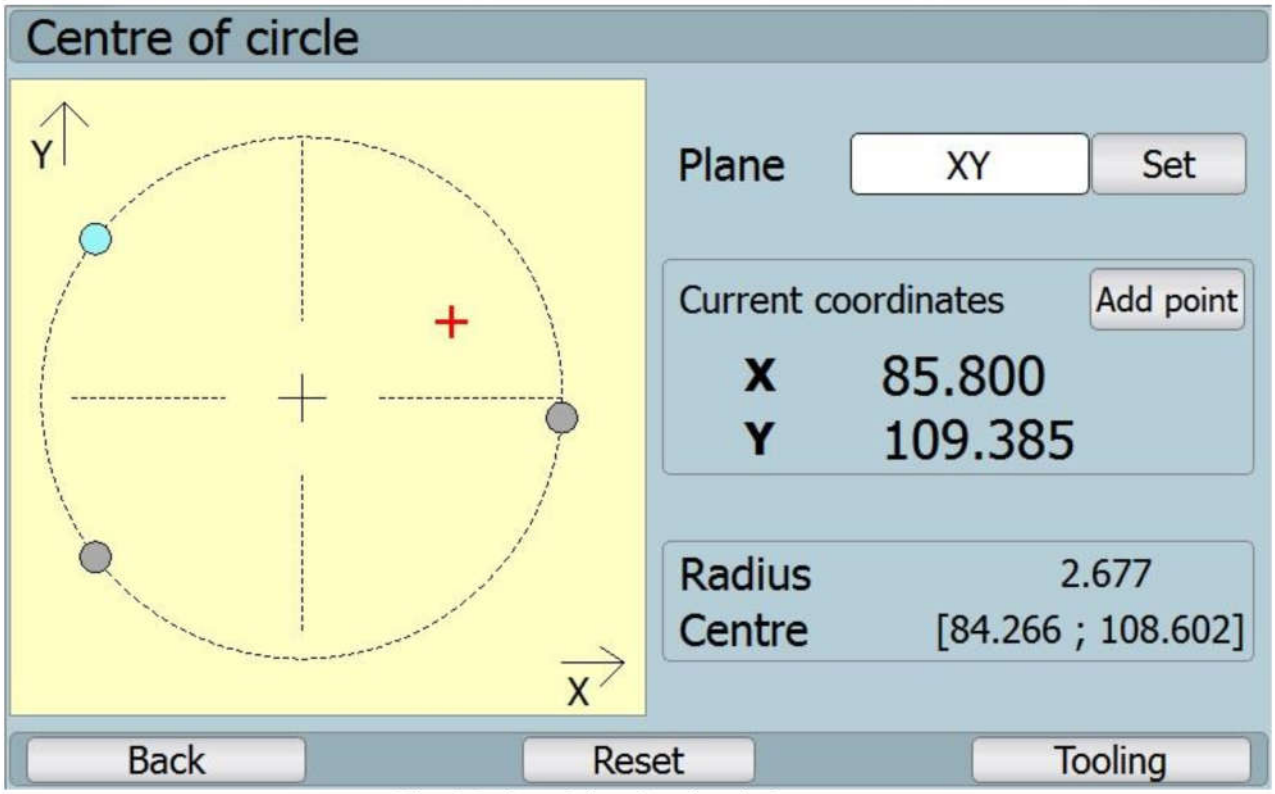

Fig. 25: Searching for the circle centre

Machining

➓ After pressing button „**Obrabeni**“ (machining) it is possible to enter the machining mode.

➓ Úse button „**Polomer**“ (diameter) to switch between the diameter and radius of the found circle.

➓ It further displays the coordinates of the found centre.

➓ It also displays the distance of the tool from the circle centre, and coordinates outside the plane (in this case Z and W) can be reset (set to zero).

➓ If we want to set the coordinates of the found centre in the axis, use button „**Prenest vzdalenost**“ (transfer distance), which set the coordinates directly on axes (in this case axes X and Y). This changes the setting of the axes in active scale (for more see chapter **Chyba! Záložka není definována.**).

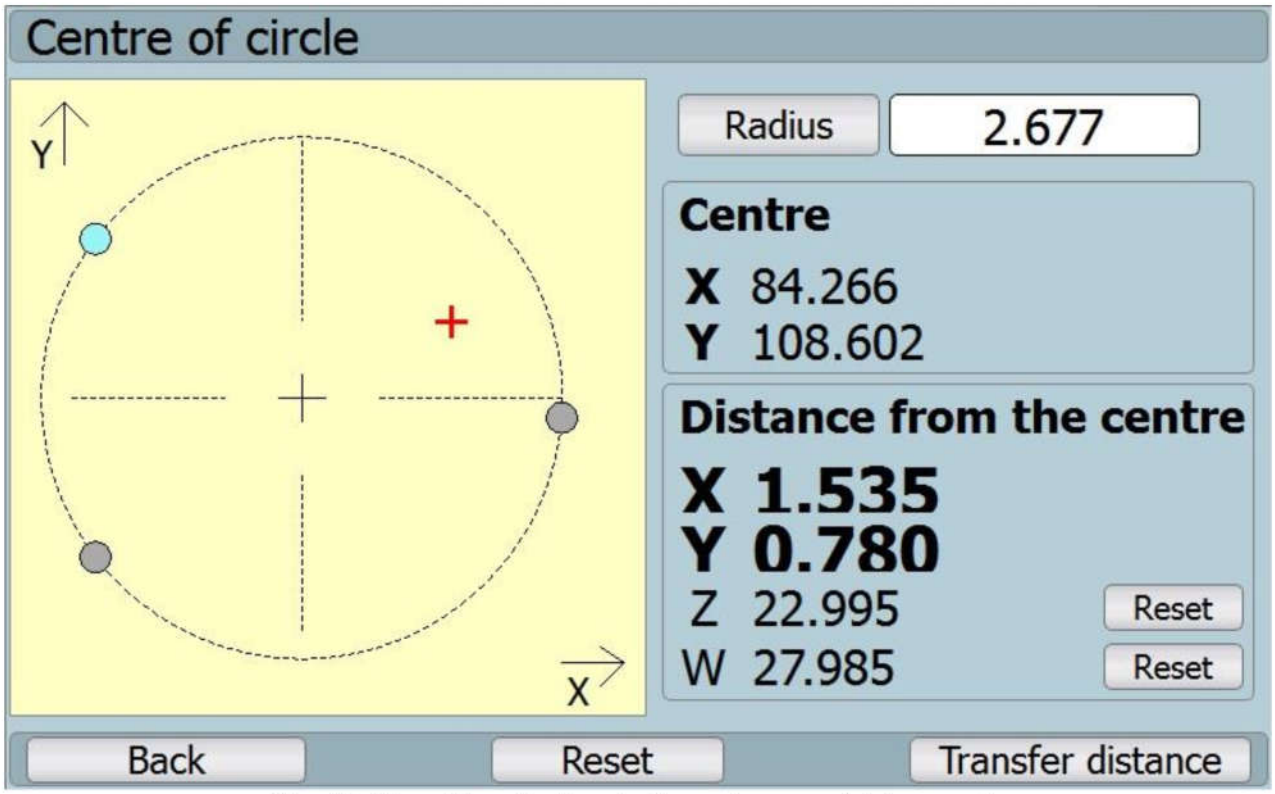

Fig. 26: Searching for the circle centre – machining mode

Setting

⑩ Setting is entered via menu by button „Setting“ (see chapter **Chyba! Záložka není definována.**).

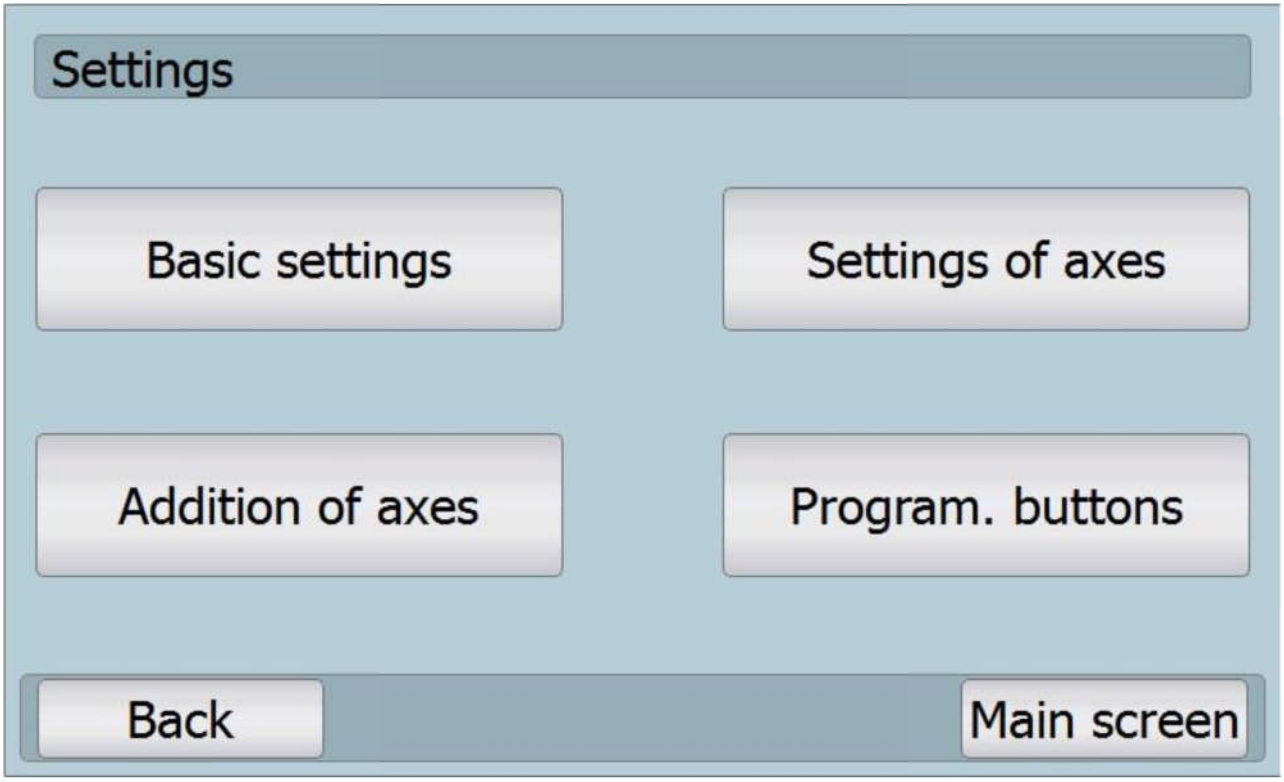

Fig. 27: Setting

- It displays four options for the application setting (see fig. 27: Setting).

Basic setting

- Setting time for the device.
- Setting the device type – miller, lathe, grinder. This setting affects the tool function (see chapter **Chyba! Záložka není definována.**).
- In case of setting the device type lathe or grinder it is impossible to display functions for drilling holes or searching for line angle or circle centre. It is impossible to see other functions (see fig. 7: The extension menu functions for the device type miller).
- The setting of displayed units – mm or inches.
- Setting the application language (currently cannot change).
- Factory setting restoring – the machine is in the state after purchase. Caution deletes all saved options and setting created by the user!!!
- User setting – it is possible to back-up or load the current application state, i.e. All saved options and setting created by the user.
- About the program – it displays the version of the application and date of the version occurrence.

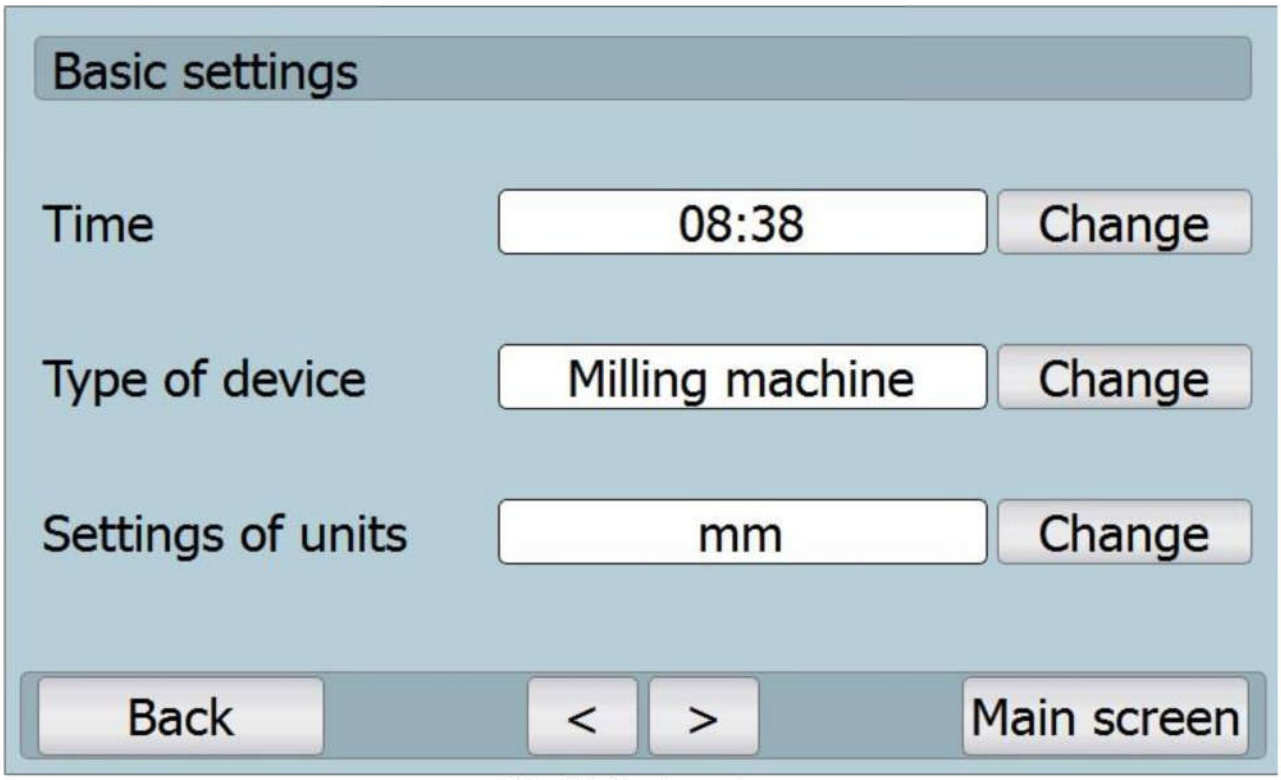

Fig. 28: Basic setting

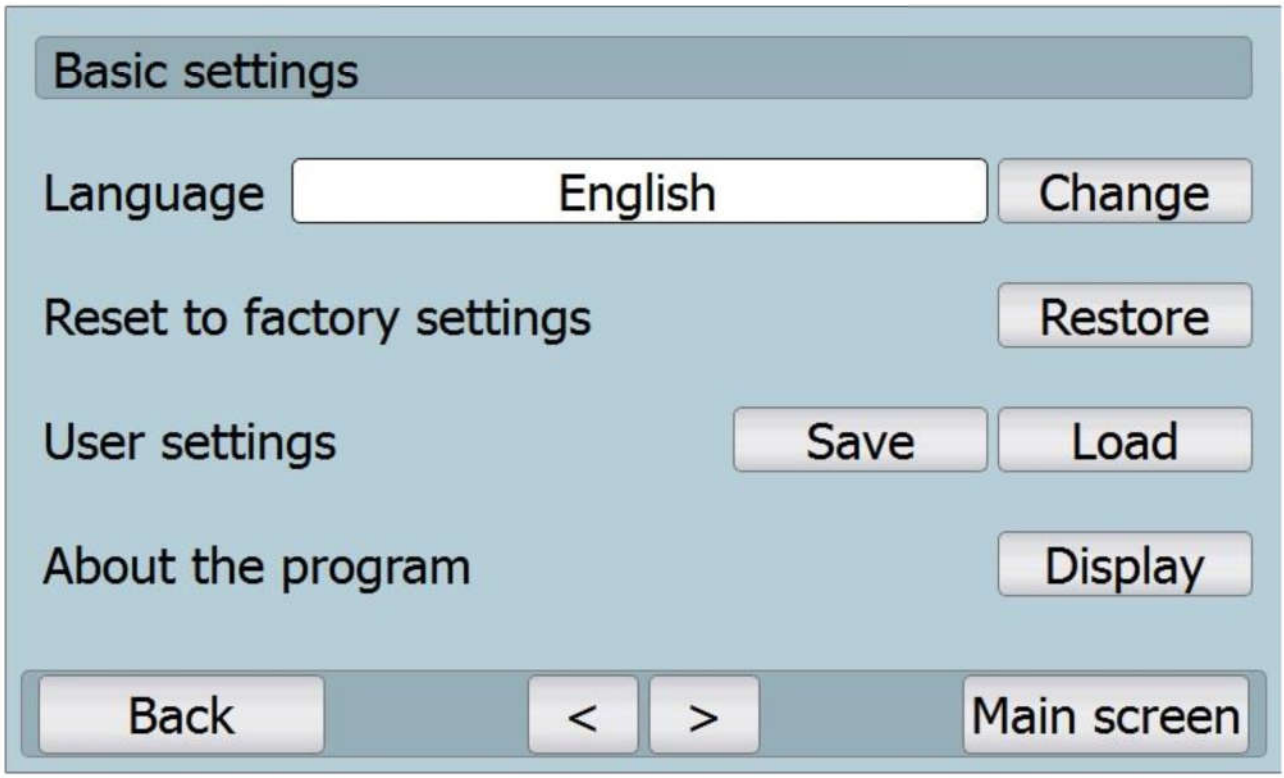

Fig. 29: Basic setting

Setting the axes

- It is used for setting the parameters for individual axes.
- After pressing button „**Nastaveni os**“ (setting axes) the axis selection is displayed which requires the setting (see fig. 30: Axis displayed – axis selection for the setting).
- After axis selection a setting for the selected axis displays.
- The axis selection can be changed any time by means of top right button which displays the actually set axis (see fig. 31: Axis setting – linear mode).

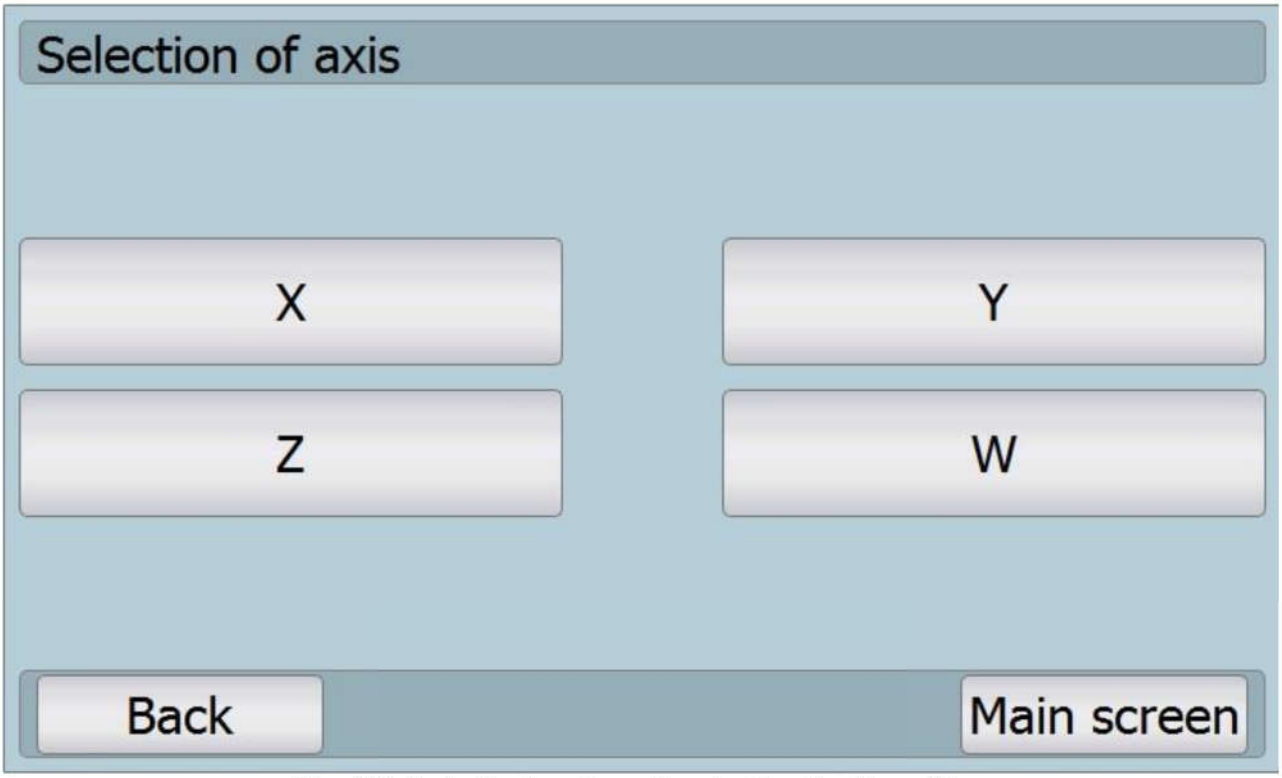

Fig. 30: Axis displayed – axis selection for the setting

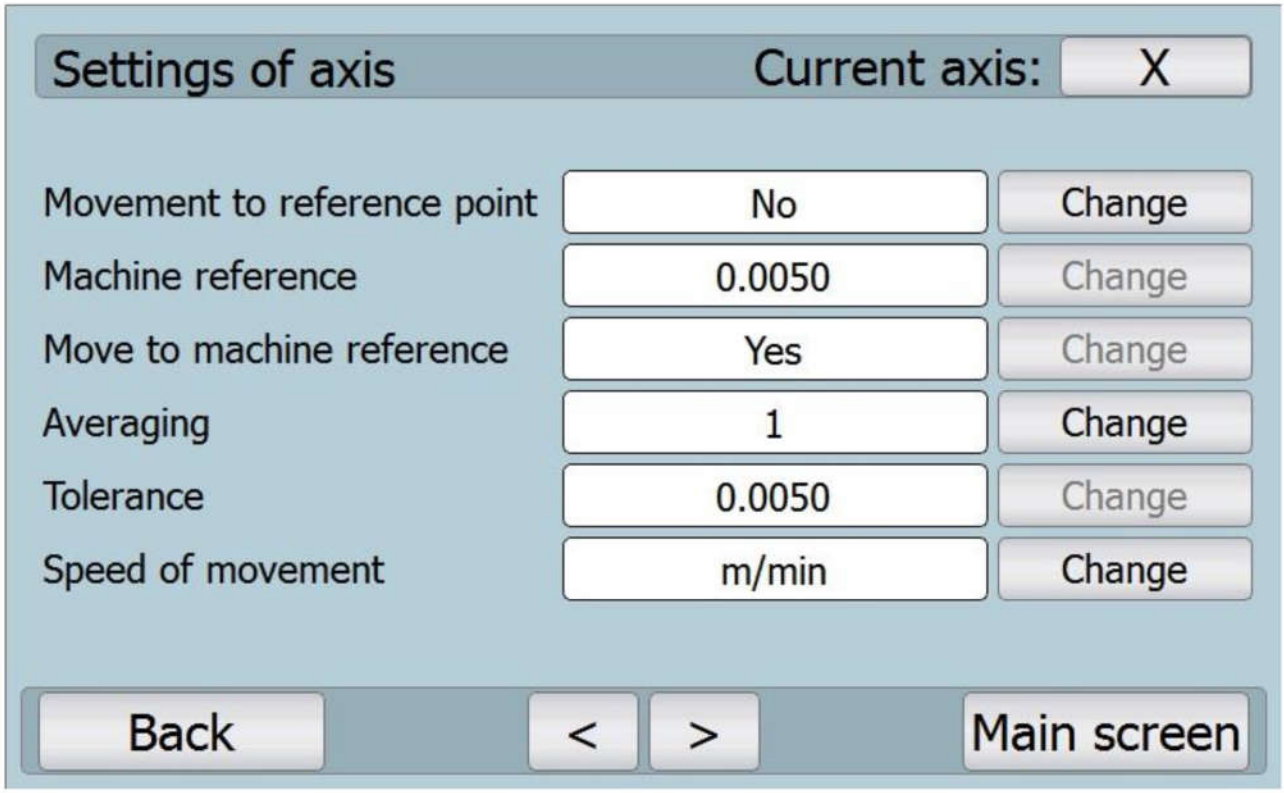

Fig. 31: Axis setting – linear mode

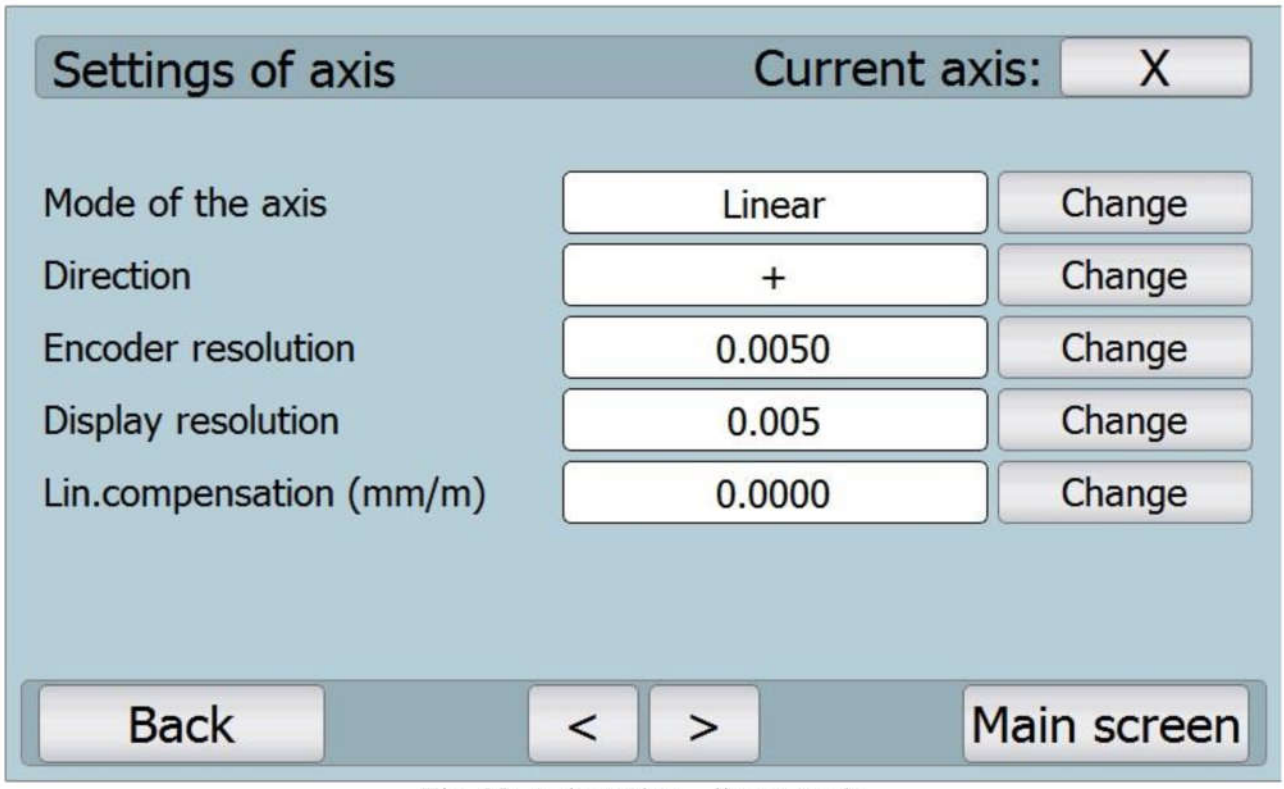

Fig. 32: Axis setting – linear mode

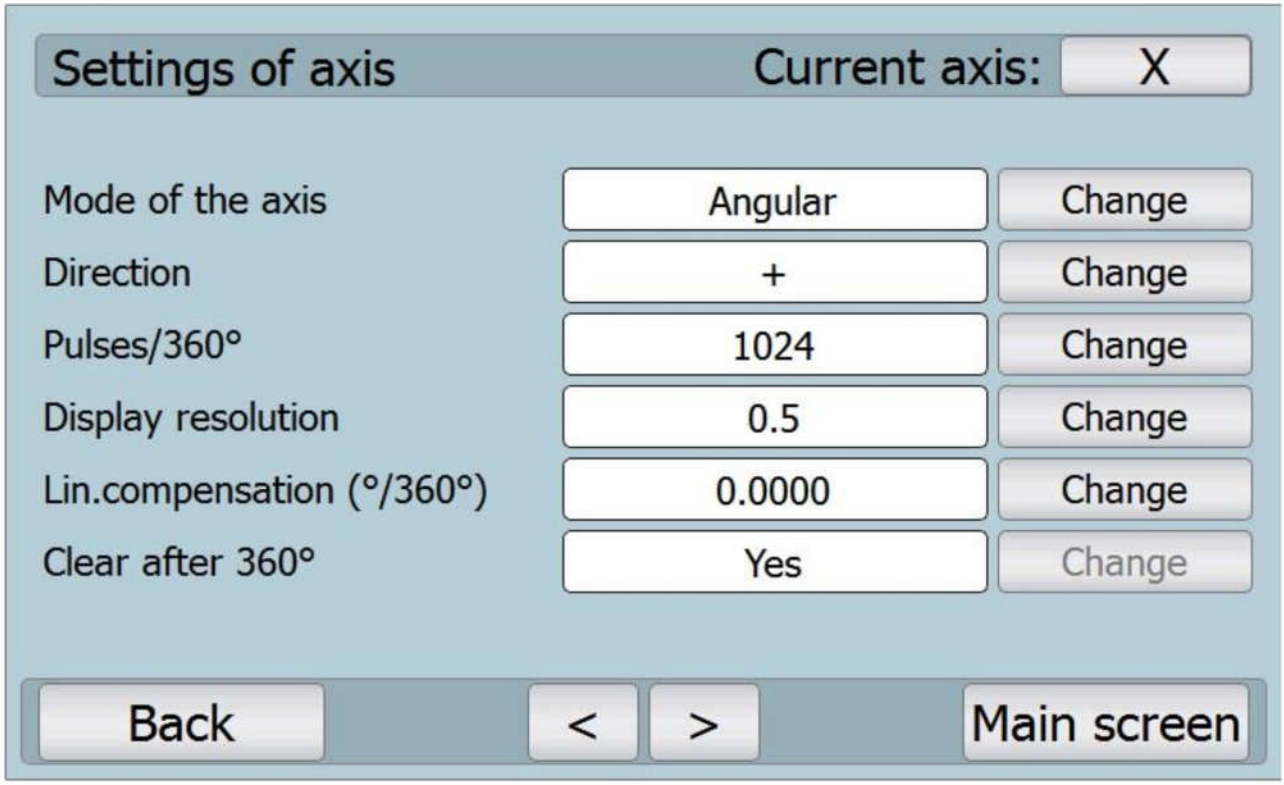

Fig. 33: Axis setting – angle mode

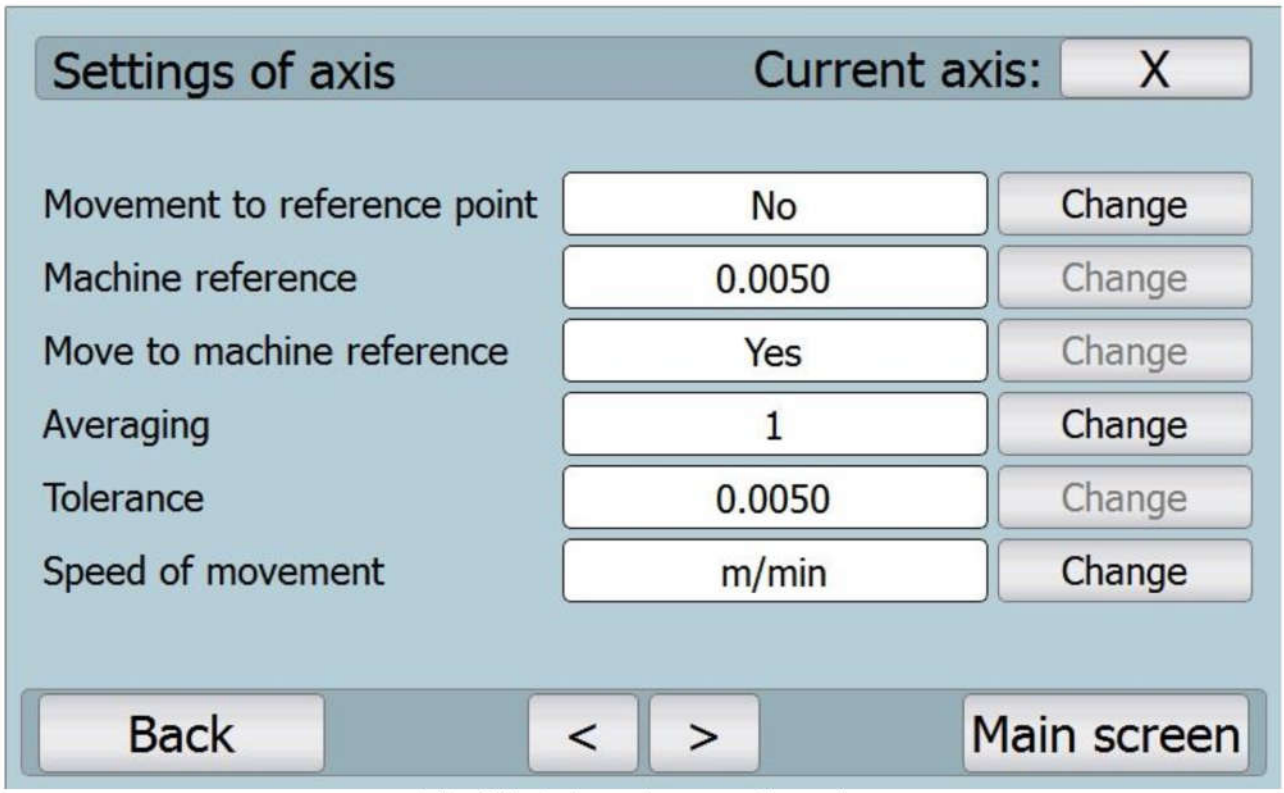

Fig. 34: Axis setting – angle mode

Axis mode

⑩ Axis mode selection:

↘ Linear.

↘ Angle.

➓ According to selected mode, other settings are displayed for the axis.

Direction

➓ Linear and angle axis mode.

➓ It defines if the positive direction of the displayed deduction in the defined axis is compliant (+) with positive direction of the encoder reading, or opposite (-).

➓ Direction can be set

↘ Positive (+).

↘ Negative (-).

Encoder resolution

➓ Axis linear mode.

➓ Options for entering encoder resolution.

➓ It defines the resolution abilities of the encoder (defined by the manufacturer or encoder type) in millimetres.

➓ It is possible to enter any value.

Display resolution

➓ Linear and angle axis mode.

➓ It defines the value for changing the data for the defined axis, and also the decimal places of read value to be displayed.

➓ It is possible to select the display resolution

↘ 1.0 – 0.5 – 0.1 – 0.05 – 0.01 – 0.005 – 0.001 – 0.0005

Linear correction

➓ Linear and angle axis mode.

➓ It is used for compensating errors which may appear during measuring.

➓ The errors can indicate the values different from real values.

➓ The errors can result from the machine inaccuracy, e.g. desk deformation during loading with worked material.

➓ It is possible to enter any value.

Resetting after 360°

- Axis angle mode.
- After every turn by 360° the angle value can be set to zero.
- This option is currently inactive.

Moving to the reference point

- Linear and angle axis mode.
- The option for moving to the reference point after the program start.
- If I choose I want to move to reference point on the defined axis, after the program start deactivate all buttons except for the axes setting, and the title „**Ref**“ appears on the respective axis (see fig. 35: Moving to the reference point).
- The button for axes setting is here because it can be switched off on the defined axis in case of a problem, and the readout is commonly started after the program restart.
- As soon as the encoder moves to the reference point, „**Ok**“ appears on the defined axis.
- If other axis do not include the setting of the reference point, the program starts and displays the values from the sensors.
- If the movement to reference points is set on other axis, it is displayed on another axis in the order title „**Ref**“ and repeat the procedure until all reference points are reached.

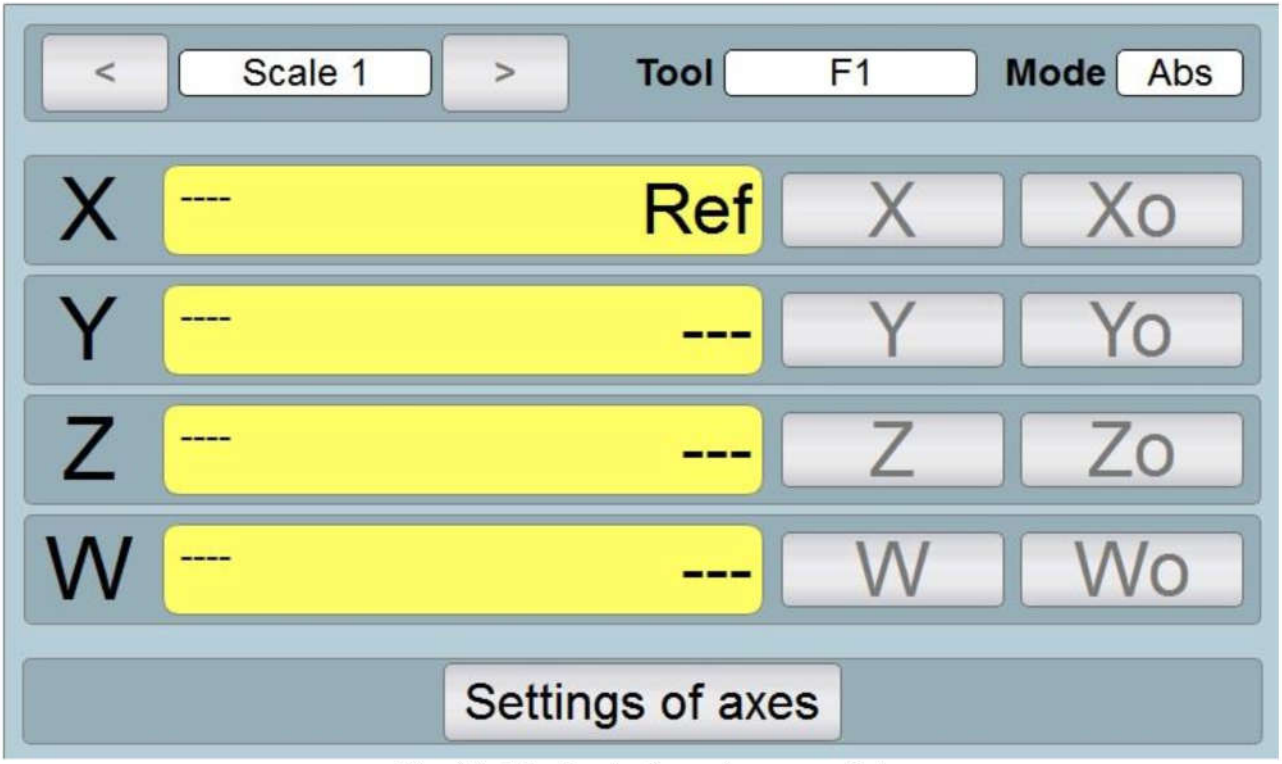

Fig. 35: Moving to the reference point

Machine reference

- Linear and angle axis mode.
- This option is currently inactive.

Moving to the machine reference

- Linear and angle axis mode.
- This option is currently inactive.

Averaging

- Linear and angle axis mode.
- It is used for the diameter display of the last values from the encoder to eliminate random errors.
- It is possible to set averaging from the last values
  - 1 – 2 – 4 – 8 – 16
- Setting the averaging results in increased start of the displayed value. If we move the tools and stop, we can see the value 'reaching'. It must be considered.

Tolerance

- Linear and angle axis mode.
- This option is currently inactive.

Feed speed

- Linear and angle axis mode.
- It is used for displaying the shift speed on the defined axis on the initial screen (see chapter **Chyba! Záložka není definována.** - point 4).
- It is possible to set speeds
  - m/min
  - mm/min
  - mm/s
  - Do not display – if I do not want to know the speed related data

Axes adding

- Every axis enables to define the adding of values from other axes multiplied by the real coefficient **k**, where **k** is subject to $-1 \leq k \leq 1$.
- The coefficients are defined as cosines function value for the angle value recorded in the angle planes. For example axis X is subject to formula

$$X = X + Y \times cos(\beta_X) + Z \times cos(\gamma_X) + W \times cos(\delta_X)$$

- Values β_X, γ_X, δ_X represent the respective angles. The formula represents in line the adding of Y axis value multiplied by the function value cosine for angle β_X, value of axis Z multiplied with function value cosine for angle γ_X and finally value of axis W multiplied with function value cosine for angle δ_X to axis value X.
- In the initial setting the angles equal to 90°, which in case of axis X results in relation:

$$X = X + Y \times cos(90°) + Z \times cos(90°) + W \times cos(90°)$$

- Values of axis X do not change with adding other axes (function cosine for angle 90° the zero values).
- Additionally to the buttons for setting the angles for individual axes, there are buttons on the left for covering and displaying individual axes. The change of the setting is indicated on the main screen.

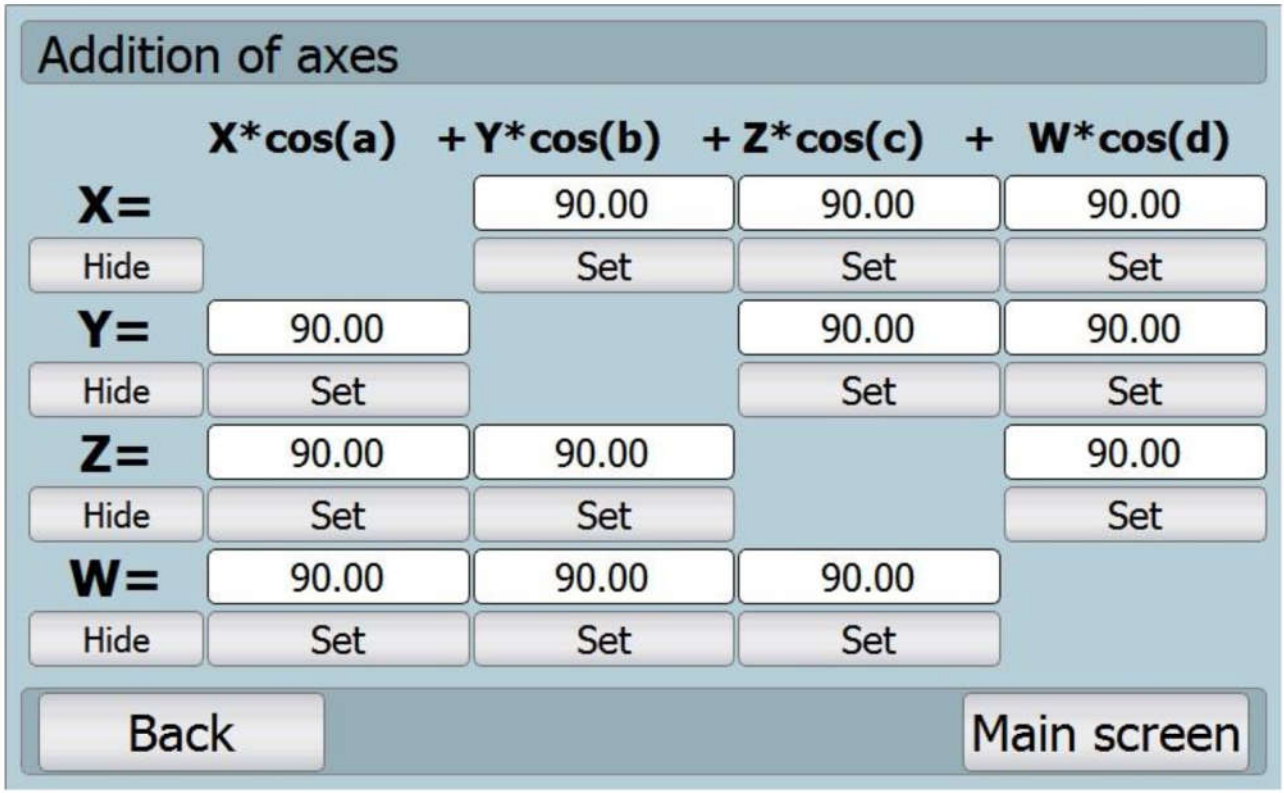

Fig. 36: Axes adding

Programmable buttons

- The main screen enables setting three buttons according to won requirements.
- It includes buttons three to five (see fig. 37: Programmable buttons).
- It is possible to set under any of the three buttons in setting (see fig. 27: Setting) the option:
  - Scale

- Tool
- Half
- Calculator

Fig. 37: Programmable buttons

1. Extending functions

➓ If the readout is adapted to it, it is possible to use other special functions.

Touch probe

➓ The extension functions for the touch probe can be seen between other functions in the menu (see).

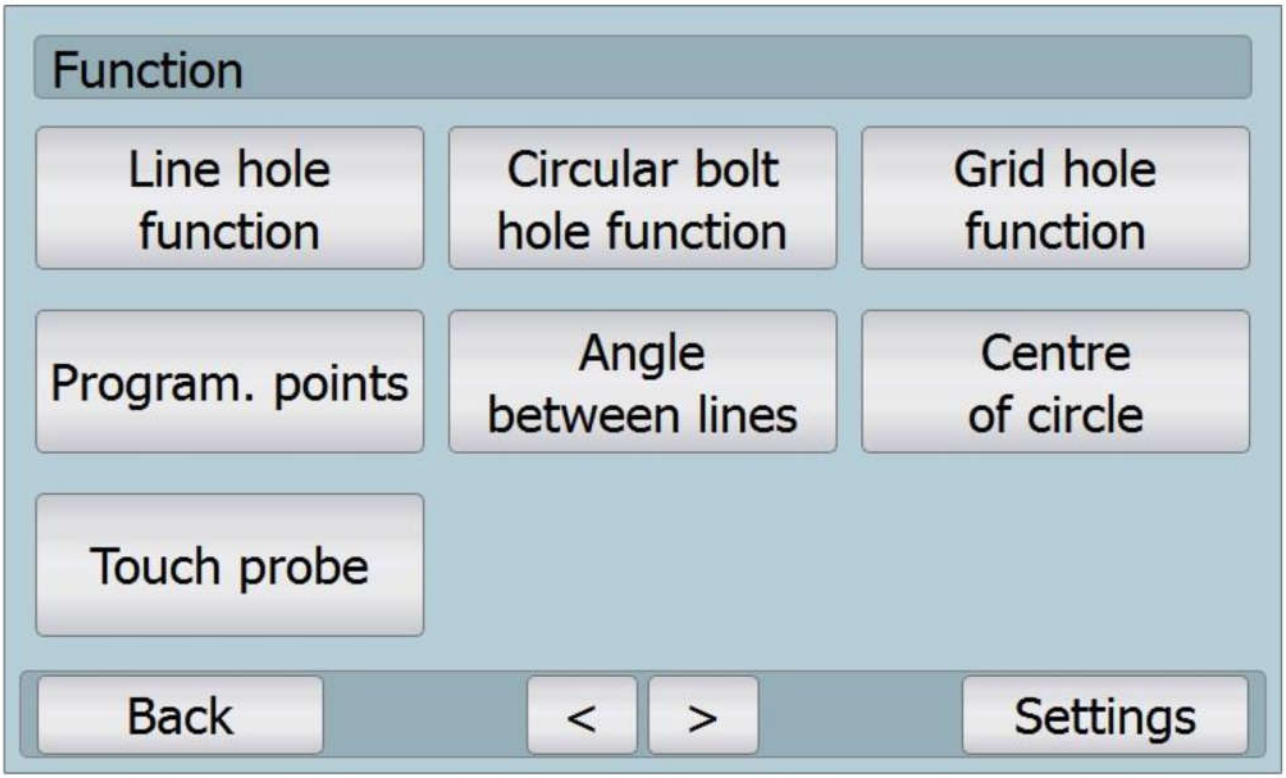

Fig. 38: Menu – touch probe

➓ After opening it includes four new function for use with 2D touch probe (see fig. 39: Touch probe function)

1. Centre of abscissa.
2. Circle centre.
3. workpiece centre.
4. Workpiece edge.

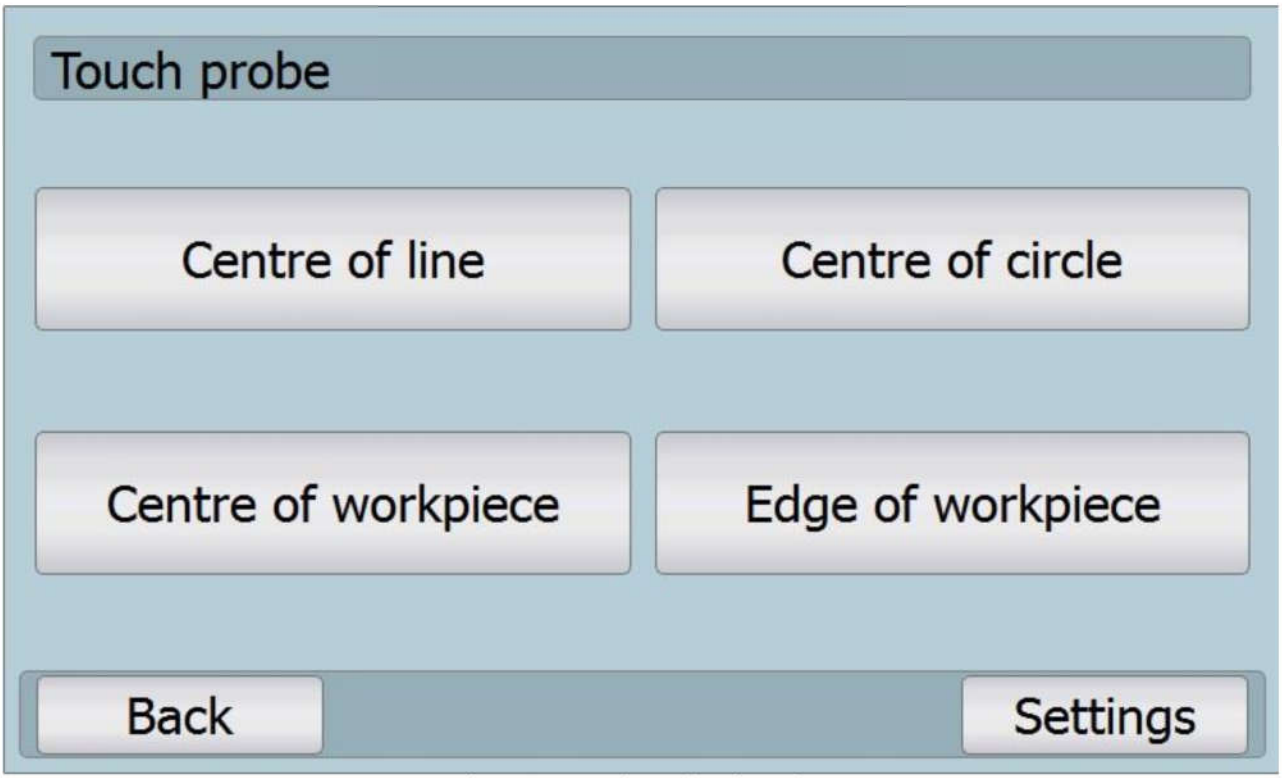

Fig. 39: Touch probe function

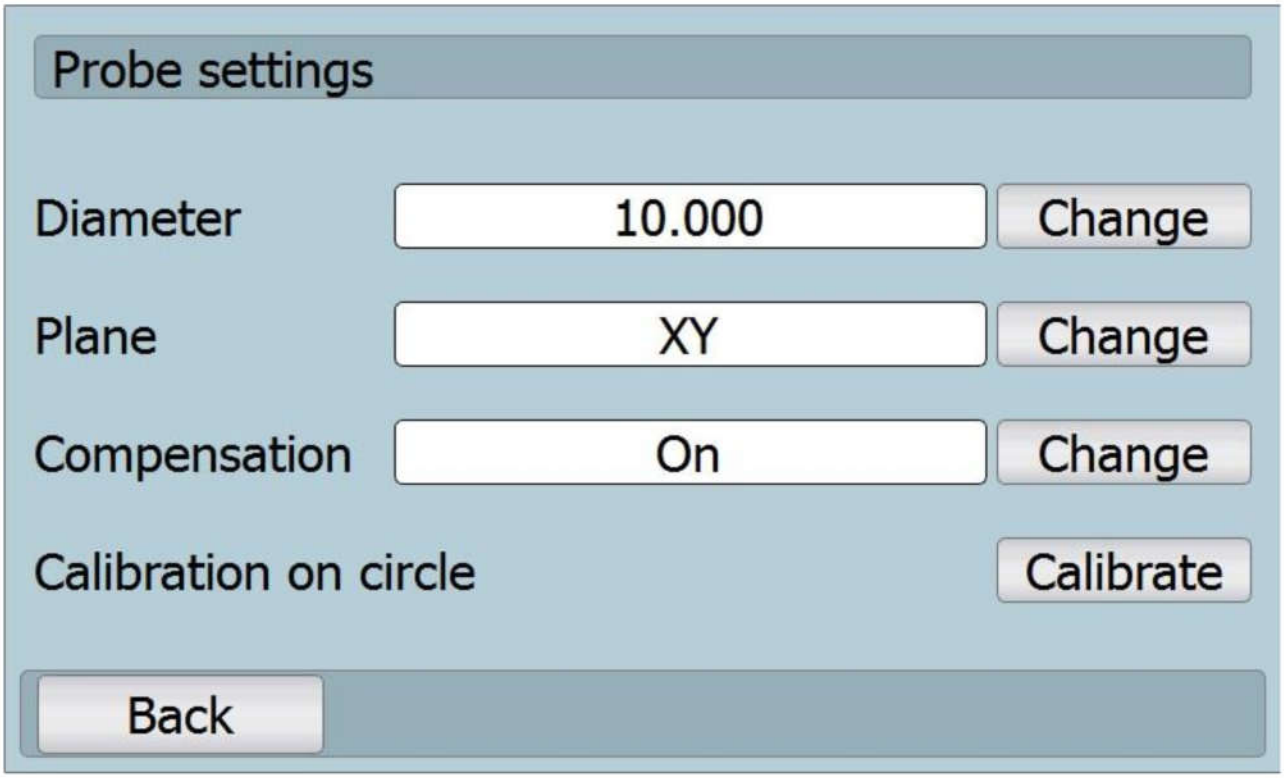

Fig. 40: Touch probe setting

Setting

➓ In the bottom right (see fig. 39: Touch probe function) is setting for the touch probe which enables setting

↘ Probe diameter

↘ The plane where the probe shall be used

↘ Compensation – setting if it is possible to consider the compensation during the probe entry on the workpiece. The compensation can be achieved by means of probe calibration on the circle.

↘ The calibration on the circle – for the probe calibration to reach the lowest possible error caused by the touch probe.

➓ Caution – in case of changing the plane setting, it is necessary to recalibrate the touch probes on the circle!!! The compensation related data are automatically reset..

Calibration on the circle

➓ The calibration on the circle is used for finding values for the deviation compensation of the touch probe in selected axes (according to the set plane).

➓ Correct calibration must be completed in nine simple steps with some steps repeated.

➓ The actually performed step is in the top right (see fig. 41: Touch probe – calibration on the circle – step 1). It is the first step from nine.

➓ Individual steps are defined by a simple guide in the form of text on yellow base on the right.

➓ Calibration procedure:

1. It is necessary to move the probe on the body on the circle circumference . It does not matter if it is on the internal or external side of the circle only if one method is selected (e.g. external) it must be observed for the whole calibration period! individual points are entered by means of button „**Potvrdit**“ (confirm). it is necessary to enter three points.

2. after entering three points on the circle circumference the found circle is automatically drawn with the centre. Now it is necessary to physically turn the touch probe by 90° in the clamping mechanism. when the probe turns, press button „**Dalsi krok**“ (next step) (see fig. 42: Touch probe – calibration on the circle – step 2).

3. repeat point 1. and then point 2. three times.

4. Finally, four centres are found with the compensation values. In ideal case, all four centres are the same and the compensation is zero (see fig. 43: Touch probe – calibration on the circle – last step).

5. The compensation value is automatically saved for next probe use and the extended functions.

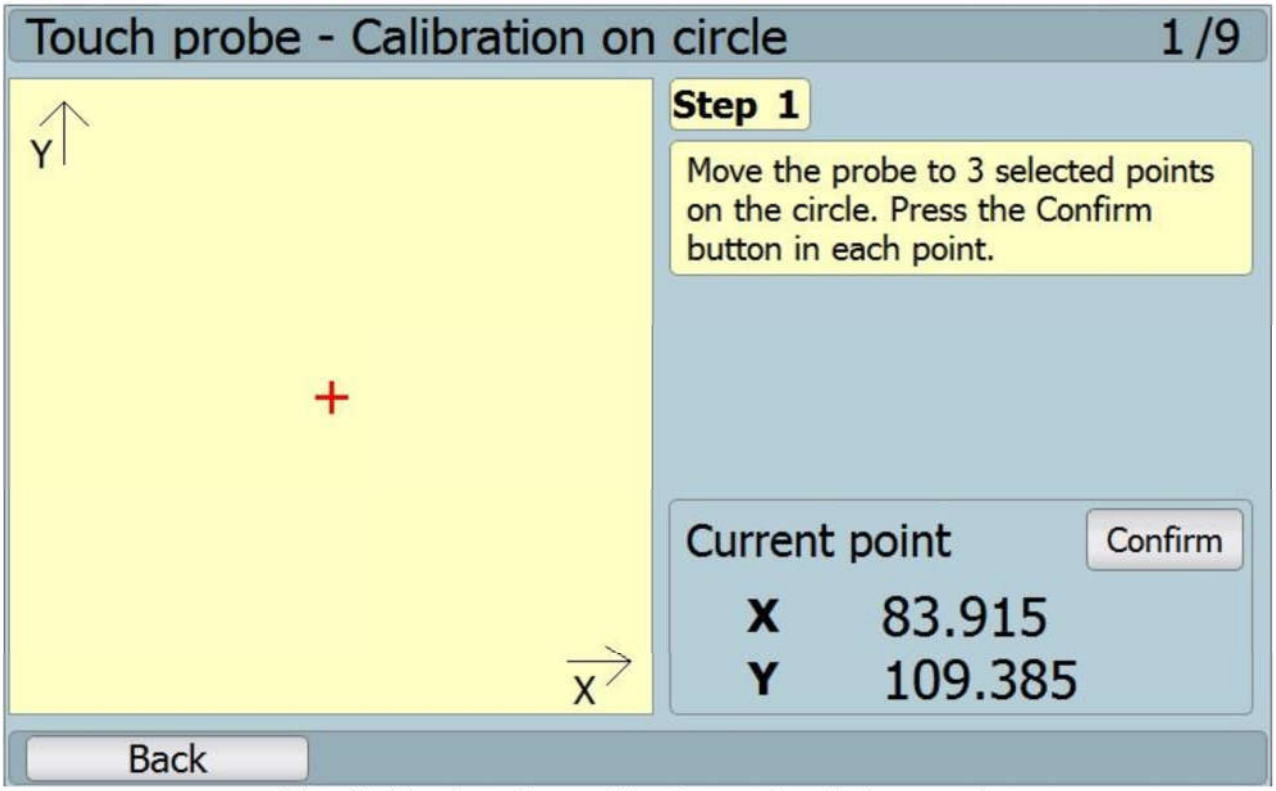

Fig. 41: Touch probe – calibration on the circle – step 1

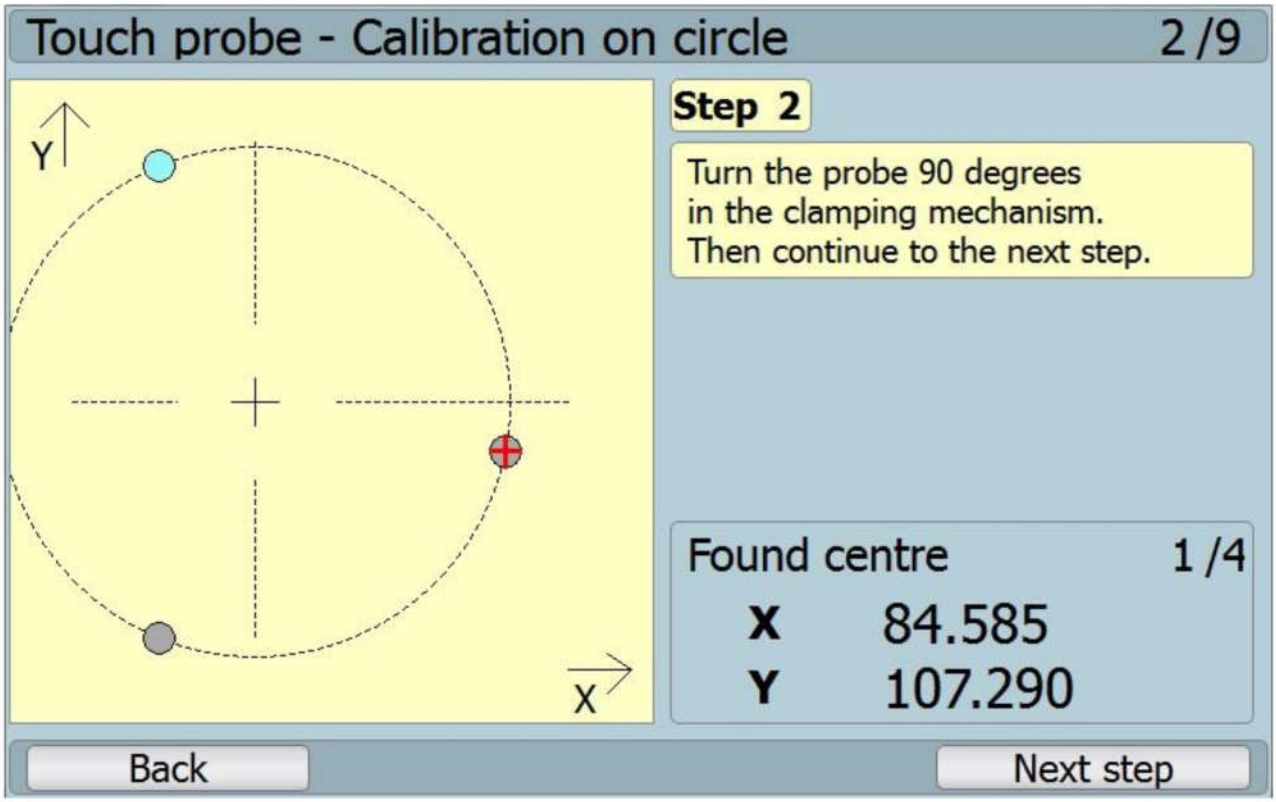

Fig. 42: Touch probe – calibration on the circle – step 2

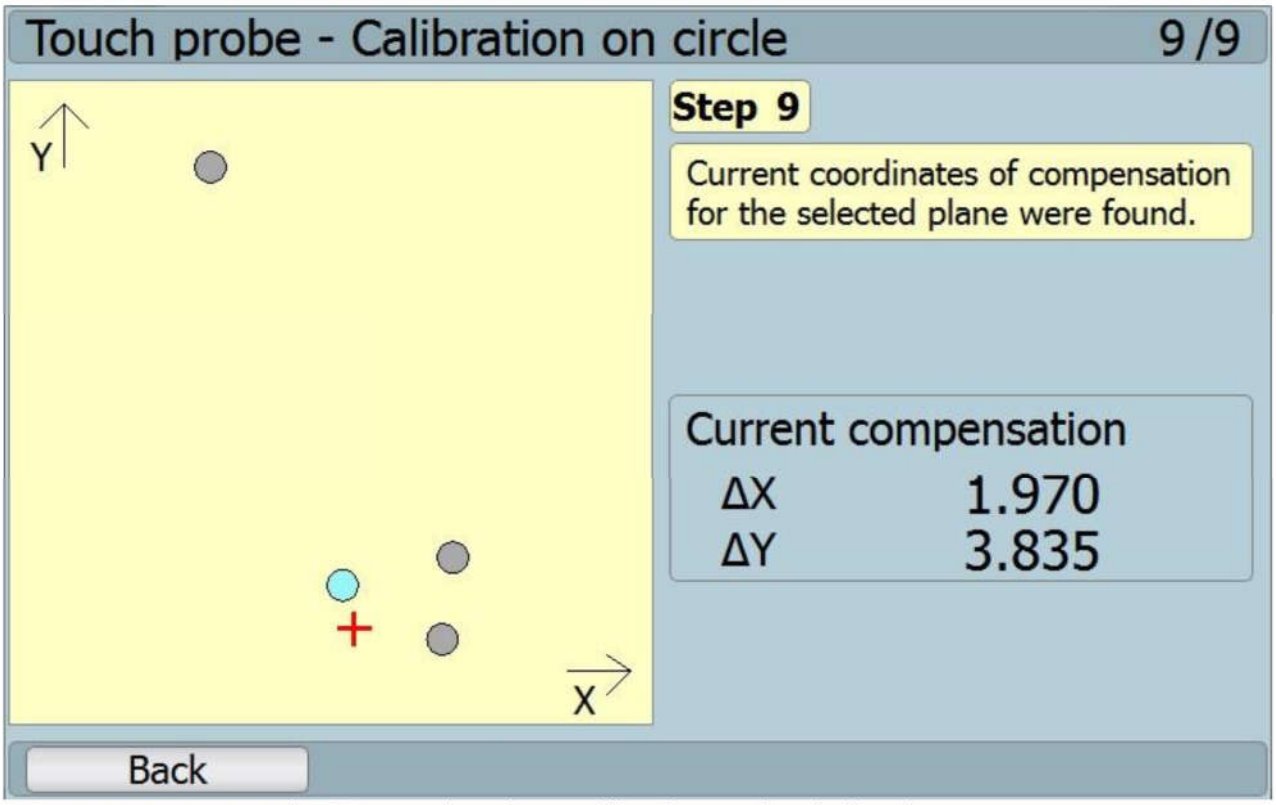

Fig. 43: Touch probe – calibration on the circle – last step

Centre of abscissa

- It is used for finding the abscissa centre entered by means of two points on the touch probe.
- After the probe reaches the required coordinate, press button „**Potvrdit**“ (confirm) (see fig. 44: Touch probe – abscissa centre) the first point is drawn in the scene.
- After reaching the second required coordinate with the probe and pressing button for the confirmation, the second point is saved and the found abscissa is drawn with the centre (see fig. 45: Touch probe – abscissa centre – found centre).
- It displays the radius (diameter) value of abscissa, the coordinates of the found centre, and it displays data on the line centre distance from the touch probe coordinates.
- The diameter value can be switched with buttons „**Polomer/Prumer**“ (diameter/ radius) for the defined abscissa.
- Button „**Vnejsi/Vnitrni**“ (external/ internal) is used for the diameter value treatment according to the way we moved the touch probe on individual line coordinates. They can be from external or internal side.
- Button „**Zapnuto/Vypnuto**“ (on/off) for the compensation edits values of the centre coordinates as per the defined compensation received during the calibration of the touch probe on the circle (see chapter **Chyba! Záložka není definována.**).
- Button „**Reset**“ sets everything into the initial setting.
- Button „**Prenest stred**“ (transfer centre) transfers the coordinates of the defined axis centre.

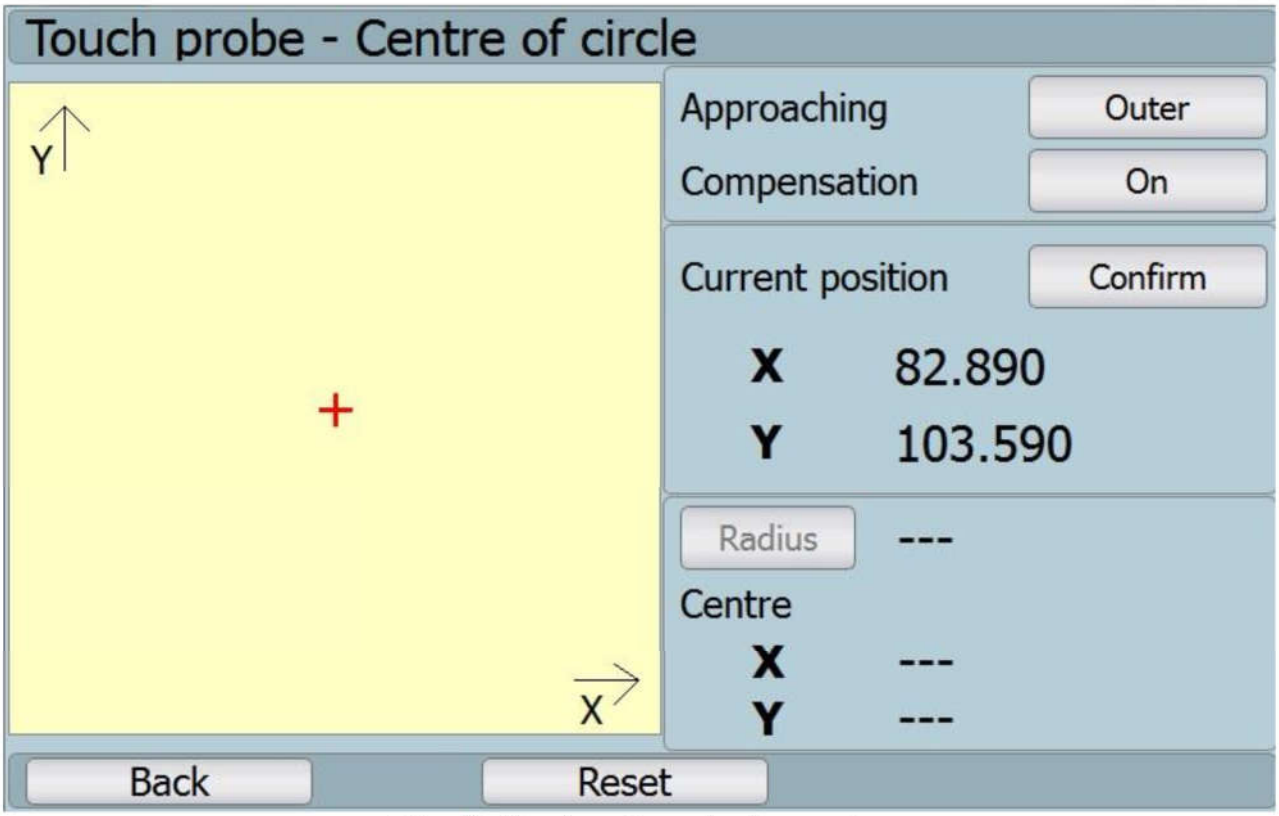

Fig. 44: Touch probe – abscissa centre

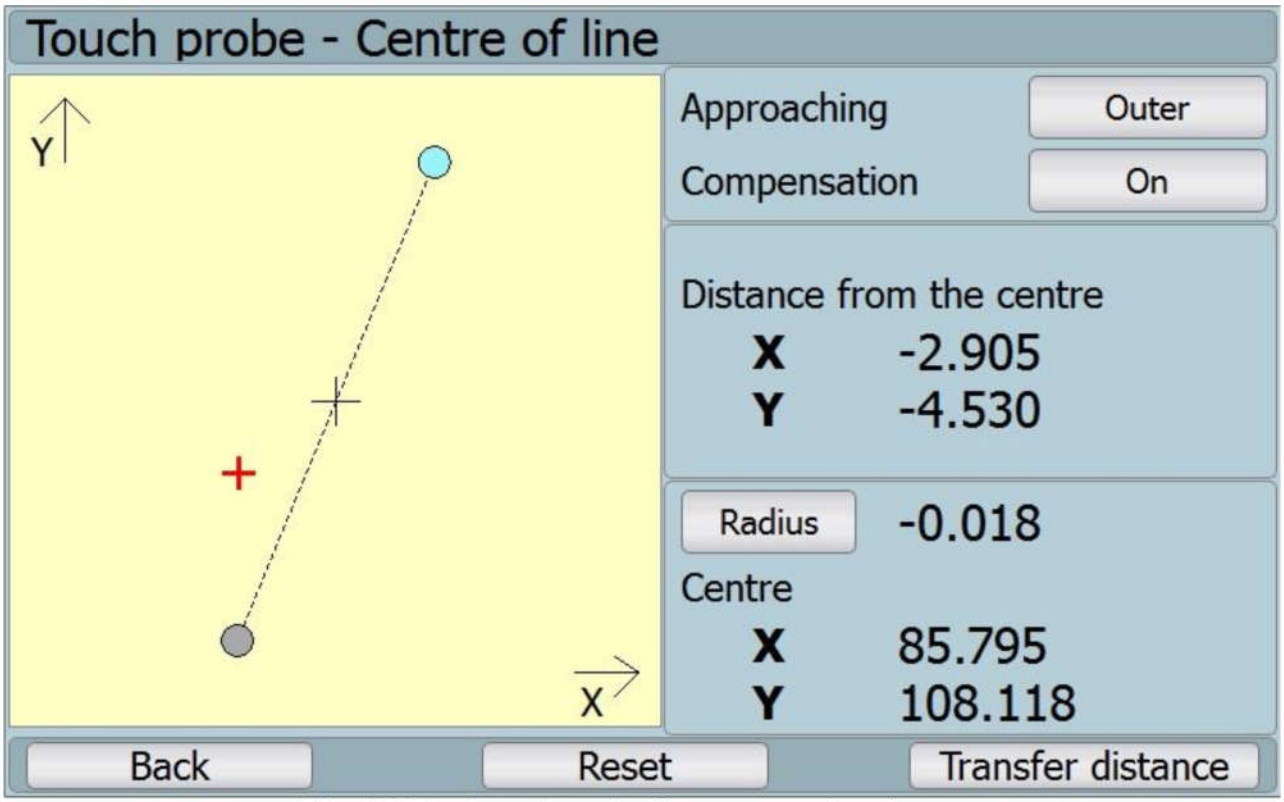

Fig. 45: Touch probe – abscissa centre – found centre

Circle centre

- It is used for finding the circle centre entered by means of three points on the touch probe.
- After the probe reaches the required coordinate, press button „**Potvrdit**“ (confirm) (see fig. 46: Touch probe – circle centre) the first point is drawn in the scene.
- After reaching the second and third required coordinate with the probe and confirming the coordinates, the found circle is drawn with the centre (see fig. 47: Touch probe – circle centre – found centre).
- It displays the radius (diameter) value of circle, the coordinates of the found centre, and it displays data on the circle centre distance from the touch probe coordinates.
- The diameter value can be switched with buttons „**Polomer/Prumer**“ (diameter/ radius) for the defined circle.
- Button „**Vnejsi/Vnitrni**“ (external/ internal) is used for the diameter value treatment according to the way we moved the touch probe on individual circle coordinates. They can be from external or internal side.
- Button „**Zapnuto/Vypnuto**“ (on/off) for the compnesation edits values of the centre coordinates as per the defined compnesation received during the calibration of the touch probe on the circle (see chapter **Chyba! Záložka není definována.**).
- Button „**Reset**“ sets everything into the initial setting.
- Button „**Prenest stred**“ (transfer centre) transfers the coordinates of the defined axis centre.

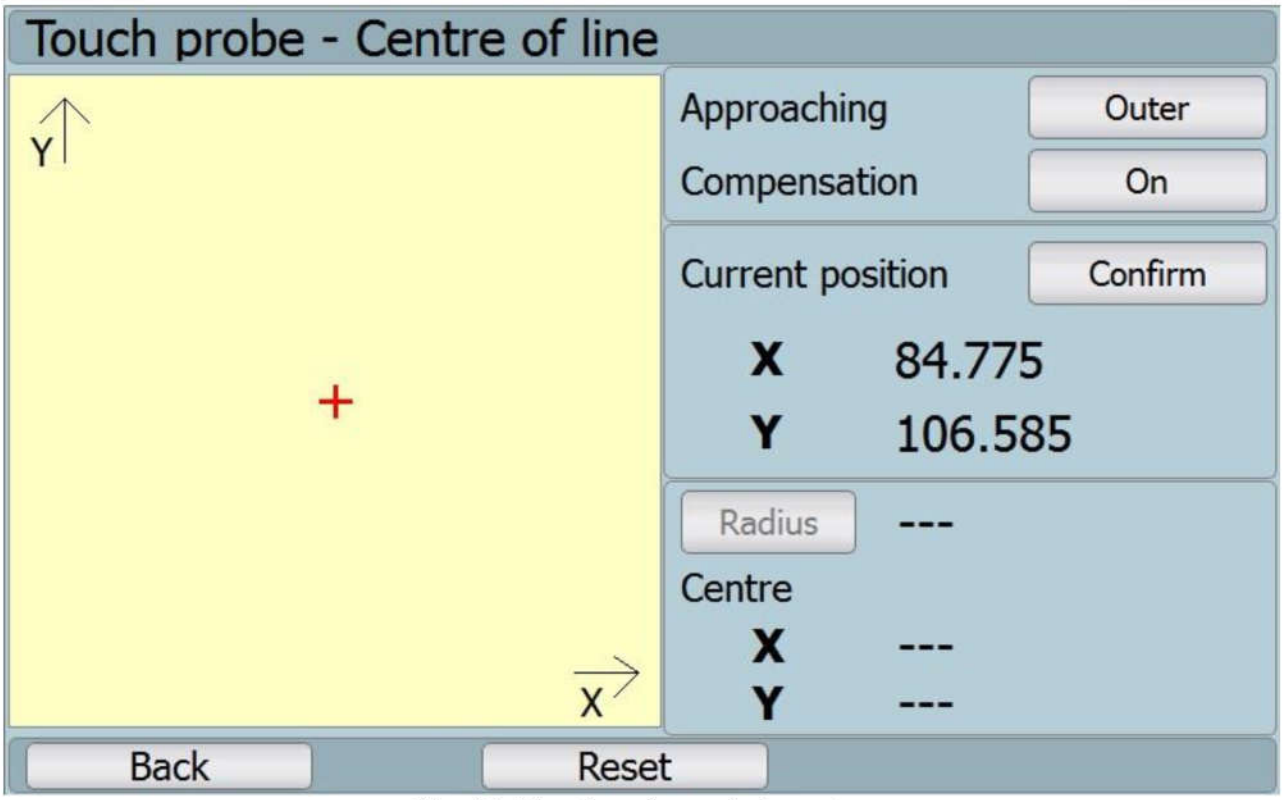

Fig. 46: Touch probe – circle centre

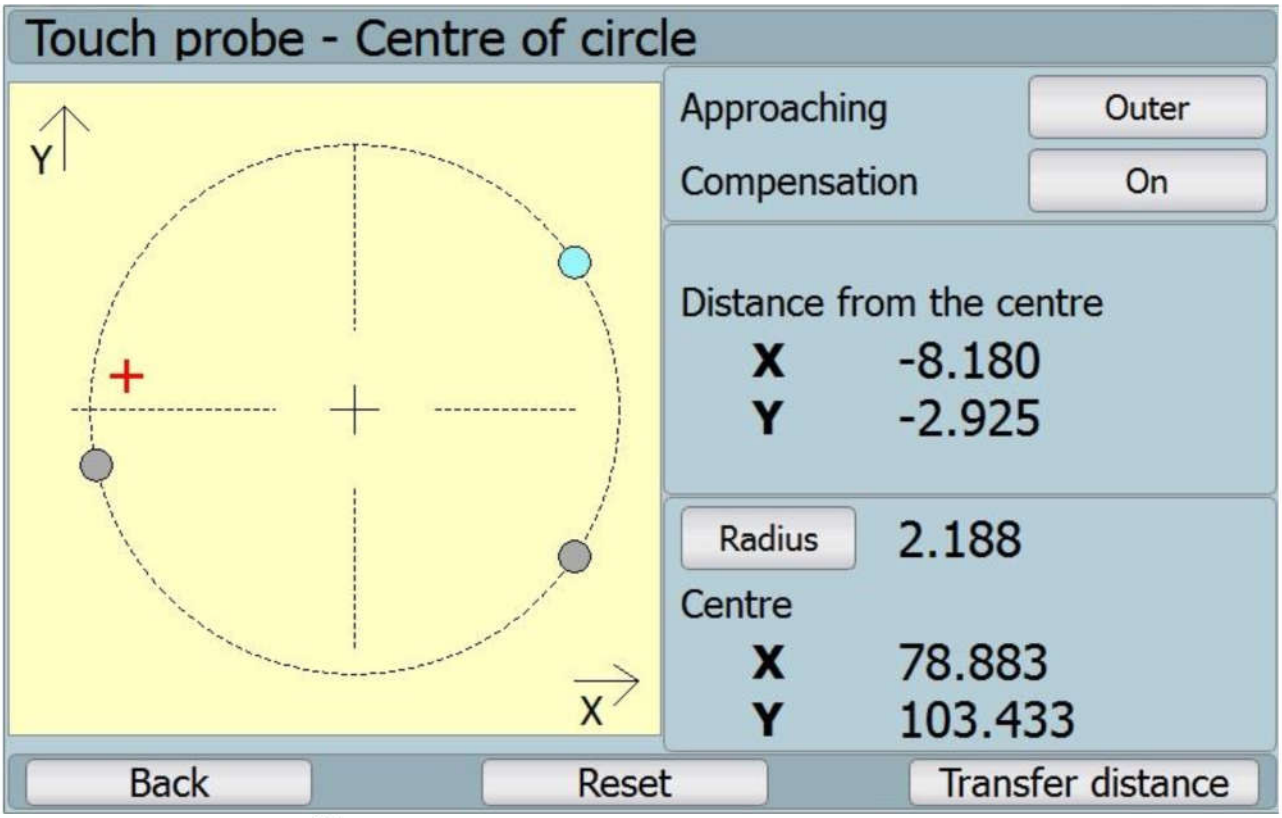

Fig. 47: Touch probe – circle centre – found centre

Workpiece centre

- It is used for finding the rectangular (square) workpiece entered by means of four points on the touch probe.
- After the probe reaches the required coordinate, press button „**Potvrdit**“ (confirm) (see fig. 48: Touch probe – workpiece centre) the first point is drawn in the scene.
- After reaching the remaining three points (each on one side of the workpiece) and confirming the coordinates, the found workpiece is drawn with the centre (see fig. 49: Touch probe – workpiece centre – found centre).
- It displays value of coordinates of the found centre, and it displays data on the workpiece centre distance from the touch probe coordinates.
- Button „**Zapnuto/Vypnuto**“ (on/off) for the compensation edits values of the centre coordinates as per the defined compensation received during the calibration of the touch probe on the circle (see chapter **Chyba! Záložka není definována.**).
- Button „**Reset**“ sets everything into the initial setting.
- Button „**Prenest stred**“ (transfer centre) transfers the coordinates of the defined axis centre.

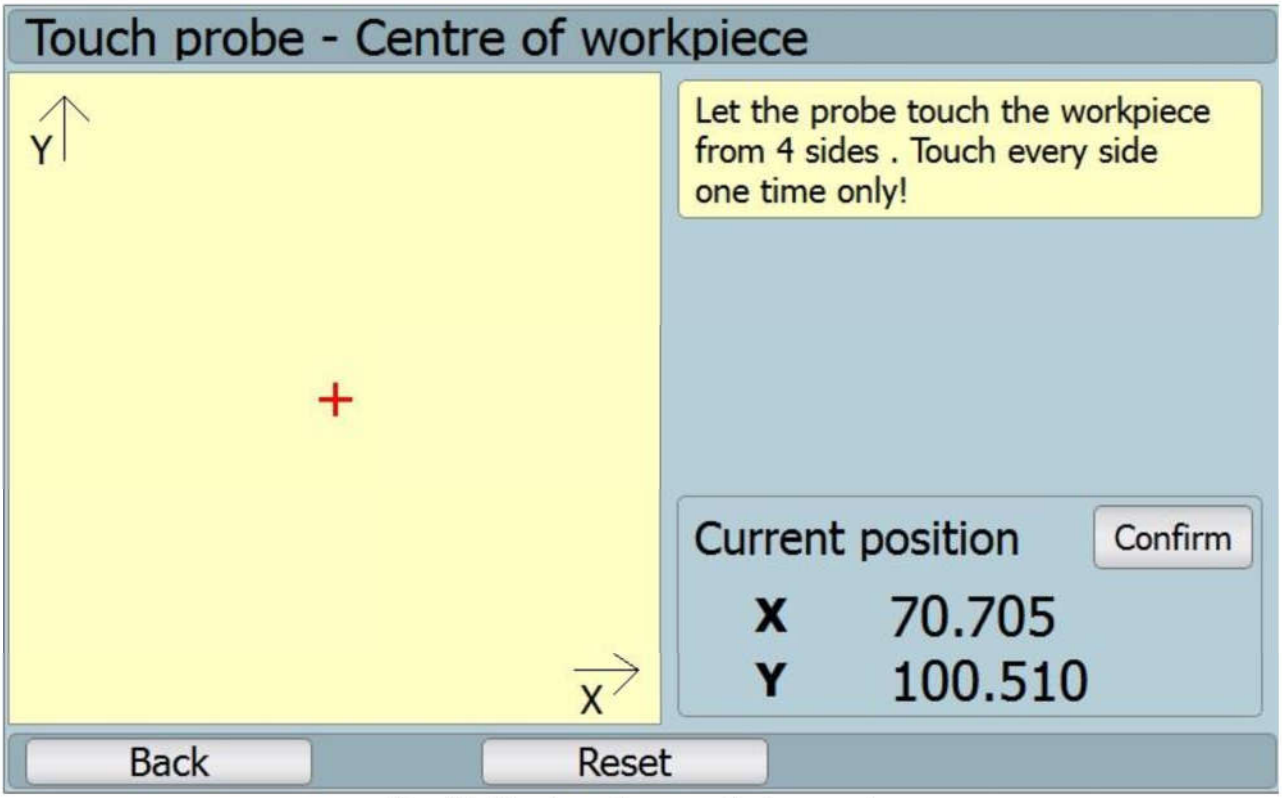

Fig. 48: Touch probe – workpiece centre

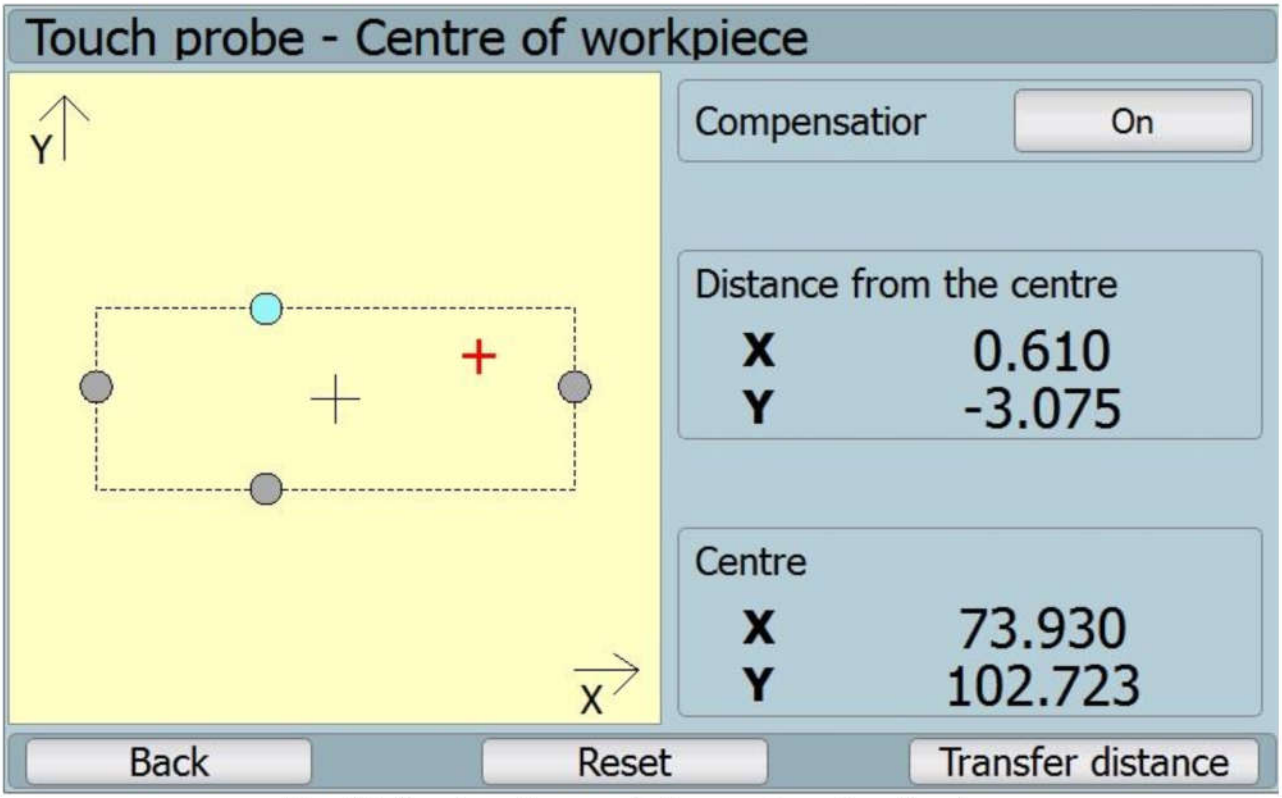

Fig. 49: Touch probe – workpiece centre – found centre

Workpiece edge

- It is used for finding the rectangular (square) workpiece edge entered by means of two points on the touch probe.
- At first set the searched edge with button „**Zmenit**“ (change) at the searched edge (see fig. 50: Touch probe – workpiece edge)
- Move the touch probe on the workpiece walls to find the edge.
- After the probe reaches the required coordinate, press button „**Potvrdit**“ (confirm) to draw their position and found centre of the workpiece edge (see fig. 51: Touch probe – workpiece edge – found centre).
- It displays value of coordinates of the found edge centre, and it displays data on the workpiece edge centre distance from the touch probe coordinates.
- Button „**Zapnuto/Vypnuto**“ (on/off) for the compensation edits values of the edge centre coordinates as per the defined compensation received during the calibration of the touch probe on the circle (see chapter **Chyba! Záložka není definována.**).
- Button „**Reset**“ sets everything into the initial setting.

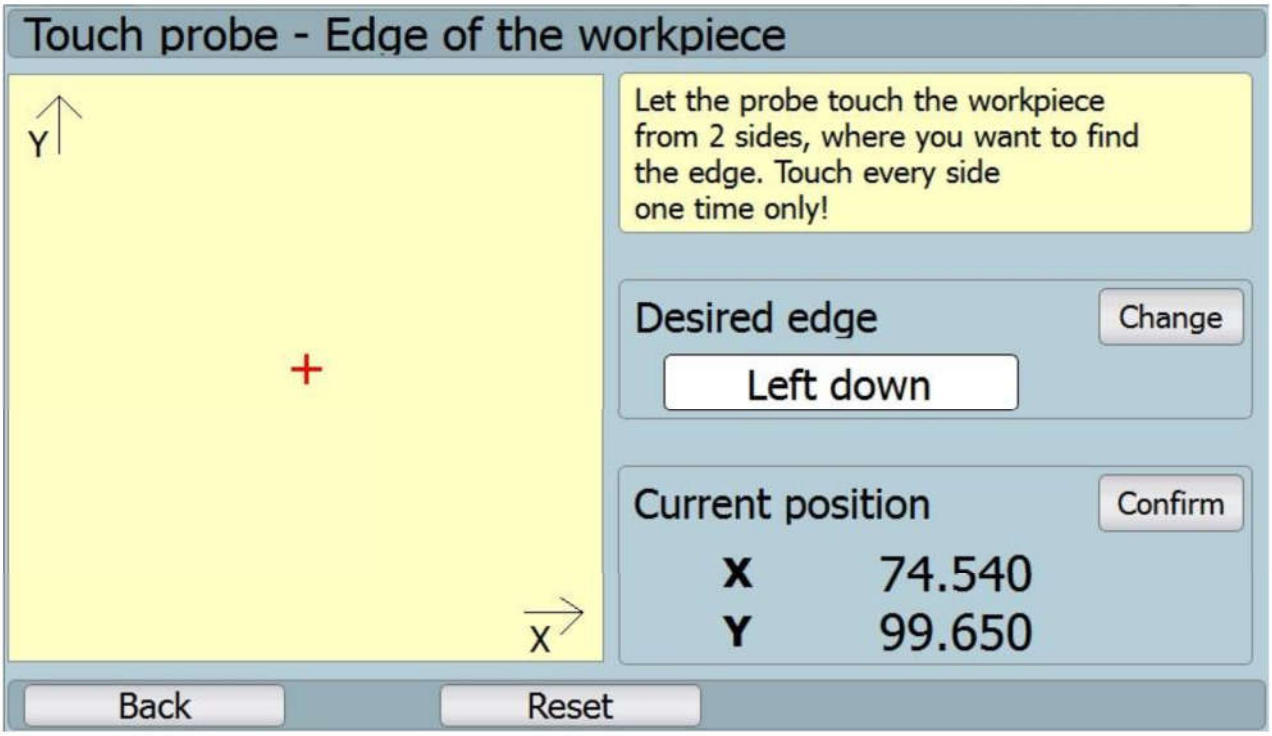

Fig. 50: Touch probe – workpiece edge

- Button „**Prenest stred**“ (transfer centre) transfers the coordinates of the defined axis centre.

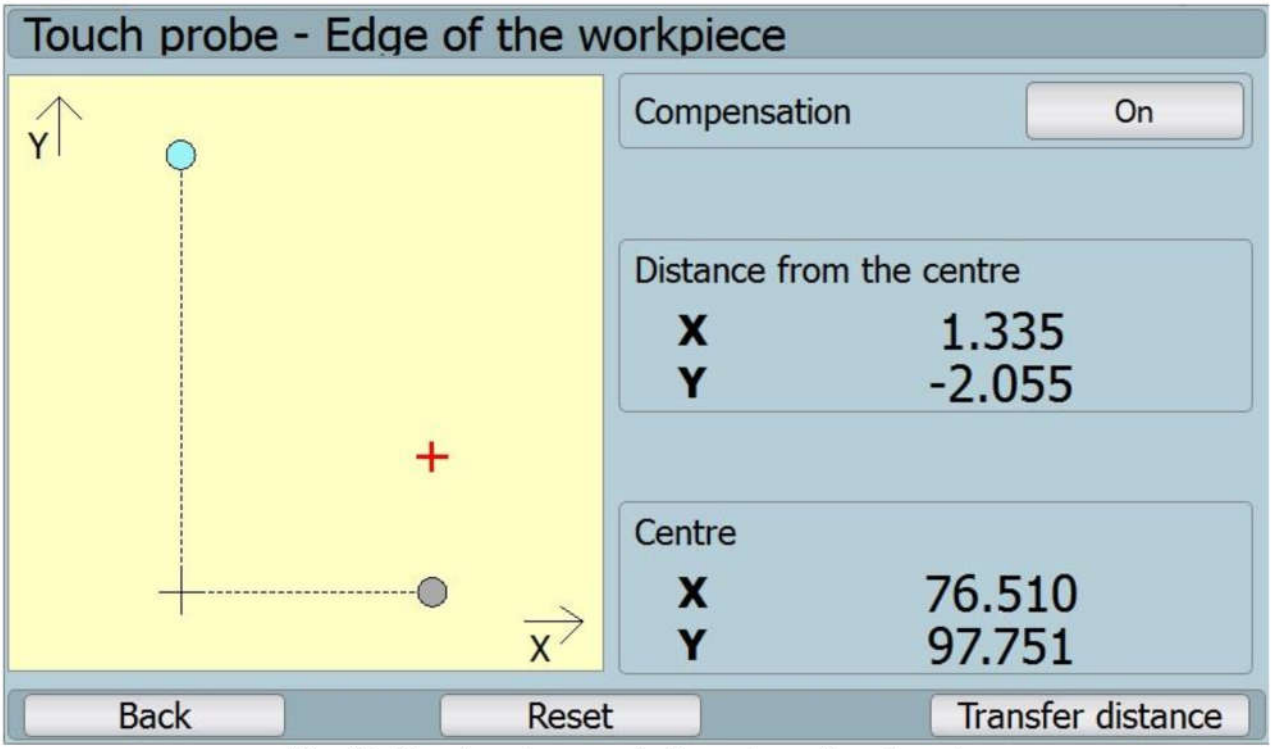

Fig. 51: Touch probe – workpiece edge – found centre

2. System update

➓ To update the system TSMAX to higher version of the system by means of PC it is necessary to install program „**TSMAX Update PC**“.

➓ Connect the readout unit by means of series interface (RS 232) to PC and start program “**TSMAX Update PC**“.

➓ It displays the initial screen of the update program (see fig. 52: System update – initial screen).

➓ The lower side of the window includes the status line which informs on the whole update procedure.

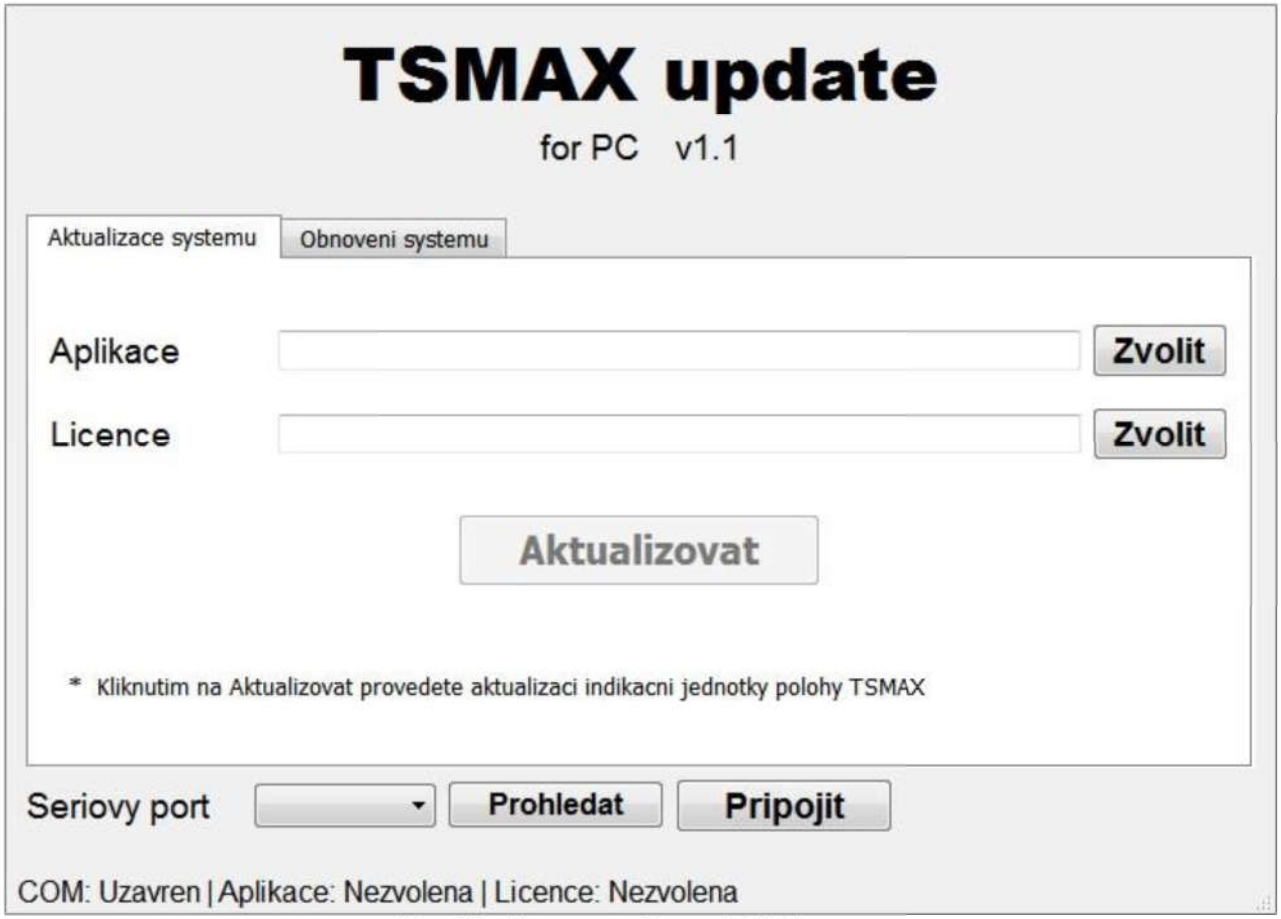

Fig. 52: System update – initial screen

➓ At first press button „**Prohledat**“ (search) to search all series ports used in PC. Then select the specific series port where the readout unit is connected.

➓ Now it is necessary to select the application file for the update and the license file using buttons „**Zvolit**“ (select).

➓ Finally press button „**Pripojit**“ (connect).

➓ If everything is ok, the button for „**Aktualizovat**“ (update) is available (see fig. 53: System update – prepared for update).

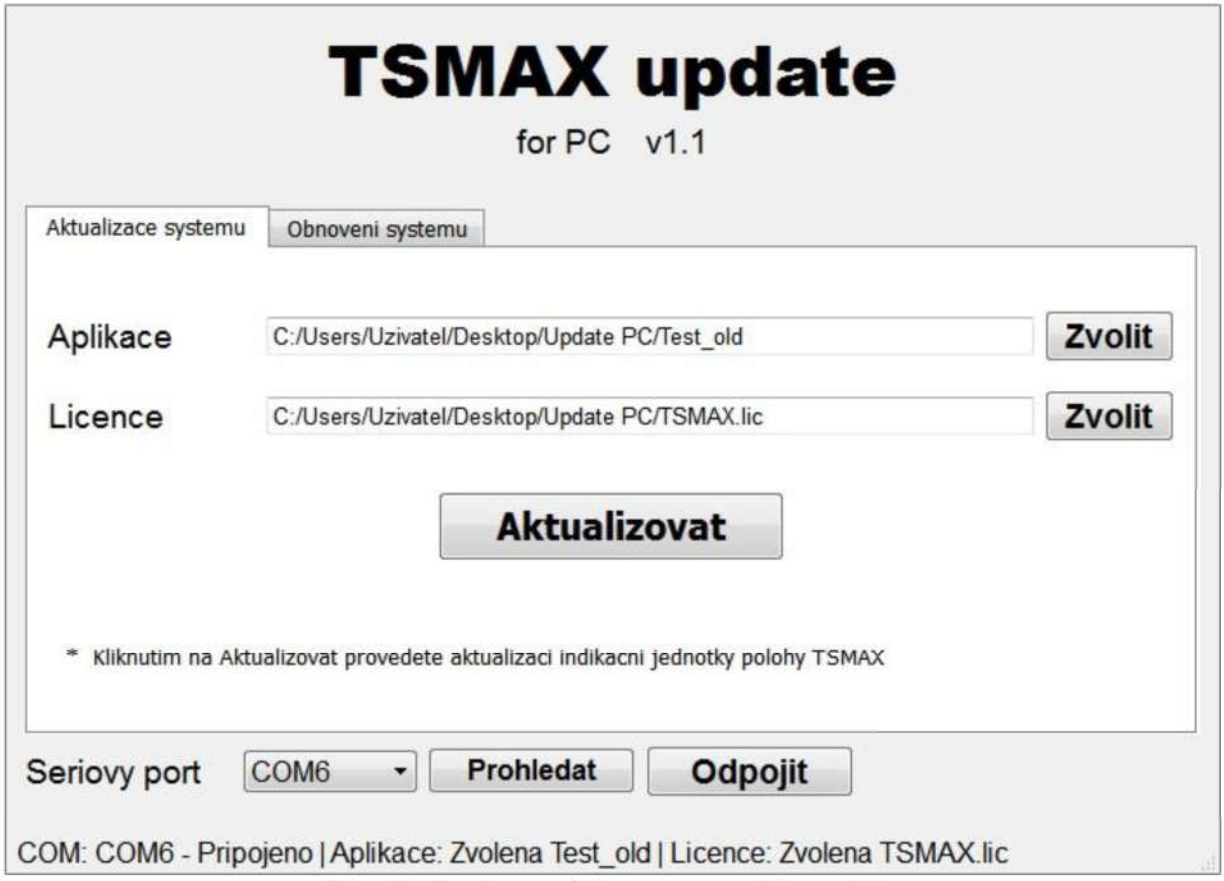

Fig. 53: System update – prepared for update

⓾ After the update the file transfer commences into the application (see fig. 54: System update – update in progress).

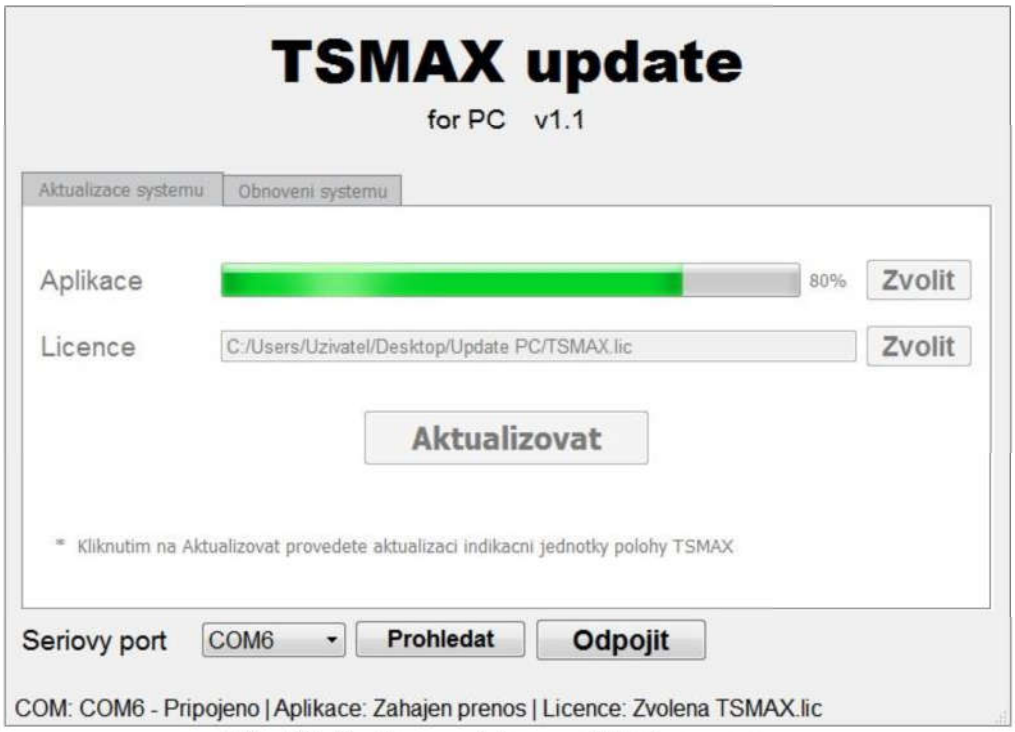

Fig. 54: System update – update in progress

➓ After completing the system update, new status report displays to restart the readout unit (see fig. 55: System update – update completed).

➓ After the readout unit restart, the system should automatically start with program TSMAX.

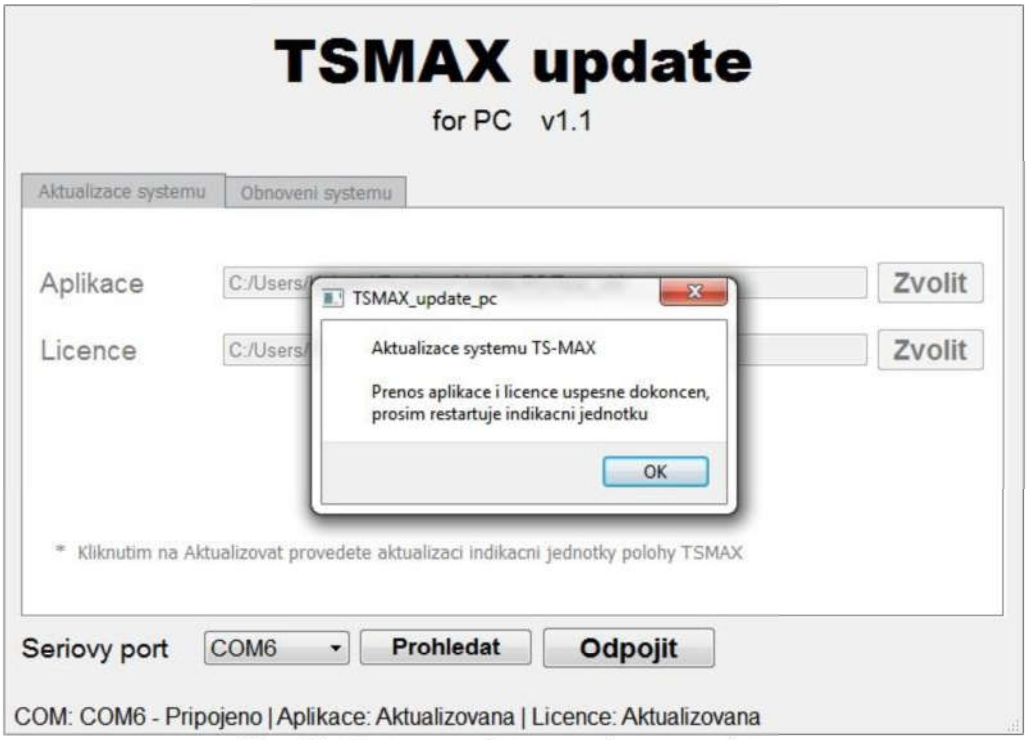

Fig. 55: System update – update completed

3. System restart

➓ To update the system TSMAX to higher version of the system by means of PC it is necessary to install program „**TSMAX Update PC**“ (for the same program see. Chapter **Chyba! Záložka není definována.**, only the second chapter).

➓ Connect the readout unit by means of series interface (RS 232) to PC and start program “**TSMAX Update PC**“.

➓ It displays the initial screen of the update program (see fig. 56: System restart – initial screen).

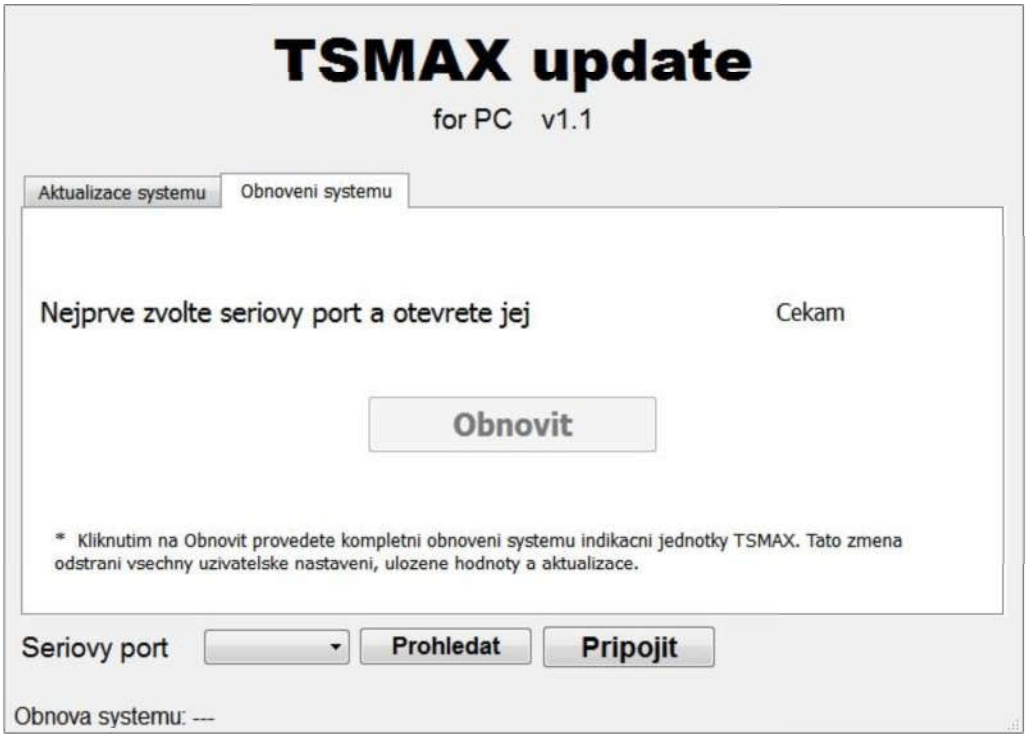

Fig. 56: System restart – initial screen

➓ The lower side of the window includes the status line which informs on the whole system restart.

➓ At first press button „**Prohledat**“ (search) to search all series ports used in PC. Then select the specific series port where the readout unit is connected.

➓ Finally press button „**Pripojit**“ (connect).

➓ If everything is ok, the button appears with the required readout unit restart (see fig. 57: System restart – connection of serial port).

➓ After manual restart button „**Obnovit**“ (restart) is available. The system restart commences.

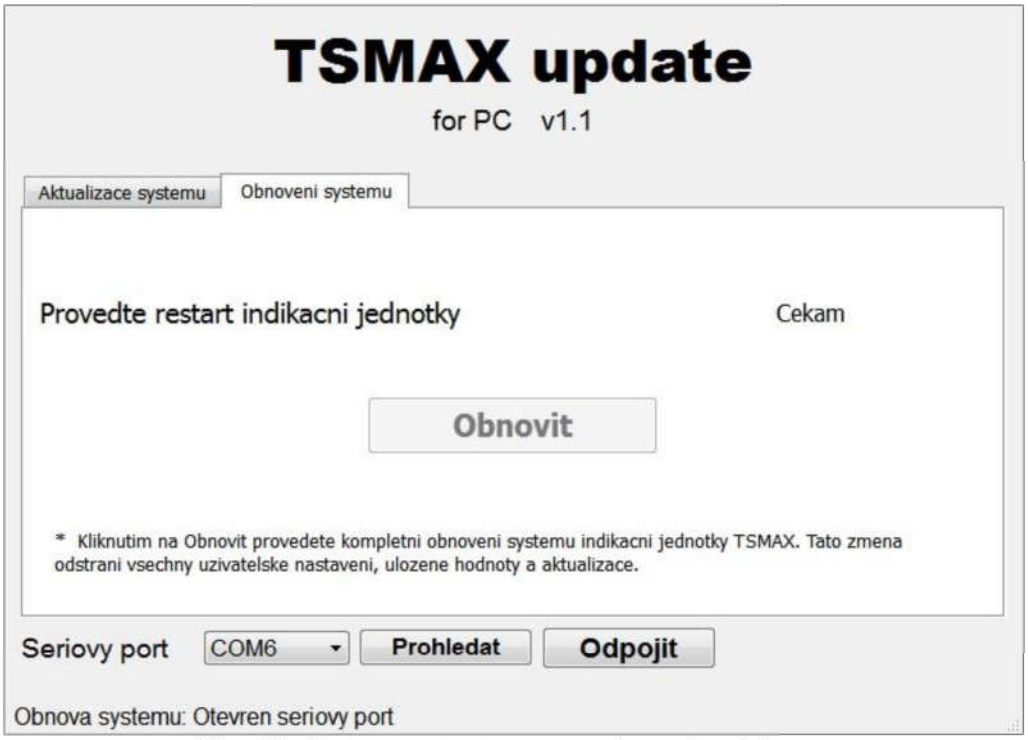

Fig. 57: System restart – connection of serial port

❿ After completing the system restart information is displayed on the completion (see fig. 58: System restart – completion).

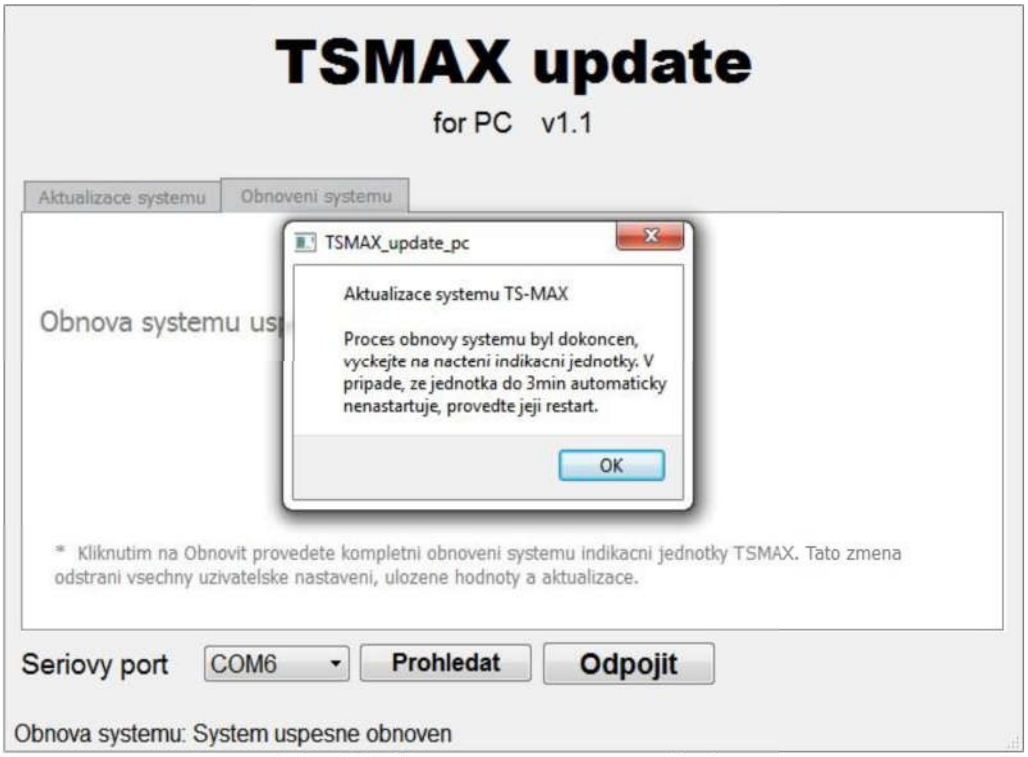

Fig. 58: System restart – completion

List of pictures