

Smart tool user guide

Creating and selecting a program



Table of Contents

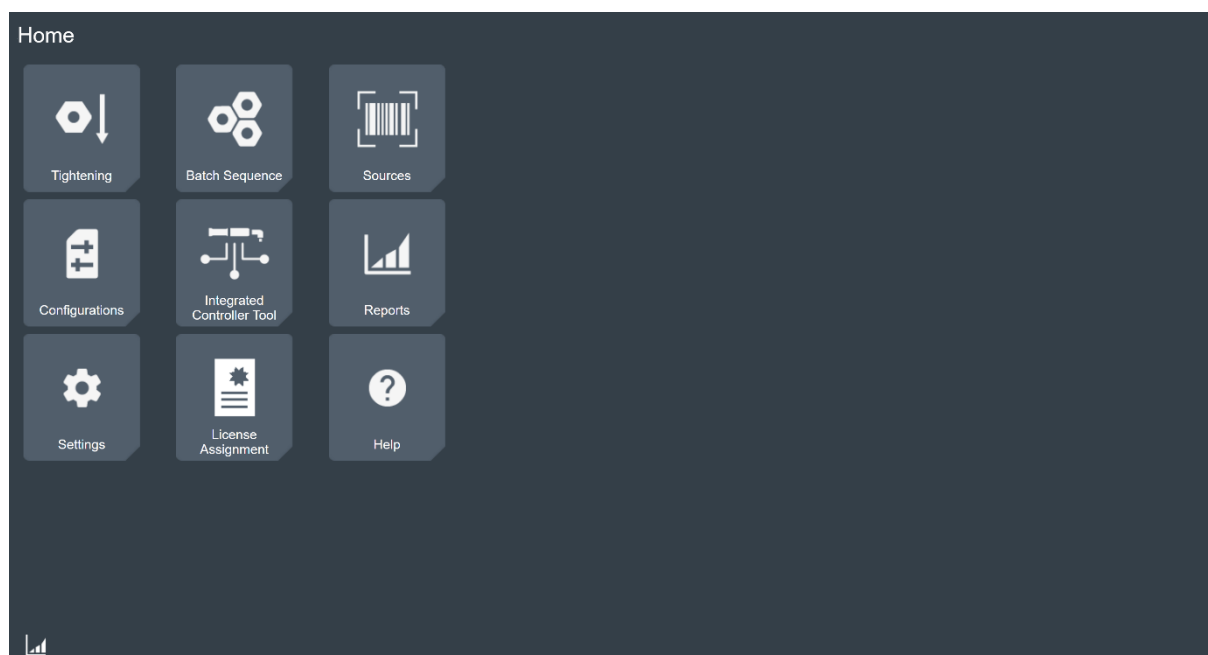
| | |
|-------------------------------------|----|
| Accessing the Smart tool menu..... | 3 |
| Smart tool menu..... | 4 |
| Creating a Tightening program | 5 |
| Creating a Loosening program | 9 |
| Creating a Batch sequence..... | 11 |
| Selecting a program to run | 13 |
| Smart Tool indications | 14 |
| Tightening and Loosening | 14 |
| Operating a Torque program | 14 |
| Operating a Batch sequence | 16 |

Accessing the Smart tool menu

1. Unscrew the back of the smart tool and connect a laptop to the Smart Torque Wrench using a Micro-USB cable.



2. Type in the following IP address into an internet browser: 169.254.1.1
Access to the Smart tool menu should now be available.



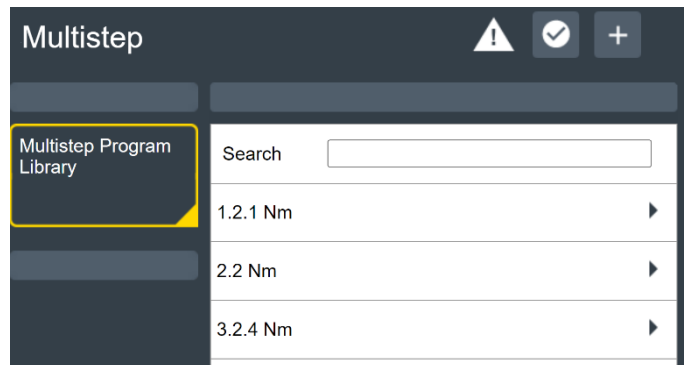
Smart tool menu

Once you have access to the menu, the following options are available on screen to select:

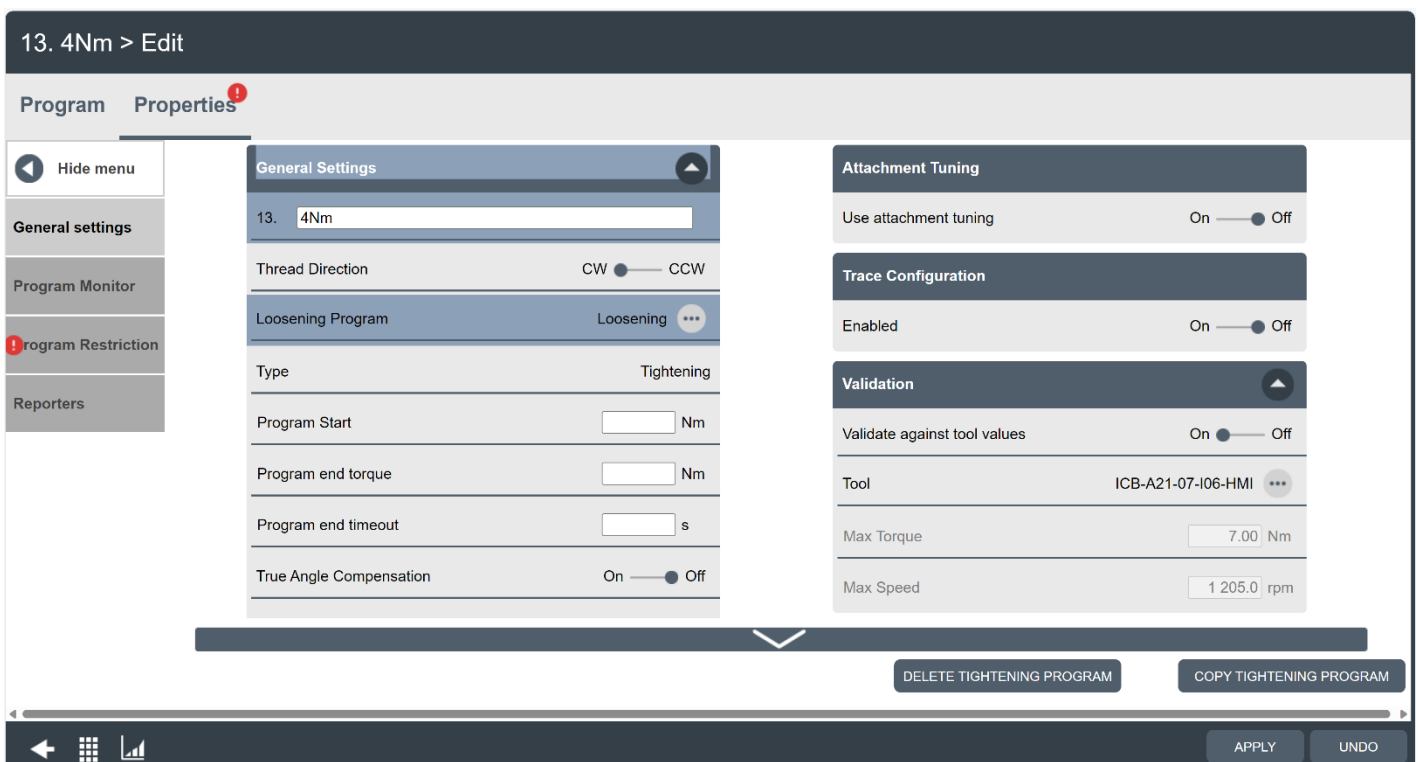
- Tightening – To create and store tightening programs
- Batch Sequence – To create and store batch sequences (setting the order of tightening programmes)
- Source – Allows the selection of the source to receive programmes from
- Configuration – For the Smart tool itself or accessory added onto the tool
- Integrated Controller – Virtual controller that brings together settings set and allows the selection of programs to run
- Reports – For results and events that have occurred during a smart tooling operation e.g recording tightening results and errors on the tool
- Settings – Has all the settings for the tool such as Software updates, Network Settings, backing up the programs, etc.
- License Assignment – Displays the current live licenses
- Help – Contains pdf of documents

Creating a Tightening program

1. From the home menu, click on 'Tightening' and then the add symbol.
2. A tightening or loosening option will be displayed, click on tightening.



3. Name the program in the Properties tab under general settings. The standard way to name these programs is either with their target torque value (e.g. 4Nm, which we will use as an example), or the name of the operation performed (e.g. Wheel nut on car). Also, make sure that a loosening program is selected (steps on how to program loosening will be shown later in the document), otherwise when the tightening program is selected, the Smart Tool won't be able to reverse the torque if a mistake has been made. Here a programme that has already been created called 'Loosening' is selected.



4. Remaining in the properties tab under Program restriction, a 'Max time limit' and 'Max torque limit' needs to be set. Otherwise, an error symbol will continue to appear. The max time can be set to any number but for the max torque it has to be 7Nm or less. *It is possible to set a max torque value up to 10.5Nm, however the smart tool will lose its accuracy if it goes above 7Nm.*

Program Properties

Program Restriction

Maximum Time Limit: 5.00 s

Maximum Torque Limit: 7.00 Nm

Time

Time: On — Off

5. In the 'Program' tab, select 'Steps' then drag and drop the 'Tighten to torque' box onto the space. This will be the First Step process.



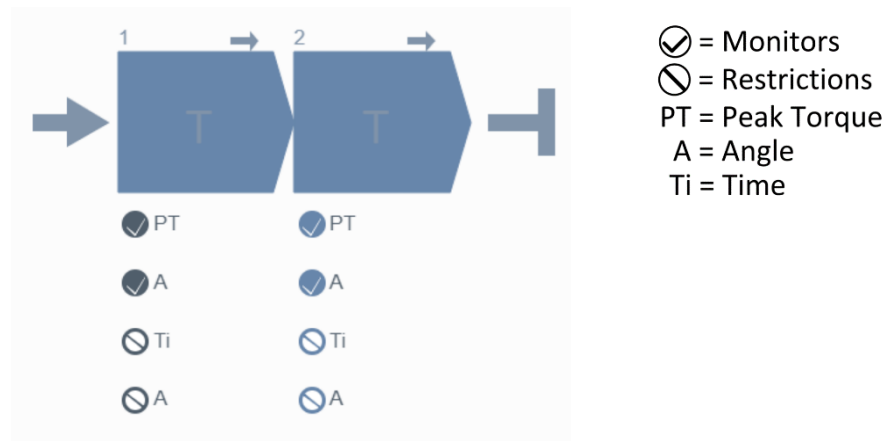
- Click on the dragged box to input parameters. The ones to focus on are the Speed and the Target Torque.
The first Speed should be high (around 300 rpm) and the Target Torque to be 40-60% of desired Torque value (e.g. for 4Nm final Torque Target, the value entered can be 2Nm).

| Tighten to Torque | Monitors | Restrictions |
|-------------------|---|---|
| Name | <input checked="" type="checkbox"/> Peak Torque | <input checked="" type="checkbox"/> Maximum Time |
| Step Category | Low Limit | High Limit |
| Speed | High Limit | <input checked="" type="checkbox"/> Maximum Angle |
| Speed ramp type | <input checked="" type="checkbox"/> Angle | High Limit |
| Target Torque | Stop conditionShut Off Angle | Trigger Torque |
| + Add speed shift | Low Limit | |
| Brake type | High Limit | |
| Adaptive brake | Trigger Torque | |
| DELETE | | |

- In the 'Program' tab, drag and drop another 'Tighten Torque' box onto the space, next to its predecessor. This will be the Final Step process.
- Click on the new dragged box to input parameters. Again, the values we are concerned with are the Speed and the Target Torque.
The final speed should be low (around 50-60 rpm) and the Target Torque to be the final desired Torque value (4Nm in the case of the example).

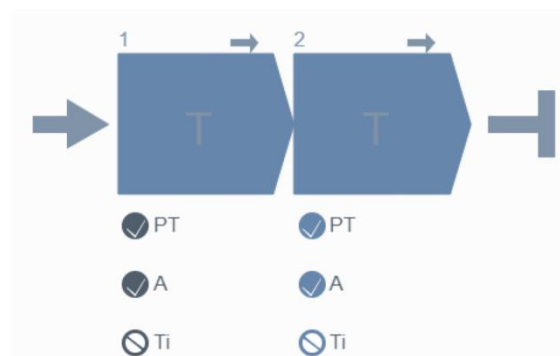
| Tighten to Torque | Monitors | Restrictions |
|-------------------|---|---|
| Name | <input checked="" type="checkbox"/> Peak Torque | <input checked="" type="checkbox"/> Maximum Time |
| Step Category | Low Limit | High Limit |
| Speed | High Limit | <input checked="" type="checkbox"/> Maximum Angle |
| Speed ramp type | <input checked="" type="checkbox"/> Angle | High Limit |
| Target Torque | Stop conditionShut Off Angle | Trigger Torque |
| + Add speed shift | Low Limit | |
| Brake type | High Limit | |
| Adaptive brake | Trigger Torque | |
| DELETE | | |

9. The program space should now look like this:



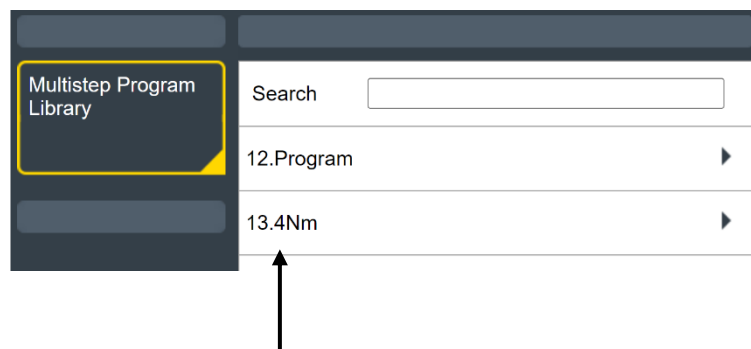
10. Ensure that Angle restriction is deleted as the default set for this is 360°. To do this, click on the symbol and click delete.

If it isn't deleted, when the trigger is pressed on the Smart Torque Wrench, the head will spin 360° and stop.



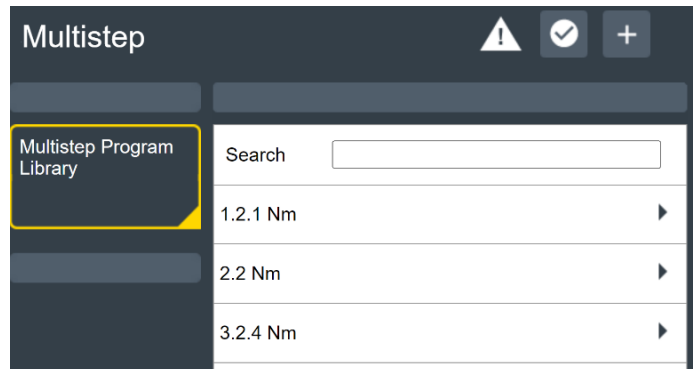
You are able to drag and drop monitoring reports to collect specific data when the smart tool is used.

11. Click apply on the bottom right of the screen. The programme should now be visible in the library

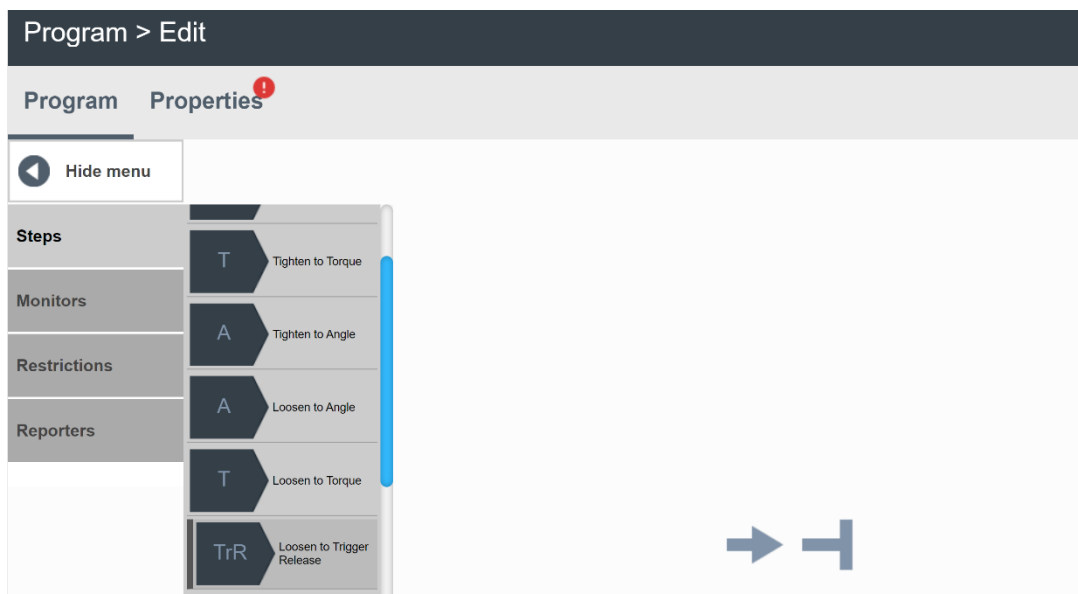


Creating a Loosening program

1. From the home menu, click on 'Tightening' and then the add symbol.
2. A tightening or loosening option will be displayed, click on loosening.

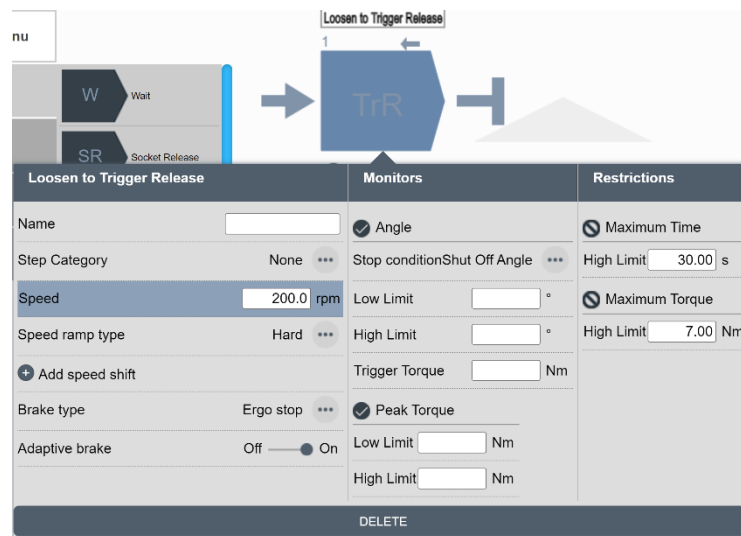


3. As can be seen from the screenshot below, there are three different options for loosening:

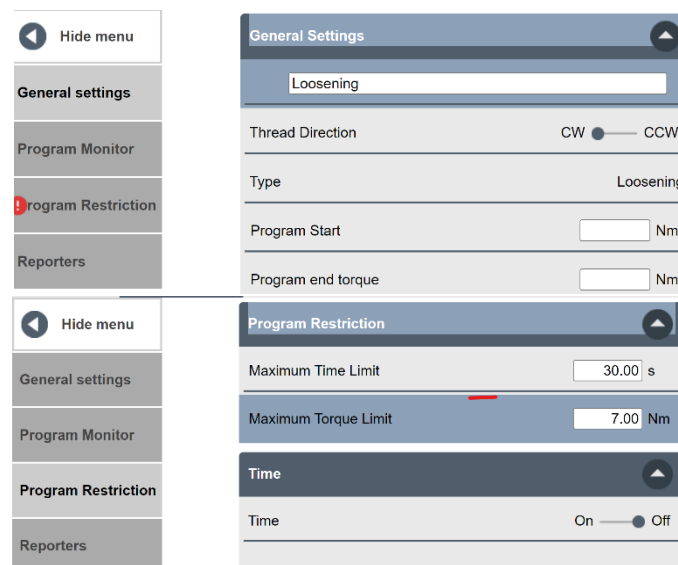


- Loosen to Angle – most important setting is the angle for tool to rotate and once that angle has been reached, the smart tool stops and assumes the operation has been performed.
- Loosen to Torque – most important setting is the target torque for the tool to reach and once the torque has been reached, the smart tool stops and assumes the operation has been performed.
- Loosen to Trigger Release – most important setting is the speed of the torque. Here it is up to the user to decide when the loosening operation has been performed; the user can keep pressing the trigger for loosening until they release it.

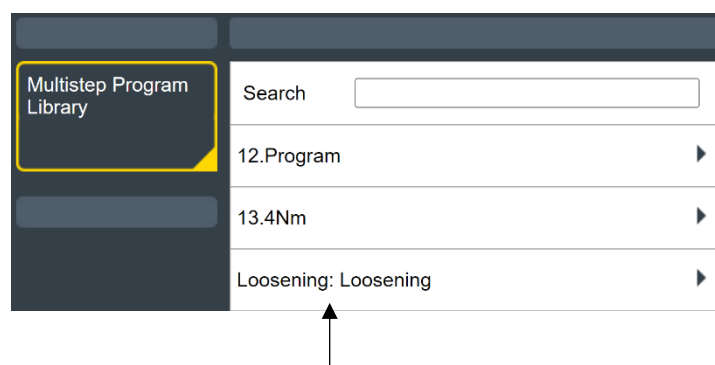
- In this example, 'Loosen to Trigger Release' is the chosen loosening option and is dropped into the space. Clicking onto the symbol to bring out its settings, the speed is set to 200 rpm.



- On the properties tab, name the loosening programme on the General Settings section. Set the max time limit and max torque in the Programme Restriction.



- Click apply on the bottom right of the screen. The programme should now be visible in the library.



Creating a Batch sequence

Tightening programmes brought together in a sequence to perform a task

1. From the home menu, click on 'Batch Sequence' and then the add symbol. The settings page will pop up as shown, with default settings applied.
2. Name the Batch to whatever is most relevant to the sequence of tasks that will be performed.
3. The settings have the following options:

- **Lock tool on batch sequence compl.**

Off – when the sequence is completed, it is automatically reset.

On – when the sequence is completed, the tool will not be available to use and the batch needs to be selected again.

- **Free order**

No – follows the order of the batch.

Yes – no distinct order to be followed.

- **Increment on NOK**

No – sequence will allow for adjustments if wrong initial torque is applied.

Yes – sequence will move on even if the torque applied is incorrect with no option to correct it (loosen and redo).

- **Max consecutive NOK**

Indicates the number of NOK chances a user has, which the batch sequence will automatically end when the value is reached.

- **Decrement on OK loosening**

Counts back on batch

- **Sequence abort timer**

Off – No time limit for the batch sequence to be completed.

On – Timer set for the job to be completed. If the timer runs out, the programme will automatically end.

The screenshot shows a 'Sequence settings' window. It has a 'Name' field containing 'Example Batch'. Below this is a 'Settings' section with several options: 'Lock tool on batch sequence compl.' (toggle set to Off), 'Free order' (toggle set to No), 'Increment on NOK' (toggle set to No), 'Max consecutive NOK' (input field with '0'), 'Decrement on OK loosening' (dropdown menu set to 'Never'), and 'Sequence abort timer' (toggle set to Off). At the bottom of the settings section is a 'Batch Configuration' section with an 'Edit' button. Below the entire settings section is a 'DELETE' button.

- Once the desired settings have been selected, click on 'Edit' under 'Batch Configuration'. Here you are able to select any of the torque programmes that have been created, in a specific sequence, to complete a job.

3. Example Batch > Edit

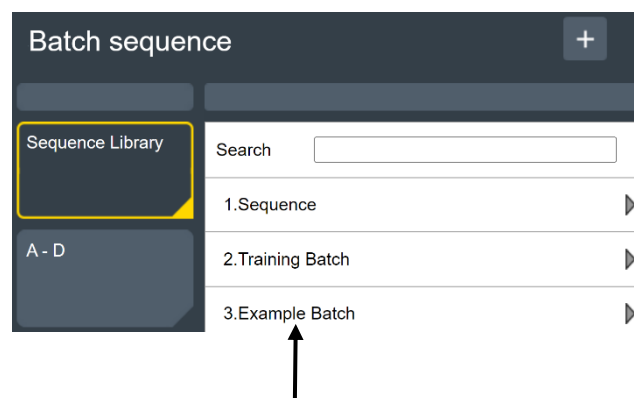
| Batch Configuration | | | | |
|---------------------|--------------------|-----|--------------------------------|-----------------------------------|
| | Tightening Program | | Batch size | Identifier number |
| 1 | 1. 2.1 Nm | ... | <input type="text" value="4"/> | <input type="text" value="None"/> |
| 2 | 4. 4.8 Nm | ... | <input type="text" value="2"/> | <input type="text" value="None"/> |
| 3 | 6. 2.7 Nm | ... | <input type="text" value="2"/> | <input type="text" value="None"/> |
| 4 | 13. 4Nm | ... | <input type="text" value="4"/> | <input type="text" value="None"/> |

As can be seen, four tightening programmes are selected.

Batch size refers to the 'number of hits', e.g. there might be four bolts that require the same torque within a specific area.

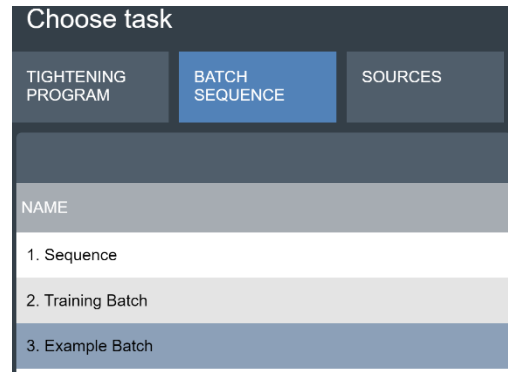
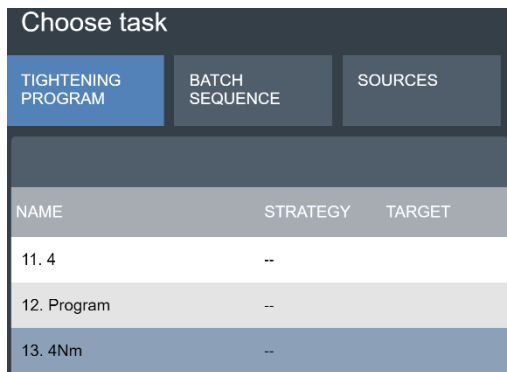
Identifier number can be set to a number up to 250, if a source is selected. Usually this is set on 'None' with 'Free order' on 'No' (from settings), which will allow the sequence to run in the order displayed from one to four.

- Click apply on the bottom right of the screen. The batch sequence should now be visible in the library.

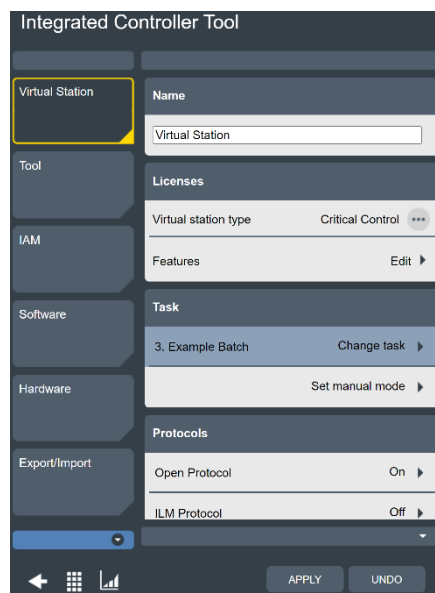
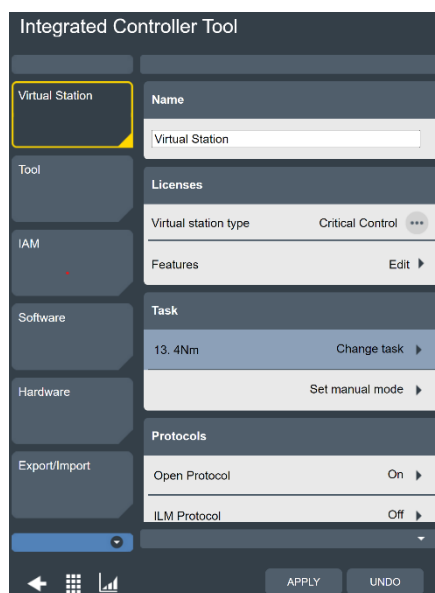


Selecting a program to run

1. From the home menu, access the 'Integrated Controller Tool'.
2. Under 'Virtual Station', click 'Change Task' and select the desired task to be performed – this can be a tightening programme or a batch sequence.



3. Click at the bottom to confirm changes.



4. The Smart Tool will give a confirmation if a programme has been successfully selected.



Smart Tool indications

Tightening and Loosening



To select tightening mode, twist the yellow area to the right. A confirmation of this mode will be displayed by the arrow lighting up on the relevant direction. It is vice versa for loosening – twist the yellow area to the left and ensure the arrow pointing left lights up.

The small screen on the Smart Tool also contains an arrow that gives an indication to tightening/loosening.

Operating a Torque program

When a Tightening program is selected, the program name is displayed at the bottom with empty values for the torque and angle above it.



If the torque/angle, depending on the program settings, has been successfully implemented, the Smart Tool will light up green and display an 'OK' message on its screen.



If the application of the torque/angle wasn't sufficient, the Smart Tool will light up red and display a 'NOK' message on its screen. *In the example below, the error came up as the Smart Tool rotation didn't reach its target angle; 135 degrees/360 degrees.*



Operating a Batch sequence

When a Batch Sequence is selected, it will display squares and circles, as well as the name of the Batch Sequence and the current Torque programme.



Squares (Batch) – indicates the current tightening programme

Circles (Count) – indicates the number of hits

When the first torque has been successful, the first circle will go green. Once all the circles are green, the first square will go green and move onto the next batch sequence. The Batch Sequence resets/ends when all the squares and circles are green.



The device connected to the Smart Tool will also display the progress of the Batch Sequence.

