USER MANUAL

HxGN SMARTFIXTURE VERSION 2023.1

Contents

1. General

1.1. Introduction

The purpose of this manual is to assist you in using the HxGN SmartFixture (hereinafter referred to as the "SmartFixture").

We have tried to describe all options of this software as best as possible and in a way that is understandable. However, we ask for your understanding that all features may possibly not be described. This may be due among other things to technical innovations, new options or similar influences.

As a precaution, we would like to point out that this user manual cannot replace training. Should you be interested in a course in this respect, we look forward to hearing from you. You can find the corresponding data at the end of this text.

Even after careful checking, it cannot be ruled out that this user manual is free of errors.

Therefore, we reserve the right to make typographical errors and mistakes.

Regardless of this, we are grateful for any suggestions, tips and proposals for improvement that arise from daily use of the SmartFixture.

If you need assistance, please contact your local Hexagon support.

1.2. Notes on the use of this user manual

- ## Find terms or functions that are not listed in the table of contents

  The terms used in this user manual for functions, etc. are identical to those used in the software. If certain functions cannot be found via the table of contents, use the search function in the PDF. To do this, enter the desired term in the notation in which it is used in the user interface.

- ## Using links

  If text passages are related to other chapters, they are linked to each other. These links can be recognized by the underlined and blue colored text. Clicking on this text will jump to the corresponding passage.

  In order to be able to find these passages in a printed user manual, the complete outline is preferably given.

  Example:

  Chapter: Configuration of the software, section: Start element: Settings, Option: Language.

  or (corresponds to the navigation in the software):

  Start element: Settings ➜ Language.

  In principle, the last term will lead to the desired information (in the example above: Option Language).

  The complete structure is not indicated if the linked passage is located in the immediate vicinity of the text (example: see Example above).

  If the text passage to which you jumped does not contain a link to the original text, you can use the shortcut keys "Alt" + "←" (left arrow) to jump back to the source text.

- ## Symbols used

  This symbol serves reminds you to read the corresponding text particularly carefully.

1.3. Meaning of mouse click, click or similar.

This term is used for the left mouse button. If the right mouse button has to be clicked, this is explicitly mentioned.

1.4. Recommended qualification

- Installation of the software

The installation of the software should be performed by personnel who have the following knowledge and permissions:

- PC skills
- Windows skills
- Installation of Windows programs
- Extraction of compressed files
- Changing access permissions in the file system and registry
- → Typical: Network Administrators

- Use of the software

The use of the software should be performed by personnel who have the following knowledge and permissions:

- PC - basic knowledge
- Windows skills
- Detailed training by Hexagon's application engineering department
- → Typical: Employees in quality assurance or scheduling

2. Software License Agreement

It is a condition of use of the Software that all terms contained in the Software License Agreement are accepted. For details, please refer to the document "EN_EULA.pdf", which is located in the same folder as the user manual.
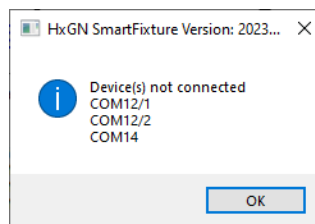
3. Starting SmartFixture

Double-click the shortcut on the desktop to start SmartFixture. The prerequisite is that PC-DMIS is open. If this is not the case, a corresponding message appears.
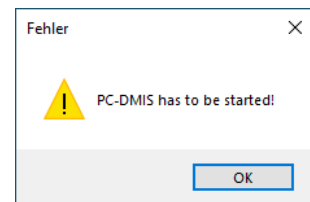
3.1. Sensors not connected

If the sensors are configured but not connected, the following note appears after clicking in the start element "Home" or "PC-DMIS" (see below in each case):

In the start element "Home", the symbol for the automatic measured value query (see below in each case) is displayed in red.

The sensors must be connected and SmartFixture restarted.
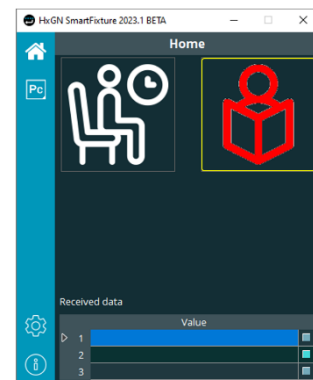
3.2. Sensors not configured

If no sensors have been set up yet, the following message appears:
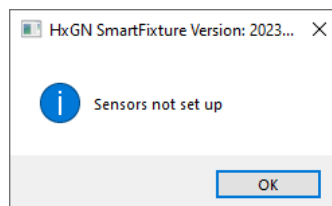
Only the start elements are available in the user interface.

In this case, after confirming the message with "OK", the sensors must be configured as described under "Configuration of the software" (see below). After configuring the sensors, a restart of the software is recommended.

4. User interface

Start elements

Symbol for manual measured value query

Symbol for automatic measured value query

Measurement values

5. Configuration of the software

For the configuration of the software, the knowledge and permissions recommended in chapter: General, section: Recommended qualification, point: Use of the software must be taken into account.
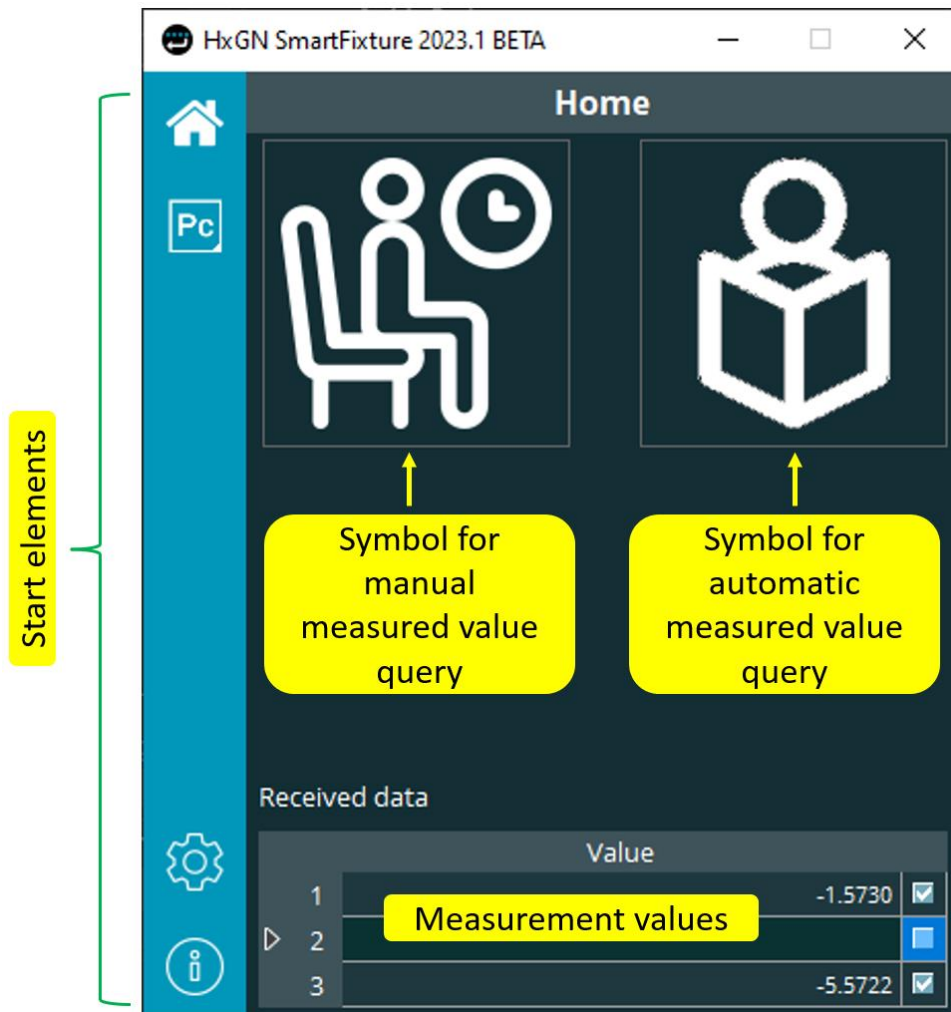
5.1. Start element: Settings

By clicking on the start element „ ⚙ " at the bottom left, you can switch to the "Settings" view. Here you can make settings for the language and the connected sensors.

If you hover your mouse pointer over the start element, a tooltip with the note "Settings" appears.

- Language

  Clicking in the selection field to the right of "Language" opens a drop-down list from which the desired language can be selected (shortened screenshot).

  After selecting another language, the software is restarted.

  If your desired language is not selectable, your local Hexagon support.

- Area: COM Parameter

  In this area the connection data to the connected hardware can be defined.
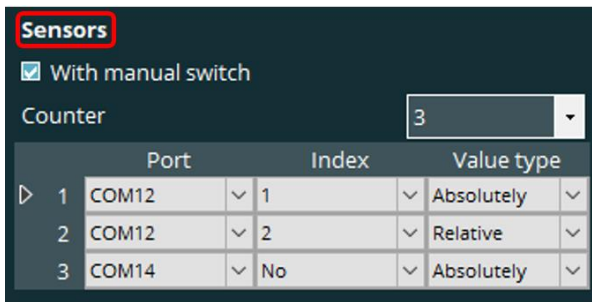
  These are preset with the values for TESA hardware. If this is used, the data should not be changed.

COM Parameter	
Baudrate	4800
Parity	Even
Data bits	7
Stop Bits	Two
Handshake	XOnXOff

  If required, the values for "Baud rate" and "Data bits" can be changed by entering the desired values. For all other values, a drop-down list can be opened by clicking on the respective selection field, from which the desired value is selected.
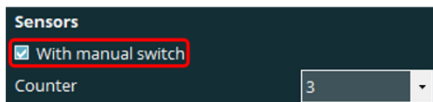
- Area: Sensors

  In diesem Bereich werden die angeschlossenen Sensoren konfiguriert.

Sensors			
With manual switch			
Counter	3		
Port	Index	Value type
1 COM12	1	Absolutely
2 COM12	2	Relative
3 COM14	No	Absolutely

- Checkbox „With manual switch"

Sensors	
With manual switch	
Counter	3

  - Checkbox activated:

    A manual measurement can be triggered. This can be done e.g.: with a hand switch, foot switch or also software.

    In the user interface (see above), the symbols for manual and automatic data reception are available.

- Checkbox deactivated:

  No manual measurement can be triggered.

  In the [user interface](#) (see above), only the icon for automatic data reception is available.

- Counter

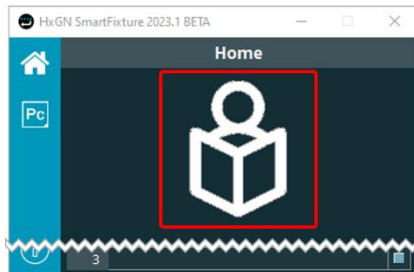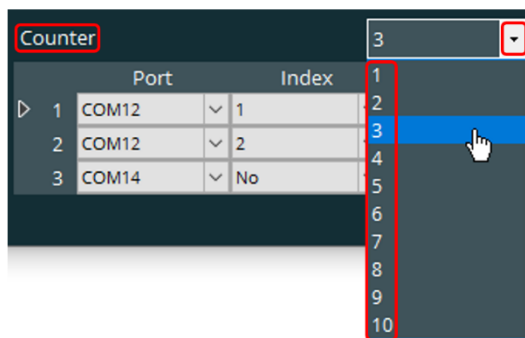 Clicking on the "▾" icon to the right of the selection field opens a drop-down list from which the number of sensors can be selected. The number of sensors is preset with 10 sensors, but can be freely defined if required. To change the number, the ConnectedDevicesCounter variable in the HxGN_SmartFixture.xml settings file in the path: "[C:\Users\Public\Documents\Hexagon\HxGN_SmartFixture](#)" must be adjusted.

  Each sensor that can generate a measurement value counts. I.e. even if only one device is connected to SmartFixture, but there are e.g.: five sensors connected to it, "5" must be selected.

  In the table below "Number", each sensor must be configured as follows.

  - Column "Port

    Clicking in the selection field opens a drop-down list from which the COM port can be selected. If several sensors with identical COM port are available, a value must be assigned to each sensor in the "[Index](#)" column (see below).
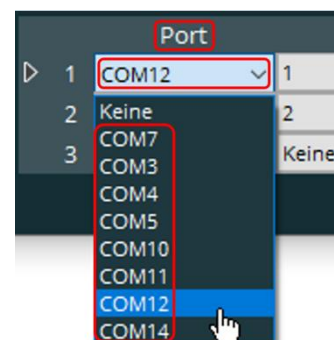
- Column „Index"

  Clicking in the selection field opens a drop-down list from which the index can be selected.

  If a device is connected to a COM port to which several sensors are connected, an index must be assigned to each sensor. In the screenshot on the right, a device with two sensors is connected to COM port "12", each of which is assigned the index "1" and "2".

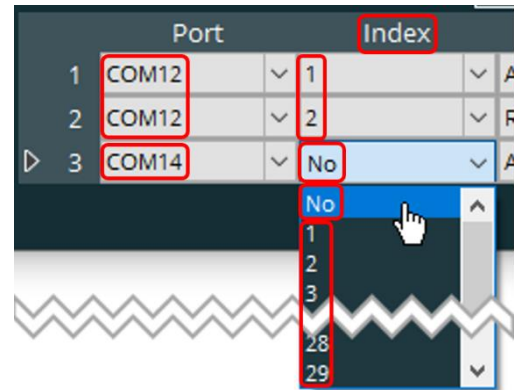 If only one sensor is connected to a COM port, "None" must be selected, since the sensor can be clearly assigned to this COM port. In the screenshot on the right, this is the case for COM port "14".

- Column „Value type"

  Clicking in the selection field opens a drop-down list from which "Absolutely" or "Relative" can be selected.

  - „Absolutly" selected

    Regardless of whether the data is received manually (see below: Start element: Home) or via a measuring routine (see below: Chapter: Transferring the measured values to the measurement routine), the actual measured value is read out.
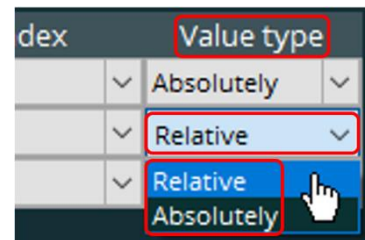
  - „Relative" selected

    - Manual reception of the data (see below: Start element: Home).

      The current measured value is read out.

    - Reception via measurement routine

      The deviation of the measured value from the nominal value is output to the user-defined element (see below Chapter: Transferring the measured values to the measurement routine; Abschnitt: Vaule typ „Relative" selected).

Each sensor is assigned a number to the right of the table. This can be used to identify the sensor in the start element "Home".
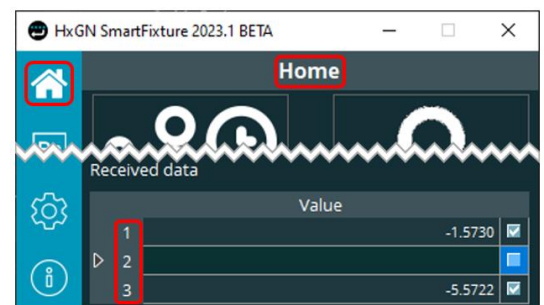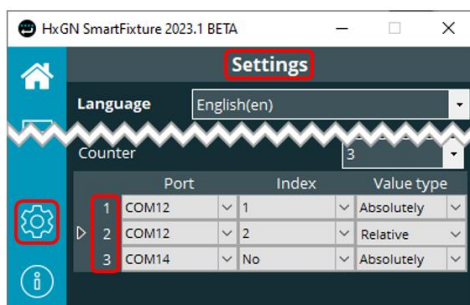
6. Start element: Home

Clicking on the start element "⌂" on the left switches to the "Home" view. The active mode and the received data are displayed here (see below: Reading out measured values via the user interface).

If the mouse pointer is moved over the start element, a tooltip with the note "Home" appears.
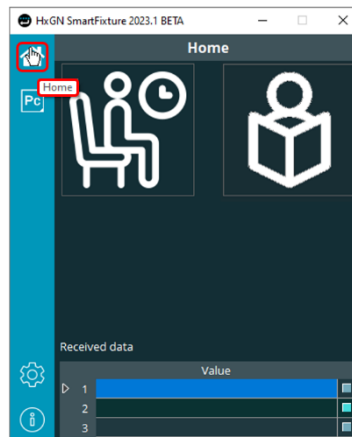
6.1. Reading out measured values via the user interface

Regardless of the settings made under chapter: Configuration of the software, section: Start element: settings, point: Counter ➜ Value type, the actual (absolute) measured values are read out.

The two buttons can be used to decide whether to wait for the measured values (left button - only available if the "With manual switch" checkbox is active) or to receive them immediately (right button). If the mouse pointer is moved over the buttons, a tooltip with the corresponding note appears in each case.

The measured values are displayed in the table at "Received data" ➜ "Value". Even if a configured measurement routine (see below: Transferred data in the measurement routine) is open in PC-DMIS, the values are not output to it. A transfer of the measuring values into the measurement routine occurs only if SmartFixture was started from the measurement routine (see below: Transferring the measured values to the measurement routine).

By activating or deactivating the checkboxes in the table at "Received data" ➜ "Value" it can be decided from which sensors the data should be read out.
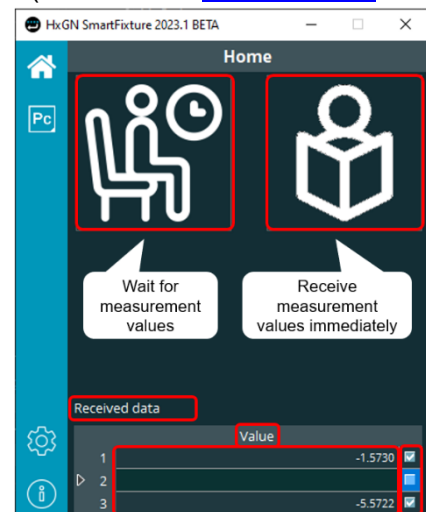
6.2. Manual measured value query

This button is only available if in the start element "Settings" in the area "Sensors" the checkbox "With manual switch" (see above in each case) is active.

By clicking on this button, the symbol is displayed in green and SmartFixture waits until a measured value is triggered. This can be done e.g.: by a hand or foot switch.
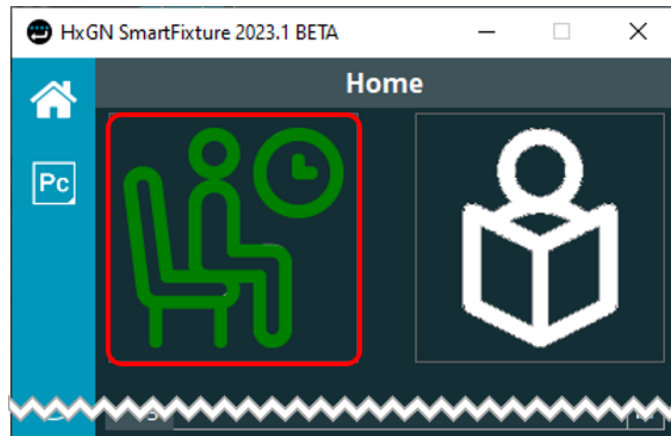
After receiving the measured values, the button turns white and can be reactivated by mouse click.

6.3. Automatic measured value query

By clicking on this button, the symbol is displayed in green and the measured values are received immediately (e.g.: the component to be measured is in the fixture and the sensors have already determined the measured values).
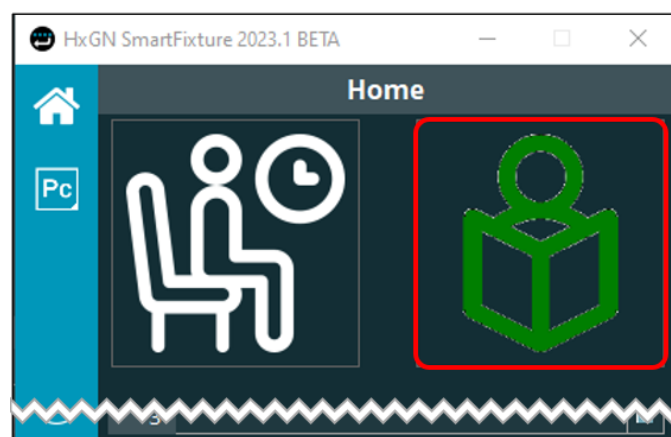
After receiving the measured values, the button turns white and can be reactivated by mouse click.

7. Start element: PC-DMIS

By clicking on the start element " " located on the left, the view "PC-DMIS" is changed and the settings for exporting the data into a measuring routine (see below: [Button: Write command to measurement routine](#)) can be made.

If the mouse pointer is moved over the start element, a tooltip with the note "PC-DMIS" appears.
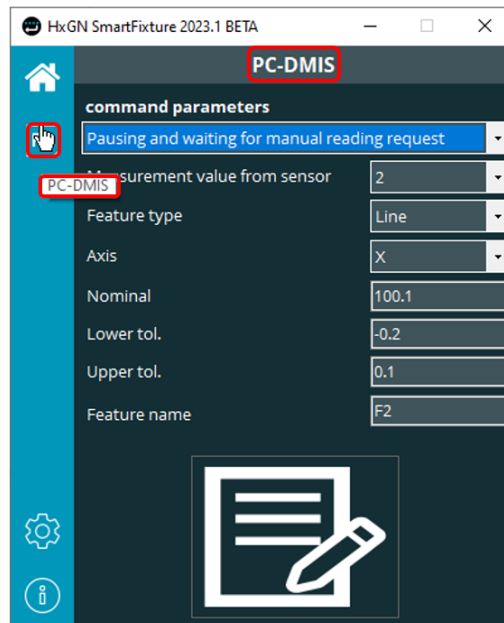
7.1. Area: command parameters

In this area the parameters for the PC-DMIS measurement routine are defined.
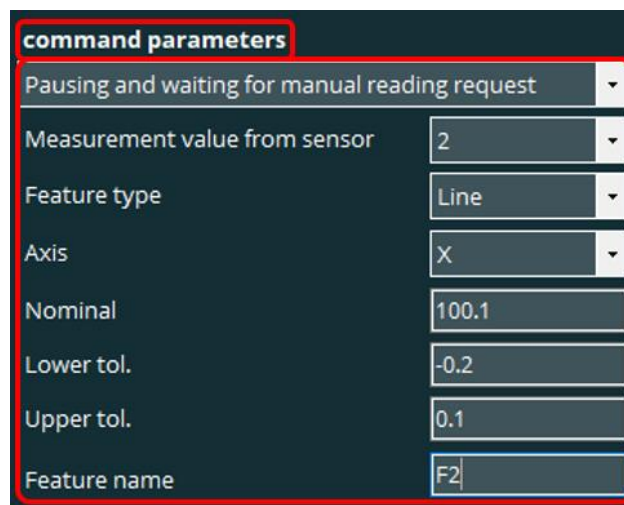
- ## Configuration of the measured value request

  Clicking on the "▼" icon on the right opens a drop-down list from which the following settings can be selected:

- ## Pausing and waiting for manual reading request

  This setting corresponds to the setting "Manual measured value query" (see above). If this setting is transferred to the measurement routine with the button "Write command to measurement routine" (see below), the parameter "M" is added to the call for SmartFixture (see below: Parameters in the measurement routine for call of SmartFixture).

  If the measurement routine is executed, the user interface opens at this point and it waits until the measured values have been transferred. The measurement routine is then continued.

- ## Query value and continue automatically

  This setting corresponds to the setting "Automatic measured value query " (see above). If this setting is transferred to the measurement routine with the button "Write command to measurement 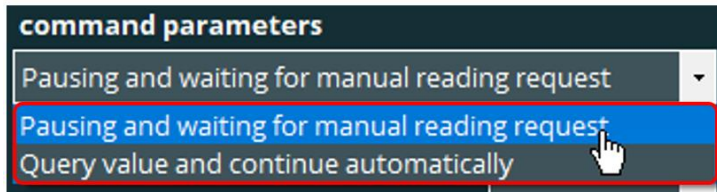routine" (see below), the parameter "A" is added to the call for SmartFixture (see below: Parameters in the measurement routine for call of SmartFixture).

  If the measurement routine is executed, the user interface opens at this point, the measured values are transferred and then the measurement routine is continued. I.e. the measured values must be available before SmartFixture is called.

- ## Measurement value from sensor

  Clicking in the selection field opens a drop-down list from which the number of the desired sensor can be selected. All sensor numbers defined in the "Settings" start element in the "Sensors" area can be selected.
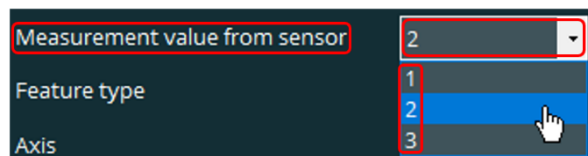
  If the value selected here is transferred to the measuring routine using the "Write command to measurement routine" button (see below), the sensor number is added to the call for SmartFixture (see below: Parameters in the measurement routine for call of SmartFixture).

- Feature type

    Clicking in the selection field opens a drop-down list from which the feature type can be selected.
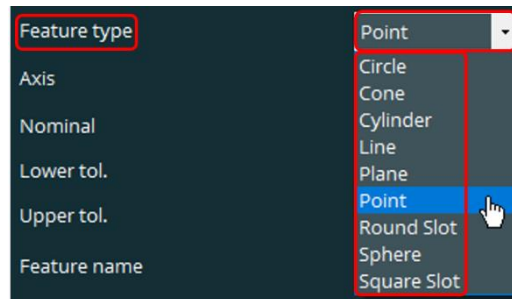
    The value selected here will be used for the generic element and the feature in the measurement routine after clicking the "Write command to measurement routine" button (see below: Transferred data in the measurement routine).

- Axis

    Clicking in the selection field opens a drop-down list from which the axis can be selected.

    The axis selected here will be used for the generic element and the feature in the measurement routine (see below: Transferred data in the measurement routine) after clicking the "Write command to measurement routine" button.

    If the axis is changed, this influences the counter (see below: Transferred data in the measurement routine) in the measuring routine.

- Nominal, Lower tol., Upper tol.,

    The desired value can be entered by clicking in the respective input field. After entering the value, the input field must be exited.

    The value defined here will be used for the generic element and the feature in the measurement routine after clicking the "Write command to measurement routine" button (see below: Transferred data in the measurement routine).

- Feature name

  The desired feature name can be entered by clicking in the respective input field. After entering the value, the input field must be exited

  The entered value will be used for the generic element and the feature ID in the measurement routine after clicking the "Write command to measurement routine" button (see below: Transferred data in the measurement routine).

  If the feature name is changed, this influences the counter (see below: Transferred data in the measurement routine) in the measurement routine.

- Button: Write command to measurement routine

  By clicking on this button, the values defined in the "command parameters" area (see above) are written to the measurement routine.

  During the transfer, the button turns red.

  The result of the transmission is described in detail in the chapter: "Transferred data in the measurement routine" (see below).

8. Transferred data in the measurement routine

After clicking the button: "Write command to measurement routine" the data defined in the area "command parameters" (see above) are written into the measuring routine as follows:

8.1. Parameters in the measurement routine for call of SmartFixture

SmartFixture is called via an external command before the respective generic element and feature. If there are several calls in the measurement routine, SmartFixture is started only once with the first call.

The parameters defined in the "command parameters" section (see above) are formed at the end of the external command after calling the "HxGN_SmartFixture.exe" and a space according to the following scheme:

{Feature name}_{Axis}_{Counter}:{Mode}:{Sensor number}

Example (shortened):

```
EXTERNALCOMMAND/N \HxGN_SmartFixture.exe F2_X_2:M:2"
```

Notes:

- Feature name:

   The feature name entered in the "command parameters" area at "Feature name" (see above in each case).

- Counter:

   This is incremented by "1" each time the parameters are transferred to the measuring routine (see below: Write command to measurement routine). If the axis and / or the feature name is changed, this starts again with "1" (if no other element has this parameter).

- Modus:

   M: Manual (see above: Pausing and waiting for manual reading request)

   A: Automatic (see above: Query value and continue automatically)

8.2. Generic element

After the external command, a generic element is written to the measurement routine.

The element type is defined in the "Settings" start element under "command parameters" ➔ "Feature type" (see above in each case).

For the nominal value of the selected axis, the value from the "command parameters" area at "Nominal" (see above in each case) is adopted.

The element name is formed according to the following scheme:

{Feature name}_{Axis}_{Counter}

Beispiel:

```
F2_X_1          =GENERIC/POINT,DEPENDENT,CARTESIAN,$
                 NOM/XYZ,<100.1,0,0>,$
                 MEAS/XYZ,<100.113,0,0>,$
                 NOM/IJK,<0,0,1>,$
                 MEAS/IJK,<0,0,1>
```

Notes:

- Feature name:

  The feature name entered in the "command parameters" area at "Feature name" (see above in each case).

- Counter:

  This is incremented by "1" each time the parameters are transferred to the measuring routine (see below: Write command to measurement routine). If the axis and / or the feature name is changed, this starts again with "1" (if no other element has this parameter).

8.3. Feature

After the generic element, the feature for the generic element is written to the measurement routine.

For the nominal value and the tolerances of the selected axis, the value from the "command parameters" (see above) are used.

The feature ID is formed according to the following scheme:

DIM_{Feature name}_{Axis}_{Counter}

Beispiel:

```
DIM DIM_F2_X_1= LOCATION OF POINT  F2_X_1   UNITS=MM ,$
GRAPH=OFF   TEXT=OFF   MULT=10.00   OUTPUT=BOTH   HALF ANGLE=NO
AX     NOMINAL         +TOL         -TOL         MEAS         DEV        OUTTOL
X       100.100        0.020       -0.010       100.113       0.013        0.000 --#------
END OF DIMENSION DIM_F2_X_1
```

Notes:

- Feature name:

  The feature name entered in the "command parameters" area at "Feature name" (see above in each case).

- Counter:

  This is incremented by "1" each time the parameters are transferred to the measuring routine (see below: Write command to measurement routine). If the axis and / or the feature name is changed, this starts again with "1" (if no other element has this parameter).

9. Transferring the measured values to the measurement routine

The prerequisite is that the external command, the generic element and the feature have been transferred to the measurement routine (see chapter: Start element: PC-DMIS, section: Area: command parameters area, point: Button: Write command to measurement routine).

By activating or deactivating the checkboxes in the start element "Home" (see above) in the table at "Received data" ➜ "Value" it can be decided from which sensors the data should be transmitted to the measurement routine.

Depending on whether the measured values are to be transmitted automatically (see above: Query value and continue automatically) or manually (see above: Pausing and waiting for manual reading request), they are received immediately or the transmission is waited for.

Depending on the settings made in the start element "Settings" in the area "Sensors" at "Value type" (see above), the measured values are written into the measuring routine as follows:

- Value type „Absolutely" selected

The measured values actually determined are output to the generic element and evaluated in the feature.

In the example below, the measured value "100.113" was sent to SmartFixture and written to the generic element.

The value "100.113" is evaluated in the feature.

```
F2_X_1      =GENERIC/POINT,DEPENDENT,CARTESIAN,$
            NOM/XYZ,<100.1,0,0>,$
            MEAS/XYZ,<100.113,0,0>,$
            NOM/IJK,<0,0,1>,$
            MEAS/IJK,<0,0,1>
DIM DIM_F2_X_1= LOCATION OF POINT F2_X_1   UNITS=MM ,$
GRAPH=OFF  TEXT=OFF  MULT=10.00  OUTPUT=BOTH  HALF ANGLE=NO
AX    NOMINAL      +TOL      -TOL       MEAS       DEV     OUTTOL
X     100.100      0.020    -0.010    100.113     0.013    0.000 --#------
END OF DIMENSION DIM_F2_X_1
```

If the mouse pointer is moved in the start element "Start" in the table at "Received data" ➜ "Value", a tooltip with the note "Absolutely" appears at the corresponding sensor.

- Vaule type „Relative" selected

  This value type must be selected if the sensor can only generate deviations and no absolute measured values.

  Since the sensor can only output the deviation (e.g.: sensor in the device mechanically aligned to nominal value), this value is sent to the generic element.

  For the evaluation, the deviation (transmitted value) is added to the nominal value.

  In the example below, the measured value "0.125" was transmitted to SmartFixture and written to the generic element. Since the nominal value is "100", the deviation of "0.125" is added to it. The value "100.125" is transmitted to the feature.

```
F2_X_2      =GENERIC/POINT,DEPENDENT,CARTESIAN,$
            NOM/XYZ,<100.1,0,0>,$
            MEAS/XYZ,<0.125,0,0>,$
            NOM/IJK,<0,0,1>,$
            MEAS/IJK,<0,0,1>
DIM DIM_F2_X_1= LOCATION OF POINT F2_X_1  UNITS=MM ,$
GRAPH=OFF  TEXT=OFF  MULT=10.00  OUTPUT=BOTH  HALF ANGLE=NO
AX    NOMINAL       +TOL       -TOL       MEAS        DEV      OUTTOL
X      100.110      0.020     -0.010     100.125      0.015     0.000 ----#----
END OF DIMENSION DIM_F2_X_1
```

  If the mouse pointer is moved in the start element "Start" in the table at "Received data" ➜ "Value", a tooltip with the note "Relative" appears at the corresponding sensor.

10. Start element: Information about …

Information about the software can be called up by clicking on the start element " ⓘ ".

If the mouse pointer is moved over the start element, a tooltip appears with the note: "Information about ...".
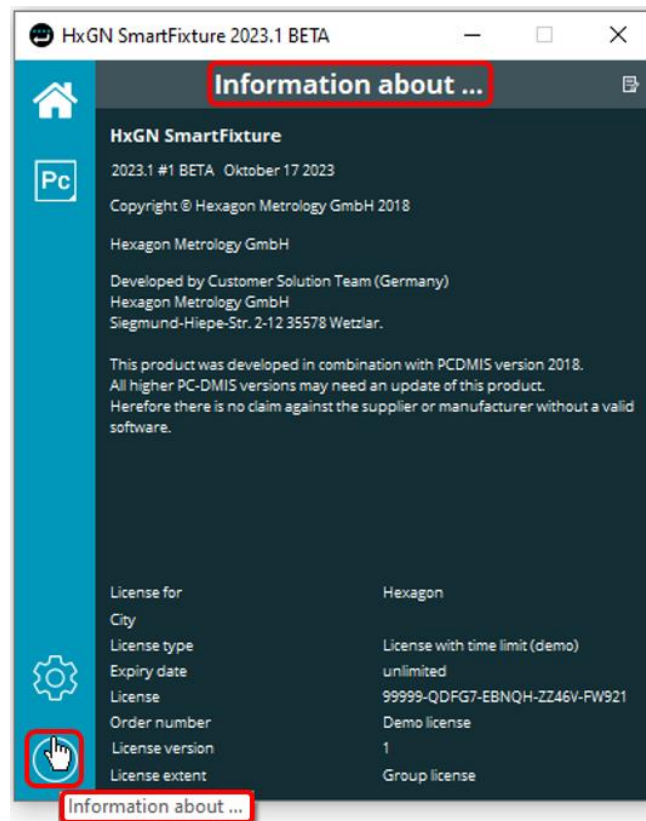
11. About Hexagon

Hexagon is a global leader in digital reality solutions, combining sensor, software, and autonomous technologies. We use data to increase the efficiency, productivity, and quality of applications in industry and manufacturing, as well as in infrastructure, security and mobility.

With our technologies, we are designing increasingly connected and autonomous ecosystems in urban environments as well as in manufacturing, ensuring scalability and sustainability in the future.

Hexagon's Manufacturing Intelligence division uses data from design and engineering, manufacturing, and metrology as the basis for solutions to optimize manufacturing processes. For more information, visit hexagonmi.com.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com. Follow us also on @HexagonAB.