EN

DNNP001

Software VisionApp 360

Operating Instructions

Subject to change without notice
Available as PDF file only
Version 1.4.0
Status: 27.01.2022
www.wenglor.com

Table of Contents

1. Change Index

Version	Date	Description/Change	Software Version
1.0.0	30.05.2018	Initial version of documentation	1.0.0
1.1.0	10.09.2019	• Addenda/amendments, sections 5 - 8 • New: section 11 (Module Round, Module Steel, Module GigEServer)	1.2.1
1.2.0	27.01.2020	• Additional note to licensing process • New section Module CrossSection	1.3.0
1.2.1	06.07.2020	• Additional graphics in section 4.4	1.3.0
1.3.0	25.11.2021	• Implementation of VisionApp 360 Interface Protocol • New option to select encoder configuration of each sensor • New option to activate Profile enable function for a selected I/O • New option to enable/disable Profinet • GigE Module: » Option to bundle multiple profiles in one frame » Option to read temperature of each sensor » Option to switch between PointCloud (unordered) or Grid (ordered) mode » New ChunkData (ChunkScan3dInvalidDataFlag & Scan3dInvalidDataValue • Fixed: Sensor synchronization problem in GigE Module	1.4.0
1.4.0	27.01.2022	• Bug fix value of signal selection • Adaption LIMA description • Added LIMA commands (project change)	1.4.1

2. General

2.1 Information Concerning these Instructions

- These instructions apply to the product VisionApp 360 (DNNP001).
- They make it possible to use the product safely and efficiently.
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- Local accident prevention regulations and national work safety regulations must be observed before, during and after initial startup.
- The product is subject to further technical development, and thus the information contained in these operating instructions may also be subject to change. The current version can be found at www.wenglor.com in the product's separate download area.

NOTE!
The operating instructions must be read carefully before using the product and must be kept on hand for later reference.

2.2 Explanations of Symbols

- Safety precautions and warnings are emphasized by means of symbols and attention-getting words.
- Safe use of the product is only possible if these safety precautions and warnings are adhered to.
- The safety precautions and warnings are laid out in accordance with the following principle:

ATTENTION-GETTING WORD
Type and Source of Danger!
Possible consequences in the event that the hazard is disregarded.
- Measures for averting the hazard.

The meanings of the attention-getting words, as well as the scope of the associated hazards, are listed below:

DANGER!
This word indicates a hazard with a high degree of risk which, if not avoided, results in death or severe injury.

WARNING!
This word indicates a hazard with a medium degree of risk which, if not avoided, may result in death or severe injury.

CAUTION!
This word indicates a hazard with a low degree of risk which, if not avoided, may result in minor or moderate injury.

ATTENTION!
This word draws attention to a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE!
A note draws attention to useful tips and suggestions, as well as information regarding efficient, error-free use.

2.3 Limitation of Liability

- The product has been developed taking into account the state of the art as well as the applicable standards and guidelines.
- We reserve the right to make technical changes.
- A valid declaration of conformity can be found at www.wenglor.com in the download area of the product.
- wenglor sensoric elektronische Geräte GmbH (hereinafter "wenglor") accepts no liability for:
  - » failure to observe the operating manual,
  - » unsuitable or improper use of the product,
  - » excessive use, incorrect or negligent treatment of the product,
  - » incorrect installation or commissioning,
  - » use of untrained personnel,
  - » use of unauthorized spare parts or
  - » Improper or unauthorized changes, modifications or repair work to the products.
- This operating manual does not contain any guarantees/warrantees from wenglor with regard to the processes described or certain product properties.
- wenglor assumes no liability with regard to printing errors or other inaccuracies contained in this operating manual, unless it can be proven that wenglor was aware of the errors at the time the operating manual was created.

2.4 Copyrights

- The contents of these instructions are protected by copyright law.
- All rights are reserved by wenglor.
- Commercial reproduction or any other commercial use of the provided content and information, in particular graphics and images, is not permitted without previous written consent from wenglor.

3. For Your Safety

3.1 Use for Intended Purpose

VisionApp 360 software combines the profiles of several (variant-independent) 2D/3D profile sensors within a coordinate system to form an overall image. It's individually configurable and can also be expanded with the help of various modules.

NOTE!
Further information regarding the mode of operation of the 2D/3D profile sensors is included in the operating instructions of each respective sensor.

This product can be used in the following industry sectors:

- Special machinery manufacturing
- Heavy machinery manufacturing
- Logistics
- Automotive industry
- Food industry
- Packaging industry
- Pharmaceuticals industry
- Plastics industry
- Woodworking industry
- Consumer goods industry
- Paper industry
- Electronics industry
- Glass industry
- Steel industry
- Aviation industry
- Chemicals industry
- Alternative energy
- Raw materials extraction

3.2 Use for Other than the Intended Purpose

- Not a safety component in accordance with 2006/42/EC (Machinery Directive)
- The product may only be used with accessories supplied or approved by wenglor, or in combination with approved products. A list of approved accessories and products which have been approved for use in combination with the software is available on the product detail page at www.wenglor.com.

DANGER!
Risk of personal injury or property damage in case of use for other than the intended purpose!
Use for other than the intended purpose may lead to hazardous situations.
- Instructions regarding use for intended purpose must be observed.

3.3 Personnel Qualifications

- Suitable technical training is a prerequisite.
- In-house electronics training is required.
- Trained personnel who use the product must have uninterrupted access to the operating instructions.

DANGER!
Risk of personal injury or property damage in case of incorrect initial start-up and maintenance!
Personal injury and damage to equipment may occur.
- Adequate training and qualification of personnel.

3.4 General Safety Precautions

NOTE!
- These instructions are an integral part of the product and must be kept on hand for the entire duration of its service life.
- In the event of possible changes, the respectively current version of the operating instructions can be accessed at www.wenglor.com in the product's separate download area.

4. General Information DNNP001

Function	
Display software	Yes
Evaluation software	Yes
Operating system	
Windows	Yes
Interface	
Ethernet	Yes
Profibus	Only supported with cards from Hilscher Gesellschaft für Systemautomation mbH
Profinet	Only supported with cards from Hilscher Gesellschaft für Systemautomation mbH
General data	
Usage	For 2D/3D profile sensors as of firmware version 1.1.0
Language	EN
Licensing model	Yes

5. System Overview

Software

DNNP001	Software VisionApp 360 (including TCP and GigE Vision interface)

Software Modules

DNNL012	Round License Upgrade
DNNL013	Steel License Upgrade
DNNL014	CrossSection License Upgrade

2D/3D Profile Sensors

MLSLxxx
MLWx2xx

Switch

EHSS001

Connection Equipment Sensors*

Connection lines M12, 8-pin, to open end
Connection lines M12, 12-pin, to open end
Connection cables M12, 8-pin to RJ45
Connection cables M12, 12-pin to M12

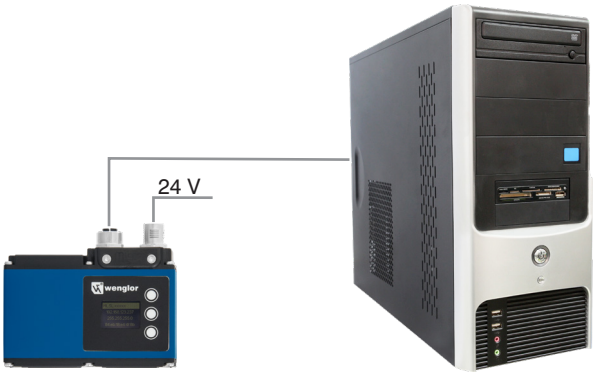
Optional Accessories Sensors*

Cooling units
Screening grid retainers + screening grids
Mounting Technology

*Please see further information in the Operating Instructions of weCat3D Profile Sensors.

6. System Setup

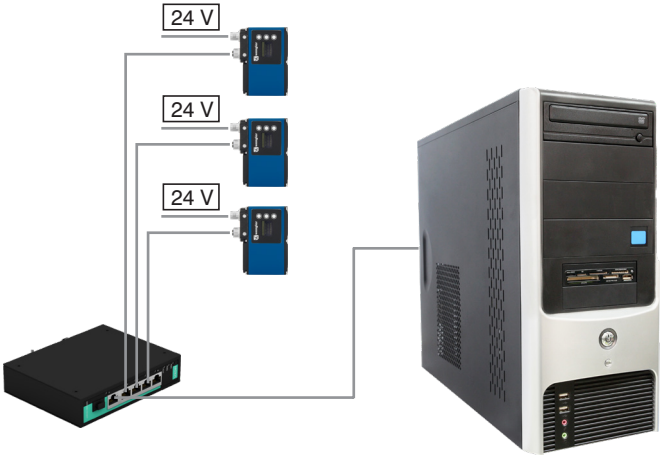
The following illustration shows the setup when using one 2D/3D profile sensor:



Example:

1 x MLSL123 + 1 x PC (provided by the customer)

The following illustration shows the setup when using several 2D/3D profile sensors:



Example:

3 x MLSL122 + 1 x EHSS001 + 1 x PC (provided by the customer)

NOTE!
Up to15 2D/3D profile sensors can be connected to a single PC in the individual trigger mode.

6.1 Synchronization of Several 2D/3D Profile Sensors

Synchronization of several 2D/3D profile sensors is required when the sensors' laser lines are located within the same scanning range and thus influence each other.

NOTE!
A 2D/3D profile sensor with red laser light and a 2D/3D profile sensor with blue laser light do not influence each other.

Synchronization of two 2D/3D Profile Sensors:
Wire the two 2D/3D profile sensors to each other so that one of the I/O pins of the first sensor (Master Unit) is connected to one of the I/O pins of the second sensor (Sub Unit).
Configure one I/O pin at the Master Unit as an output with time delay. Delay should be at least as long as the exposure time of the Master Unit. The output signal may not be any longer than the exposure time of the Sub Unit.

Example:
I/O #3 at the Master Unit is connected to I/O #4 at the Sub Unit:

Pin	Sensor	Input/output	Function	Color
5	Master Unit	I/O3	Sync out	Pink
6	Sub Unit	I/O4	Sync in	Yellow

Example with 3 sensors with encoder:

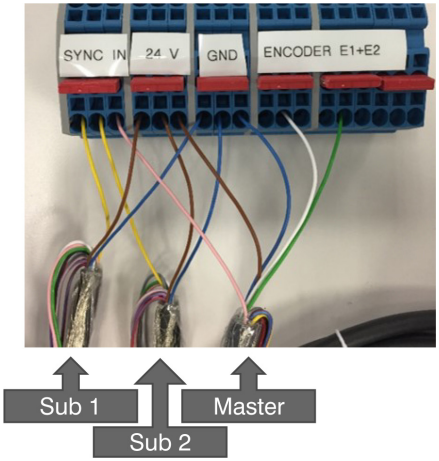


Fig. 1:Wiring of 3 synchronized sensors

Example Settings:

Master Unit

- Exposure time 200 µs
- I/O: #3
- Trigger: INT
- Trigger delay: 0 µs

NOTE!
The Master Unit can be triggered as desired.

Sub Unit

- Exposure time 200 µs
- I/O: #4
- Trigger: HW
- Trigger delay: 200 µs

NOTE!
If the Master Unit is triggered internally, trigger delay at the Master Unit must be at least as long as the exposure time of the Sub Unit.

Further information about pin assignment can be found in the download area for the 2D/3D profile sensors at www.wenglor.com.

7. General Information Regarding Individual Profile Evaluation

2D/3D profile sensors ascertain the height profile along a laser line. This results in a point cloud. The cloud consists of numerous points with X and Z coordinates. Ascertained data are transmitted to the control unit for evaluation where they are displayed as points with coordinates in mm.

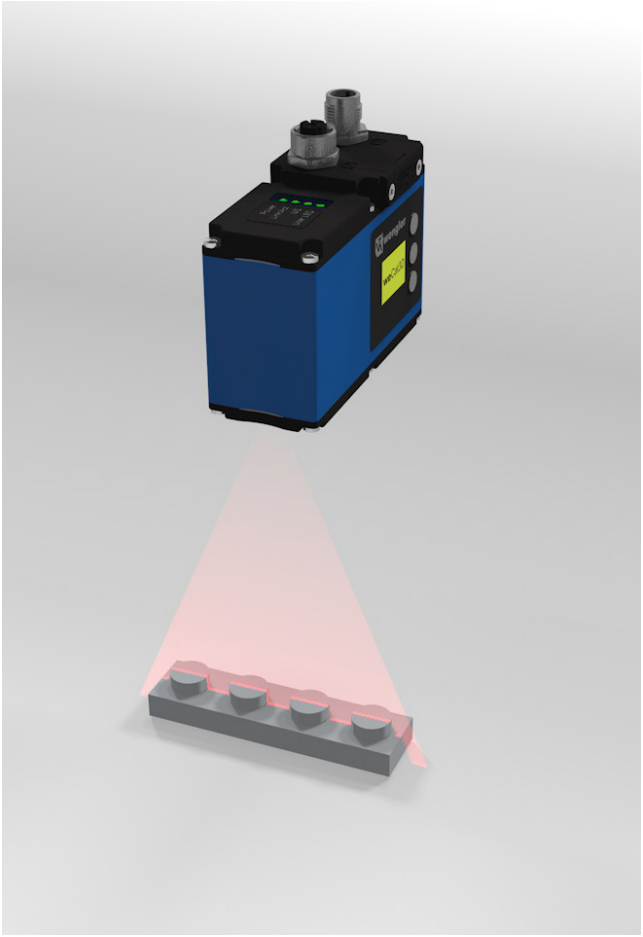


Fig. 2: Individual profile evaluation

The origin of the coordinate system is in the sensor – in the middle of the laser line. The height or distance from the sensor is specified as the Z value. The larger the Z value, the greater the distance from the sensor. Height information for an individual profile evaluation is always within the X-Z plane.

X coordinate	In the direction of the laser line
Y-coordinate	In the conveyor belt's advancing direction or in the direction of sensor motion
Z coordinate	Distance from the sensor (height information)

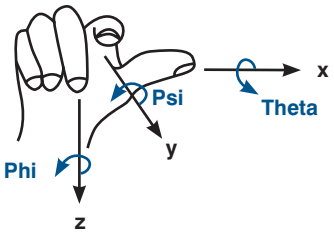


Fig. 3: Coordinate direction

NOTE!
Assignment of the coordinates only applies to the individual profile evaluation. If several sensors are combined with each other, they're aligned to the calibration object.

8. General Information Concerning the System

8.1 Browser

As a standard feature, the sensor's website is accessed with a web browser like Firefox, Chrome etc.

NOTE!
Further information concerning settings are included in the operating instructions of the respective sensor.

8.2 SOS wenglor MEL Support

In the event of technical questions or problems, wenglor's technical support department can establish a connection to the control unit via remote access. The control unit must be equipped with Internet access and active approval for remote access is required to this end.

The Team Viewer for SOS wenglor MEL Support can be downloaded from www.wenglor.com. Enter article number "DNNF016" as a search term to access the download.

NOTE!
Enter customer name and a description of your question.

8.3 System Requirements

The following system requirements must be fulfilled in order to use VisionApp 360 software:

- Intel Core i5
- 8 GB RAM
- 64 GB HDD
- 1 Gbit network card
- Windows 10

NOTE!
It is not recommended to operate via a remote desktop control. This could affect the stability of the application.

8.4 Software Installation

The software can be downloaded by clicking the respective link in the download tab when you're logged on as a customer. The license for enabling the software can be ordered from your wenglor sales partner or by contacting our customer service department.

9. Licensing

In order to activate the software, enter your data to the lines provided for this purpose and activate the check-box next to the desired module (see Fig. 5). Click “Generate request”, save the displayed license request key to your PC and send it by e-mail to **order@wenglor.com**.

NOTE!
Please make sure that the licensing process is executed at the PC which will actually be used in the application, because the license is restricted to the respective PC.
During the license process no USB drives / sticks should be connected to the PC.

You’ll receive the license key and the invoice promptly. Save the license key to your PC. Select the “Product Activation” tab in the license dialog box and open the corresponding file. Click “Activate License” in order to enable the software (see Fig. 6).

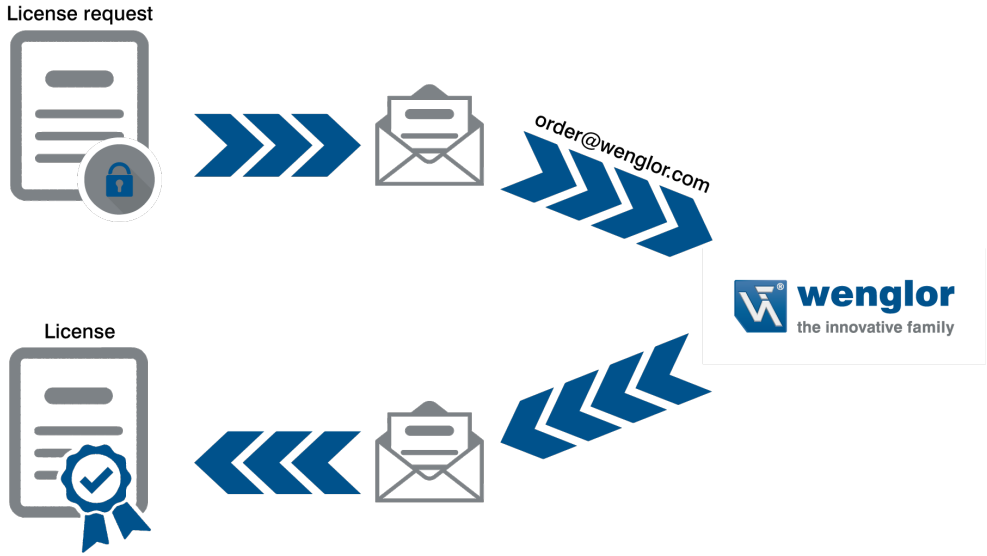


Fig. 4: Licensing procedure

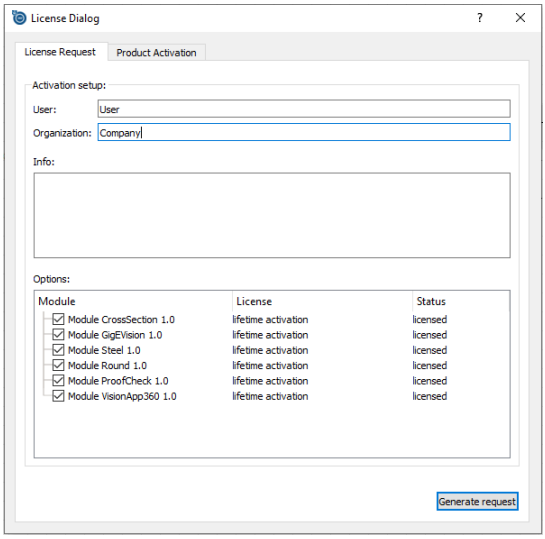


Fig. 5: License Request

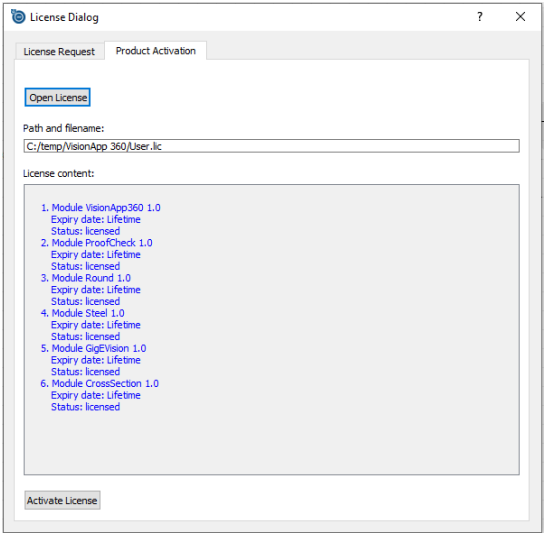


Fig. 6: Product Activation

10. User Interface

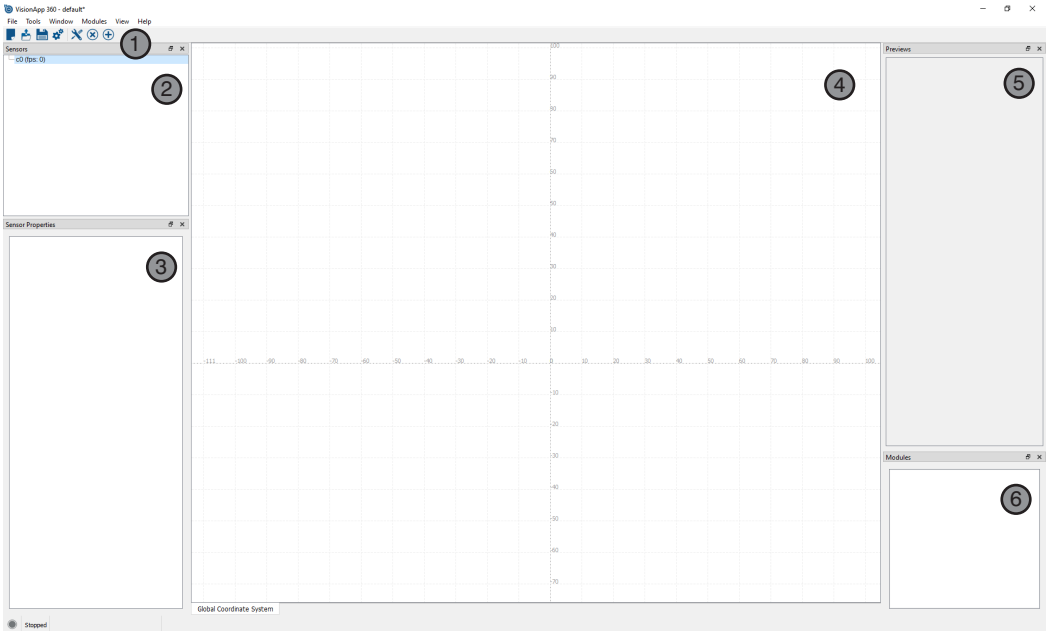


Fig. 7: User interface

① = Menu bar and icons (see sections 10.1 and 10.2)
② = Sensors: previously set up sensor group / sensors are displayed (see section 10.3)
③ = Sensor Properties: properties of the selected sensor (see section 10.4)
④ = Global Coordinate System: main window with coordinate system (see section 10.5)
⑤ = Previews: display of measured profiles and intensity distribution (see section 10.6)
⑥ = Modules: activated software modules (see section 10.7)

10.1 The Menu Bar

10.1.1 File

Open	Opens a stored project.
Save	Saves the current project.
Exit	Closes the program.

NOTE!
After starting the software VisionApp 360, the last project is loaded. If no project has yet been created, the default settings are loaded.

10.1.2 Tools

Undo Chart	Undoes the last entry.
Redo Chart	Repeats the last entry.
Preferences	Opens the options window (see section 10.1.2.1)
Sorting/Filtering options	Sorting/filtering of the combined point cloud (see section 10.1.2.2)
Export sensor data	Sensor data export
Disable/enable features	Blocks changes of the software settings if disabled. Can be password protected.
Change password	Defines user specific password protection to disable/enable features of the software settings.

10.1.2.1 Preferences

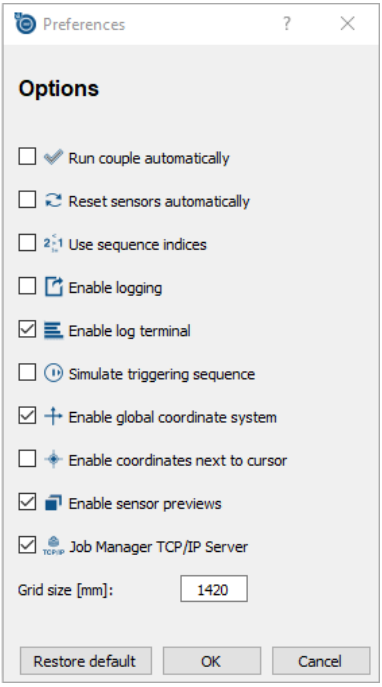


Fig. 8: Preferences

Run couple automatically	The sensor group is started automatically.
Reset sensors automatically	Automatically resets the selected sensors.
Use sequence indices	Sequence indices are displayed (see description, “Edit Sensor”).
Enable logging	A log file is saved to the VisionApp 360 directory.
Enable log terminal	The log terminal can be displayed when activated (see section 10.1.3).
Simulate triggering sequence	Triggering is displayed by means of a blinking visual field of a sensor.
Enable global coordinate system	The coordinate system is displayed with installed sensors.
Enable coordinates next to cursor	The cursor’s coordinates are displayed.
Enable sensor previews	Measured profiles with the intensities of all sensors are displayed in the “Previews” window.
Job Manager TCP/IP Server	LIMA commands can be forwarded via port 62232 (without feedback) (see also section 15.2).
Grid size	Indicates width X of the coordinate system in mm.
Restore Defaults	Resets all options selected in “Preferences” to their default settings.

10.1.2.2 Sorting/Filtering Options

The tool makes it possible to sort the combined point cloud in the desired direction and to use individual filters for each sensor which are capable of filtering out single points (noise) or entire contours (reflections).

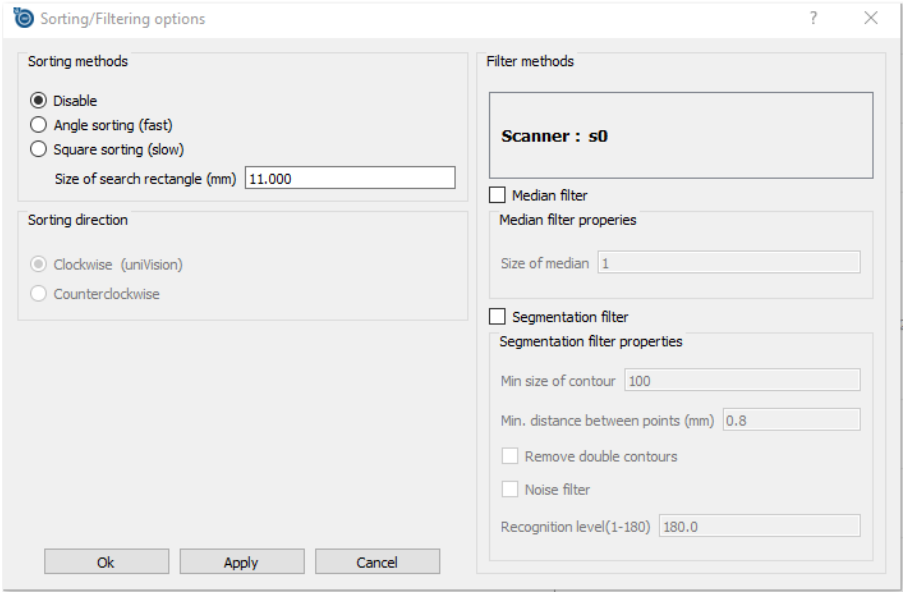
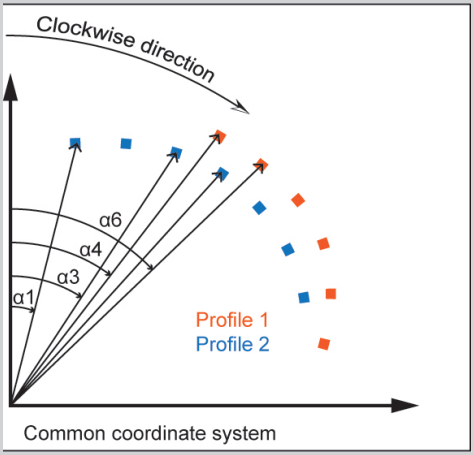
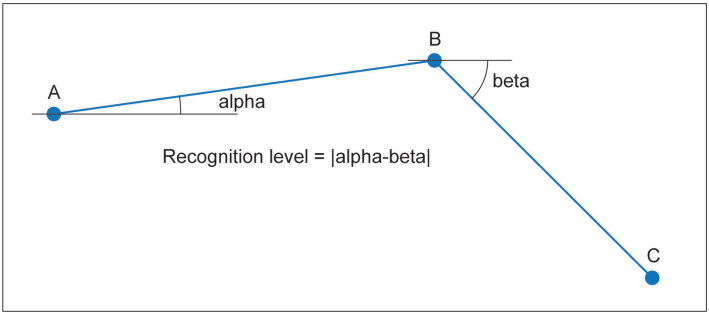


Fig. 9: Sorting/Filtering options

Sorting methods:	
Angle sorting (fast)	The points are collected in a common coordinate system and then sorted by angle. The original relation to the source sensors will be lost after sorting. Fast, but only possible if the points are clearly assigned within circular coordinates.  Fig. 10: Angle sorting in clockwise sorting direction
Square sorting (slow) Size of search rectangle	Suitable for all shapes. Size of the search area in mm. The value must to be set in accordance with the contour. The smaller the value the more precisely the contour is acquired. Possible sources of error: If the selected rectangle is too large, no sorting takes place (no error message) and if the search area is too small, the process terminates without an error message. The value must be at least 10 times higher than sensor resolution.
Sorting direction *	Sorting direction: Clockwise or counterclockwise
Filter methods (for selected sensor):	
Median filter: Size of median	nteger value which indicates the number of points for median calculation
Segmentation filter: Min. size of contour Min. distance between points	Minimum length of a contour to be viewed (in points). Minimum distance between two points (in mm) which should still be recognized as a contour.
Remove double contours	In the case of ambiguous/overlapping contours, the shorter contour is deleted.

Noise filter / Recognition level	Recognition level of 1…180 [degrees]. Indicates the maximum angle between 3 points. If the angle is larger, the points are not taken into account (see picture below). If the angle is larger, then the middle point B will be erased.  Fig. 11: Determination of the recognition level

* Basis for the direction of rotation is the right-handed system, rotation around Psi (see Fig. 3).

10.1.3 Window

Full Screen/Windowed	Switch back and forth between full screen and window mode
Log Terminal	Display of various commands which are transmitted to the sensors

10.1.4 Modules

Module Viewer	Overview of all available software modules
Module VisionApp 360	Activated after licensing (see section 15.2). Data transmission of unified profiles via TCP/IP interface.
Module GigEVision	Activated after licensing DNNP001 (see section 15.3). Data transmission of unified profiles via GigE Vision interface.
Module Proofcheck	Not documented (custom solution)
Module Round	Evaluates diameter an cross section of a round object (see section 15.4). Activated after licensing DNNL012.
Module Steel	Evaluates width and other properties of a plate (see section 15.5). Activated after licensing DNNL013.
Module CrossSection	Evaluates the cross section of arbitrary formed objects (see section 15.6). Activated after licensing DNNL014.

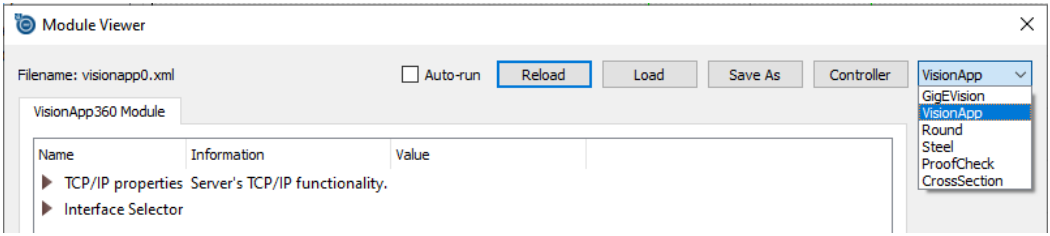


Fig. 12: Module Viewer (Example: VisionApp 360)

Auto-run	The module starts automatically after starting of the VisionApp 360 application.
Reload	Reloads the module's configuration out of the last loaded job xml file.
Load	Opens the dialog and loads selected module's configuration from xml file.
Save As	Opens the dialog to save the current configuration of the module in xml file.
Controller	Controller Configuration, see section 15.1

10.1.5 View

Various sections of the screen can be displayed or hidden.

10.1.6 Help

Licensing	Opens the license dialog box (licensing and product activation, see section 9)
Manual	Opens the operating instructions
About	Displays the installed software version

10.2 Symbols (Icons)

Icon	Function
	“New”: Deletes the current configuration and starts over again.
	“Open Configuration”: Opens a stored project.
	“Save Configuration”: Saves the current project.
	“Preferences”: Activation/deactivation of various options (see section 10.1.2).
	“Remove all”: All previously set up sensor groups, including sensors, are removed.
	“Run”: Measurement is started.
	“Stop”: Measurement is stopped.
	“Reset all”: All settings are returned to their default values.
	“Rename”: Entry/editing of the group name (only possible in stop mode). “Edit”: Adjust sensor settings (see section 10.2.1), only possible in stop mode).
	“Remove”: The selected group is removed.
	“Add new sensor”: Adds a new sensor.
	“Remove sensor”: Removes the selected sensor.
	“Perform calibration”: The entire group is calibrated (see section 12.4, only possible in the run mode).
	“Delete calibration parameters”: Cancels calibration for the entire group (only possible in the run mode).
	“Perform sensor calibration”: The selected sensor is calibrated(see section 12.4, only possible in the run mode).
	“Delete sensor calibration parameters”: Cancels calibration for the selected sensor (only possible in the run mode).
	“Define sensor ROI”: The region of interest is defined (see section 12.4, only possible in the run mode).
	“Define sensor ROI finish”: Ends the procedure for defining the sensor’s ROI.

10.2.1 Rename/Edit

The “Edit” icon has two functions: If the sensor group has been selected, it can be used to change the group name. If a single sensor has been selected, the “Edit sensor” window is displayed.

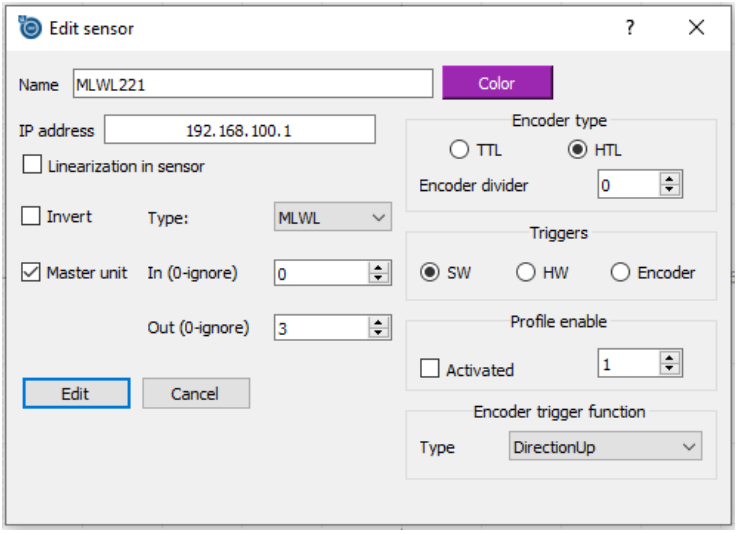


Fig. 13: Sensor settings

Name	Enter the desired sensor designation.
Color	The color of the sensor can be defined/edited. It can be saved and loaded in the project file. The sensor adopts the selected color.
IP address	Enter the sensor’s IP address.
Linearization in sensor	Conversion of the measuring signal into length units can be carried out either by the sensor or by the computer. Calculation by the sensor reduces the computer’s workload.
Invert	Reverses the sensor’s alignment (see section 11).
Type	Enter the sensor type (MLSL or MLWL).
Master unit	Set up the sensor as the Master unit (see section 6.1).
In (0-ignore)	Number of the I/O as trigger input (sync in)
Out (0-ignore)	Number of the I/O as trigger output (sync out), Master Unit
Encoder type	Selection of TTL or HTL
Encoder divider	Reduction of encoder pulses taken into consideration for profile recording (values from 0 to 65535). 0: no reduction 1: every 2nd encoder pulse triggers a profile recording 2: every 3rd encoder pulse triggers a profile recording ⋮

Triggers	Selection of the trigger type: • SW: Software trigger • HW: Hardware trigger (must be selected for all slave sensors) • Encoder: external trigger via (incremental) encoder
Profile enable	Profile enable can be activated and adjusted. Select the number of the used I/O. I/O should be set as an input (see weCat3D Operating Instructions).
Encoder trigger function	Trigger function can be defined: • Motion: The encoder will trigger the profile sensor in both directions (counting up and down) • DirectionUp: The encoder will trigger the profile sensor only in one direction (counting up) • DirectionDown: The encoder will trigger the profile sensor in only one direction (counting down) • PositionUp: The encoder will trigger the profile sensor in one direction (counting up) only if the encoder position is larger than the latest position • PositionDown: The encoder will trigger the profile sensor in one direction (counting down) only if the encoder position is smaller than the latest position

10.3 “Sensors” Display Area

The previously set up group is displayed in the “Sensors” area with its associated sensors. One group (couple) with one sensor is previously set up at the factory. This sensor’s properties can be changed or adapted after clicking the “Edit” icon (see section 10.2). Additional sensors can be set up after clicking the “Add new sensor” icon.

10.4 “Sensor Properties” Display Area

Current sensor properties are displayed in this area. A detailed description can be found in the operating instructions for the respective sensor in the product area at www.wenglor.com.

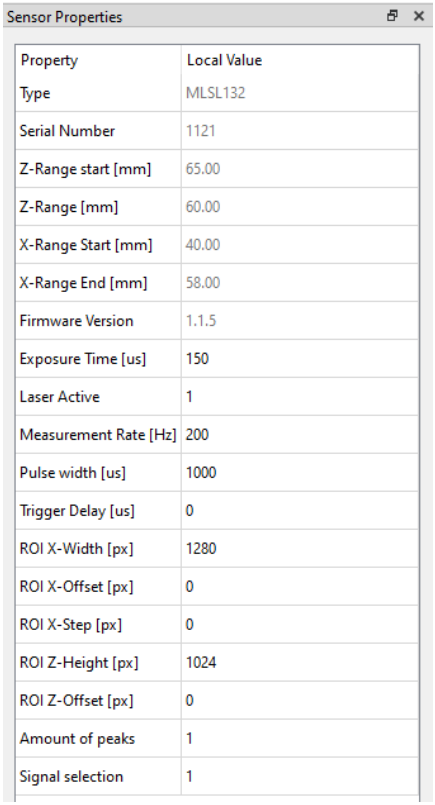


Fig. 14: Sensor properties

Type	Sensor type
Serial Number	Serial number
Z-Range start	Beginning of the measuring range in the Z direction
Z-Range	Measuring range in the Z direction
X-Range Start	Visual field width at the beginning of the measuring range in the Z direction
X-Range End	Visual field width at the end of the measuring range in the Z direction
Firmware Version	Indicates the firmware version
Exposure Time	Indicates current exposure time
Laser Active	1: laser activated, 0: laser deactivated.
Measurement Rate	Indicates the current measurement rate
Pulse Width	Displays pulse width (minimum width: 10 µs).

Trigger Delay	Indicates delay time after which the trigger is tripped.
ROI X-Width	Indicates the number of CMOS lines in the X direction.
ROI X-Offset	Shifts the ROI in the X direction by the selected number of CMOS lines.
ROI X-Step	Only a portion of the existing CMOS lines in the X direction are taken into consideration. Example: An entry of “20” means that only every 20th line is taken into consideration.
ROI Z-Height	Indicates the number of CMOS lines in the Z direction.
ROI Z-Offset	Shifts the ROI in the Z direction by the selected number of CMOS lines.
Amount of peaks	1: first peak is considered 2: second peak is considered 3: first and second peaks are considered
Signal selection	0: Peak 1 1: Intensity 2: Width 3: Peak 2

10.5 “Global Coordinate Systems” Display Area

The “Global Coordinate System” main window shows all of the components involved in the measurement and makes it possible to calibrate the entire measuring system. The measured profiles from the individual sensors can be seen in the run mode as long as the object to be measured is within the visual field of the respective sensor.

10.6 “Previews” Display Area

The measured profiles and signal strengths of all active sensors are displayed in the “Previews” area in the run mode.

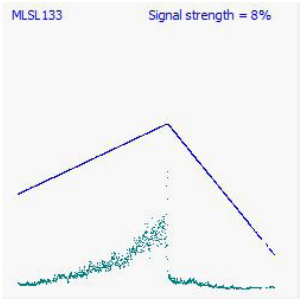


Fig. 15: Display of the measured profile and signal strength

After double-clicking a sensor area, a new tab appears in the main window at which the sensor’s visual field and scanned profile are displayed.

10.7 “Modules” Display Area

A list of all available modules is displayed. Descriptions of the software modules can be found in section 15.

11. Layout of the Measuring System

Correct profile evaluation is only possible if the sensors have been correctly aligned to the direction of motion of the object to be measured (see Fig. 16 and Fig. 17).
If corresponding arrangement is not possible, the sensors have to be inverted with the software (see section 10.2.1).

NOTE!
Sensors inverted by means of the software are displayed in the coordinate system without logo (see Fig. 23 and Fig. 24).

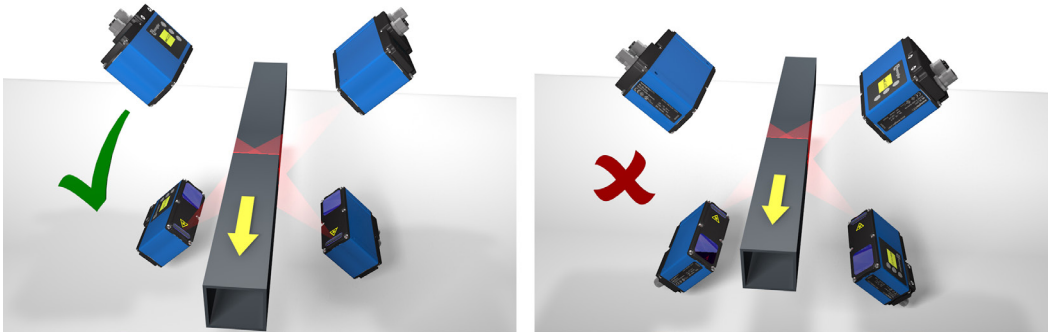


Fig. 16: Arrangement of the sensors for measurement of square tubing

Fig. 17: Direction of motion

NOTE!
The sensors must be positioned such that the object to be measured moves in the direction in which the laser beam is emitted.

12. Calibrating the Measuring System

The measuring system has to be calibrated in order to generate an overall image from the obtained indivi dual images. A calibration object with an angular cross-section is required to this end. The number of corners must coincide with the number of utilized sensors. The calibration object is positioned such that each sensor is aligned to one corner of the calibration object. The sensors' laser lines must all be at the same height. This arrangement is then transferred to the coordinate system as described below.

12.1 The Calibration Object

The calibration object must be appropriately laid out depending on whether the object to be measured will be measured at one level only (e.g. width measurement) or over its entire cross-section (e.g. tubing measure-ment).

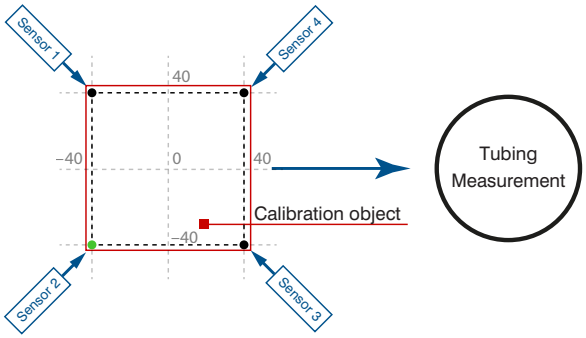


Fig. 18: Calibration object for measurement all the way around with 4 sensors, e.g. tubing measurement (closed profile)

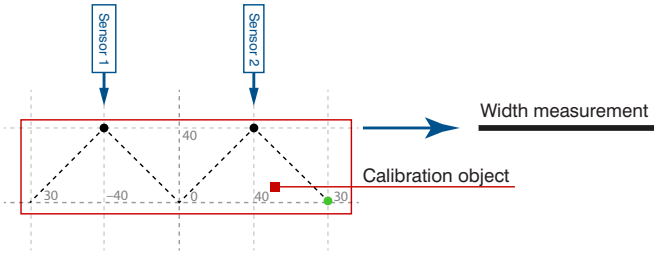


Fig. 19: Calibration object for measurement at one level with 2 sensors, e.g. width measurement (open profile)

12.2 Setting Up the Calibration Object

The coordinates of the calibration object are entered first of all. Click into the coordinate system with the right mouse key and select the “Add new point” option. Enter all X and Y coordinates of the corner points of the calibration object, one after the other. Alternatively, the court points can be entered by double-clicking with the left mouse key.

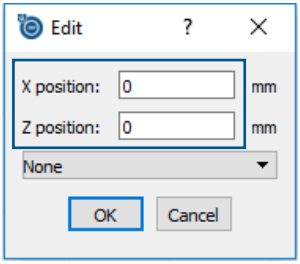


Fig. 20: Entering the coordinates

NOTE!
A corner point is the point at which the extended sides of two neighboring edges intersect (see Fig. 21).

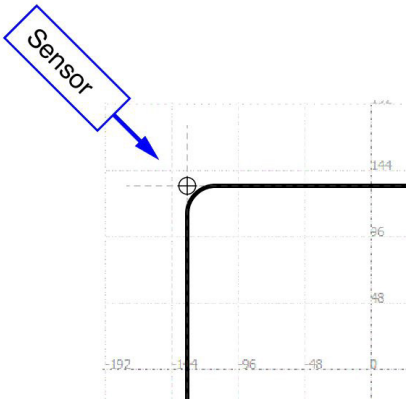


Fig. 21: Determining the corner point of a calibration object

12.3 Positioning the Sensors

The sensors are added after setup of the calibration object has been completed. Position the cursor at one of the calibration object's corner points, right click and select to the "Edit point" option (the activated corner point turns red).
Then select the associated sensor in the combination field and confirm your entry by clicking "OK". Repeat this procedure until all of the sensors have been assigned to their corner points.

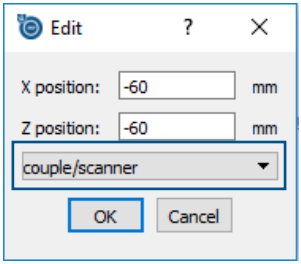


Fig. 22: Sensor selection

NOTE!
Only sensors which have been previously set up can be selected (see section 10.3).

NOTE!
Arrangement of the sensors in the software must coincide with reality.

After all of the corner points have been set and the sensors have been assigned, a display appears in the run mode with all visual fields and individual profiles (see Fig. 23). In order to obtain a contiguous profile, the sensors must be calibrated as described in section 12.4.

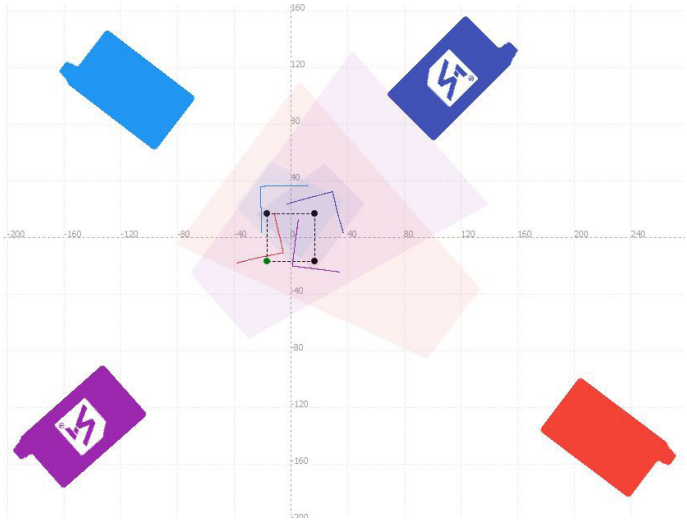


Fig. 23: Display of the sensor profiles before calibration

12.4 Calibrating the Sensors

Actual calibration is conducted after all of the components have been entered. An entire sensor group, as well as individual sensors, can be calibrated.

Entire sensor group: Select the group while in the run mode, click the “Perform calibration” icon and acknowledge your entry.

Individual sensors: Select a sensor while in the run mode, click the “Perform sensor calibration” icon and acknowledge your entry. Repeat this procedure until all of the sensors have been calibrated.

A magnifying glass appears in the icon field after calibration. The magnifying glass can be clicked in order to switch back and forth between the profile views before and after calibration.

After successful calibration, the measuring profile and the calibration object are congruent (see Fig. 24).

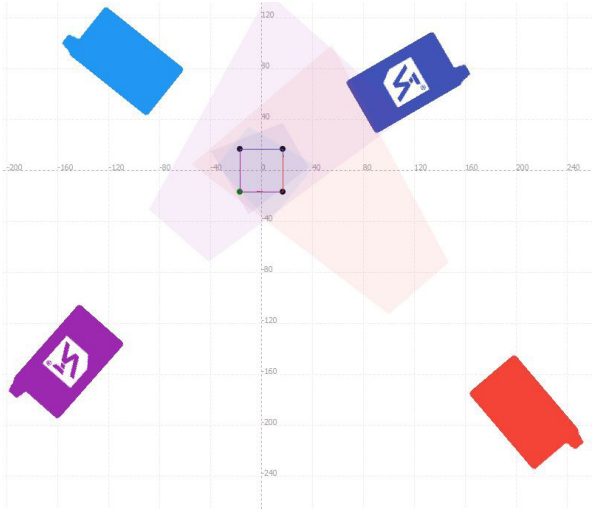


Fig. 24: Display of the sensor profiles after calibration

If calibration of one or more sensors is not successful, calibration must be conducted again with the help of an ROI. Select the sensor in question to this end and undo the calibration procedure (click the “Delete sensor calibration parameters” icon and acknowledge your entry). Then click the “Define sensor ROI” icon. Set up an appropriate ROI around the profile by setting corner points by means of double clicking (see Fig. 25). End the procedure by clicking “Finish sensor ROI”. Calibration must then be performed once again.

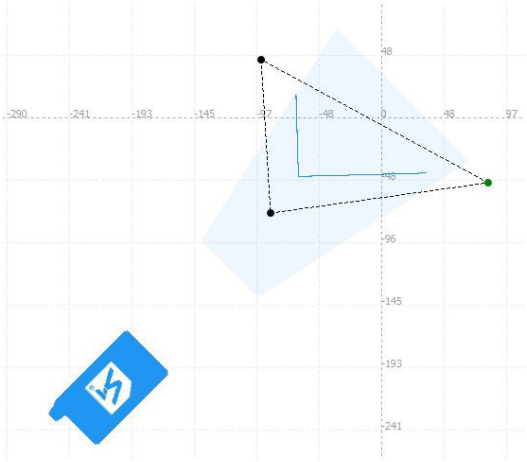


Fig. 25: ROI

13. VisionApp Interfaces

Interface	Type	Settings	Description
Global Interface:			
LIMA Interface	TCP/IP	IP: IP of host PC Port: 62232 (fixed)	The LIMA interface allows to change the sensor settings and to control the Software VisionApp 360
ATTENTION! Some of the commands like Start/Stop may interfere with other modules.			
Module VisionApp 360:			
TCP Interface	TCP/IP	IP: IP of host PC Port configurable by user	United point cloud and additional information, see section 15.2.
Module GigE Vision:			
GigE Vision (2.1)	UDP	IP configured by user	United point cloud and additional information, see 15.3.
Modules Round / Steel / CrossSection:			
TCP/IP Server	TCP/IP	IP: IP of host PC Port configurable by user	Preconfigured data set with full sensor speed. Double 8 byte data in order of module + ROI index + picture counter
PROFINET	Profinet	None	Submits configured data package via Profinet
PROFIBUS	Profibus	None	Submits configured data package via Profibus
TCP RAW	TCP/IP	IP: IP of host PC Port configurable by user	Submits configured data package via TCP/IP

14. Interface Protocol

14.1 Introduction

This section describes the layout and the function of the TCP commands for controlling and adjusting weCat3D profile sensors with the help of VisionApp 360 software.
The commands are transmitted via an open protocol (LIMA protocol) based on XML using port 62232.
In order to establish a connection with VisionApp 360, the “Job Manager TCP/IP Server" must be activated in “Preferences" (see section 10.1.2.1).

NOTE!
Upper and lower case letters must be observed.

14.2 LIMA Protocol

First, carry out the sensor settings and save the VisionApp 360 project. LIMA commands can then be used, for example, to load projects or to start or stop the measurement.

14.2.1 Establishing a TCP/IP Connection

Establish a TCP/IP connection to the VisionApp 360 on the control unit

- VisionApp 360 application's IP address
- Port: 62232 (fixed)

Example based on the control unit's default settings:

- IP address: 192.168.100.252
- Port: 62232

14.2.2 General Information on LIMA Communication

The following general points must be observed for LIMA communication:

- LIMA commands may only be sent sequently to the VisionApp 360
- Data consistency must be assured during communication

14.3 Set Commands

14.3.1 Load Project Configuration

Command	`<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="PROJECT" PATH="SetFile" VALUE="Path to file name" />`
Description	Loads a project in string format. Example: `<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="PROJECT" PATH="SetFile" VALUE="D:\default.vcfg" />`

14.3.2 Command Sequence for Change of Project

(Example: GigE Vision Module)

1. Stop the GigEVision Module:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="GigEVision" PATH="Start" VALUE="0" />

2. Stop project:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple_name" PATH="Start" VALUE="0" />

3. Choose a new project:

<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="PROJECT" PATH="SetFile" VALUE="Path to file name" />

4. Start the new project:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple_name" PATH="Start" VALUE="1" />

5. Start the GigE Vision Module:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="GigEVision" PATH="Start" VALUE="1" />

14.3.3 Commands for Sensor Groups

The following commands affect the selected sensor group. A sensor group unites all sensors to be combined in the application. An example can be found in section 14.4.

14.3.3.1 Start Measurement

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="Start" VALUE="1" />
Description	Starts measurement by the selected sensor group.

14.3.3.2 Stop Measurement

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="Start" VALUE="0" />
Description	Stops measurement by the selected sensor group.

14.3.3.3 Re-Synchronization

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="Resync" VALUE="1" />
Description	Re-synchronizes the selected sensor group. The sensors are stopped automatically and restarted subsequently.

14.3.3.4 Conduct Calibration

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="Calibration Start" VALUE="1" />
Description	Sensor calibration is conducted for the selected sensor group.

14.3.3.5 Delete Calibration

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="Calibration Delete" VALUE="1" />
Description	Sensor calibration is deleted for the selected sensor group.

14.3.3.6 Activate/Deactivate Calibration

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="Calibration Enable" VALUE="*X*" />
Parameter	Values for X: 0: Calibration deactivated 1: Calibration activated
Description	Sensor calibration is activated or deactivated for the selected sensor group. It can be subsequently reactivated. Calibration is not deleted.

14.3.4 Device Settings

The following commands affect the selected sensor. An example can be found in section 14.4.

14.3.4.1 Set Exposure Time

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetExposureTime" VALUE="*X*" />		
Parameter	Range for value X: 0…1 000 000	**Default:**	150
Description	Sets the value for exposure time in µs.		

14.3.4.2 Set Measuring Interval

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetAcquisitionLineTime" VALUE="*X*" />		
Parameter	Range for value X: 166…100,000	**Default:**	MLWL: 5714 MLSL: 5000
Description	Sets the time value between the two consecutive profiles in µs. This command is only operational in the internal trigger mode. 166 µs = 6000 Hz Example: MLWL: 5714 µs = 175 Hz MLSL: 5000 µs = 200 Hz **NOTE!** The ROI settings must be reduced in order to achieve a higher measuring frequency.		

14.3.4.3 Switch Laser On/Off

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetLaserDeactivated" VALUE="*X*" />		
Parameter	Values for X: 0: Laser on 1: Laser off	**Default:**	0
Description	Software command for switching the laser on and off. If X = 0 (enabled), other signals applied to the I/Os have no effect.		

14.3.4.4 Set Sync-Out Pulse Width

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetSyncOut" VALUE="*X*" />		
Parameter	Range for value X: 0…100,000	**Default:**	1000
Description	Defines the pulse width of the sync-out signal for the sync-out I/O in µs. The pulse width must be at least half the period of the measuring rate.		

14.3.5 Region of Interest (ROI)

14.3.5.1 ROI Width in X Direction

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetROI1WidthX" VALUE="*X*" />		
Parameter	Range for value X: MLSL: 32…1280 MLWL: 32…2048	**Default:**	MLSL: 1280 MLWL: 2048
Description	Defines the number of camera lines in the X direction which will be read out. MLSL: This selection affects the adjustable measuring frequency and network utilization (bandwidth). Adjustment is made in steps of 16. MLWL: This selection affects network utilization (bandwidth). Adjustment is made in steps of 1.		

14.3.5.2 ROI Offset in X Direction

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetROI1OffsetX" VALUE="*X*" />		
Parameter	Range for value X: MLSL: 0…1279 MLWL: 0…2047	**Default:**	0
Description	Defines ROI offset in the in X direction. The setting specifies offset to the first line. MLSL: Adjustment is made in steps of 32. MLWL: Adjustment is made in steps of 1.		

14.3.5.3 ROI Step in X Direction

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetROI1StepX" VALUE="*X*" />		
Parameter	Values for X: 0: disabled 1: MLSL subsampling enabled, MLWL only step 1 2...X: only steps	**Default:**	0
Description	MLSL: If amount of pixel in the CMOS line (width X) is set to half then the range of X looks like full. Speed can be increased by double MLWL: Decreases only the amount of data, has no effect to speed		

14.3.5.4 ROI Height in Z Direction

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetROI1HeightZ" VALUE="*X*" />			
Parameter	Range for value X:	MLSL: 32…1024 MLWL: 32…2048	**Default:**	MLSL: 1024 MLWL: 2048
Description	Defines the number of camera lines in the Z direction which will be read out. This selection affects the adjustable measuring frequency.			

14.3.5.5 ROI Offset in Z Direction

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="*sensor group designation*" PATH="*sensor designation* SetROI1OffsetZ" VALUE="*X*" />			
Parameter	Range for value X:	MLSL: 0…1023 MLWL: 0…2047	**Default:**	0
Description	Defines ROI offset in the in Z direction. This setting specifies offset to the first line.			

14.3.6 Commands for Module Control – VisionApp 360 Module

14.3.6.1 Start TCP/IP Server

Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="VisionApp" PATH="Start" VALUE="1" />
Description	Starts the TCP/IP server in order to get profile data from the application (see section 15.2.1).

14.3.6.2 Stop TCP/IP Server

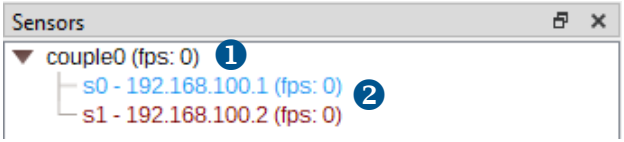
Command	<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="VisionApp" PATH="Start" VALUE="0" />
Description	Stops the TCP/IP server.

14.3.6.3 Change TCP/IP Server Port

Command	`<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="VisionApp" PATH="tcp_ip_api.Port" VALUE="Portadresse" />`
Description	Changes the TCP/IP server's port. **ATTENTION!** Do not change to port 62232!

14.4 Sample Setup

14.4.1 Enter Sensor Group and Utilized Sensors

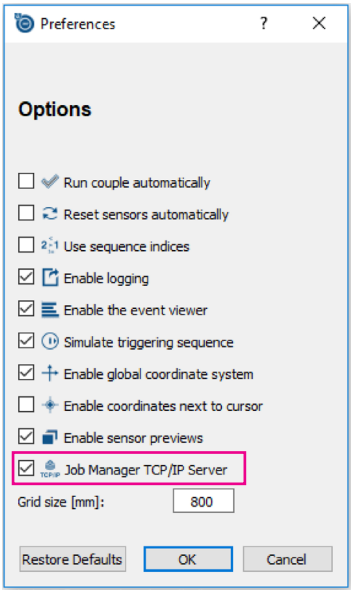


① Sensor group designation (here: couple0), freely selectable

② Sensor designations (here: s0, s1), freely selectable

NOTE!
Designations for sensor groups and sensors may not include any blanks.

14.4.2 Activation of the “Job Manager TCP/IP Server”



The checkbox next to “Job Manager TCP/IP Server” must be activated in the “Preferences” dialog box (refer to the operating instructions for VisionApp 360 software to this end).

The Job Manager opens port 62232 in order to be able to transmit commands to the application.
A TCP connection must then be established with the application. Use the IP address of the device to which VisionApp 360 is installed to this end, or the device at which communication will take place.
Then open port 62232 and transmit the commands as plain text as described below.

14.4.3 Commands

14.4.3.1 Commands for Sensor Groups

Start measurement:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Start" VALUE="1" />

Stop measurement:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Start" VALUE="0" />

14.4.3.2 Commands for Devices

Set exposure time at Sensor1 to 500 µs:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Sensor1 SetExposureTime" VALUE="500" />

Switch off the laser at Sensor2:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Sensor2 SetLaserDeactivated" VALUE="0" />

14.4.3.3 Commands for ROI

Set height Z to 1200 lines at Sensor1:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Sensor1 SetROI-1HeightZ" VALUE="1200" />

Set offset Z to 500 lines at Sensor1:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Sensor1 SetROI-1HeightZ" VALUE="1200" />

14.4.3.4 Commands for Modules

Start TCP/IP server:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="VisionApp" PATH="Start" VALUE="1" />

Change TCP/IP server port to 6000:
<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="VisionApp" PATH="tcp_ip_api.Port " VALUE="12345" />

14.5 Get Commands

With LIMA commands it is possible not only to set the parameters of the sensors, but also to read them out For this purpose, a command is sent to the desired element of the couple and the client receives the corresponding response. If the device does not respond, this is passed on to the client as an error.

The Get commands are structured similarly to the Set commands according to the folllowing principle:

<LIMA CMD="Module_GetState" DIR="Request" MODULENAME="COUPLE NAME" PATH="SENSOR NAME COMMAND" />

- COUPLE NAME Name of the couple
- SENSOR NAME Name of the sensor in the couple
- COMMAND Desired Get command from current weCat3D SDK (siehe NOTE below)

Example 1:

Request of the current exposure time of the sensor "s0" from the couple "c0":

<LIMA CMD="Module_GetState" DIR="Request" MODULENAME="c0" PATH="s0 GetExposureTime" />

Answer from VisionApp 360 if OK:

<LIMA CMD="Module_GetState" DIR="ReplyOk" MODULENAME="c0" PATH="s0" "GetExposureTime" VALUE="149" />

Answer from VisionApp 360 if not OK (error):

<LIMA CMD="Module_GetState" DIR="ReplyError" MODULENAME="c0" PATH="s0" "GetExposureTime" VALUE="ERROR" />

Example 2:

Request of the current temperature of the sensor "s0" and couple "c0":

<LIMA CMD="Module_GetState" DIR="Request" MODULENAME="c0" PATH="s0 GetTemperature" />

Answer from VisionApp 360 if OK:

<LIMA CMD="Module_GetState" DIR="ReplyOk" MODULENAME="c0" PATH="s0" "GetTemperature" VALUE="31" />

Answer from VisionApp 360 if not OK (error):

<LIMA CMD="Module_GetState" DIR="ReplyError" MODULENAME="c0" PATH="s0" "GetTemperature" VALUE="ERROR" />

NOTE!
For further information about the Get commands please see the Interface Description in the download area of the 2D/3D Profile Sensors.

The following table shows the current ASCII commands for the parameters, which can be read out by means of the command structure described above.

ASCII command	Remarks
GetPictureCounter	
GetSystemTime	in µs
GetStatisticDataUserData	
GetOrderNumber	
GetProductVersion	
GetProducder	
GetFirmwareVersion	
GetSerialNumber	
GetMAC	
GetWorkingRangeZStart	
GetWorkingRangeZEnd	
GetFieldWidthXStart	
GetFieldWidthXEnd	
GetPixelXMax	
GetPixelZMax	
GetOnOffCounter	
GetOnTimeCounter	
GetLinInfo	if the sensor is calibrated
GetUserString	
GetHeartBeat	
GetSocketConnectionTimeout	

ASCII command	Remarks
GetIOState	bit0: E/A 1 bit1: E/A 2 bit2: E/A 3 bit3: E/A 4
GetEncoderHTL	
GetEncoderTTL	
GetTemperature	
GetScannerState	bit0: Profile sensor OK bit1: ExposureTime OK bit2: LaserONTime OK bit3: Not in use bit4: Not in use bit5: Measurement rate too fast bit6: Not in use bit7: Not in use
GetSignalEnable	The number of signals in each scan, see function SetSignalEnable
GetSignalContentZ	
GetSignalContentStrength	
GetSignalContentWidth	
GetSignalContentReserved	
GetSignalWidthMin	
GetSignalWidthMax	
GetSignalStrengthMin	
GetSignalSelection	
GetAcquisitionLineTime	
GetCameraRunning	
GetTriggerSource	
GetTriggerAmountProfilesY	
GetAmountProfilesY	
GetTriggerEncoderStep	
GetTriggerDelay	
GetExposureTime	
GetLaserActive	
GetROI1WidthX	
GetROI1OffsetX	
GetROI1StepX	
GetROI1HeightZ	
GetROI1OffsetZ	
GetSyncOut	
GetSyncOutDelay	
GetEncoderTriggerFunction	
GetEncoderCountDirection	

ASCII command	Remarks
GetEA1Function	
GetEA1FunctionLaserOff	
GetEA1FunctionProfileEnable	
GetEA1FunctionResetCounter	
GetEA1InputFunction	
GetEA1InputLoad	
GetEA1Output	
GetEA1OutputFunction	
GetEA1ResetCounterRepeat	
GetEA1ResetCounterSignaledge	
GetEA1ResetCounterBaseTimeCounter	
GetEA1ResetCounterPictureCounter	
GetEA1ResetCounterEncoderHTL	
GetEA1ResetCounterEncoderTTLRS422	
GetEA2Function	
GetEA2FunctionLaserOff	
GetEA2FunctionProfileEnable	
GetEA2FunctionResetCounter	
GetEA2InputFunction	
GetEA2InputLoad	
GetEA2Output	
GetEA2OutputFunction	
GetEA2ResetCounterRepeat	
GetEA2ResetCounterSignaledge	
GetEA2ResetCounterBaseTimeCounter	
GetEA2ResetCounterPictureCounter	
GetEA2ResetCounterEncoderHTL	
GetEA2ResetCounterEncoderTTLRS422	
GetEA3Function	
GetEA3FunctionLaserOff	
GetEA3FunctionProfileEnable	
GetEA3FunctionResetCounter	
GetEA3InputFunction	
GetEA3InputLoad	
GetEA3Output	
GetEA3OutputFunction	
GetEA3ResetCounterRepeat	
GetEA3ResetCounterSignaledge	
GetEA3ResetCounterBaseTimeCounter	
GetEA3ResetCounterPictureCounter	
GetEA3ResetCounterEncoderHTL	

ASCII command	Remarks
GetEA3ResetCounterEncoderTTLRS422	
GetEA4Function	
GetEA4FunctionLaserOff	
GetEA4FunctionProfileEnable	
GetEA4FunctionResetCounter	
GetEA4InputFunction	
GetEA4InputLoad	
GetEA4Output	
GetEA4OutputFunction	
GetEA4ResetCounterRepeat	
GetEA4ResetCounterSignaledge	
GetEA4ResetCounterBaseTimeCounter	
GetEA4ResetCounterPictureCounter	
GetEA4ResetCounterEncoderHTL	
GetEA4ResetCounterEncoderTTLRS422	
GetEAFunctionInputCounter	
GetSettings=0	Returns the saved settings of the profile sensor in default as xml structure
GetSettings=1	Returns the saved settings of the profile sensor in set1 as xml structure
GetSettings=2	Returns the saved settings of the profile sensor in set2 as xml structure
GetSettings=3	Returns the current settings of the profile sensor as xml structure

15. Modules

Add-on software modules can be obtained with the help of the licensing procedure described in section 9.
A module can be started via the menu item "Modules" (see section 10.1.4).

15.1 Controller Configuration

The controller configuration is identical for all modules. Open the Module Viewer and select the desired module.
Settings for the interfaces and the module-specific parameters can be made after activating the “Controller” button.

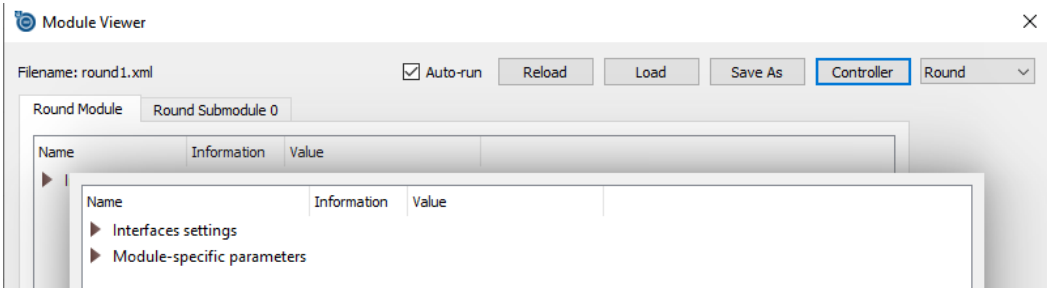


Fig. 26: Controller Configuration (Example: Module Round)

15.1.1 Interface Settings

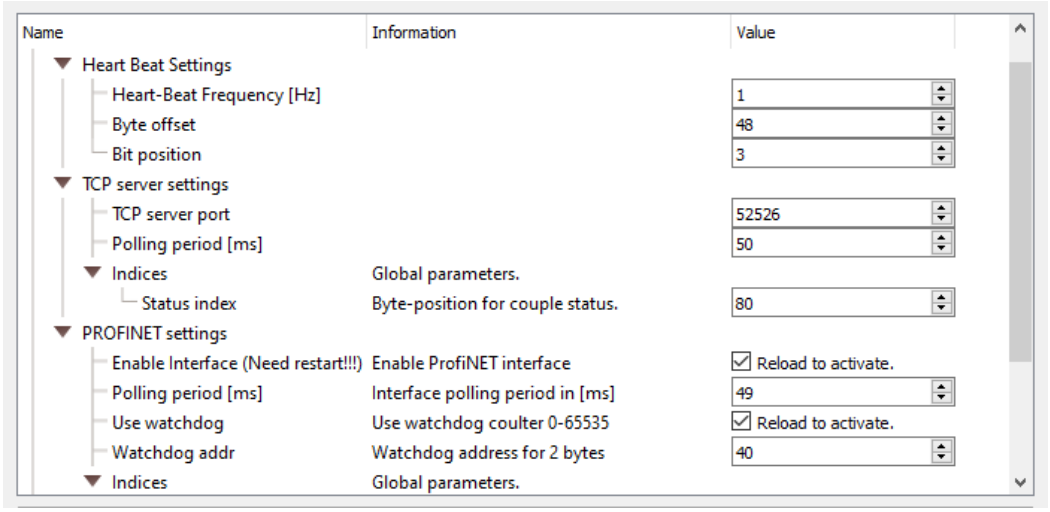


Fig. 27: Interface Settings

Designation	Description	Default value
Heart Beat Settings:		
Heart Beat Frequency [Hz]	Heartbeat frequency	1
Byte offset	Byte position in the data packet	48
Bit position	Bit position in the selected byte	3
TCP Server Settings:		
TCP server port	Port no. for data communication	52526
Polling period [ms]	Interface timeout for read and write operations	50
Status index	Byte position for couple status	80
Profinet Settings:		
Enable Interface	Enable Profinet interface	
Polling period	Interface polling period in [ms]	49
Use watchdog	Use watchdog counter 0-65535	
Watchdog addr	Watchdog address for 2 bytes	40
Status index	Byte position for couple status	60
Action index	Byte position for modifying a specific action	50
Acknowledge index	Byte position for acknowledging operations	40

NOTE!
After switching on/off the interface the application has to be restartet.

15.1.2 Module-specific parameters

If a job needs to be selected, the job number must be transmitted to the software at the byte position defined for the module.

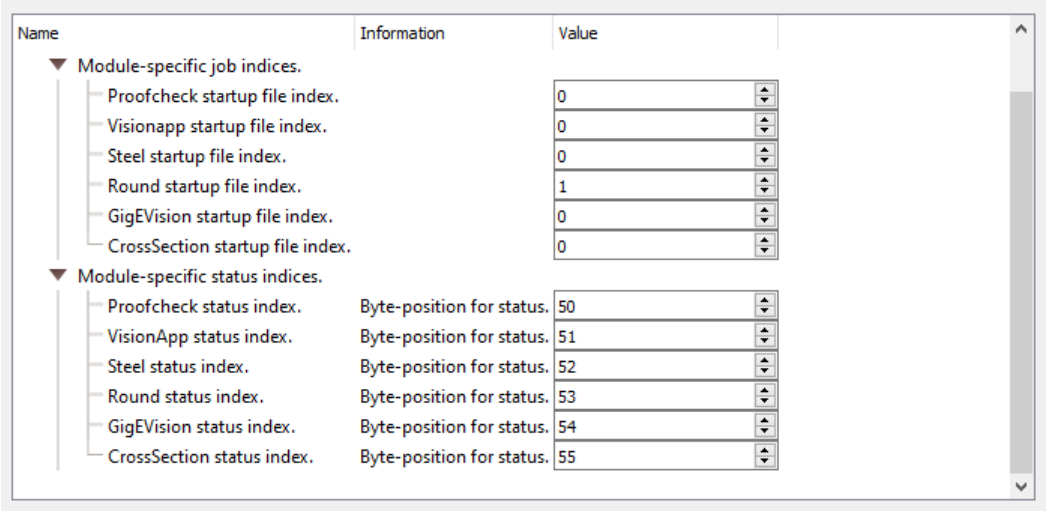


Fig. 28: Module-specific parameters

Designation	Description	Default value
Module specific job indices:		
Proofcheck startup file index	Job number for the proofcheck module	0
Visionapp startup file index	Job number for the VisionApp 360 module	0
Steel startup file index	Job number for the steel module	0
Round startup file index	Job number for the round module	0
GigEVision startup file index	Job number for the GigEVision module	0
CrossSection startup file index	Job number for the CrossSection module	0
Module-specific status indices:		
Proofcheck status index	Byte position for status	50
Visionapp status index	Byte position for status	51
Steel status index	Byte position for status	52
Round status index	Byte position for status	53
GigEVision status index	Byte position for status	54
CrossSection status index	Byte position for status	55

15.2 Module VisionApp 360

Measurement data can be received via preset port with the VisionApp 360 module (see).

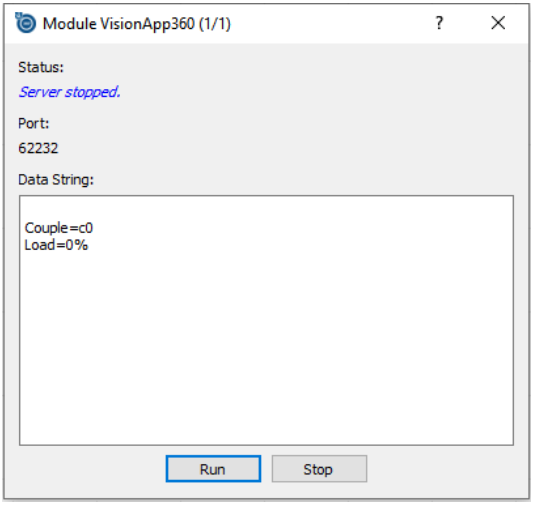


Fig. 29: Module VisionApp 360

15.2.1 Data Format

Description	Offset in bytes	Type (bytes)	Predefined value
Multisensor container ID	0	uint32 (4)	0x021b0100
Container size (entire data package). The size of the sensors' point data blocks is not included in the predefined value.	4	uint32 (4)	0x4b0
General multisensor ID	8	uint32 (4)	0x021b0200
Size of the data package	12	uint32 (4)	0x84
numberOfSources: NumberOfSources: Number of sources (sensors) in a sensor group	16	uint32 (4)	0x0
User string, reserved for the user (not used)	20	char[128] (128)	"VisionApp"
Current data timestamp (not used)	148	uint32 (4)	0x0
Multisensor part ID	152	uint32 (4)	0x021b0400
Size of the sub-data block. The size of the sensors' point data blocks is not included in the predefined value.	156	uint32 (4)	0x418
Multisensor header ID	160	uint32 (4)	0x021b0402
Header size	164	uint32 (4)	0x408
scannerPoints: Number of points along a sensor axis	168	uint32 (4)	0x0
scannerDataFormat: Sensor Datenformat (8 Bytes)	172	uint32 (4)	0x0
Sensor image counter	176	uint32 (4)	0x0
scannerIntensityDataFormat: Sensor intensity data format (4 bytes)	180	uint32 (4)	0x0
Encoder	184	uint32 (4)	0x0
Reserved for overall header data. Together with the five preceding data units, this results in 1024 bytes (offset: 168 - 1192).	188	uint32 (1004)	0x0
Point data ID	1192	uint32 (4)	0x021b0403
Point data size without sensor data (fixed value: 8 bytes)	1196	uint32 (4)	0x8
Sensor1 data: Format of the sensor: X array, Z array with scannerPoints of the scannerDataFormat and format intensity data scannerIntensityDataFormat. The range encompasses n = scannerPoints × (2 × scannerDataFormat + scannerIntensityDataFormat) bytes for one sensor. The data are not coupled to the object instance, for which reason there is no associated data.	1200	float[scannerPoints] or double [scannerPoints] (n)	
Sensor2 data: same format as for Sensor1. There are k = numberOfSources sensors per connection	1200 + n	float[scannerPoints] or double [scannerPoints] (n)	
Cyclic redundancy checksum, multisensor ID	1200 + n × k	uint32 (4)	0x021b01ff
Size of the CRC block	1204 + n × k	uint32 (4)	0xc
CRC data (a dummy value is used for the image counter)	1208+ n × k	uint32 (4)	0x0

15.2.2 Interface Configuration

To configure the interface open the module viewer and select VisionApp 360 (see section 10.1.4).

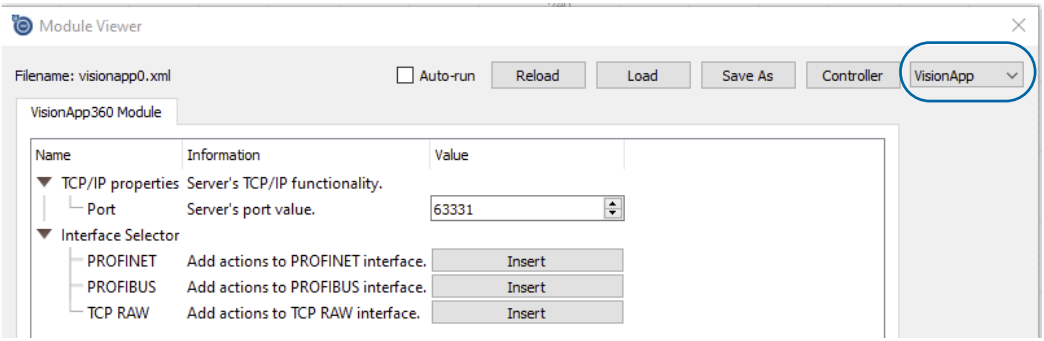


Fig. 30: Interface Configuration VisionApp 360

Use the "Insert" button of selected interface to adjust the trigger conditions

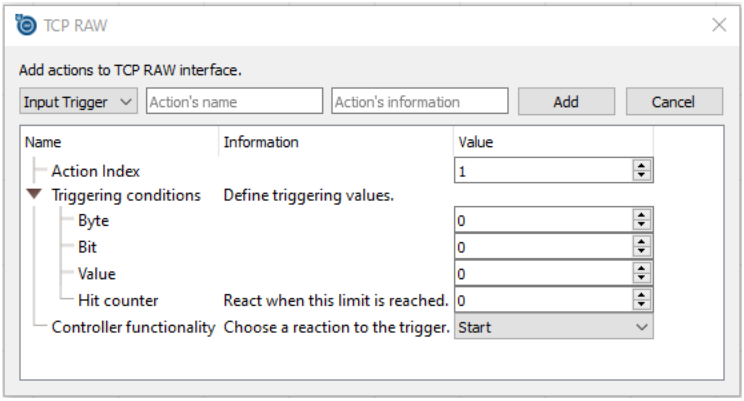


Fig. 31: Interface Selector VisionApp 360

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer values
Triggering conditions:		
Byte	Definition of the position in the protocol in bytes	Max. value: 31
Bit	Specifies the bit that contains the information	Max. value: 7
Value	Defines the value that sets the trigger	0 or 1
Hit counter	Number of trigger signals before triggering is initiated	0: each trigger signal initiates triggering

Controller functionality	Defines the reaction initiated by the trigger	Start/Stop/Reset

15.3 GigE Vision Server Module

The GigE Vision Server module makes it possible to exchange data with other programs such as Halcon via a GigE Vision interface (version 2.1).

NOTE!
Execution of this module is only possible if VisionApp 360 is launched with administrator rights.

If the GigE Vision Server in VisionApp 360 and the GigE Vision image processing client are run on the same computer, it must be assured that the filter settings for the utilized interface are deactivated. (see Fig. 8).

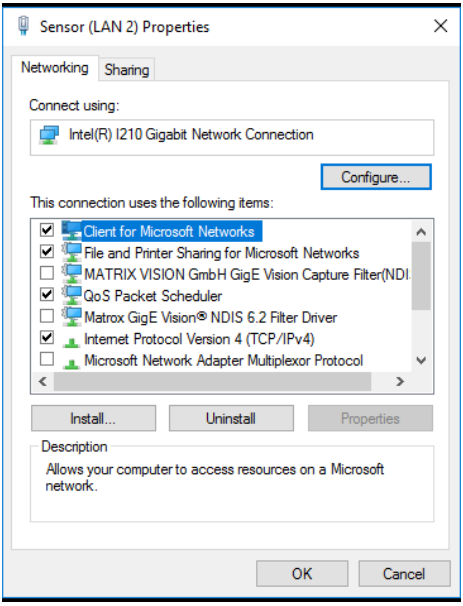


Fig. 32: Filter settings of interface

All available network cards are listed under Interface IP. The IP address of the GigE Vision Server can be set under Server IP. The GigE Vision Server can be started with the Run and Stop functions.

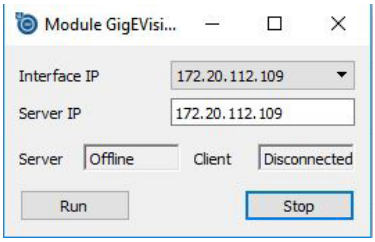


Fig. 33: IP Setting in the GigE Vision Module

15.3.1 Interface Configuration

To configure the interface open the module viewer and open GigE Vision (see section 10.1.4).

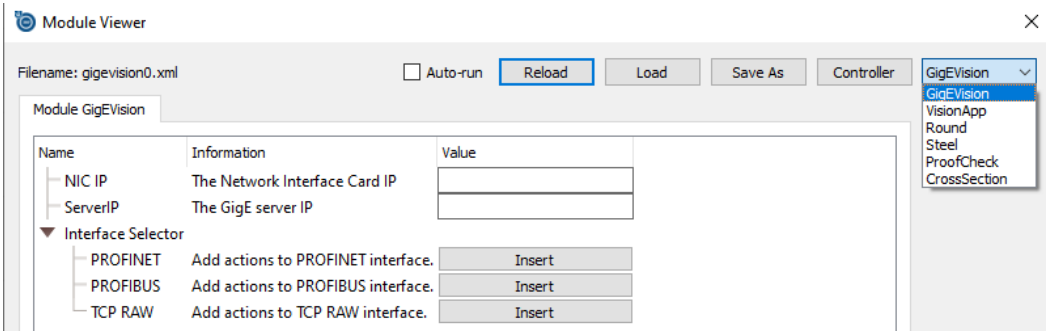


Fig. 34: Configuring the GigE Vision Server

Designation	Description	Value
NC IP	Used Network Interface Card IP	IP address
Server IP	IP of the GigE Vision Server	IP address

Use the "Insert" button of selected interface to adjust the trigger conditions

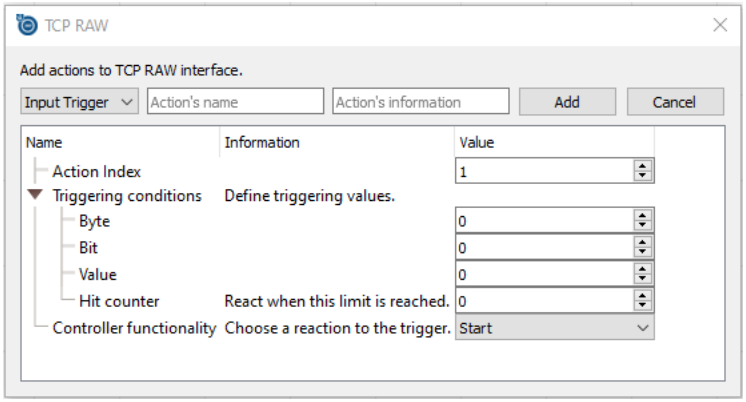


Fig. 35: Interface Selector GigE Vision

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer values
Triggering conditions:		
Byte	Definition of the position in the protocol in bytes	Max. value: 31
Bit	Specifies the bit that contains the information	Max. value: 7
Value	Defines the value that sets the trigger	0 or 1
Hit counter	Number of trigger signals before triggering is initiated	0: each trigger signal initiates triggering
Controller functionality	Defines the reaction initiated by the trigger	Start/Stop/Reset

15.3.2 GigE Functionality

The module is subdivided into the following groups:

- ImageFormatControl
- AcquisitionControl
- TransportLayerControl
- ChunkDataControl
- Scan3DControl
- Device Control

ImageFormatControl

The GigE Vision server module in VisionApp 360 supports new GigE Vision standard 2.1. This standard permits transmission of various components in a single image. This makes it possible to synchronously transmit point cloud data in pixel format “Coord3D_ABC32f” and intensity in pixel format “Mono16” in a single image.

Example:
ComponentSelector = Range
ComponentEnable = 1// It is not possible to deactivate Range component
PixelFormat = Coord3D_ABC32f
ComponentSelector = Intensity
ComponentEnable = 1
PixelFormat = Mono16

NOTE!
The software used by the customer should support new GigE Vision standard 2.1 and pixel format “Coord3D_ABC32f” in order to decode images correctly.

15.3.3 ImageFormatControl

Command	RegionSelector
Access mode	Read/write
Parameter	Scan3DExtraction0
Description	Scan3DExtraction0 displays the image configuration (e.g. pixel format, width, height etc.).

Command	Width
Access mode	Read only
Parameter	1
Description	Image width (in VisionApp 360, the width of the image is always 1).

Command	Height
Access mode	Read only
Parameter	Depends on the number of sensors in the couple and their configuration
Description	Image height

Command	OffsetX
Access mode	Read only
Parameter	0
Description	Unused

Command	OffsetY
Access mode	Read only
Parameter	0
Description	Unused

Command	PixelFormat
Access mode	Read/write
Parameter	Coord3D_ABC32f/Mono16
Description	Defines the pixel format for the selected component in the ComponentSelector. Coord3D_ABC32f is only valid for the “Range” component. Mono16 is only valid for the “Intensity” component.

Command	ComponentSelector
Access mode	Read/write
Parameter	Range/Intensity
Description	Selects the component to be configured.

Command	ComponentEnable
Access mode	Read/write
Parameter	1/0
Description	Activates/deactivates the selected component in the image.

NOTE!
The “Range” component cannot be deactivated.

Command	ComponentIDValue
Access mode	Read only
Parameter	Component-dependent
Description	Returns the selected component ID.

15.3.4 Acquisition Control

Command	AcquisitionMode
Access mode	Read/write
Parameter	Continuous
Description	Defines the recording mode. In the Continuous mode, the server transmits images endlessly after the AcquistionStart command is issued. The server stops transmission as soon as it receives the AcquisitionStop command.

Command	AcquisitionStart
Access mode	Read/write
Parameter	Command
Description	Starts image acquisition.

NOTE!
The GigE Vision server deletes all images in the VisionApp buffer as soon as it receives the AcquisitionStart command.

Command	AcquisitionStop
Access mode	Read/write
Parameter	Command
Description	Ends image acquisition.

Command	TriggerSelector
Access mode	Read/write
Parameter	LineStart
Description	Selects the trigger function for the configuration.

Command	TriggerMode
Access mode	Read/write
Parameter	On/Off
Description	Activates/deactivates the selected trigger function in the TriggerSelector.

Command	TriggerSource
Access mode	Read/write
Parameter	Software
Description	Selects the trigger source for selecting the trigger function in the TriggerSelector (available as software only).

Command	TriggerSoftware
Access mode	Read
Parameter	Command
Description	Sends a software trigger command to the GigE Vision server.

NOTE!
The GigE Vision server deletes all images in the VisionApp buffer as soon as it receives the TriggerSoftware command.

15.3.5 TransportLayerControl

Command	PayloadSize
Access mode	Read only
Parameter	Depends on the number of sensors in the couple, as well as sensor and image configuration.
Description	Indicates the size of the transmitted image in bytes.

15.3.6 ChunkDataControl

Command	ChunkSelector
Access mode	Read/write
Parameter	ChunkEncoder/ChunkPictureCounter/ChunkScan3dInvalidDataFlag/ ChunkScan3dInvalidDataValue
Description	Selects the chunk file to be configured.

Command	ChunkEnable
Access mode	Read/write
Parameter	1/0
Description	Activates/deactivates the selected chunk in the transmitted image.

Command	ChunkEncoder
Access mode	Read only
Description	Reads out the encoder value of the Master Unit in the couple.

Command	ChunkPictureCounter
Access mode	Read only
Description	Reads out the value of the picture counter for the Master Unit in the couple.

Command	ChunkScan3dCoordinateSelector
Access mode	Read/write
Description	Selects the individual axis for coordinate specific chunk settings. Coordinate A is for X axis. Coordinate B is for encoder (Y) axis. Coordinate C is for Z axis.

Command	ChunkScan3dInvalidDataFlag
Access mode	Read only
Description	Reads out whether ChunkScan3dInvalidDataValue is enabled or disabled for the axis selected by the ChunkScan3dCoordinateSelector.

Command	ChunkScan3dInvalidDataValue
Access mode	Read only
Description	Reads out the ChunkScan3dInvalidDataValue, which indicates invalid points, for the axis selected by ChunkScan3dCoordinateSelector.

NOTE!
If ChunkScan3dInvalidDataFlag and ChunkScan3dInvalidDataValue are enabled, some clients (e.g. Halcon) filter out invalid points automatically.

15.3.7 Scan3D Control

Command	Scan3dCoordinateSelector
Access mode	Read/write
Parameter	CoordinateA/CoordinateB/CoordinateC
Description	Selects the individual axis for 3D information/transformation. Coordinate A is for X axis. Coordinate B is for encoder (Y) axis. Coordinate C is for Z axis.

Command	Scan3dCoordinateScale
Access mode	Read/write
Parameter	Scale factor
Description	Applies a scale factor to the source selected in Scan3dCoordinateSource to transform profile in B (Y) axis direction into absolute coordinates. y=coordOffset+scaleFac*coordSource

Command	Scan3dCoordinateOffset
Access mode	Read/write
Parameter	B (Y) Offset
Description	Adds an initial offset to the profiles transformation in B (Y) axis direction. y=coordOffset+scaleFac*coordSource

Command	Scan3dCoordinateSource
Access mode	Read/write
Parameter	PictureCounter/Encoder
Description	Selects the source for the profile transformation in B (Y) axis direction. y=coordOffset+scaleFac*coordSource

Command	Scan3dOutputMode
Access mode	Read/write
Parameter	CalibratedABC_Grid/CalibrateABC_PointCloud
Description	Controls the sensors output data organization. CalibratedABC_Grid: Organized 3D pointcloud including invalid points in sensor pixel grid organization. CalibratedABC_PointCloud: Unorganized 3D pointcloud excluding invalid points (varying image size).

Command	NumberOfProfiles
Access mode	Read/write
Parameter	Number of profiles per pointcloud
Description	Controls the number of scans bundled and transmitted in one single pointcloud.

Command	Scan3dInvalidDataFlag
Access mode	Read only
Description	Reads out whether Scan3dInvalidDataValue is enabled or disabled for the axis selected by the Scan3dCoordinateSelector.

Command	Scan3dInvalidDataValue
Access mode	Read only
Description	Reads out the Scan3dInvalidDataValue, which indicates invalid points for the axis selected by Scan3dCoordinateSelector.

15.3.8 Device Control

Command	DeviceTemperatureSelector
Access mode	Read/write
Parameter	Number of selected sensor
Description	Selects the device from which the temperature should be read.

Command	DeviceTemperature
Access mode	Read only
Description	Device temperature in degrees Celsius (°C). It is measured from the device selected by DeviceTemperatureSelector.

15.4 Module Round

The module Round is a VisionApp 360 extension for the measurement of objects with circular cross-section. The layout of the user interface corresponds to the description in section 10.
The following quantities are determined in the “Measuring results” area:

- Minimum diameter
- Maximum diameter
- Average diameter
- Ovality
- Cross-sectional area

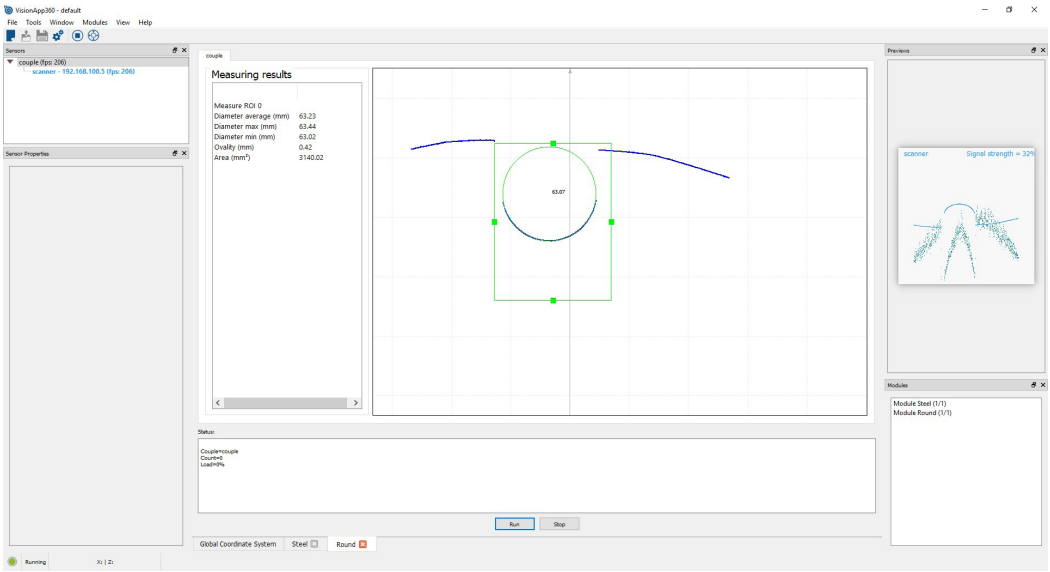


Fig. 36: User interface of Module Round

15.4.1 Layout of the Measuring System

The measuring system is laid out in accordance with the specifications in section 11.

15.4.2 Calibrating the Measuring System

The measuring system is calibrated in accordance with the specifications in section 12.

15.4.3 Data Format

The module permits configuration of a user-specific data format. The user can specify with which data type and at which byte position the information is transmitted. In order to assure unequivocal allocation, each configured output of the sensor's picture counter value (see operating instructions for weCat3D profile sensors) is automatically appended as a 4 byte unsigned int.

Example:

Byte Position	0	1	2	3	4	5	6	7	8
Content	Empty				Tolerance Check with byte offset 4	Picture counter sensor			

15.4.4 Interface Configuration

To configure the interface open the module viewer and open Module Round (see Fig. 37).
The PROFINET, PROFIBUS and TCP RAW interfaces are always configured in accordance with the same principle which is described here using TCP RAW as an example.

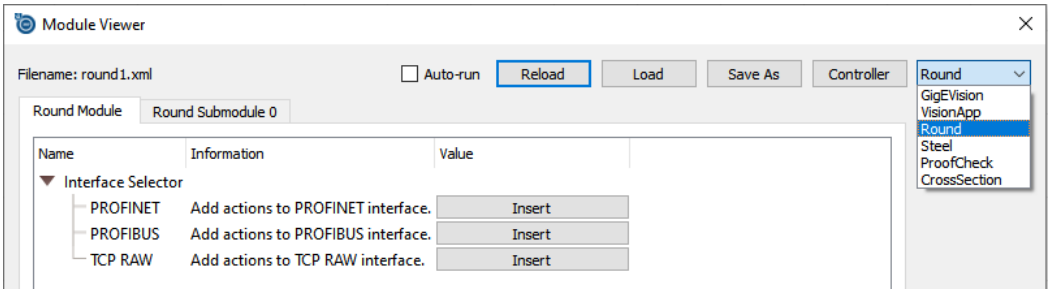


Fig. 37: Interface Selector of Module Round

The "Insert" buttons can be used to configure various data for the following functions:

- "Tolerance Check" indicates whether or not a measured variable is outside of the tolerance range
- "Input Trigger" for starting, stopping or resetting the module via the interface
- "Send Output" for transmitting measured variables

15.4.4.1 Tolerance Check

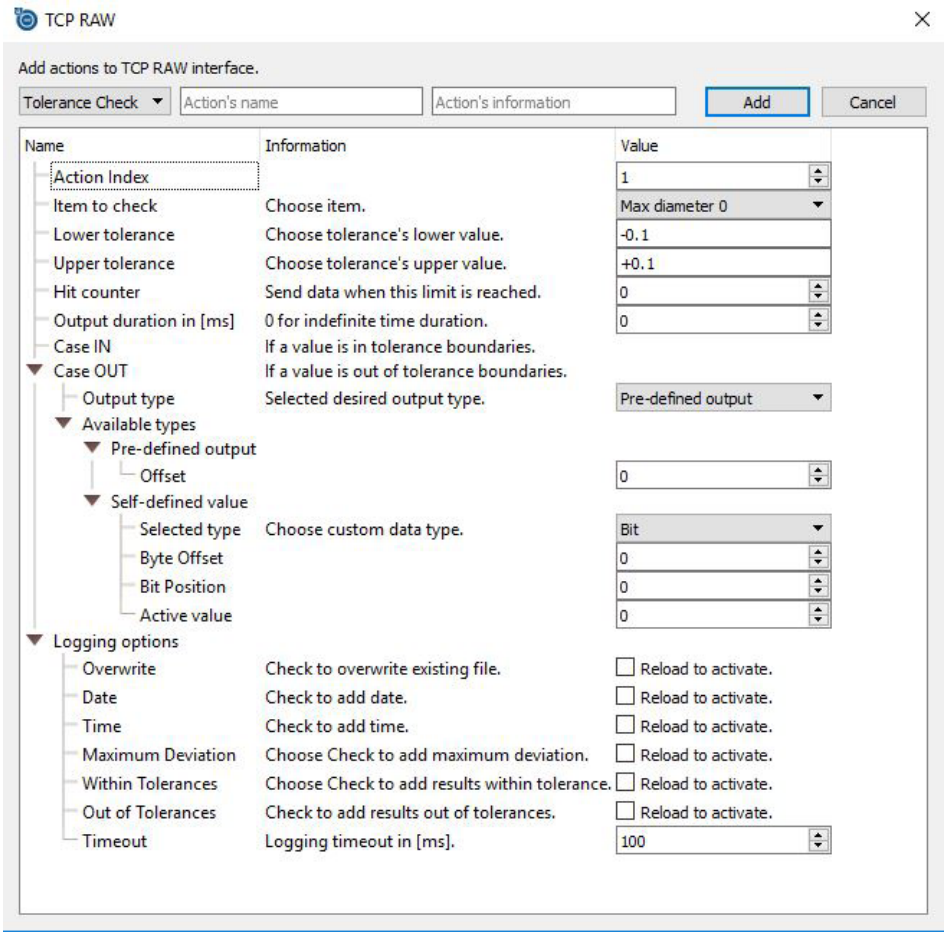


Fig. 38: Tolerance Check of Module Round

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer values
Item to check	Measured variable to be checked	Digit corresponds to ROI number
Lower tolerance	Lower tolerance limit	For example 40, if the value must be greater than 40 mm
Upper tolerance	Upper tolerance limit	For example 41, if the value must be less than 41 mm
Hit counter	Number of tolerance deviations before a tolerance deviation is displayed	0: each deviation is displayed
Out duration [ms]	Specifies how long information about a tolerance deviation is displayed at the interface	0: infinitely long display
Case IN	No function	
Case OUT	Definition of when the measured variable is not within tolerance	
Output type	Definition of the data type	Predefined output: A predefined data type is used. Self-defined value: A user-defined data type is used.
Pre-defined output/Offset	Definition of the position output in the protocol in bytes	0 is the beginning of the data record (max. 31)
Self-defined value/ Selected type	Data type selection	Bit, byte, integer, float, double, array and string are possible
Self-defined value/ Byte Offset	Definition of the position output in the protocol in bytes	0 is the beginning of the data record (max. 31)
Self-defined value / Bit Position	Specifies the bit to be changed	0 denotes the first bit
Self-defined value/ Active value	Value to which the data type is to be set	For example 1
Logging options	A log file can be configured if required	The log file is typically located here: C:\Users\<USER>\AppData\Roaming\Vision-App360\resources\modules\CircleCheck

15.4.4.2 Input Trigger

The module can be controlled via a trigger, and control signals can be sent via the same interface.

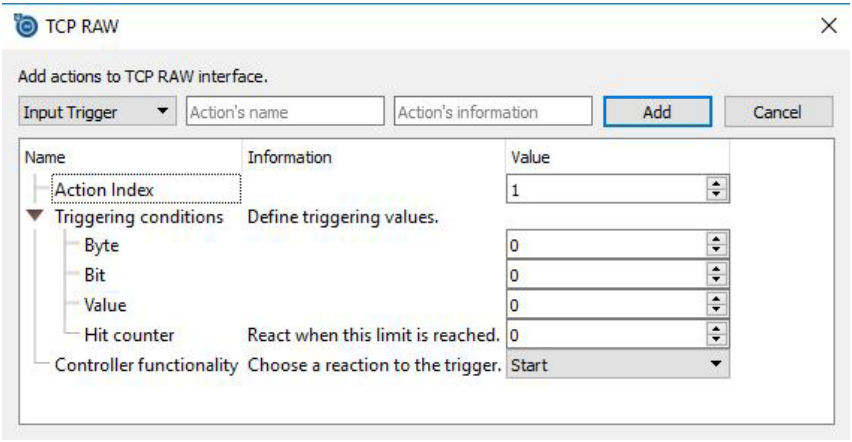


Fig. 39: Input Trigger

Designation	Description	Value
Action index	Consecutive number which identifies the action	Integer values
Triggering conditions:		
Byte	Definition of the position in the protocol in bytes	Max. value: 31
Bit	Specifies the bit that contains the information	Max. value: 7
Value	Defines the value that sets the trigger	0 or 1
Hit counter	Number of trigger signals before triggering is initiated.	0: each trigger signal initiates triggering
Controller functionality	Defines the reaction initiated by the trigger	Start/Stop/Reset

15.4.4.3 Send Output

Measured variables are defined for the protocol here. Data type is always 4-byte float.

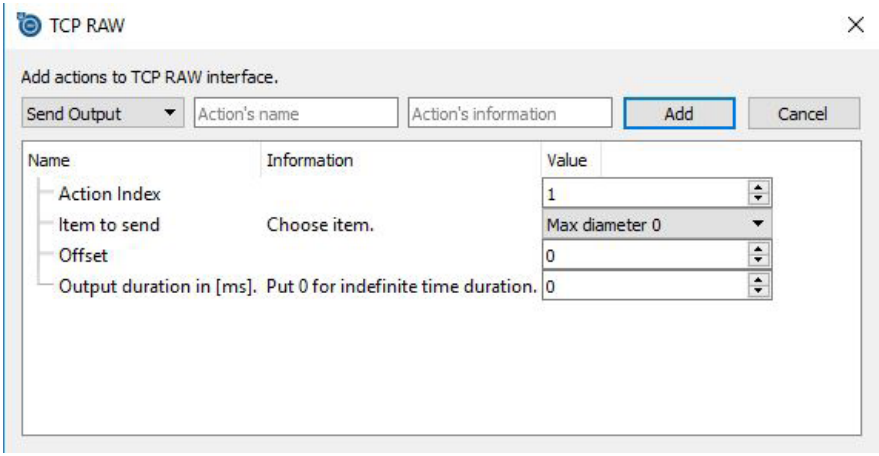


Fig. 40: Send output

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer values
Item to send	Measured variable selection	For example max. diameter
Offset	Definition of the position output in the protocol in bytes	0: beginning of the data record (max. 31)
Output duration [ms]	Specifies how long information about the measured variable is displayed at the interface	0: infinitely long display

15.4.5 Submodule Settings

Various settings can be entered to the “Round Submodule 0” tab.

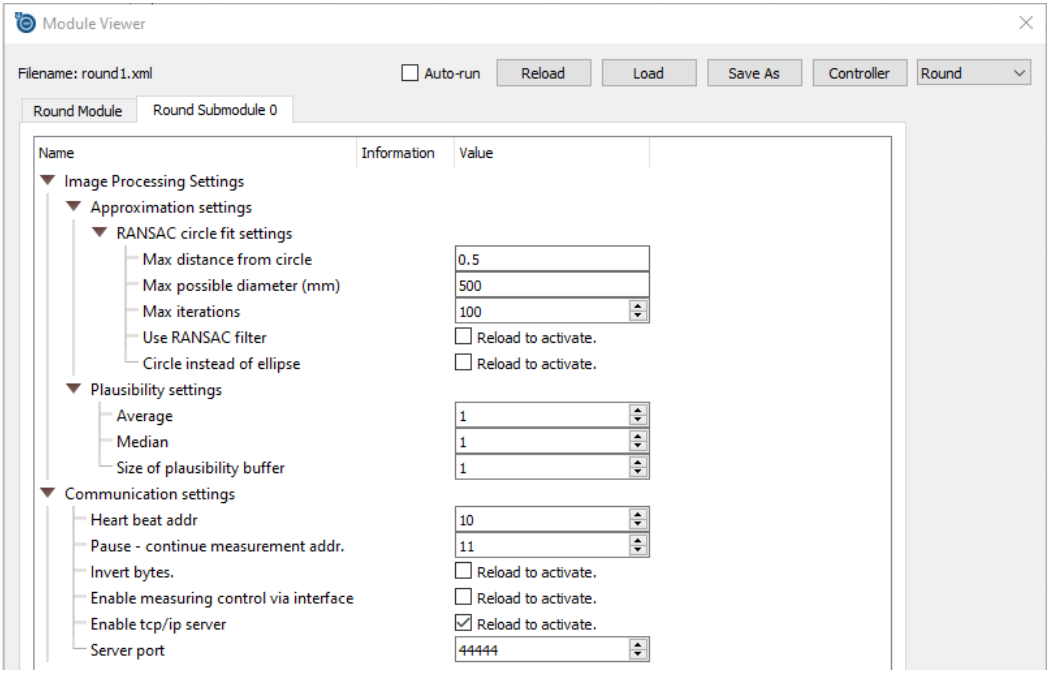


Fig. 41: Round Submodule

Designation	Description
RANSAC circle settings:	
Max distance from circle	Only points within this distance are taken into consideration
Max possible diamter (mm)	Maximum circle diameter to be evaluated
Max iterations	Maximum number of repetitions (typically 500)
Use RANSAC filter	When deactivated, a least square adjustment is applied (sensitive to outliers)
Circle instead of ellipse	The circle is used as a model (ovality, as well as min. and max. diameter, are not acquired)
Plausibility settings:	
Average	Contour smoothing (1: no averaging)
Median	Median filter for removing outliers (1: no filtering)
Size of plausibility buffer	Reserved
Communication settings:	
Heart beat addr	Position of the byte which indicates the running system with a frequency of 1 Hz (PROFIBUS/PROFINET)

Pause – continue measurement addr.	Address at which pausing or continuation of the measurement is indicated
Invert bytes	Big endian or little endian
Enable measuring control via interface	Activate interface control
Enable tcp/ip server	Start/stop server (see section 15.4.7)
Server Port	Port number of the server (see section 15.4.7)

15.4.6 TCP Raw Interface Settings

Example:

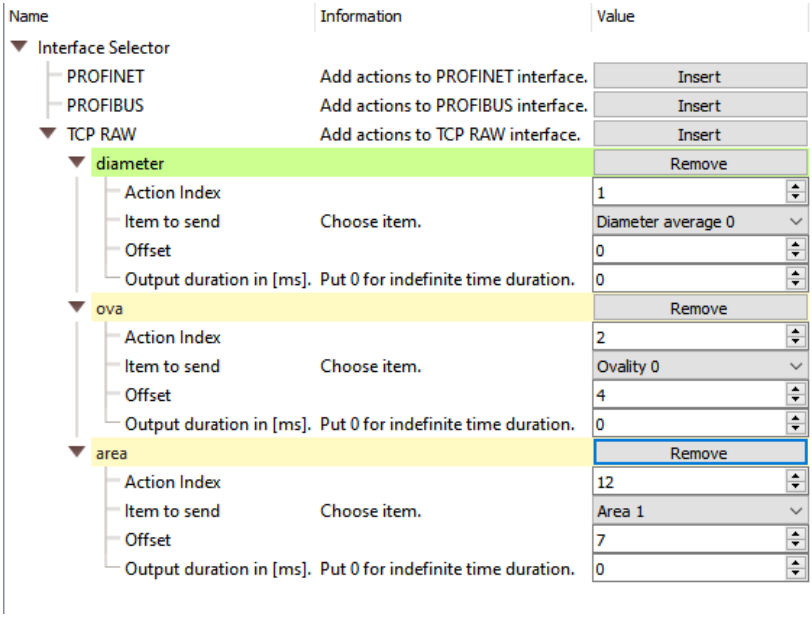
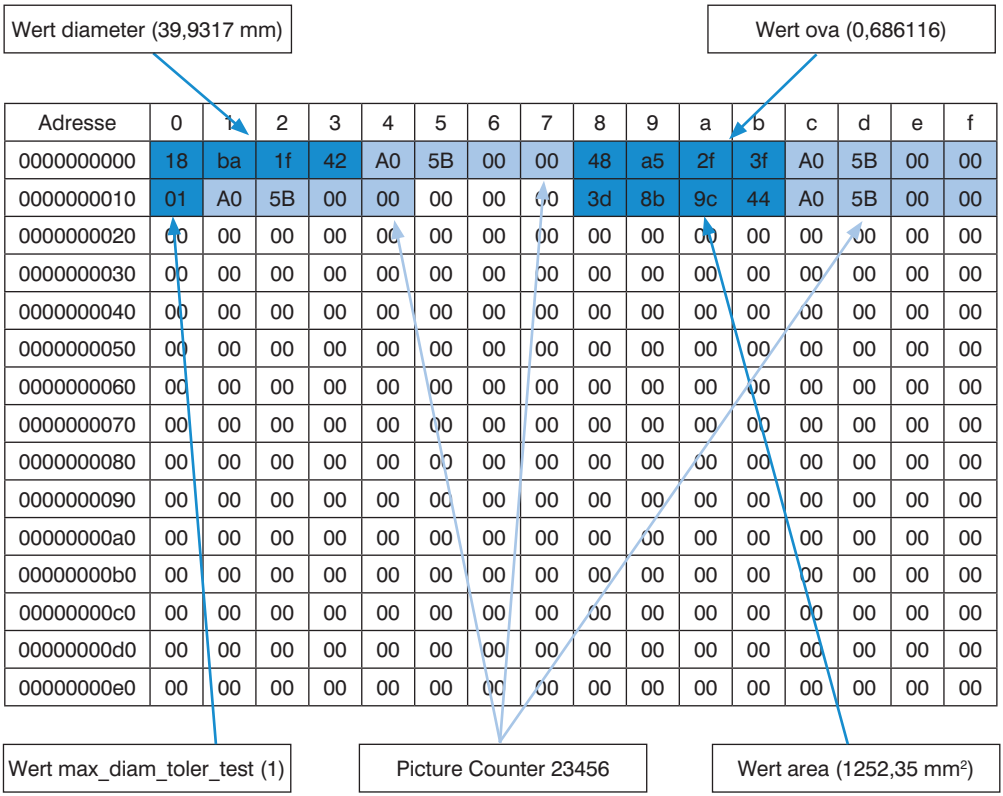


Fig. 42: TCP RAW interface settings

NOTE!
Yellow areas indicate overlapping actions (e.g. double offsets). As soon as all entries are correct, the fields turn green.

15.4.6.1 Data Stream



Adresse	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
0000000000	18	ba	1f	42	A0	5B	00	00	48	a5	2f	3f	A0	5B	00	00
0000000010	01	A0	5B	00	00	00	00	00	3d	8b	9c	44	A0	5B	00	00
0000000020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000030	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000080	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0000000090	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00000000a0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00000000b0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00000000c0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00000000d0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00000000e0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Fig. 43: Example of a data stream

15.4.7 TCP/IP Data Server

In addition to the configured data protocol, there's a data output which makes all measured values available (not all data can be transferred via the configured interface at high measuring rates). The measured values are read out in packets of 100 measured value packets each with following structure:

Description	Offset in Bytes	Type (bytes)
Diameter in mm	0	Double (8)
Small semiaxis (ellipse) in mm	8	Double (8)
Large semiaxis (ellipse) in mm	16	Double (8)
Area in mm²	24	Double (8)
Ovality in mm	32	Double (8)
ROI index of the data	40	Int (4)
Picture Counter Sensor	44	Unsigned Int (4)

The overall size of the packet is 48 bytes × 100 = 4800 bytes.

15.5 Module Steel

The module Steel is a VisionApp 360 extension for ascertaining the following measured variables:

- Width of a plate (projected width in case of curved plate)
- Length of a plate (actual width of the plate without curvature)
- “Diabolo effect” for describing edge deformation

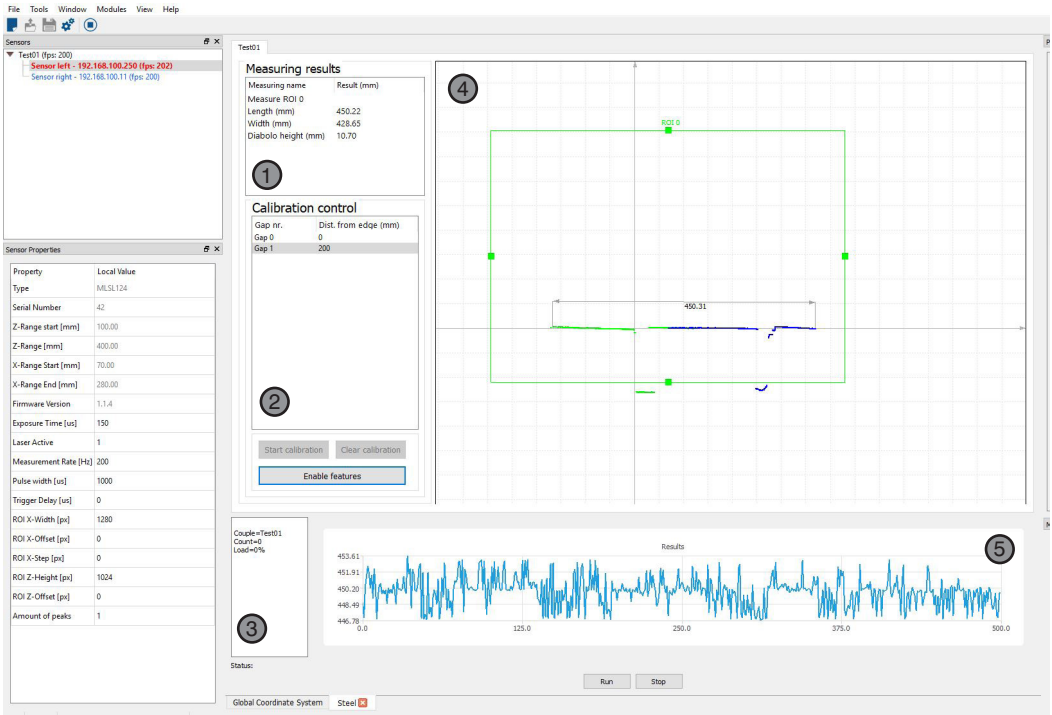


Fig. 44: User interface of Module Steel

① = Summary of measurement results.
② = Calibration control for sensors calibrated in a coordinate system (unification of the point cloud). Administrative features are enabled after entering the password “wenglor”. Details can be found in section 15.5.2.
③ = Status of the interface used for the module.
④ = Representation of the point cloud and evaluation. The ROI can be defined or deleted after right-clicking.
⑤ = Graph showing the current measuring process.

15.5.1 Layout of the Measuring System

The measuring setup consists of sensors aligned perpendicularly to the object.

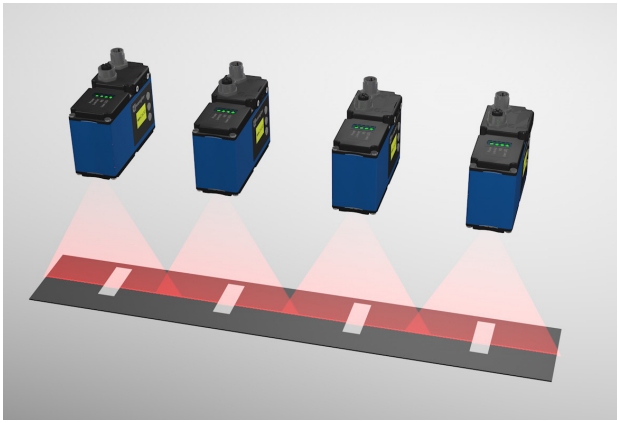


Fig. 45: Measuring setup with perforated plate for calibration

NOTE!
It must be assured that the calibration object is absolutely flat.

15.5.2 Calibrating the Measuring System

The following geometric prerequisites must be fulfilled in order to calibrate the measuring system:

- The sensors must be mounted vertically above the calibration object (object).
- A calibration object with gaps is located underneath the sensors, and the number of gaps must correspond to the number of utilized sensors (see Fig. 45).
- Gap width should be roughly 20 mm.
- The material thickness of the calibration object should be at least 2 mm.
- Each sensor should have only one gap in its field of view (this can also be achieved by using the ROI function).
- Gap positions can be entered or deleted after right clicking in the “Calibration control” area (see also the following example of a calibration object).

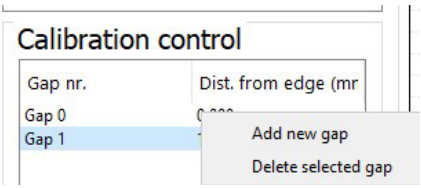


Fig. 46: Sample calibration object for Module Steel

Example of a calibration object which is suitable for 13 sensors (all specifications in mm):

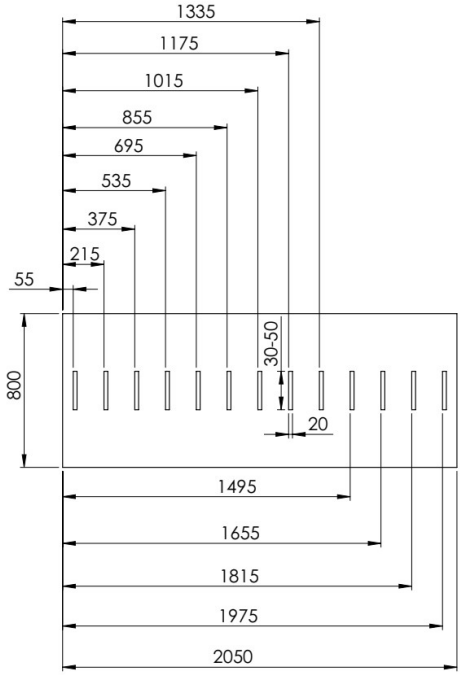


Fig. 47:Sample calibration object for Module Steel

Before calibration, the measuring profile is undefined within the coordinate system.

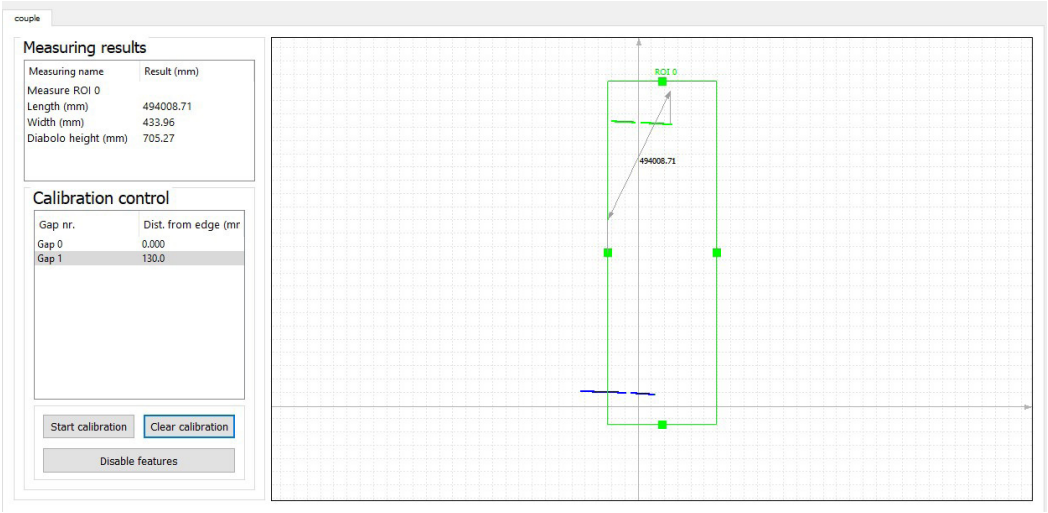


Fig. 48: Display of the measuring profile **before** calibration

The ROI is wrapped around the measuring profile for the purpose of calibration so that all relevant areas are acquired. Outliers, such as the gap areas, must be excluded. The ROI can be scaled with the help of the handles. Calibration is started by clicking the “Start calibration” button.

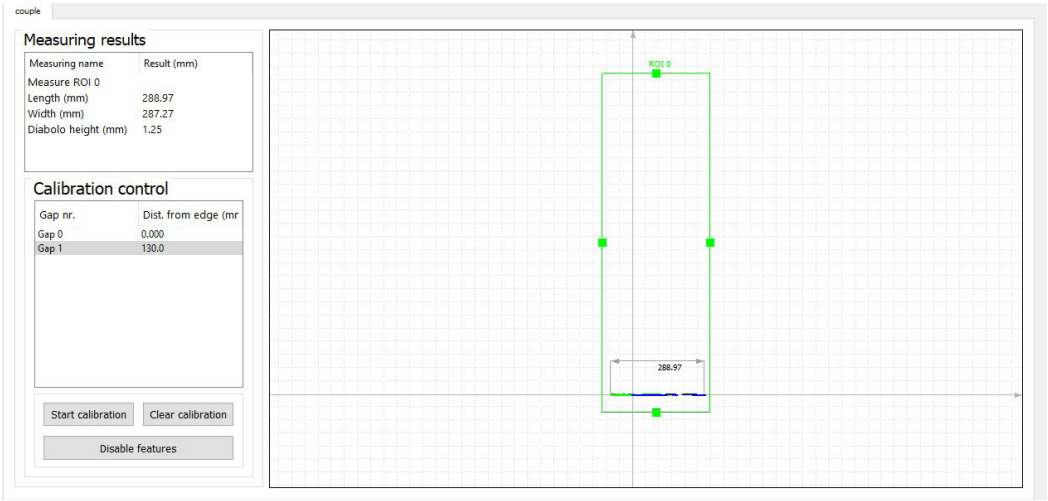


Fig. 49: Display of the measuring profile **after** calibration

15.5.3 Data Format

The module permits configuration of a user-specific data format. The user can specify with which data type and at which byte position the information is transmitted.

Example:

Byte Position	0	1	2	3	4	5	6	7	8
Content	Empty				Tolerance Check mit Byte Offset 4	Empty			

Example:

Data package no.	Content
1	total_size = 44+3*4 protocoll_version = 1 msg = 0x47534D24 sequence_number = 0 message_id = 271 creation_nr = 72848955 relation_nr = 0 year = 2019 month = 8 day = 28 hour = 10 minutes = 35 seconds = 58 milliseconds = 356 mode = 1 float data0 = 25.356 float data1 = 24.984 float data2 = 25.001
2	total_size = 44+4*4 protocoll_version = 1 msg = 0x47534D24 sequence_number = 1 message_id = 271 creation_nr = 72848955 relation_nr = 0 year = 2019 month = 8 day = 28 hour = 10 minutes = 35 seconds = 58 milliseconds = 422 mode = 1 data0 = 24.399 data1 = 25.041 data2 = 25.021 data3 = 25.032

3	total_size = 44 protocoll_version = 1 msg = 0x474E4C24 sequence_number = 2 message_id = 271 creation_nr = 72848955 relation_nr = 0 year = 2019 month = 8 day = 28 hour = 10 minutes = 35 seconds = 58 milliseconds = 450 mode = 1

15.5.4 Interface Configuration

To configure the interface open the module viewer and open Module Steel (see Fig. 50).
The PROFINET, PROFIBUS and TCP RAW interfaces are always configured in accordance with the same principle which is described here using TCP RAW as an example.

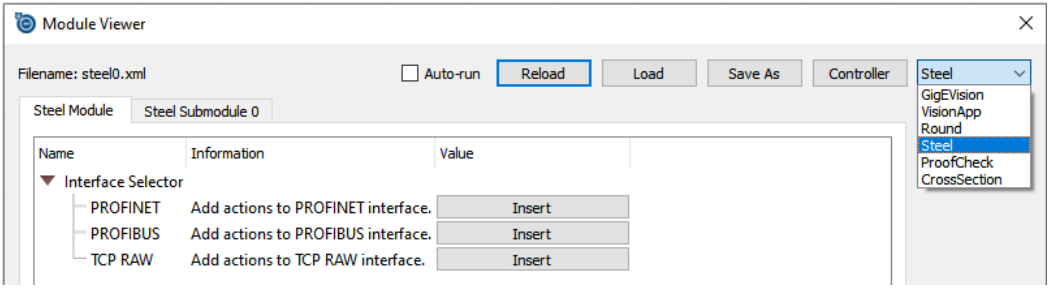


Fig. 50: Interface Selector Module Steel

The “Insert” buttons can be used to configure various data for the following functions:

- “Tolerance Check” indicates whether or not a measured variable is outside of the tolerance range
- “Input Trigger” for starting, stopping or resetting the module via the interface
- “Send Output” for transmitting measured variables

15.5.4.1 Tolerance Check

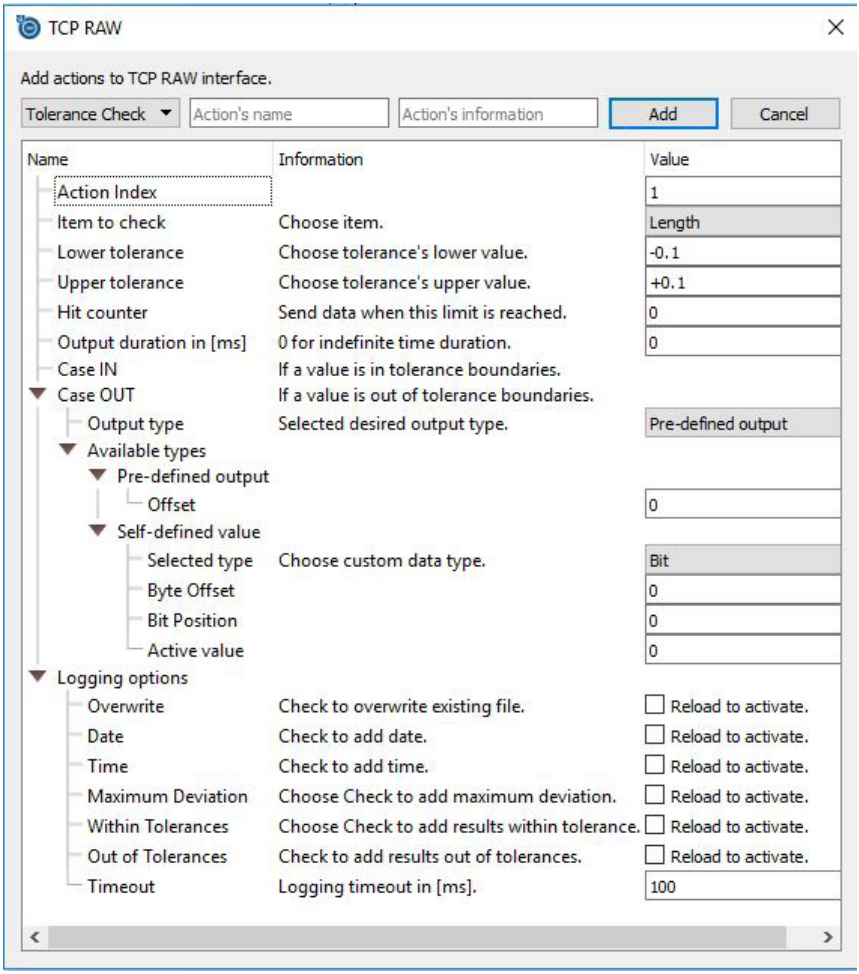


Fig. 51: Tolerance Check of Module Steel

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer value
Item to check	Selection of the measured variable	Width, length, diabolo effect
Lower tolerance	Lower tolerance limit	For example 40, if the value must be greater than 40 mm
Upper tolerance	Upper tolerance limit	For example 41, if the value must be less than 41 mm
Hit counter	Number of tolerance deviations before a tolerance deviation is displayed	0 (each deviation is displayed)
Out duration [ms]	Specifies how long information about a tolerance deviation is displayed at the interface	0 (infinitely long display)
Case IN	No function	
Case OUT	Definition of when the measured variable is not within tolerance	
Output type	Definition of the data type	Predefined output: A predefined data type is used. Self-defined value: A user-defined data type is used.
Pre-defined output/Offset	Definition of the position output in the protocol in bytes	0 is the beginning of the data record (max. 31)
Self-defined value/Selected type	Data type selection	Bit, byte, integer, float, double, array and string are possible
Self-defined value/Byte Offset	Definition of the position output in the protocol in bytes	0 is the beginning of the data record (max. 31)
Self-defined value/Bit Position	Specifies the bit to be changed	0 denotes the first bit
Self-defined value/Active value	Value to which the data type is to be set	For example 1
Logging options	A log file can be configured if required	The log file is typically located here: C:\Users\<USER>\AppData\Roaming\VisionApp360\resources\modules\CircleCheck

15.5.4.2 Input Trigger

The module can be controlled via a trigger, and control signals can be sent via the same interface.

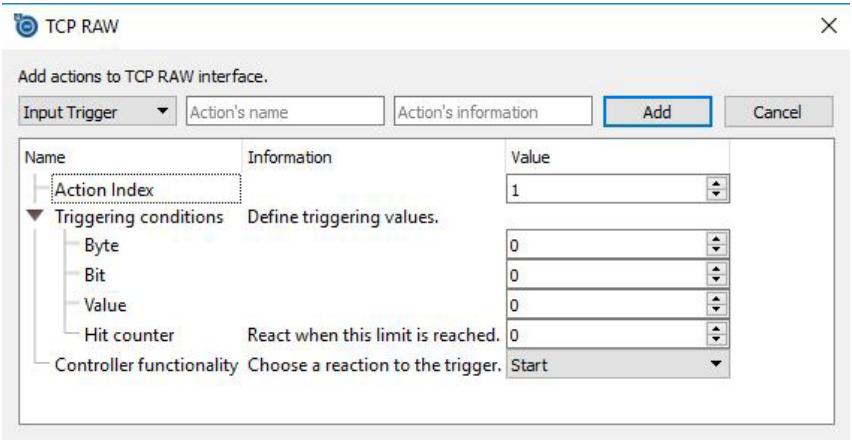


Fig. 52: Input Trigger

Designation	Description	Value
Action index	Consecutive number which identifies the action	Integer values
Triggering conditions:		
Byte	Definition of the position in the protocol in bytes	Max. value: 31
Bit	Specifies the bit that contains the information	Max. value: 7
Value	Defines the value that sets the trigger	0 or 1
Hit counter	Number of trigger signals before triggering is initiated.	0: each trigger signal initiates triggering
Controller functionality	Defines the reaction initiated by the trigger	Start/Stop/Reset

15.5.4.3 Send Output

Measured variables are defined for the protocol here. Data type is always 4-byte float.

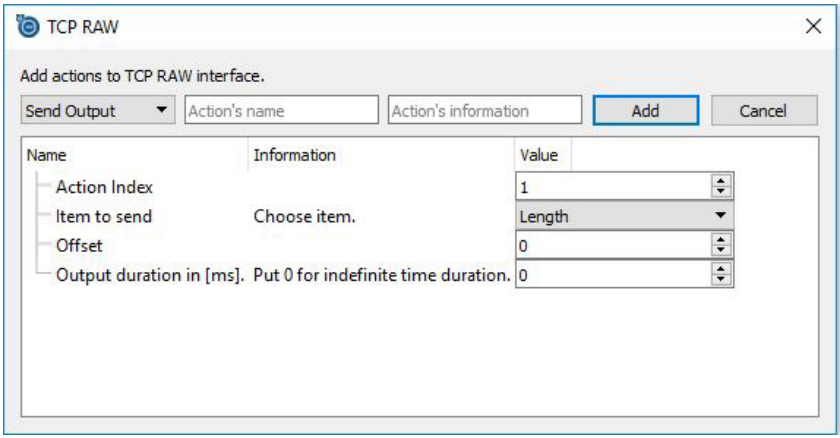


Fig. 53: Send output

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer value
Item to send	Measured variable selection	For example length
Offset	Definition of the position of the output in the protocol in bytes	0: beginning of the data record (max. 31)
Output duration [ms]	Specifies how long information about the measured variable is displayed at the interface	0: infinitely long display

15.5.5 Submodule Settings

Various settings can be entered to the “Steel Submodule 0” tab.

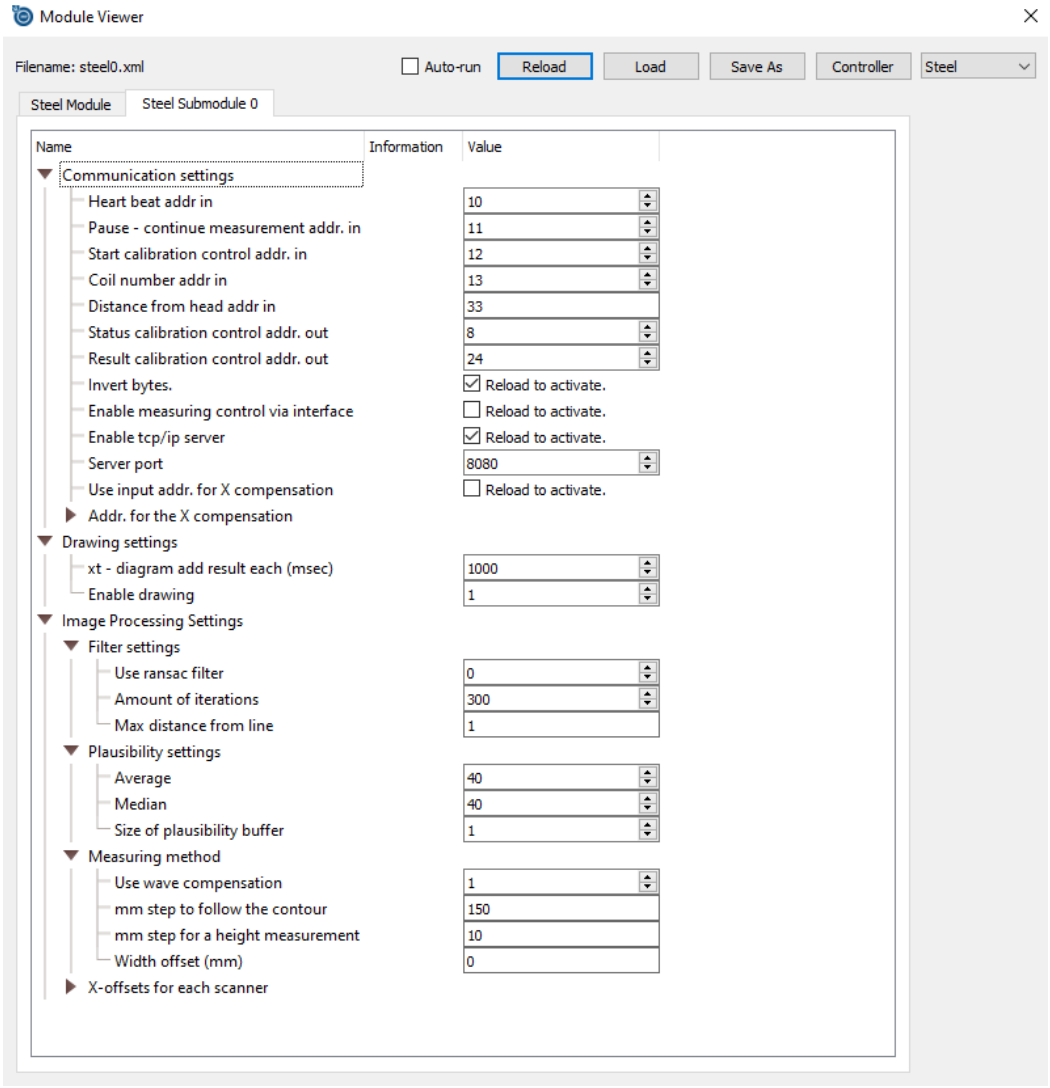


Fig. 54: Steel Submodule

Designation	Description	Value
Communication settings:		
Heart beat addr. in	Position of the byte which indicates the running system with a frequency of 1 Hz (PROFIBUS/ PROFINET)	0 and 1
Pause - continue measurement addr. in	Address at which pausing or continuation of the measurement is indicated	Byte value
Start calibration control addr. in	Address on SPS to start calibration process. VisionApp 360 will start calibration if the input at this address is changed to 1.	Integer value
Coil number addr. in	Address of coil number on SPS. The coil number is the serial number of the current measured coil. VisionApp 360 reads the coil number out of the Profibus/Profinet and sends it to the TCP/IP client, connected to the TCP server of the Steel module.	Integer value
Distance from head addr. in	Address on SPS where to read the head distance of the current measured coil. VisionApp 360 reads the distance from head out of the Profibus/Profinet and sends it to the TCP client, connected to the TCP server of the Steel module.	Integer value
Status calibration control addr. out	Output address on SPS for a calibration status. By starting of calibration it changes to 1 and then to 0, when the calibration is finished.	Integer value
Result calibration control addr. out	Address of the calibration rsult	Integer value
Invert bytes	Big endian or little endian	0 or 1
Enable measuring control via interface	Activate interface control	0 or 1
Enable tcp/ip server	Start/stop the server	0 or 1
Server port	Port number of the server	Integer value
Use input addr. for X compensation	X compensation can be forwarded for each sensor via a 4-byte float.	0 or 1
Addr. for the X compensation	Address for X compensation for sensors 0...12	Integer value
Drawing settings:		
xt-diagram add result each (msec)	Time interval for the display of measurement results	Integer value
Enable drawing	Enable/disable drawing of the contour and the results in Steel module	0 or 1
Filter settings:		
Use ransac filter	Enabling/disabling the ransac filter for a better recognition of the lines at the left and the right side of the measuring object.	0 or 1
Amount of iterations	Amount of iterations for ransac filter	Integer value

Designation	Description	Value
Max distance from line	Max. point distance from the recognized line. Used in ransac filter for the approximation if the line fits.	Floating value in mm
Plausibility settings:		
Average	Contour smoothing (1: no averaging)	Integer value
Median	Median filter for removing outliers (1: no filtering)	Integer value
Size of plausibility buffer	Reserved	Integer value
Measuring method:		
Use wave compensation	Calculates the length instead of the width. The curvature of the surface of the measuring object is used for the calculation.	0 or 1
mm step to follow the contour	Step size on the contour	Floating-point number [mm]
mm step for a height measurement	Step size for determining the diabolo effect	Floating-point number [mm]
Width offset (mm)	Measured value correction via constant offset	Floating-point number [mm]
X-offsets for each sensor:		
Offset for scanner (0...12)	Offset in X for sensors 0 ... 12	Floating-point number [mm]

15.5.6 TCP/IP Data Server

In addition to the configured data protocol, there's a data output which makes data package available once every second.
The data server sends three different data packages to the client.

15.5.6.1 Watchdog Package

The Watchdog package is sent on the clients request. This package serves as a HeartBit to monitor the communication status. As soon as the client sends something to the VisionApp 360 server, VisionApp 360 recognizes this as a request and answers back. The answer has the following format:

Description	Offset in Bytes	Type (bytes)
Overall packet size	0	Unsigned int (4)
Protocol version	4	Unsigned int (4)
Message ("0x474E4C24" or "$LNG") as a string	8	Unsigned int (4)
Sequence number with each new measurement (incremented) from 0 to 32000 and reset to 0 again	12	Unsigned int (4)
Message ID default is "72"	16	Unsigned int (4)
Creation number (always "72848955")	20	Unsigned int (4)
Relation number (always "0")	24	Unsigned int (4)
Year	28	Unsigned short (2)
Month	30	Unsigned short (2)
Day	32	Unsigned short (2)
Hour	34	Unsigned short (2)
Minute	36	Unsigned short (2)
Second	38	Unsigned short (2)
Milliseconds	40	Unsigned short (2)
Mode (always "1")	42	Unsigned short (2)
n × measurement results (diabolo). "n" can be determined from overall size.	44	n × float (n × 4) n = (overall size - 44) / 4

15.5.6.2 Calibration Control

The quality of the calibration of the measuring system can be monitored via PLC (Profibus or Profinet). The addresses reserved for this can be found in the settings of the Steel module (see section 15.5.5).
A calibration plate with a maximum of 14 gaps in the surface is required for the quality check. This plate is measured and the distances between the gaps are sent as a result to the client via TCP/IP communication. Each distance is scaled with the value 10.0 and sent as an integer.
Example: Measurement result 10.2 is converted to 102 unsigned integer. Accordingly, the client must divide the measured values by 10.0.

Data format description:

Description	Offset in Bytes	Type (bytes)
Overall packet size	0	Unsigned int (4)
Protocol version	4	Unsigned int (4)
Message (“0x47534D24” or "$MSG") as a string	8	Unsigned int (4)
Sequence number with each new measurement (incremented) from 0 to 32000 and reset to 0 again	12	Unsigned int (4)
Message ID "401"	16	Unsigned int (4)
Creation number (always “72848955”)	20	Unsigned int (4)
Relation number (always “0”)	24	Unsigned int (4)
Year	28	Unsigned short (2)
Month	30	Unsigned short (2)
Day	32	Unsigned short (2)
Hour	34	Unsigned short (2)
Minute	36	Unsigned short (2)
Second	38	Unsigned short (2)
Milliseconds	40	Unsigned short (2)
Mode (always “1”)	42	Unsigned short (2)
Measurement data of gaps	44	Unsigned int (13*4)
Reserved	96	Unsigned bytes (448)

15.5.6.3 Measurement Values

15 measurement values (see table below), each 472 bytes, are collected and sent to the client all in once. Data for entry coil and coil position is read from the PLC (Profibus or Profinet) and sent to the client as an ECHO. The addresses reserved for this can be found in the settings of the Steel module (see section 15.5.5). The total size of the result frame is 44 bytes for header+15*472=7124 bytes.

Data format description:

Description	Offset in Bytes	Type (bytes)
Overall packet size	0	Unsigned int (4)
Protocol version	4	Unsigned int (4)
Message (“0x47534D24” or "$MSG") as a string	8	Unsigned int (4)
Sequence number with each new measurement (incremented) from 0 to 32000 and reset to 0 again	12	Unsigned int (4)
Message ID "400"	16	Unsigned int (4)
Creation number (always “72848955”)	20	Unsigned int (4)
Relation number (always “0”)	24	Unsigned int (4)
Year	28	Unsigned short (2)
Month	30	Unsigned short (2)
Day	32	Unsigned short (2)
Hour	34	Unsigned short (2)
Minute	36	Unsigned short (2)
Second	38	Unsigned short (2)
Milliseconds	40	Unsigned short (2)
Mode (always “1”)	42	Unsigned short (2)
Measurement values (snapshots):		
Entry coil number	44	Char (16)
Coil position	60	Int (4)
Number of heigth measurements	64	Unsigned int (4)
Height measurements (max. 200 height results)	68	Unsigned short (2)*200
Width	468	Unsigned int (4)
Length	472	Unsigned int (4)
Left point X of measuring object	476	Unsigned int (4)
Left point Z of measuring object	480	Unsigned int (4)
Right point X of measuring object	484	Unsigned int (4)
Right point Z of measuring object	488	Unsigned int (4)
Reserved	492	Char (1*24)

15.6 Module CrossSection

The Module CrossSection is a VisionApp 360 extension for the measurement of objects with arbitrary cross-section. The layout of the user interface corresponds to the description in section 10.
The following quantity is determined in the “Measuring results” area:

- Cross section

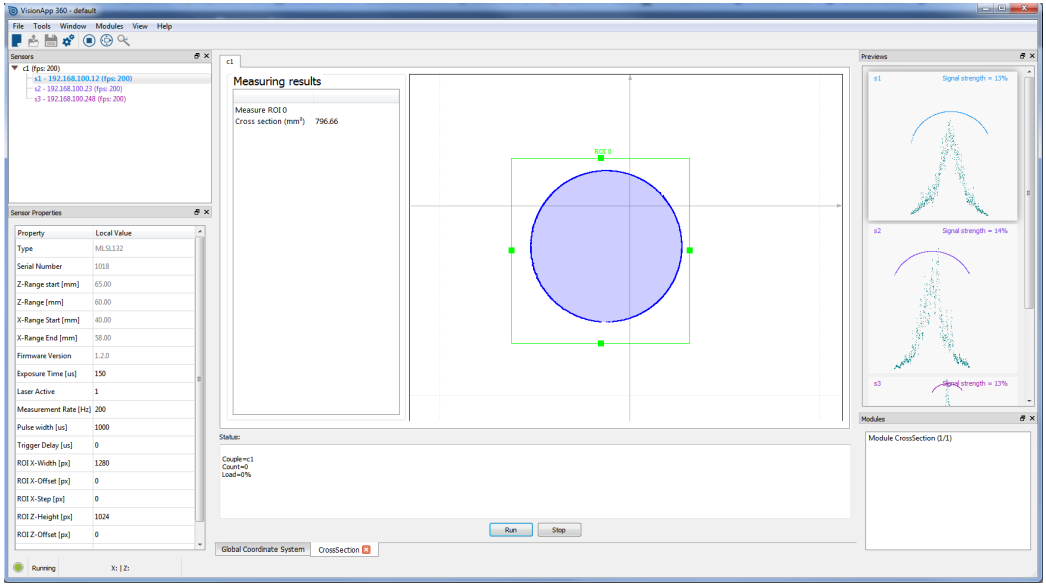


Fig. 55: User interface of Module CrossSection

15.6.1 Layout of the Measuring System

The measuring system is laid out in accordance with the specifications in section 11.

15.6.2 Calibrating the Measuring System

The measuring system is calibrated in accordance with the specifications in section 12.

15.6.3 Data Format

The module permits configuration of a user-specific data format. The user can specify with which data type and at which byte position the information is transmitted. In order to assure unequivocal allocation, each configured output of the sensor's picture counter value (see operating instructions for weCat3D profile sensors) is automatically appended as a 4 byte unsigned int.

Example:

Byte Position	0	1	2	3	4	5	6	7	8
Content	Empty				Tolerance Check with byte offset 4	Picture counter sensor			

15.6.4 Interface Configuration

To configure the interface open the module viewer and open CrossSection (see Fig. 56).
The PROFINET, PROFIBUS and TCP RAW interfaces are always configured in accordance with the same principle which is described here using TCP RAW as an example.

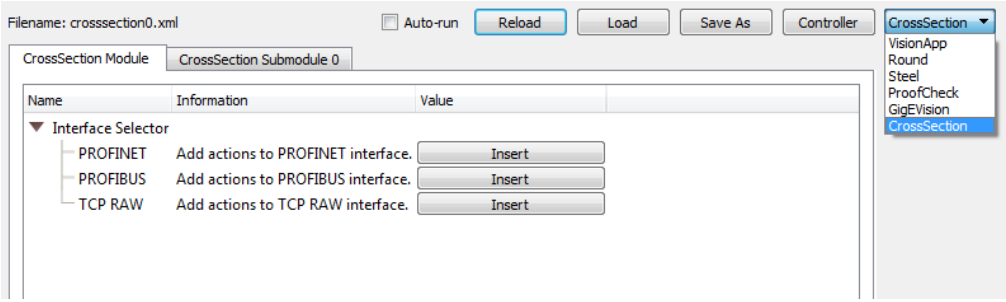


Fig. 56: Interface Selector CrossSection

The "Insert" buttons can be used to configure various data for the following functions:

- "Tolerance Check" indicates whether or not a measured variable is outside of the tolerance range
- "Input Trigger" for starting, stopping or resetting the module via the interface
- "Send Output" for transmitting measured variables

15.6.4.1 Tolerance Check

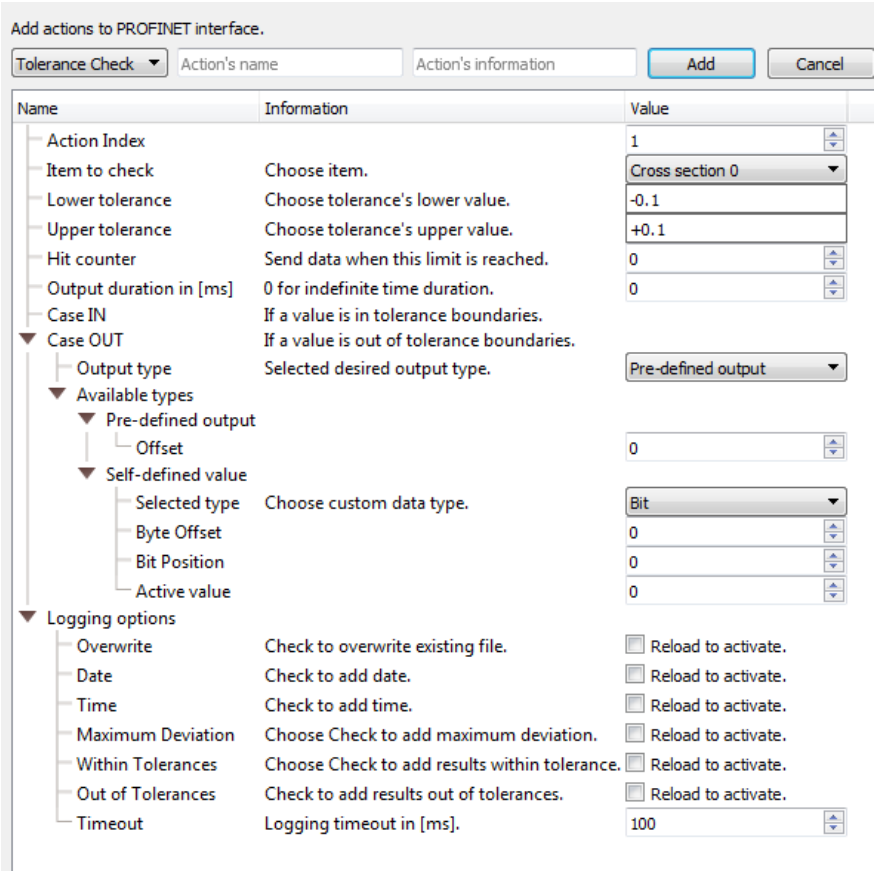


Fig. 57: Tolerance Check of Module CrossSection

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer values
Item to check	Measured variable to be checked	Digit corresponds to ROI number
Lower tolerance	Lower tolerance limit	For example 40, if the value must be greater than 40 mm
Upper tolerance	Upper tolerance limit	For example 41, if the value must be less than 41 mm
Hit counter	Number of tolerance deviations before a tolerance deviation is displayed	0: each deviation is displayed
Out duration [ms]	Specifies how long information about a tolerance deviation is displayed at the interface	0: infinitely long display
Case IN	No function	
Case OUT	Definition of when the measured variable is not within tolerance	
Output type	Definition of the data type	Predefined output: A predefined data type is used. Self-defined value: A user-defined data type is used.
Pre-defined output/Offset	Definition of the position output in the protocol in bytes	0 is the beginning of the data record (max. 31)
Self-defined value/ Selected type	Data type selection	Bit, byte, integer, float, double, array and string are possible
Self-defined value/ Byte Offset	Definition of the position output in the protocol in bytes	0 is the beginning of the data record (max. 31)
Self-defined value / Bit Position	Specifies the bit to be changed	0 denotes the first bit
Self-defined value/ Active value	Value to which the data type is to be set	For example 1
Logging options	A log file can be configured if required	The log file is typically located here: C:\Users\<USER>\AppData\Roaming\VisionApp360\resources\modules\CircleCheck

15.6.4.2 Input Trigger

The module can be controlled via a trigger, and control signals can be sent via the same interface.

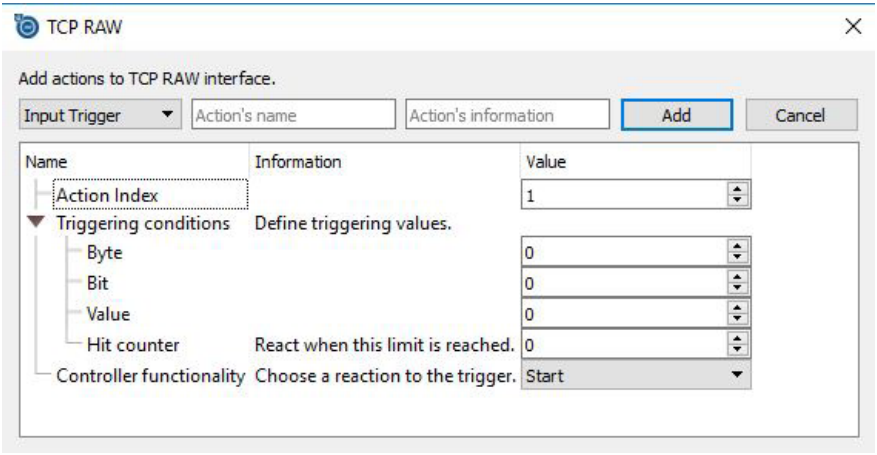


Fig. 58: Input Trigger

Designation	Description	Value
Action index	Consecutive number which identifies the action	Integer values
Triggering conditions:		
Byte	Definition of the position in the protocol in bytes	Max. value: 31
Bit	Specifies the bit that contains the information	Max. value: 7
Value	Defines the value that sets the trigger	0 or 1
Hit counter	Number of trigger signals before triggering is initiated.	0: each trigger signal initiates triggering
Controller functionality	Defines the reaction initiated by the trigger	Start/Stop/Reset

15.6.4.3 Send Output

Measured variables are defined for the protocol here. Data type is always 4-byte float.

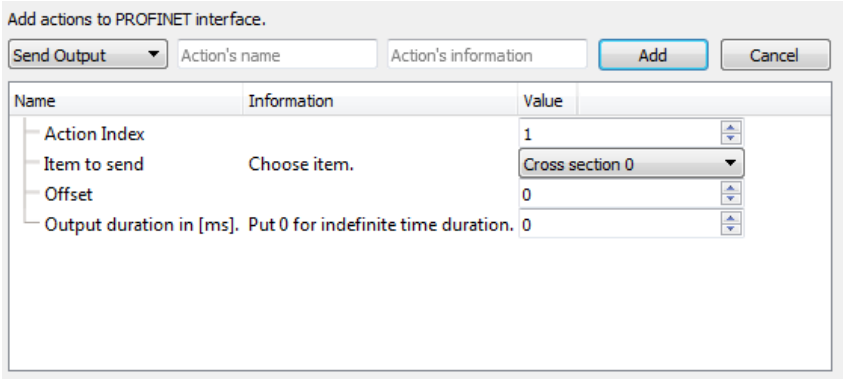


Fig. 59: Send output

Designation	Description	Value
Action Index	Consecutive number which identifies the action	Integer values
Item to send	Measured variable selection	For example Cross section
Offset	Definition of the position output in the protocol in bytes	0: beginning of the data record (max. 31)
Output duration [ms]	Specifies how long information about the measured variable is displayed at the interface	0: infinitely long display

15.6.5 Image Processing Settings

Image processing settings can be entered to the “CrossSection Submodule 0” tab.

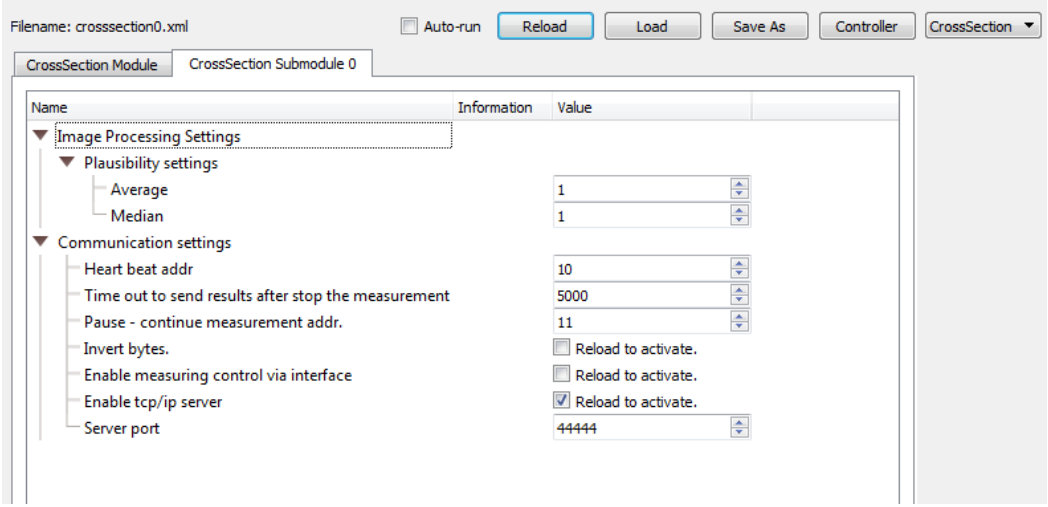


Fig. 60: CrossSection Submodule

Designation	Description
Plausibility settings:	
Average	Contour smoothing (1: no averaging)
Median	Median filter for removing outliers (1: no filtering)
Communication settings:	
Heart beat addr	Position of the byte which indicates the running system with a frequency of 1 Hz (PROFIBUS/PROFINET)
Time out to send results after stop the measurement	Reserved
Pause – continue measurement addr.	Address at which pausing or continuation of the measurement is indicated
Invert bytes	Big endian or little endian
Enable measuring control via interface	Activate interface control
Enable tcp/ip server	Start/stop server (see section 15.6.7)
Server Port	Port number of the server (see section 15.6.7)

15.6.6 Settings

Example – TCP settings:

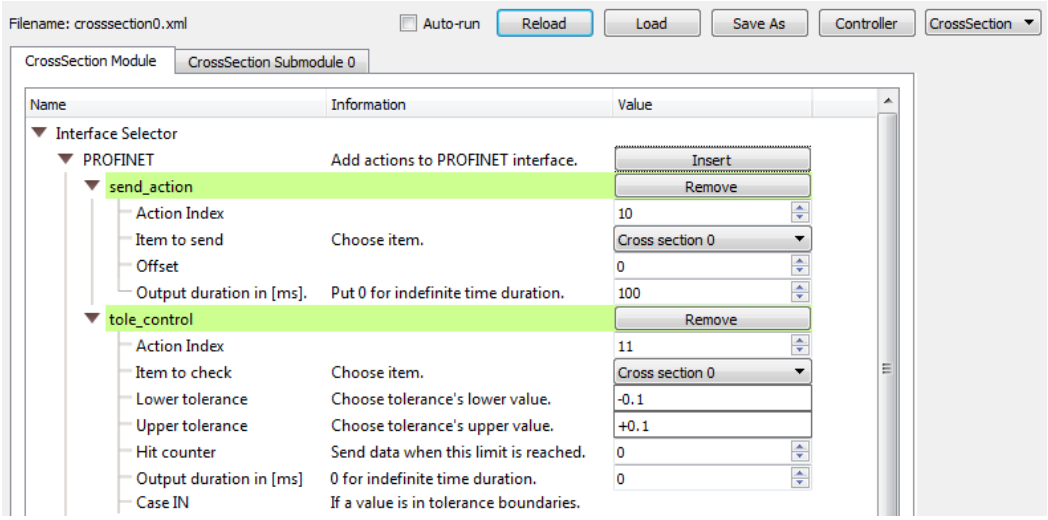


Fig. 61: TCP RAW interface settings

NOTE!
Correct entries are marked in green, yellow areas indicate overlapping actions (e.g. double offsets).

15.6.7 TCP/IP Data Server

In addition to the configured data protocol, there's a data output which makes all measured values available (not all data can be transferred via the configured interface at high measuring rates). The measured values are read out in packets of 100 measured value packets each. Each measured value packet has the following structure:

Description	Offset in Bytes	Type (bytes)
Cross section in mm²	0	Double (8)
Region of interest index	8	Integer (4)
Scanner picture counter	12	Unsigned integer (4)

The overall size of the packet is 16 bytes × 100 = 1600 bytes.